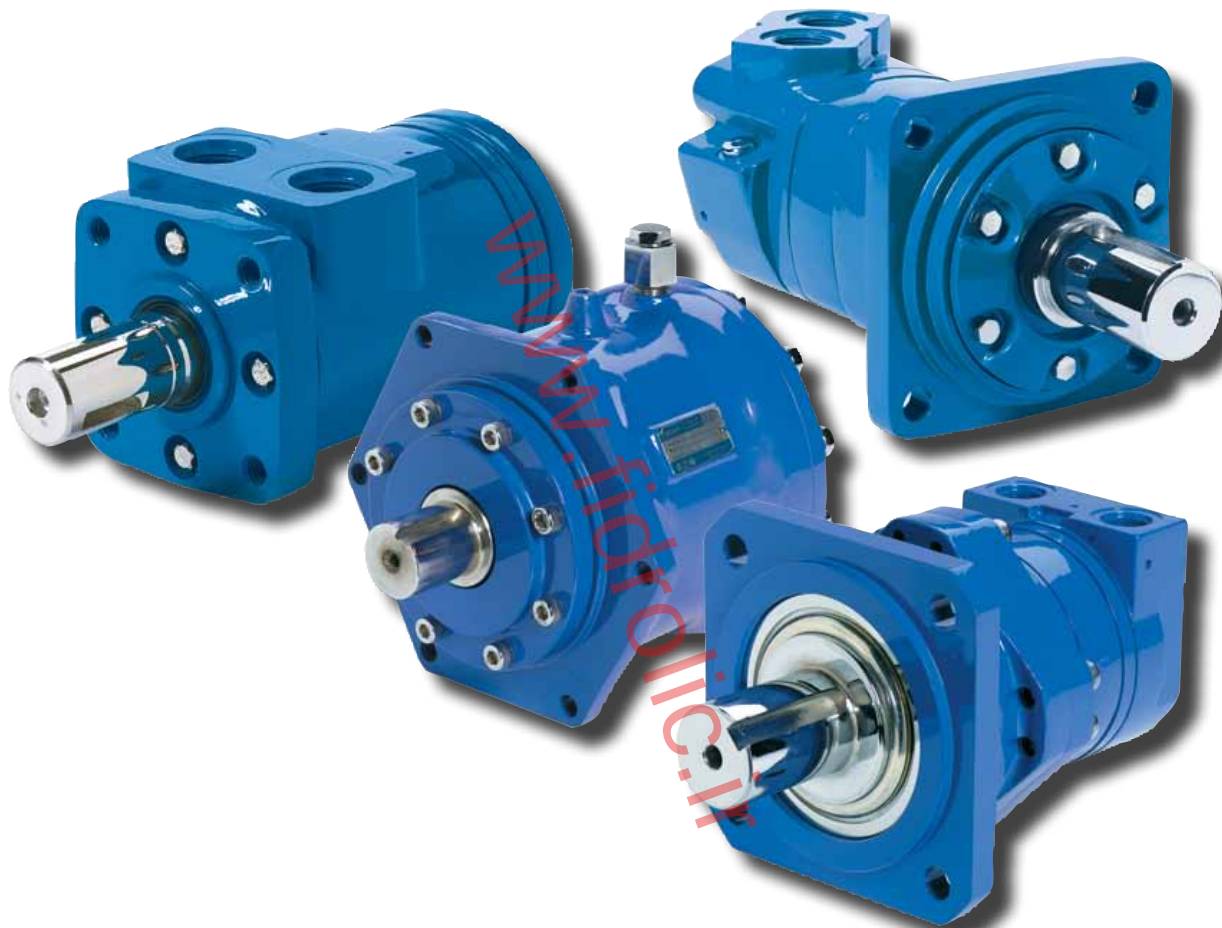




Powering Business Worldwide

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Product and Application Matrix

	Char-Lynn Motors	Vickers Vane Pumps & Motors	Eaton Gear Products	Eaton Open Circuit Piston Pumps	Eaton Med. Duty Closed Circuit Piston Pumps & Motors	Eaton Heavy Duty Hydrostatics	Hydrokraft Pumps & Motors	Eaton Piston Pump Controls	Eaton Control Products	Eaton Packaged Systems*
Logistics & Construction										
Highway Construction	x	x	x	x	x	x		x	x	
Railroad	x	x	x	x	x	x		x	x	
Ports / Shipbuilding	x	x	x		x	x		x	x	x
Commercial Construction	x	x	x	x	x	x		x	x	
Distribution Centers	x	x	x	x	x	x	x	x	x	
Aerospace (Ground Support / Tugs)	x		x		x	x		x	x	x
Lift trucks / Telehandlers	x	x	x	x	x	x		x	x	
Aerial work platforms	x	x	x	x	x			x	x	
Cranes / Winches	x	x	x	x				x	x	x
Agriculture										
Harvestors / Combines	x	x	x	x	x	x		x	x	
Tractors			x	x				x	x	
Implements / Attachments	x	x	x	x	x	x		x	x	
Construction & Earth Moving										
Pavers / Finishers	x	x	x	x	x	x		x	x	
Compactors	x		x		x	x		x	x	
Skid Steer Loaders	x		x	x	x			x	x	
Wheel Loaders		x	x	x	x	x		x	x	
Motor Graders	x	x	x	x	x	x		x	x	
Dozers		x	x	x	x	x		x	x	
Concrete Placement	x	x	x	x	x	x		x	x	
Utility										
Aerial / Boom Trucks	x			x				x	x	
Digger Derricks	x			x				x	x	
Forest Products	x	x	x	x	x	x		x	x	
Lumber	x		x	x	x			x	x	x
Paper	x		x	x	x			x	x	x
Packaging	x		x	x	x			x	x	x
Mining & Aggregate										
Coal Shears				x		x	x	x	x	x
Rock Crushers	x			x		x	x	x	x	x
Tunnel Boring	x			x		x	x	x	x	x
Transportation										
Fan Drives		x	x	x	x			x	x	
Salt / Sand Spreaders	x		x	x				x	x	
Refuse		x	x	x				x	x	
Swing / Knuckle Booms / Lifts	x	x	x	x				x	x	
Machine Tools										x
Metal Cutting & Forming	x	x	x	x		x	x	x	x	x
Paper Mills		x	x	x		x	x	x	x	x
Molding										
Plastic Injection, Rubber, & Die Cast	x	x	x	x			x	x	x	x
Primary Metals										
Steelworks	x	x	x	x			x	x	x	x
Automotive										
Engine & Transmission plants	x	x	x	x			x	x	x	x
Energy										
Power Generation			x				x	x	x	x
Coal Reclaim, Transfer, Pulverizing		x					x	x	x	x
Thero, Hydro, Wind		x	x	x			x	x	x	x
Port Machinery										
Ship to Shore Cranes & Container Handlers	x	x	x	x	x	x	x	x	x	x
Food & Beverage										
Packaging Equipment	x	x	x	x	x			x	x	x
Food Processing	x	x	x	x	x			x	x	x
Entertainment										
Motion Systems	x	x	x	x	x	x	x	x	x	x

* North America Only

Eaton's Char-Lynn Motors

With decades of proven reliability and performance, low-speed, high-torque hydraulic motors help you build a reputation for dependability. Our motors are designed and manufactured (speeds up to 2000 rpm and from 270-192,410 Nm [200-142,000 lb-in] of torque) to exceed the demanding requirements of the mobile and industrial industries.

Known throughout the industry for being a fast and flexible supplier, Eaton produces spool valve, disc-valve and high-performance motors for original equipment manufacturers (OEMs) and distributors.



Features and Benefits:

Spool Valve Motors

- Broad range of application specific solutions and options
- Industry-leading motor life with very high performance

Valve-In-Star™ (VIS) Motors

- High torque output in a small package for tight mobile applications
- Uses patented Valve-In-Star (VIS) technology for superior efficiencies at high pressure

Disc Valve Motors

- World's most complete range of low speed high torque motors
- Many options and features to fit the specific needs of your applications

ME Series Motors

- Industry leading motor life; built to withstand thermal shock
- High efficiencies and starting torque; smooth rotation at extremely low speeds

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
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

Optional Feature	Benefit
Shuttle Valve	Redirects a portion of 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 temp. 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



Eaton's Char-Lynn Motors



Spool Valve Motors

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

Options include a variety of output shafts: straight with Woodruff key, splined, tapered or straight with cross holes; plus other mountings, displacements and ports.

Specifications

Speed Range: Up to 2000 rpm

Torque Range: Up to 565 Nm (5000 lb-in)



Valve-In-Star (VIS) Motors

High performance VIS 30, 40 and 45 motors deliver high torque in a compact envelope.

Patented design reduces leakage by incorporating a flexible, pressure-balanced wear plate.

Specifications

Speed Range: Up to 500 rpm

Torque Range: Up to 5085 Nm (45,000 lb-in)



Disc Valve Motors

Disc valve hydraulic motors are designed with a flat, disc-shaped valving system. They use Geroler exclusively, are effective at very low speeds, and are reversible.

Options include a wide variety of shafts, mountings, ports, displacements, speed sensors and bolt-on valves. Two-speed models are available in Series 2000 and 10000.

Specifications

Speed Range: Up to 900 rpm

Torque Range: Up to 3390 Nm (30,000 lb-in)



ME Series Motors

These double swash plate, opposed-piston, low-speed, high-torque hydraulic motors operate smoothly at low speed within the maximum ratings and cause very little torque ripple.

Specifications

Speed Range: Up to 1000 rpm

Pressure Range: 248 and 276 bar (3600 and 4000 psi)

Torque Range: Up to 16136 Nm (11,900 lb-ft)



Eaton's Vane Pumps and Motors

Eaton's Vickers products are known for high efficiency fixed pumps with low noise. These products have been optimized for both mobile and industrial markets. Their modular designs allow for flexibility in displacement, mounting, and port options. A cartridge kit design feature allows for easy repair and interchangeability between pumps.

Other manufacturers may produce pumps that look like Eaton's Vickers products; that's intentional. But none of them can match their endurance, reliability, warranty or performance.



Features and Benefits:

V10/V20 Series

- Low displacement/lower pressure
- Compact and economical for both mobile and industrial applications
- Integral valve options help reduce size and cost
- Balanced pressure-induced radial loads leads to longer bearing life
- Efficient design produces extra horsepower for your investment

V/VQ Series

- Medium to high displacement with double / triple pumps and medium pressures
- Industrial (V series) and Mobile (VQ) applications
- Cartridge kit design for ease of repair
- The industry standard
- Cold start capability

VMQ Series

- Highest potential displacements and pressures in portfolio
- Mobile and industrial applications
- Cold start capability
- Cartridge kit design for ease of repair

Vane Motors

- Economical alternative to piston technology for medium to low pressure industrial applications
- Noise and efficiency benefits over gear motors displacement products
- Heavy duty bearings



Eaton's Vane Pumps and Motors



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.

Specifications

- Speeds 2400-4800 (size dependent)
- Pressures up to 172 bar (2500 psi) (size dependent)
- Displacements:
V10: 3-23 cm³/(0.18-1.40 in³/r)
V20: 23-41 cm³/(1.40-2.5 in³/r)
- Double pump capable



V/VQ Series

The V 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.

Specifications

- Speeds: 1800 for V, up to 2700 for VQ
- Pressures up to 210 bar (3000 psi) (size/type dependent)
- Four frame sizes (20, 25, 35, and 45)
- Displacements range from 7 to 193 cm³/(0.4-12 in³/r)
- Single, double, and thru-drive pumps



VMQ Series

The VMQ series of vane pumps is the pump that can do it all. Used in both mobile and industrial applications, the VMQ is designed for the highest pressure and displacement systems.

Specifications

- Speeds up to 3000 rpm
- Pressures up to 293 bar (4200 psi) (size dependent)
- Three frame sizes (25, 35, and 45)
- Displacements range from 10 to 268 cm³/(0.61-16.3 in³/r)
- Single, double, triple, and thru-drive pumps



Vane Motors

The M2U, M2-210 and M vane motor series are standards in the industry. The proven reliability and the available cartridge kit designs make for uptime easy serviceability.

Specifications

- Speeds up to 3600 rpm
- Pressures up to 155 bar (2300 psi) (size dependent)
- Four frame sizes (25, 35, 45, and 50)
- Torque range: 118-850 Nm (1050 to 7500 lb-in)
- Heavy duty shaft bearing available



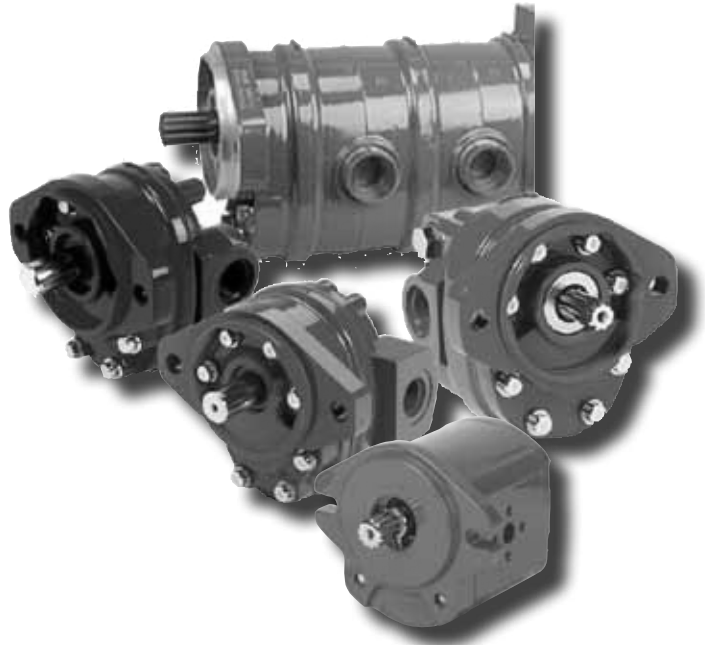
Eaton's Gear Products

Eaton's Series 26 & L2 products are small in package size and length, a variety of options and configurations are available and have reliable performance in the field. Eaton Global Gear Products are high efficiency, high performance and are extremely quiet.

The size and shape of the wave created in a gear pump depends on the way the gears fit together. By refining the fit of teeth between gears, Eaton has reduced the size of the wave. That reduces vibration and airborne noise.

Gear pumps are used in drive trains, hydrostatic transmissions, open and closed circuit piston applications, and charge pump applications. These products are integral to most construction, agriculture, lift trucks, fork trucks, bus, and material handling equipment.

When you specify a gear pump, look for more than output. For high performance with reduced vibration and noise, choose gear pumps from Eaton.

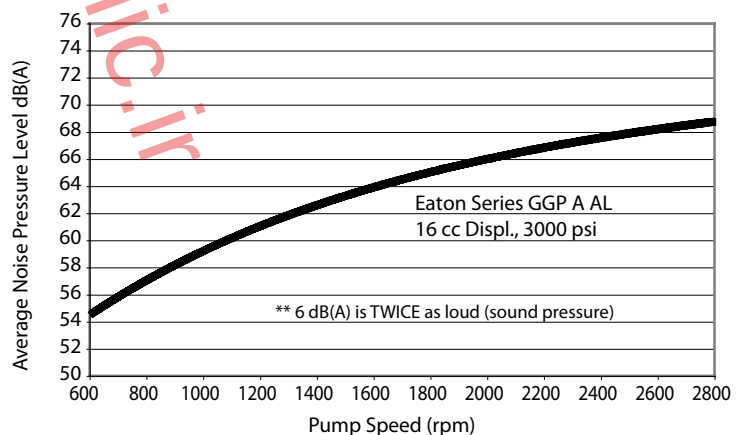


Features and Benefits:

- Continuous operating pressures to 4000 psi
- SAE, DIN, & ISO flange, shaft and porting styles
- High efficiency gear profiles
- 12 & 13 tooth low noise and pressure ripple gear design
- Meets ISO 9001 standards
- Single and multiple section pump options
- Options for applications requiring separate fluids or reservoirs
- Broad range of shaft and port options
- Common and separate inlet options
- Relief valve and priority control valve options
- Auxiliary mounting capabilities
- Field reversability

Low Noise Pressure Chart

Measured in a low noise room to ISO 4412, part 1.
Distance of noise sensor to pump = 1 m (3.2 ft.),
ISO32 fluid @ 48C (120F)



Eaton's Gear Products



S26 Pumps

SAE A mount aluminum pumps with many shaft and porting options. Meets SAE and metric standards. Single and multiple sections available. Optional integral relief and flow valves simplify system design and installation. Easy field reversability.

Specifications

Displacements from .4 cid [6,6 cc] to 30,6 cm³/r (1.87 in³/r)

Speed Range (max.): 3000-3600 rpm

Rated Pressure: to 207 bar [3000 psi]; intermittent to 241 bar [3500 psi]



S26 Motors

SAE A mount aluminum bi-directional motors in a wide range of shaft and porting options, meeting SAE and metric standards. Optional integral relief and cross-over valves simplify system design and installation.

Specifications

Displacements from .43 cid [7,1 cc] to 31,8 cm³/r (1.94 in³/r)

Speed Range (max.): 3000-4000 rpm

Rated Pressure: to 207 bar [3000 psi]; intermittent to 241 bar [3500 psi]



L2 Pumps

SAE B mount aluminum pumps with many shaft and porting options, meeting SAE and metric standards. Single and multiple section options. Optional integral relief and flow valves simplify system design and installation.

Specifications

Displacements from 1.3 cid [21,3 cc] to 55,2 cm³/r (3.37 in³/r)

Speed Range (max.): 2250-3500 rpm

Rated Pressure: to 248 bar [3600 psi]; intermittent to 276 bar [4000 psi]



GGP A-Aluminum Pumps

SAE A mount aluminum pumps with a range of shaft and porting options, meeting SAE and metric standards. Single and multiple section options. Optional integral relief and flow valves simplify system design and installation. Permits easy field reversability.

Specifications

Displacements from .32 in³/r [5,3 cc] to 33,4 cm³/r (2.04 in³/r)

Speed Range (max.): 2100-4000 rpm

Rated Pressure: to 276 bar [4000 psi]; intermittent to 305 bar [4400 psi]

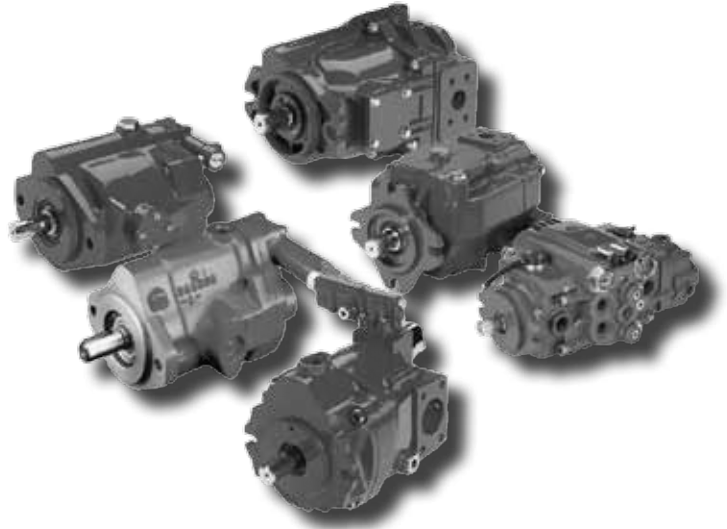


Open Circuit Piston Pumps

At the heart of every hydraulic system is a pump, which supplies force and motion to the components. Open circuit piston pumps offer the flexibility needed to drive a broad range of fluid power systems; they maximize energy savings at high power densities.

Eaton currently offers three lines of these versatile products. Including the PVM, PVH, PVE, and PVQ series pumps. These are based on time-tested designs, with countless hours of use in automotive, agricultural, and construction equipment.

Our newest designs, the Eaton 420 Series, are created to provide higher pressure and more efficient operation, giving our customers a competitive advantage.



Features and Benefits:

420 Series

- Smaller envelope size for compact mobile applications
- Configurations available to fit popular transmission and PTO packages
- Swashplate angle feed back and integrated speed sensors allow interface with engine control computers for efficient system operation

PVM Series

- Quietest medium pressure pump available: Up to 10 dBA quieter than most dual usage pump products and noise levels significantly lower than other pump brands
- Reduces need for expensive sound enclosures or inline pulsation dampers
- Features like gauge ports and adjustable displacement come standard with each pump

PVH Series

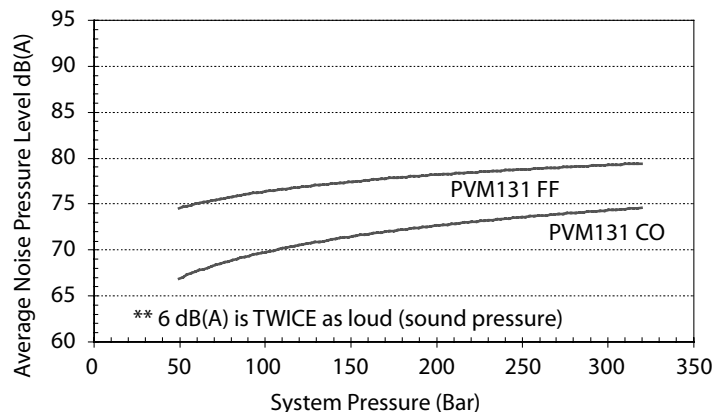
- Versatile design includes single pumps, thru-drive arrangements, and a variety of drive shaft and control options that will adapt to any application and provide the most cost effective installation
- Variety of controls including pressure compensator, flow compensator and torque control

PVQ Series

- PVQ model options provide quieter noise levels during operation over the standard PVB models at industrial conditions
- Functions well on alternate fluids like water glycol and environmentally friendly fluids



PVM131
Industrial Conditions, 1800 RPM, 120 F



Open Circuit Piston Pumps



420 Series

High operating pressures and small envelope size for compact applications. Ideal for mobile applications, featuring both clockwise and counter-clockwise rotation drives.

Specifications

Displacements: 41-80 cm³/r (2.5–4.8 in³/r)

Speed Range (max.): 3000–3600 rpm

Rated Pressure: Up to 280 bar [4000 psi]; intermittent to 320 bar [4600 psi]



PVM Series

Quietest medium pressure pumps available—up to 10 dBA quieter than most dual usage pump products. High operating pressures. Designed for industrial applications with clockwise (right hand) rotation drives.

Specifications

Displacements: from 18cm³/r to 141cc (1.09–8.60 in³/r)

Speed (max.): 1800 rpm

Rated Pressure: Up to 280 bar [4000 psi]; intermittent to 320 bar [4600 psi]



PVH Series

Made for industrial and mobile applications, with both clockwise and counter-clockwise rotation. Available with a wide range of controls including torque controls. Widely used in construction equipment.

Specifications

Displacements: from 57cc to 141cc (3.48–8.60 in³/r)

Speed (max.): 2400 rpm

Rated Pressure: Up to 250 bar [3600 psi]; intermittent to 280 bar [4000 psi]



PVQ Series

Designed for industrial applications, with both clockwise and counter-clockwise rotation drives. Small displacements fit design of compact power applications. Allows higher efficiency than fixed displacement systems.

Specifications

Displacements: from 10cc to 94cc (1.08–5.7 in³/r)

Speed (max.): 1800 rpm

Rated Pressure: Up to 210 bar [3000 psi]



Medium Duty Closed Circuit Piston Pumps and Motors

First known as MD-CC products, Eaton medium duty closed circuit piston pumps and motors have been in production since the 1960s. Together, the pump and motor are generally referred to as a hydrostatic transmission, or HST. They are best suited for applications requiring mid-range power (< 85 HP engines) and system pressures (< 380 Bar/5500 PSI). An HST can provide continuous rotary motion at a remote location from the power source, which meets the unique and demanding requirements of off-highway vehicles.

Eaton MD-CC products are used to form the pump/motor hydraulic system for fans drive in engine cooling systems, and for driving small concrete transit mixers. They can also power auger/trenching auxiliary type circuits. Customers in construction markets use MD-CC components in skid-steer loaders, pavers, compactors, trenchers, truck mounted lift trucks, compact wheel loaders, telescopic booms, and railroad maintenance equipment.



Features and Benefits:

70160 & 70360 Series Manual Pumps

- Low component weight, reducing energy demands and increasing performance
- Low control arm efforts, reducing operator fatigue
- Compact package size, fits into tight places
- Square control shaft for tight linkage
- Trunnion shaft seals
- Robust housing and swashplate control for reduced noise and vibration

72400 Series Servo Pumps

- Ease of installation, with easier routing for hoses than mechanical linkages
- Low operator effort, low noise and vibration
- Durable cast iron design
- More charge pump displacement flexibility
- Lower charge pressures required and lower parasitic losses
- Industry benchmark for precision and controllability
- Servo control

74XXX Series Fixed & 72450 Series Variable Motors

- Flexible operation, allowing reverse flow in a closed circuit while maintaining constant pump input rotation
- Lightweight durable housing, for easy installation and service
- Numerous shaft and porting options
- Shuttle valves and speed pickups are well proven in the field

350 Series Pumps

- Extremely compact and easily integrated. Only 398.6 mm (15.7 in) long
- Full-Range of control options
 - Mechanical Servo and Hydraulic (non-feedback)
 - Electro-proportional “EP”
 - Proportional valve control with electronic swash plate feedback
- Non-contacting sensor
- Fast response, precise, real-time pump control
- Ideal for mobile hydrostatic transmissions (requires proprietary Eaton electronic control or control algorithms)



Medium Duty Closed Circuit Piston Pumps and Motors



70160 & 70360 Series Manual Pumps

Variable displacement piston pumps are used in closed loop systems either as a single or tandem pump. A charge supply is used to supplement the closed loop system with oil.

Specifications

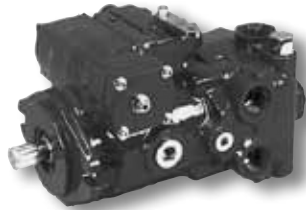
Displacements: 20–49 cm³/r (1.22–3.0 in³/r)

Speed (max.): 3600 rpm

Nominal Pressure:

Up to 350 bar [5076 psi]

Peak 380 bar [5500 psi]



72400 Series Servo Pumps

Versatile pumps with many features and options; five different charge pump displacements are available. Their flexible designs can be configured in numerous ways.

Specifications

Displacements: 41–49 cm³/r (2.48–3.0 in³/r)

Speed (max.): 3600 rpm

Nominal Pressure:

Up to 350 bar [5076 psi]

Peak 380 bar [5500 psi]



74XXX Series Fixed & 72450 Series Variable Motors

Converts hydraulic energy from a pump to mechanical energy. Fits applications that require continuous rotary motion at a remote location from the power source.

Specifications

Fixed Displacements:
10–82.6 cm³/r (0.60–5.04 in³/r)

Variable Displacements:
12–49 cm³/r (0.7–3.0 in³/r)

Speed: Fixed disp. 1500–4500 rpm

Variable disp. 3600–4500 rpm

Nominal Pressure:

Up to 350 bar [5076 psi]

Peak 370 bar [5400 psi]



350 Series Pumps

The 350 Series mobile pumps is an advanced design offered as either a single or dual pump (two pumps in one housing) for medium duty hydrostatic circuits. These pumps can be combined with an Eaton motor to transfer and control hydraulic power in many different ways.

Specifications

Displacements: 41–62 cm³/r (2.50–3.8 in³/r)

Speed (max.): 3600 rpm

Nominal Pressure: Up to

380 bar [5500 psi]



Heavy Duty Hydrostatics

Eaton is a recognized leader in heavy duty hydrostatic piston products for mobile and industrial applications. Eaton has produced more than a million units, and introduced new product lines including the Series 1, Series 2, 760 Series and bent axis products.

These core products are supplemented with new pump-mounted electronic controls, from a simple electronic proportional (EP) displacement control to the sophisticated multiplex control with CAN communications for displacement and pressure control. Customers in construction and logistics use Eaton heavy duty hydrostatic piston products in applications such as compactors, wheel loaders, lift trucks, telehandlers, pavers, road planers, crawlers, dozers, rock crushers, motor graders, sweepers, snow groomers, and winches.



Features and Benefits:

Series 1 & 2 Pumps

- Field proven in a wide range of applications
- Low charge pressure requirements (reduced parasitic losses and operation at low input speeds)
- Serviceable bearing/valve plate combination
- Comprehensive range of auxiliary drive options SAE "A," "B," "B-B," and "C" including full tandem capability

Bent Axis Motors

- Wide range of auxiliary drive options
- ISO, SAE, and planetary gearbox mounting configurations
- Complete range of variable motors controls

Series 1 Motors

- Compact size
- High power density
- Integral shuttle valve and valve block configuration
- Speed sensor options



Heavy Duty Hydrostatics



Heavy Duty Series 1 & 2 Axial Piston Pumps

Series 1 & 2 pumps meet your demands for compact, quiet hydrostatic power. The power-dense, axial-piston design and wide range of controls are suited for mobile and industrial applications.

Specifications

Displacements: 54-125 cm³/r (3.3–7.6 in³/r)

Speed Range (max.): 4510–3720 rpm

Nominal Pressure: Up to 430 bar [6250 psi]; Peak 500 bar [7250 psi]

Bent Axis Motors

Configurations include fixed and variable displacements, flange or gearbox mounts. Can be tailored with optional controls, ports, and valving.

Specifications

Variable Displacements: 55–225 cm³/r (3.3–13.7 in³/r)

Fixed Displacements: 11–225 cm³/r (0.66–13.7 in³/r)

Speed: Variable Disp., 3900–2500 rpm; Fixed Disp., 5590–3900 rpm

Nominal Pressure: Up to 430 bar [6235 psi]; Peak 480 bar [6960 psi]

Heavy Duty Series 1 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.

Specifications

Displacements: six models, ranging from 54 cc/r (3.34 cir) to 125 cc/r (7.62 cir)

Speed Range (max.): Up to 4510 rpm

Nominal Pressure: Up to 420 bar [6000 psi]; Peak 480 bar [7000 psi]

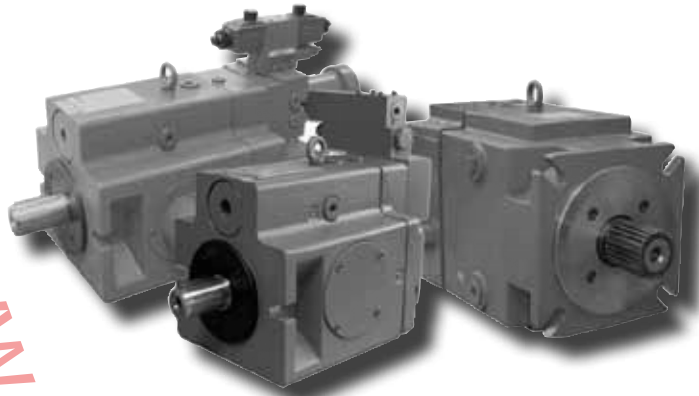


Eaton's Hydrokraft Pumps and Motors

Eaton offers robust and reliable high-pressure industrial open and closed circuit piston pumps and motors. The axial piston pumps feature cradle-type swash plate designs that provide reliable operation as well as long life.

Pumps are built with a through drive, which enables multiple pump installation from a single shaft. Multiple pump combinations are also available from the factory. These products are built for closed circuit applications with integrated valves and filters; an entire closed circuit system is available in one package.

For highly efficient system control, Eaton pumps have wide range of control options for variable displacement pumps, including mechanically, hydraulically and electrically controlled types. Multiple controls can be merged with variable displacement units, from a simple mechanical hand-wheel to electronic proportional control, including controller cards and associated software.



Features and Benefits:

- Many control options, allow matching of pumps to any application
- Can be operated with mechanical, hydraulic or electrical controls
- Largest shafts in class, for true tandem mount capability at corner horsepower
- Automatic pressure balancing of cylinder block to the valve plate for high efficiency
- Shaft bearing life is longest in it's class for long life and through-drive capability
- Automatic wear compensation ensures high resistance to dirt
- Swashplate design and other proven features reduce sound levels
- Most accurate HP limiter control in its class
- Self-priming open circuit pumps require no boosting
- Through drive allows installation of multiple pumps with single shaft



Eaton's Hydrokraft Pumps and Motors



Series W Axial Piston Pumps—Open Circuit

The W series pump is available with fixed (PF) and variable (PV) displacement. Rated 350 bar continuous, 420 bar peak, it is designed for all types of industrial and mobile applications.

Specifications

Displacements from 130 cc to 750 cc (8–45 in³/r)

Speed Range (max.):
2200–1200 rpm

Nominal Pressure: Up to
350 bar [5000 psi]; Peak to
420 bar [6000 psi]



Series X / W Axial Piston Motors

The X / W series motors are available with fixed (MFS) and variable (MVS) displacement. Rated 350 bar continuous, 420 bar peak, with advanced control options and through-drive.

Specifications

Displacements from 66 cc to 750 cc (4–45 in³/r)

Speed Range (max.):
2800–1800 rpm

Nominal Pressure: Up to
350 bar [5000 psi]; Peak to
420 bar [6000 psi]



Series X Axial Piston Pumps—Open Circuit

The X series pump is an open loop pump and available with fixed (PF) and variable (PV) displacement. Rated 350 bar continuous, 420 bar peak, it is designed for all standard industrial applications.

Specifications

Displacements from 66 cc to 250 cc (4–45 in³/r)

Speed Range (max.):
2300–1800 rpm

Nominal Pressure: Up to
350 bar [5000 psi]; Peak to
420 bar [6000 psi]



Series X / W Axial Piston Pumps—Closed Circuit

Closed circuit X / W series pumps are closed loop axial piston pumps. Rated 350 bar continuous, 420 bar peak with advanced control options and through-drive for all heavy duty industrial and mobile applications.

Specifications

Displacements from 66 cc to 750 cc (4–45 in³/r)

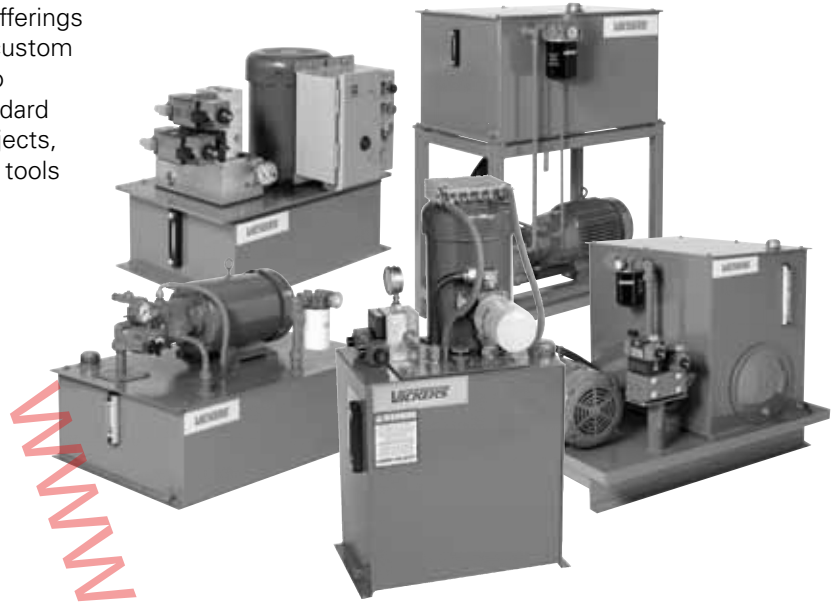
Speed Range (max.):
2600–1800 rpm

Nominal Pressure: Up to
350 bar [5000 psi]; Peak to
420 bar [6000 psi]



Standard Packaged Systems

Eaton has made a considerable expansion to its standard package systems product line. Eaton provides the industry's most complete line of standard power units to meet your customer's needs. Industrial power unit offerings include verticals, horizontal, L's, overheads, JIC and custom configurations. We offer the industry's fastest way to buy power units with the most flexible range of standard configurations. Typical applications include: civil projects, primary metals, metal forming, windpower, machine tools and automotive.



Features and Benefits:

- Continuous duty rated electric motors for durability and long life
- Aeroquip hose and fittings for leak free design
- Lift off tops for easy maintenance
- Close-coupled pump and motor for easy service and reliability
- Standard relief valve, pressure gauges and level / temperature
- Bar Manifolds and Pump / Motor Group configurations including the IMP (integrated motor pump)
- A more extensive selection of pumps, motors, valves, and reservoirs that are configurable
- Improved Cutler-Hammer motor starters with quick disconnect and variable drive capabilities
- Expansion of accessories to include more filtration, accumulators, coolers, etc.



Standard Packaged Systems



Vertical Power Units

Can be ordered in configurations for larger applications or lower profile designs for space savings. Available in gear, vane and variable piston pump options with multiple manifold options.

Specifications

Standard rated pressure up to 200 bar [3,000 psi]. Standard rated flows from 6–120 lpm (1.5–31.5 gpm). Standard reservoir sizes from (3–60 gallons). Standard motor configurations can range from 1–21 Kw (.75–30 HP).



L Style Power Units

These configurations include a containment tray and flooded pump inlet. Available in gear, vane and variable piston pump options with multiple manifold options.

Specifications

Standard rated pressure up to 235 bar [4,000 psi]. Standard rated flows from 6–216 lpm (1.5–57 gpm). Standard reservoir sizes from 38–455 liters (10–120 gallons). Standard motor configurations can range from 1–35 Kw (.75–50 HP).

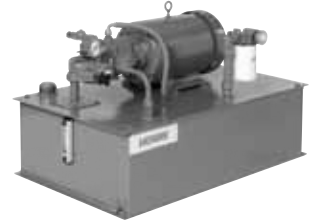


Overhead Style Power Units

Designed for space savings for larger applications. Configurations include a flooded pump inlet and suction strainer. Available in gear, vane and variable piston pump options with multiple manifold options.

Specifications

Standard rated pressure up to 235 bar [4,000 psi]. Standard rated flows from 6–216 lpm (1.5–57 gpm). Standard reservoir sizes from 38–455 liters (10–120 gallons). Standard motor configurations can range from 1–35 Kw (.75–50 HP).



Horizontal or JIC Style Power Units

Designed for larger applications. Available in gear, vane and variable piston pump options with multiple manifold options.

Specifications

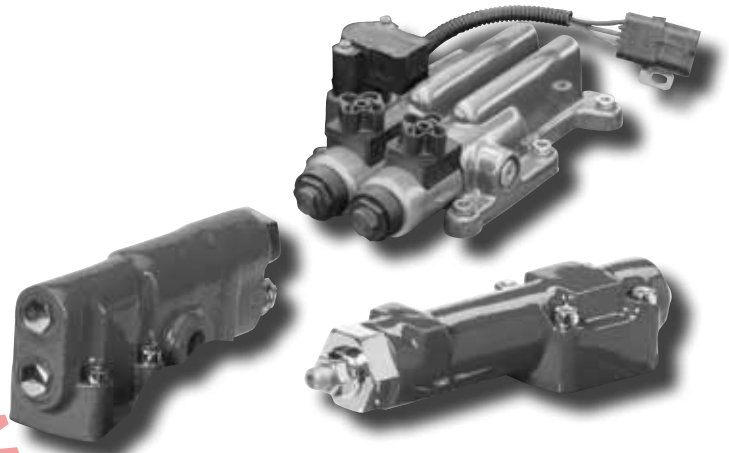
Standard rated pressure up to 275 bar [4,000 psi]. Standard rated flows from 6–348 liters (1.5–91 gpm). Standard reservoir sizes from 38–455 liters (10–120 gallons). Standard motor configurations can range from 1–70 Kw (.75–100 HP).



Piston Pump Controls

You want your fluid power system to respond quickly, accurately and repeatably while minimizing power consumption and parasitic losses. That's where Eaton's line of pump controls comes into play. Eaton provides a variety of options to control its variable displacement open-circuit and closed-circuit piston pumps to meet the needs of your system. Whether you need to manage pressure, flow or power, whether your control is based on system conditions or remote decisions, Eaton can find a control for you.

Eaton can also provide a variety of sensors to help meet your control needs, including speed sensors and swash plate angle (displacement) sensors. From presses, injection molding machines, compaction equipment, and robotics to steering, implements, fan drives, and ground drives, Eaton can provide the control you need to help you succeed.



Features and Benefits:

Pressure Compensated Controls

- The most basic open-circuit pump control. Provides a constant pressure at the outlet of the pump for quick valve and system response. The pressure may also be set remotely by using external relief valves.

Load Sensing Controls

- An economical control. Reduces parasitic losses by controlling the pump to meet the pressure and flow demands of the load. Thus minimizing the power draw on the prime mover. Settings may also be controlled remotely by using external valves.

Torque / Power Limiting Controls

- This control option allows the pump to limit the torque/power consumed by a given function. This enables power management of a system and helps prevent stalling the prime mover. This option can be added to either a pressure compensated or load sensing control.

Electronic Controls

- Eaton's most accurate servo control provides fast response time with very low hysteresis on closed-circuit pumps. Command signals are received via a CAN bus and redundant sensors can be provided for safety critical applications.

* Note: Some controls are only available on specific product lines. Contact your Eaton representative for more details.



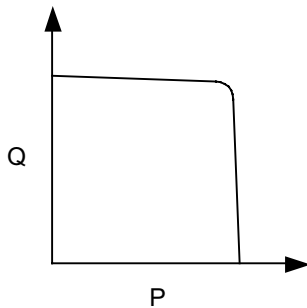
Piston Pump Controls



Pressure Compensated Controls

This control adjusts the pump displacement to maintain a constant pressure at the pump outlet until the maximum displacement (flow) is reached.

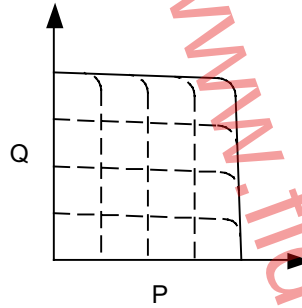
Specifications



Load Sensing Controls

By sensing the load pressure and the outlet pressure, this control adjusts the pump displacement to meet both the pressure and flow demands of the circuit, thus minimizing power consumption.

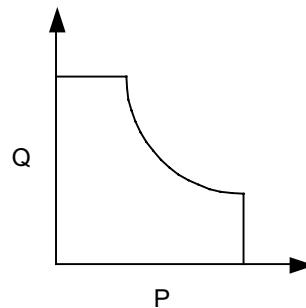
Specifications



Torque / Power Limiting Controls

A sense orifice creates a pressure proportional to flow that allows this control to limit the torque or power transmitted by the pump. Must be used with either a pressure compensated or load sensing control.

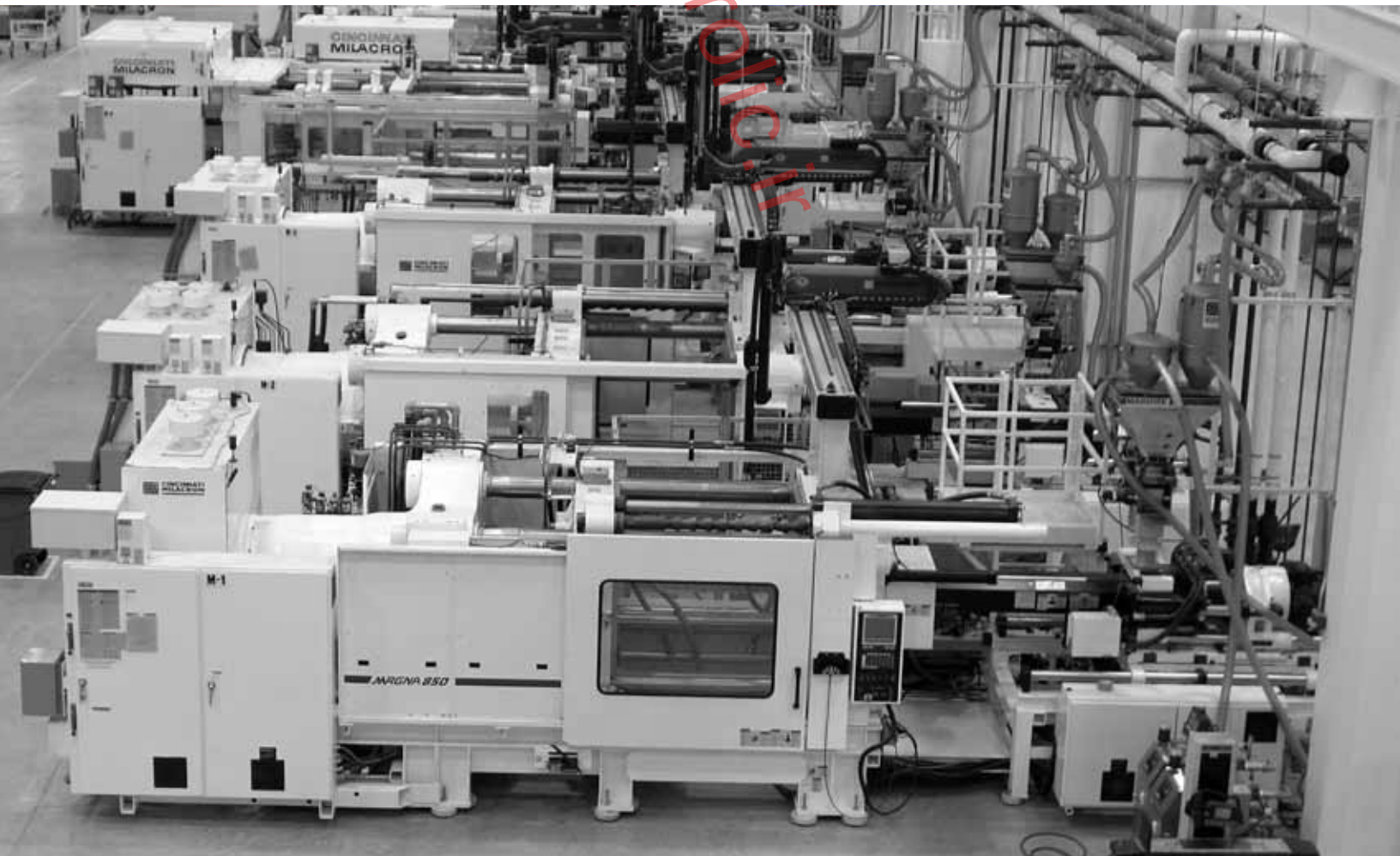
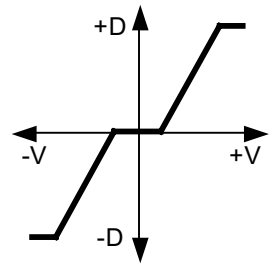
Specifications



Electronic Controls

Electronically actuated valves and displacement sensing methods (mechanical and/or electronic), are used to accurately control the displacement (flow) of closed-circuit pumps.

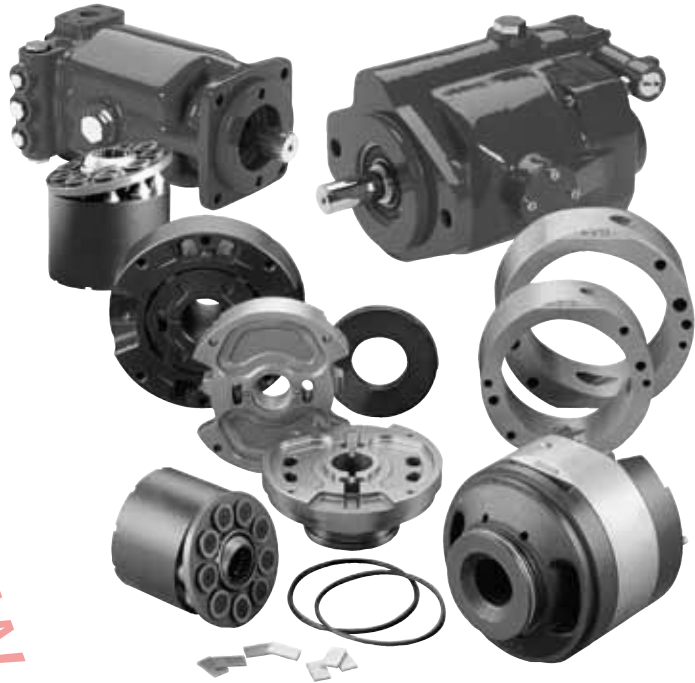
Specifications



Remanufactured Products

For more than 80 years, engineers have chosen Eaton and Vickers products for their quality, reliability and high performance features. This same quality and reliability is available in a complete line of products remanufactured by Eaton's Hydraulics Group. "Will fitters" claim their products are "as good as new"; however, they cannot offer the same high performance found with Eaton's genuine Remanufactured Parts, because the parts are not to Eaton's original equipment specifications. Eaton guarantees 100 percent use of genuine Eaton parts for longer life at rated conditions. No one knows Eaton's products better than Eaton.

As parts enter our Remanufactured Products Facility, they're disassembled and pieces are inspected against certain specifications to determine if the part can be remanufactured. If so, the parts are reworked to perform like new, following the exact same processes we use in our manufacturing facility. Each unit is assembled and tested against original new standards prior to shipping to the customer.



Features and Benefits:

- Authentic Eaton parts
- Eaton certified
- Remanufactured to original equipment specifications
- Remanufactured parts are warranted same as new. The longest warranty in the industry for remanufactured parts by far!



Remanufactured Products

Piston Pump Products

Critical components remanufactured include: piston pump rotating group, cylinder block, piston shoe sub-assembly and piston pump valve plate.

If the remanufacturing process does not provide the same tolerances, materials and surface treatments as new, you may experience any one or many of the following:

- Reduced pump output
- Higher power requirements
- Loss of parts durability
- Increased noise
- Excessive heat generation
- Generation of contaminants

Closed Circuit Piston Families

Remanufacturing services are offered for the following closed circuit product families

- Heavy Duty
 - Series 1 pumps
 - Fixed displacement motors
 - Variable displacement motors
- Medium Duty
 - Fixed pumps and motors
 - Manual pumps and motors
 - Variable pumps and motors



Open Circuit Piston Families

Remanufacturing services are offered for open circuit PVB, PVE and PVH pumps. Eaton's offerings includes remanufactured rotating groups, valve plates and complete pumps. Yokes are offered for the E and H Series.

B Series



A



B



C



E Series



A



B



C



H Series



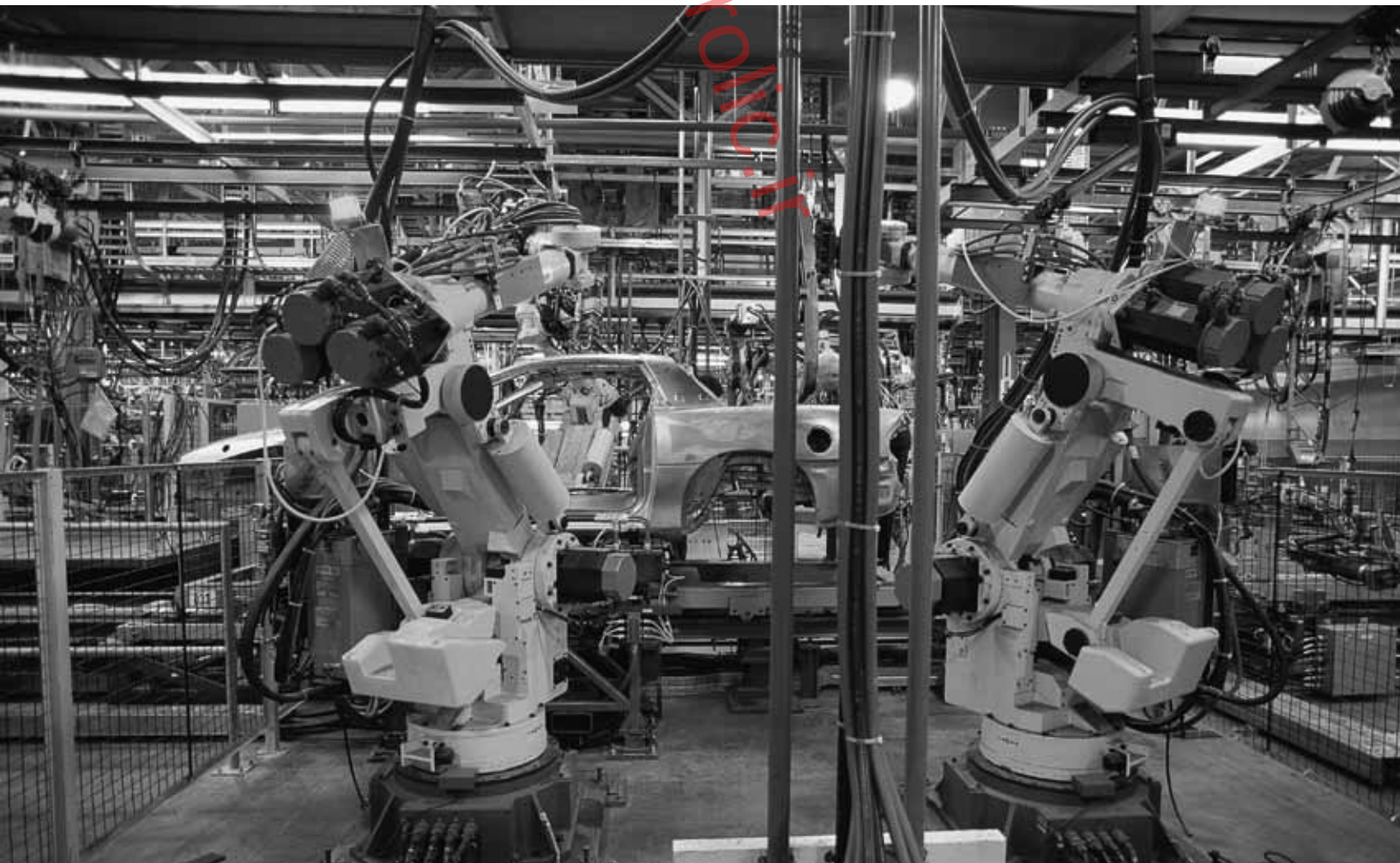
A



B



C



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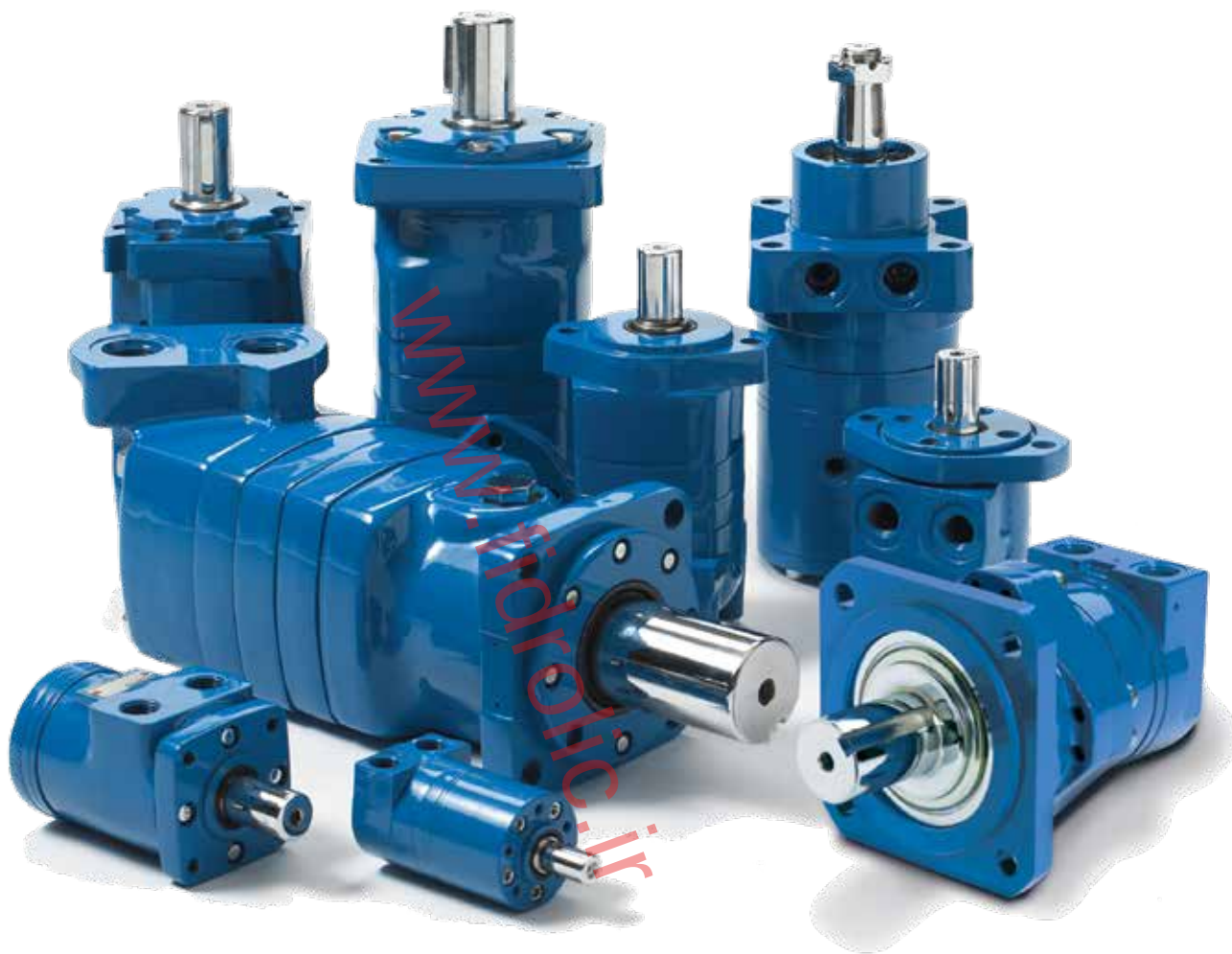
Powering Business Worldwide

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Supersedes M-HYOV-MC003-E
February 2013

Low Speed, High Torque Motors

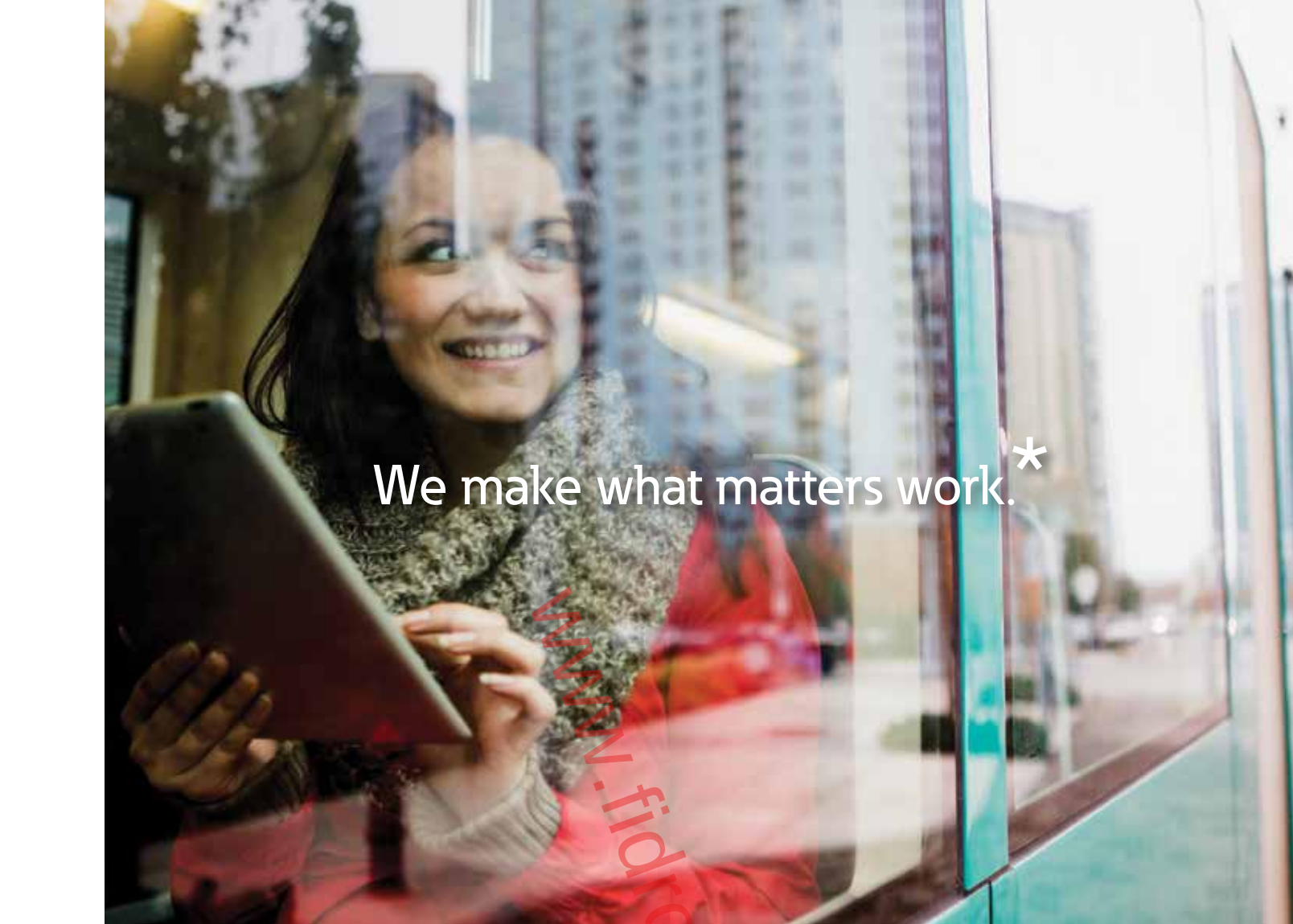
Spool Valve: J, H, S, T

Disc Valve: 2,000, 4,000 Compact, Delta,
4,000, 6,000, and 10,000 Series



EATON

Powering Business Worldwide



We make what matters work.*

* At Eaton, we believe that power is a fundamental part of just about everything people do. Technology, transportation, energy and infrastructure-these are things the world relies on every day. That's why Eaton is dedicated to helping our customers find new ways to manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. To improve people's lives, the communities where we live and work, and the planet our future generations depend upon. Because that's what really matters. And we're here to make sure it works.

See more at Eaton.com/whatmatters



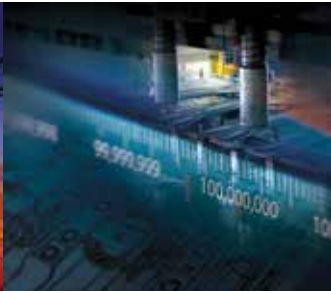
Powering Business Worldwide

Serving eight key segments - sharing one focus



Alternative Energy

Making energy sources technically practical and economically sound requires the kind of control made possible by high-quality components. When Eaton is on the inside, you will experience the reliable, consistent performance to create and capture energy—making renewable energy an every-day energy.



Discrete Manufacturing

Produce at peak efficiency with the superior precision and repeatability of Eaton products. Eaton hydraulic components provide the precise control and consistent operation required for virtually every step in your manufacturing operation. With Eaton, we'll help you redefine the meaning of raw productivity.



Oil & Gas

As the oil & gas industry continues to face further globalization and consolidation, large-scale organizations that can meet your needs in every corner of the world are more difficult to find. At Eaton, our portfolio of products is only surpassed by our tremendous reach.



Processing

Whatever your industry, no matter which processes you manage, Eaton parts and systems help keep you up and running. Our components make equipment more efficient and easier to use, so you get optimal machine performance and maximum productivity.



Agriculture & Forestry

There's a reason farming and forestry are called "working the land." These segments involve some of the hardest work and longest hours of any sector in the economy. Your productivity and profitability depend on the way you manage time and tasks.



Commercial Vehicles

Eaton technologies can make your driving operation more successful. Greater comfort and productivity help increase driver retention, while reduced emissions, leaks, and noise improve environmental performance. Increased efficiencies overall mean lower costs and higher net revenue.



Material Handling

Eaton hydraulic systems provide the precise control and consistent operation required for material handling and utility work. With a broad selection of products and solutions built in, Eaton helps make you a master of your domain.



Construction & Mining

When you work on a large scale, even the details are big. You need to trust every part of the equipment that lets you handle construction and mining jobs. For reliable components that deliver consistent performance in extreme conditions, turn to Eaton.

Eaton is a leading diversified power management company

Eaton provides reliable, efficient and safe power management for a growing number of industries.

Understanding and helping our customers succeed

- Listening and understanding to requirements and business drivers
- Delivering solutions with value propositions to solve the critical business needs

Knowing what's important to our customers and integrating that knowledge into the fabric of our business

- to deliver innovative, quality products
- to respond fast
- to provide dedicated customer service and support around the globe

Our strength is global reach with local responsiveness and support

- Customers served in more than 150 countries
- Diverse channels ensure reliable availability and support
- Design and engineering teams provide support for standard products and custom solutions
- Eaton experts offer efficient product and application training

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A

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www.hifidraulic.ir

Introduction:

For the past 65 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 principle 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 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]	177 [2565]	61 [16]	635 [1400]
Disc valve	2700 [24000]	205 [3000]	170 [45]	4500 [10000]

Motor options include:

- Displacement size (cubic inches or cc's per revolution)
- Output shaft size and type
- Mounting flange type
- Porting interface
- Special features such as integrated brakes, sensors, specialty seals, integrated crossover 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

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.

A

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 springapplied, hydraulic release brake. It is common to use a shuttle valve for directing flow to release the springapplied 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. The T and Delta Series motors have options for a SAHR (spring-applied, hydraulic release) brake that meet this need.

Typical applications using closed loop circuits include:

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

Power density:

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:

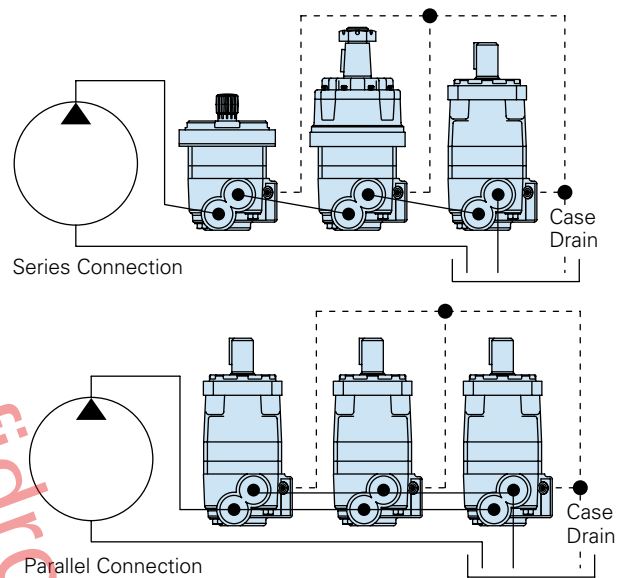
Char-Lynn motors are self contained, with hydraulic fluid providing lubrication. These motors are completely sealed so they can operate safely and reliably in hostile environments such as dust, dirt, steam, water, and heat and provide reliable performance.

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 (Bearing-less motor applications) can also be controlled. In applications where more system cooling and flushing is required, a shuttle valve option is available in 2000, 4000 Compact, 4000, 6000 series motors.



Motor application information

Vehicle drive calculations

A

Step One – Calculate motor speed (RPM)

$$\text{RPM} = \frac{2.65 \times \text{KPH} \times G}{R_m}$$

$$\text{RPM} = \frac{168 \times \text{MPH} \times G}{R_i}$$

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

ρ = value from Table 1

Table 1 - Rolling resistance coefficients For rubber tires on various surfaces

Surface	r
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.

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

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:

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

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

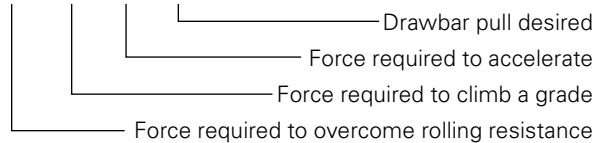
Drawbar Pull (DP) is total force available at the drawbar or "hitch" after the above forces have been subtracted from the total propelling force produced by the hydraulic motors. This value is established as either:

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).

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.

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



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

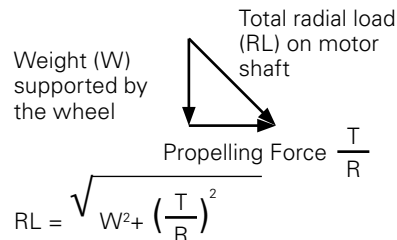
W = loaded vehicle weight over drive wheel

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.



Refer to radial load rating of each motor series.

Shaft Torque (T)

$$T = \frac{q \cdot D \cdot P}{2 \cdot p}$$

$$\frac{\text{bar} \times \text{cm}^3/\text{rev}}{62.8} = \text{Nm}$$

$$\frac{\text{PSI} \times \text{in}^3/\text{rev}}{6.28} = \text{lb - in}$$

Shaft Speed (N)

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

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

$$\text{RPM} = \frac{231 \times \text{GPM}}{\text{in}^2/\text{rev}}$$

Power (into motor)

$$\text{Kw} = \frac{\text{bar} \times \text{l/min}}{600}$$

$$\text{HP} = \frac{\text{PSI} \times \text{GPM}}{1714}$$

Power (out of motor)

$$\text{Kw} = \frac{\text{Nm} \times \text{RPM}}{9549}$$

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

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

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Optional feature	Benefit
2 Speed motors	Allows motor to have two displacements (higher speed has lower torque)
Seal guard/Extreme duty 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 environments
Nickel Plating	For highly corrosive environment or food/sanitary applications
Integrated Parking Brake	Spring applied hydraulic release brake
Free running / reduced clearance option	Improved mechanical efficiency at high-speed/high-flow conditions and improved volumetric efficiency at low-speed/low-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, reduce case pressure, and 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)
Viton seals	For higher temperature or chemical resistance applications
Integral cross over valving	Compact design that limits the differential pressure across the motor
Reverse rotation	Allows opposite shaft rotation for a given port pressure.
ATEX	Motor meets ATEX certification requirements for explosive environments

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					x				
High pressure shaft seal									x					
Environmental protection					x	x							x	x
Nickel Plating					x	x							x	x
Integrated parking brake	x	x			x			x			x			x
Free running / reduced clearance 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							
Integral cross over valving	x	x		x										x
Reverse rotation					x									
ATEX			x				x			x	x		x	

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

Feature description	Spool valve motors				Disc valve motors					
	J Series	H Series	S Series	T Series	2000 Series	4000 Compact Series	Delta	4000 Series	6000 Series	10000 Series
2 Speed motors	—	—	—	—	0	—	—	—	—	0
Seal guard	—	0	0	0	0	0	0	0	0	0
Viton seals	0	0	0	0	0	0	0	0	0	0
High pressure shaft seal	—	0	0	0	0	0	—	0	—	—
Environmental protection	0	0	0	0	0	0	0	0	0	0
Nickel plating options	0	0	0	0	0	0	0	0	0	0
Integrated parking brake	—	—	—	0	—	—	0	—	—	—
Free running / reduced clearance option	0	0	0	0	0	0	—	0	0	0
Speed sensors	0	0	0	0	0	0	0	0	0	0
Shuttle valve					0	0	—	0	0	—
Case port	0	0	0	0	S	S	S	S	S	S
Internal check valves	S	0	S	0	—	—	—	—	—	—
Low speed valving	—	0	0	0	—	—	—	—	—	—
Integral cross over valving	—	—	—	—	0	0	—	—	—	0
Reverse rotation	0	0	0	0	0	0	0	0	0	0
ATEX Certification		0	0	0	0	0	0	0	0	0

O Optional
 S Standard
 — Not applicable

Two speed motors

This option is available on all 2000 series motors.

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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. 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. With full shift-on-the-fly ability, shift ratios of 2:1 (2000 series) provide greater circuit flexibility in a compact reliable package.

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



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This option is available on H, S, T, 2000, 4000 compact, Delta, 4000, 6000, and 10,000 series motors

Seal guard

Features:

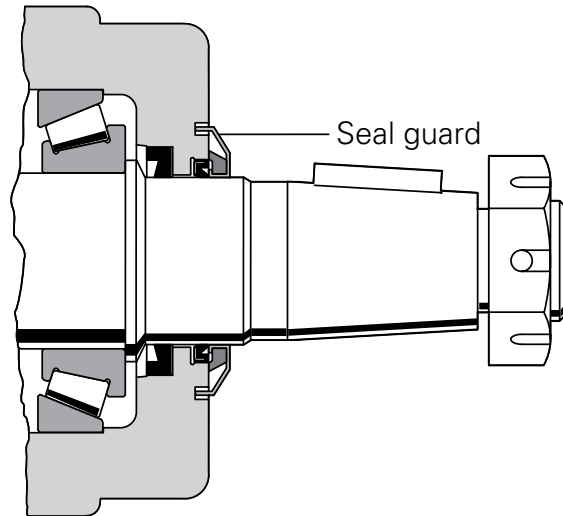
This option consists of a metal shield that protects an internal wiper seal. The shield is interference fit on the output shaft and moves with the output shaft. For added protection, the shield is recessed into a groove in the bearing housing face.

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:

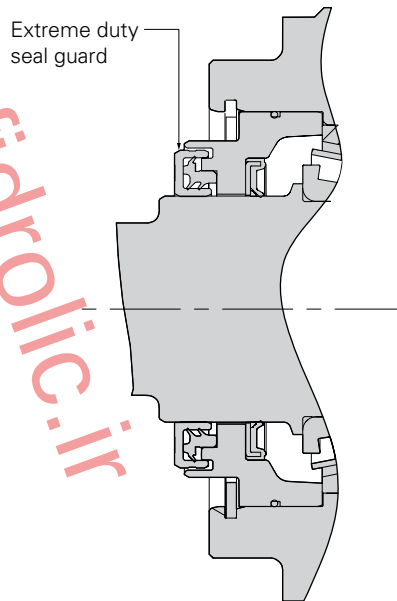
- Street sweepers
- Industrial sweepers
- Lawn and turf equipment
- Harvesting machinery
- Mining equipment



Extreme duty seal guard

Extreme duty seal guards are designed for equipment working in harsh conditions, such as cement augers, dredgers, fertilizer and salt spreaders, tillers and other machines that require power wash-downs.

The two piece seal features two channels, one stationary and one that rotates with the motor shaft. In between the channels is a greased cavity used to reduce friction and keep dirt out. Compared to the current industry standard slinger seal guard, the Extreme Duty Seal Guard adds three additional barriers to protect the motor from contamination.



Viton seals

This option is available on most 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
- Operating Temperature Range of -25°C to 200°C [-13°F to 392°F]

Applications:

- Industrial conveyors
- Plastic injection molding

Note: Minimum Viscosity Levels must still be maintained

High pressure seals

This option is available on H, S, T, 2000 and 4000 series motors.

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Features:

Eaton has introduced a high-pressure shaft seal option for its H, S, T, 2000 and 4000 series motors. The seal geometry is optimized for applications that operate under extreme conditions. The seal geometry optimizes the clamping force of the sealing lip against the output shaft to prevent seal leakage at extreme pressure conditions. 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

Benefits:

- Increases ability to handle high-pressure spike conditions.
- Can be an effective alternative to additional case port plumbing
- Operating Temperature -40°C to 150°C [-40°F to 300°F]

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).
4. Minimum Viscosity Levels must be maintained.

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

High pressure shaft seal part numbers:

H Series	–	Kit No. 60572-000
S Series	–	Kit No. 9900098-000
T Series	–	Kit No. 60579-000
Shaft Seal	–	Part No. 5995483-001
2000 Series	–	Kit No. 9901109-000
Shaft Seal	–	Part No. 5991881-001

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
- 2000 Series (Kameoka), Delta Series

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.

Benefits:

- Complete compact system package
- Performance-matched brake / motor solution
- Increases design flexibility
- Reduces assembly costs and simplifies service requirements
- Better fit for hydro electric vehicles over traditional mechanical actuated brakes
- Ability to direct port release pressure (eliminate brake release hose correction)
- Streamlines inventory and order processing

Applications:

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



Free running and reduced side clearance Gerotor/Geroler sets

This feature is available in all Char-Lynn motors.

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Free running Gerotor/Geroler sets

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
- Applications with continuous high speed/high flow applications
- Applications with high-pressure spikes from rapid reversals

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

Reduced side clearance Gerotor/Geroler sets

Features:

The reduced side clearance option decreases the axial clearance between the star and the mating surfaces, allowing less flow between these parts. This improves volumetric efficiency, and is useful in very low flow applications.

Benefits:

- Increased volumetric efficiency

Applications:

- Conveyors, seeders, low speed industrial applications.

Special Notes: Reduced clearances affects the motors ability to withstand thermal shock conditions. See your Eaton representative for further information.

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:

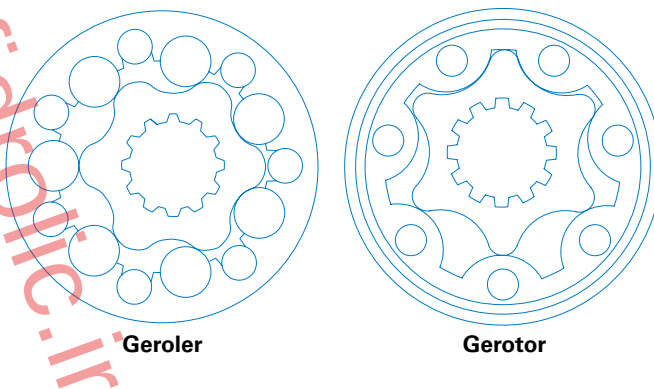
20 x psi / RPM = SUS (use this formula to determine minimum fluid viscosity)

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 psi/ RPM = 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.

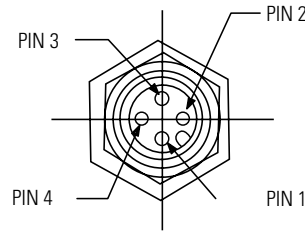


Thermal shock:

Eaton's Char-Lynn Geroler sets are precision-machined with clearances fitted for the mobile hydraulics market. A key consideration in all hydraulic components is the components resistance to thermal shock. Thermal shock is the seizure of a component due to thermal expansion. This is typically caused by hot oil quickly induced in an ambient hydraulic circuit. Side clearance between the Geroler Star and Ring is a major factor in overall motor efficiency, and is controlled very tightly. It is important that this clearance is able to withstand varying environmental changes. All Char-Lynn standard Gerolers/ Gerotor sets are designed to withstand a 70°FΔ (39°CΔ) oil temperature differential at rated flow in under 10 seconds. For motors with 2 speeds, this condition is designed in low speed mode operation.



Note: The speed sensor option does NOT include read-out display.



M12 Connector,
PIN Detail

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)

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 10kW 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

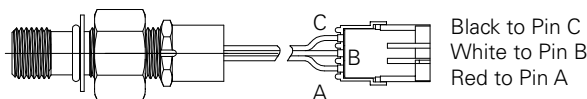
Technical information

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

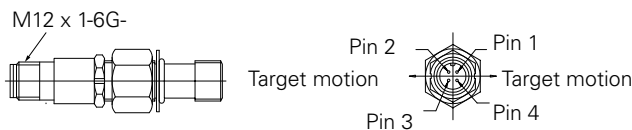
Connector Type

Output	Signal	Weather pack shroud	M12	Deutsch
Single	Digital on/off	6026077-001	6026077-22 (spool & disc) 5989814-001 (HP30)	
Dual	Version 1 2 Signals 90 degree out of phase		113003-001	5998790-001
	Version 2 Dual pulse with speed and direction		113003-002 (disc) 203266-001 (spool - no direction)	

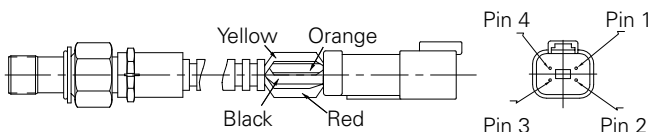
Weather pac shroud



M12 Connector

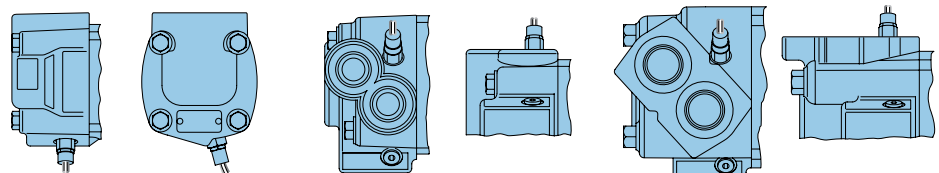


Deutsch Connector



Pin Details

PIN	Function
1	Power (RED)
2	Output 1 Orange
3	Common (Black)
4	Output 2 (Yellow)



Shuttle valve

Lubricating shuttle

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The shuttle valve option is available in 2000, 4000 and 6000 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.

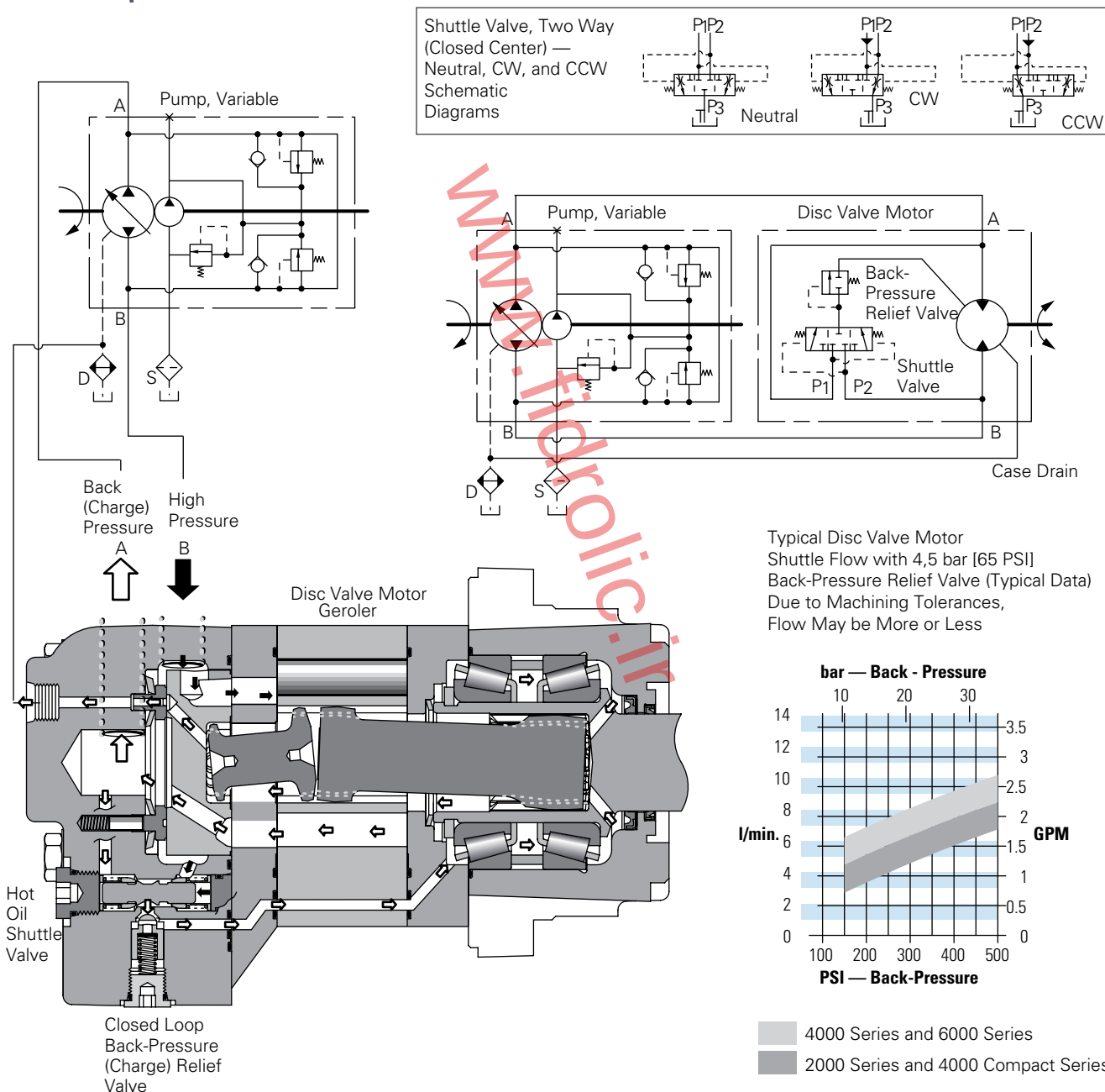
Applications:

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

Benefits:

- Flushing
- Cooling
- Longer system life

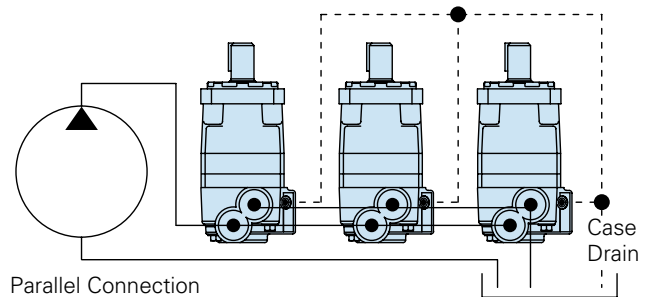
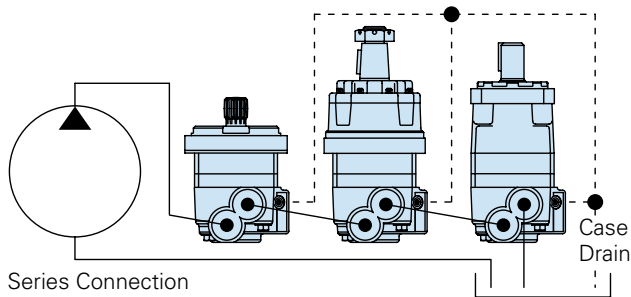
Closed Loop Circuit



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

This option is available on all Char-Lynn motors.

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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 contaminants 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

Internal check valves:

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

Internal check valve reduces high case pressure on the shaft seal by venting excess pressure to the lowest pressure port, further extending shaft seal life, This option is not necessary when using case drain.

Internal check valves are available as an option in H and T Series motors, whereas S Series motors have this feature as standard.

Low speed valving / Low flow housing

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

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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.

Note: Motors with this valving are not intended for low pressure applications (A minimum of 300 psi delta must be maintained between A port pressure and case pressure)

Low flow housing:

This feature is available on the H and T Series motor

Features:

This feature further optimizes the motor for low-speed performance. This option is used in combination with low speed valving to mate the housing geometry to the rotating valve to further increase sealing. Motors with this feature are designed to run continuously up to 200 rpm at the standard rated pressures.

Benefits:

- Further improves smoothness at low speeds (less than 200 rpm)
- Improves volumetric efficiency

Applications:

- Seed metering
- Steering motors
- Low speed conveyors



Full body Nickel plating:

This option is available on H, S, T, 2000, 4000, and 6000 motors.

Features:

Eaton is offering full body nickel plating for Char Lynn motors for protection against wash down environments. This does not offer protection against salt water environments and the recommended option is epoxy paint

Paint option	Description	Applications
Electroless Nickel Plating (AMS 2404D specification)	Premium process offering extremely high quality corrosion resistance	Where water contact is extremely high+
+ Washdown applications only – does not include salt water applications		

Benefits:

- Protection in heavy and frequent washdown environments
- Single source plating
- Warranty from Eaton on nickel plating

Applications:

- Food processing
- Industrial conveyors

Environmental protection (epoxy paint):

This option is available on all Char-Lynn motors.

Features:

All motors are available with a corrosion resistant coating for use in hostile environments. This hard, extremely durable coating is the best protection against corrosion and rust. This paint option is commonly combined with a plated shaft option and the extreme duty seal option for a full body protection.

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
- Fishing and agricultural applications
- Fertilizer spreaders and conveyors

Nickel plated shafts:

This option is available on H, S, T, motors.

Features:

Eaton is offering Electroless nickel plating on the shafts alone for corrosion protection. This option is commonly used with full body nickel plating in wash down applications.

Benefits:

- Protection in heavy and frequent wash-down environments
- Single source plating
- Warranty from Eaton on nickel plating
- Protects shaft seals from shaft corrosion

Applications:

- Car washes
- Fishing winches / marine applications
- Fertilizer spreaders and conveyors

Chrome plated shafts:

This option is available on J, 2000, 4000 Compact, Delta, 4000, and 6000 Series motors.

Benefits:

- Protection in heavy and frequent wash-down environments
- Protects shaft seals from shaft corrosion
- Single source plating
- Warranty from Eaton on Chrome plating

Applications:

- Car washes
- Fishing winches / marine applications
- Fertilizer spreaders and conveyors



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 are available for H, S, T and 2000 Series motors.

Features:

- Aluminum manifolds anodized black
- Pre-set cartridges to your specifications
- 100% production tested assembly
- 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

Benefits:

- Minimize use of hoses, tubing and fittings for faster assembly
- Minimize leak points
- Compact solutions

Special T-brake release manifolds are available. Please contact your local Eaton representative for more information on manifold solutions for motors.

Features:

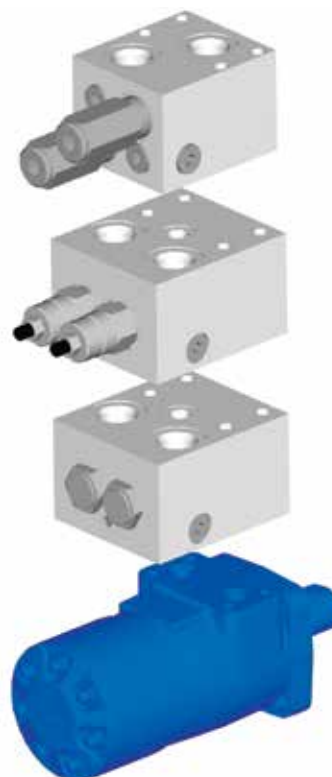
- Complete packaged system solution, single source for motors with relief valve capability
- Relief valves as close to Geroler as possible, providing added protection
- Eliminate leak points from in-line or bolt-on relief's
- Valves capable of full motor pressure
- Provides added flexibility to system 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 reduces production and assembly.

Applications:

- Skid-steer attachments
- Swing motors
- Brush cutters & mowers
- Harvesting equipment
- Directional boring
- Winches
- Augers
- Any place where pressure relief is optimal for system or motor performance and life



ATEX Certification

H, S, T, 2000, 4000 compact, Delta, 4000, 6000 and 10,000 series motors

What is ATEX Certification?

ATEX certification is a certification that allows our motors to be used in certain types of explosive environments. It derives its name from the French title of the European Union ATEX directive - ATmosphèresEXplosives.

Benefits

ATEX certification on Char-Lynn motors allows use in certain types of explosive environments. Ordering an ATEX certified motor, you receive:

- An ATEX certified motor that has the ATEX marking on the label
- An operating instructions manual
- EC Declaration of Conformity (ATEX Certificate)

Applications

- Oil and gas drills and conveyors
- Specialty mining vehicles

How to configure an ATEX certified Motor in the model code?

To specify an ATEX certified motor, you will need to select the 'EX' option from the Special features (Hardware) section of the model code for the above motors.

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Performance data

Product line	Viscosity minimum	Recommended Viscosity range	ISO Cleanliness requirements
H Series	100 SUS 20 cst	100-200 SUS 20-43 cst	20/18/13
J, S, T Series	70 SUS 13 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

Introduction:

Hydraulic fluids are one of the vital components of hydraulic system. Proper selection of oil assures satisfactory life and operation of system components. 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.

Viscosity and temperature:

Viscosity is the measure of a fluid's resistance to flow. The most important characteristic to consider when choosing a fluid to be used in a hydraulic system is viscosity. The fluid must be thin enough to flow easily but thick enough to maintain adequate lubricating film between component and to maintain proper sealing at the operating temperatures of the hydraulic system. For viscosity requirements see table. Viscosity of any fluid is relative to temperature, as the fluid warms the viscosity decreases and vice versa. When choosing a fluid it is important to consider the start-up and operating temperatures of the hydraulic system. A high Viscosity Index (VI) fluid shows relatively small change of viscosity with temperature. Lubricants used for hydraulic applications may contain viscosity index improvers. They refer to these fluids as viscosity index improved, or multi-viscosity fluids. The viscosity of these fluids may drop down in use due to the shearing of VI improvers used in the formulations. Anti-wear hydraulic oils containing polymeric thickeners viscosity index improvers are generally used for wide band operating temperature applications. These fluids experience temporary and permanent viscosity loss during use in hydraulic system. Check the extent of viscosity loss (shear stability) to avoid hydraulic service below the recommended minimum viscosity. Oil with good shear stability is recommended for wide band temperature applications. Multi-grade engine oils, ATFs, UTTOs, etc., also contain VIs, and viscosity loss will be encountered during use.

Cleanliness:

Cleanliness of the fluid in a hydraulic system is extremely important. More than 70% of all failures are caused by contamination. Eaton recommends that the fluids used in its hydraulic components be maintained per ISO 4406. Cleanliness level requirements varies with the hydraulic components. The cleanliness of a hydraulic system is dictated by the cleanliness requirement of the most stringent component in the system. Cleanliness requirements for specific products are given in the table. OEMs and distributors who use Eaton hydraulic components in their products should provide for these requirements in their design. A reputable filter supplier can supply filter information.

Fluid maintenance:

The condition of a fluid has a direct effect on the performance and reliability of the system. Maintaining proper fluid viscosity, cleanliness level, water content, and additive level is essential for excellent hydraulic system performance. Routine fluid condition monitoring is recommended.

Fluid selection:

Premium grade anti-wear (AW) petroleum based hydraulic fluids will provide the best performance in Eaton hydraulic components. Lubricants that pass Eaton Vickers® 35VQ25A high-pressure vane pump test (Eaton ATS-373 test procedure, ASTM Specification D-6973) are considered good quality, anti-wear hydraulic fluids. Automotive crankcase oils with American Petroleum Institute (API) letter designation SE, SF, SG, SH, or higher per SAE J183 classes of oils are recommended for applications using Eaton GG motors. Automotive crankcase oils generally exhibit less shear stability compared to industrial anti-wear hydraulic fluids, which can result in higher loss of viscosity during service life. Other mineral oil-based lubricants commonly used in hydraulic systems are automatic transmission fluids (ATFs) and universal tractor transmission oils (UTTOs). Synthetic hydrocarbon base stocks, such as polyalphaolefins (PAOs), are also used to formulate hydraulic fluids, engine oils, ATFs and UTTOs. Alternative fluids are recommended when specific properties, such as fire resistance, biodegradability, etc., are necessary for the application. Keep in mind that alternative fluids may differ from AW petroleum fluids in properties such as pressure viscosity coefficient, specific gravity, lubricity, etc. Hence, Geroler/Gerotor motors may need to be derated, some can be operated under full ratings, and other are not rated.

Additional notes:

When choosing a hydraulic fluid, all the components in the system must be considered. Viscosity limitations has to meet the most stringent components requirements. For any system where the fluid is non petroleum oil, set the target one ISO range code cleaner for each particle size, than that of petroleum fluids. Keep adequate fluid level in the reservoir. Take fluid level reading when the system is cold. For more details, refer to Eaton Fluid Recommendation Document # 03-401-2010. Contact your Eaton representative if you have specific questions about the fluid requirements of Eaton hydraulic components.

Spool Valve Hydraulic Motors

Spool Valve: J, H, S, T Series

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



Spool valve motors

Highlights

Product description

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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. 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:

- 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

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. 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.

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

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]	141 [2050]	61 [16]	635 [1400]
S Series	465 [4112]	135 [2000]	55 [15]	635 [1400]
T Series	441 [3905]	177 [2565]	61 [16]	635 [1400]

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

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H Series (101-)

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T Series with parking brake (185-)

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

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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.

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



Plastic Injection



Metal Forming



Food Processing

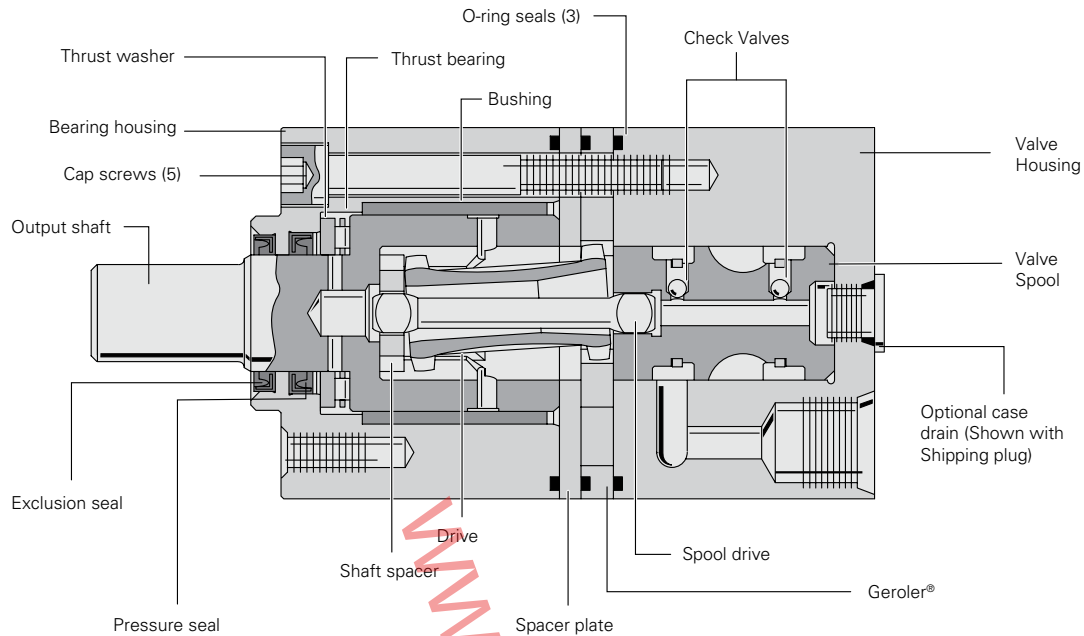


Agriculture

J Series (129-)

Specifications

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Specification data — J motors

Displ. cm ³ /r [in ³ /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 case pressure: See case pressure seal limitation graph.

A simultaneous maximum torque and maximum speed NOT recommended.

Note: To assure best motor life, run motor in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

Maximum Inlet Pressure

* 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.

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

*See shaft torque ratings for limitations.

Peak operation:

1% of every minute

Recommended fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 13 cSt [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

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (expect when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous

 Intermittent

B-1

8.2 cm³/r [.50 in³/r]
Δ Pressure bar [PSI]

**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	166
Flow LPM [GPM]	[1]	[11]	[25]	[33]	[40]	[47]	[55]	[69]	[96]	[102]	[130]	[132]	[146]
	4	1 456	3 444	4 437	5 429	5 422	6 412	8 394	11 347	12 332	15 250	15 239	16 170
	[2]	[9]	[24]	[31]	[38]	[46]	[53]	[68]	[97]	[105]	[139]	[141]	[163]
	8	1 897	3 886	4 877	4 867	5 860	6 847	8 823	11 768	12 749	16 657	16 647	18 557
	[3]	[6]	[20]	[28]	[35]	[44]	[51]	[65]	[94]	[102]	[137]	[139]	[164]
	11	1 1349	2 1331	3 1318	4 1309	5 1296	6 1285	7 1261	11 1198	12 1176	15 1070	16 1060	19 959
	[4.25]		[16]	[23]	[30]	[36]	[44]	[60]	[90]	[97]	[133]	[135]	[160]
	16		2 1902	3 1885	3 1873	4 1858	5 1846	7 1817	10 1750	11 1721	15 1599	15 1585	18 1475
	[4.5]		[16]	[23]	[29]	[36]	[43]	[59]	[89]	[96]	[131]	[134]	[160]
	17		2 1992	3 1979	3 1964	4 1947	5 1929	7 1900	10 1833	11 1808	15 1684	15 1673	18 1553
Max. Continuous													
Max. Intermittent	[5.5]		[12]	[18]	[26]	[33]	[40]	[54]	[83]	[92]	[124]	[129]	[154]
	21		1 2458	2 2437	3 2420	4 2405	5 2387	6 2353	9 2272	10 2255	14 2134	15 2115	17 1994

12.9 cm³/r [0.79 in³/r]
Δ Pressure bar [PSI]

**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	166
Flow LPM [GPM]	[1]	[19]	[43]	[54]	[65]	[76]	[88]	[109]	[154]	[159]	[164]	[214]	[217]	[250]
	4	2 290	5 285	6 281	7 277	9 273	10 268	12 260	17 237	18 234	19 230	24 194	25 189	28 151
	[2]	[16]	[39]	[51]	[63]	[74]	[86]	[109]	[155]	[160]	[165]	[221]	[225]	[263]
	8	2 573	4 566	6 561	7 555	8 549	10 544	12 534	18 501	18 496	19 490	25 442	25 437	30 396
	[3]	[11]	[35]	[47]	[58]	[70]	[82]	[105]	[152]	[157]	[163]	[219]	[223]	[263]
	11	1 859	4 849	5 843	7 838	8 832	9 825	12 810	17 777	18 771	18 763	25 708	25 701	30 652
	[4]	[6]	[30]	[41]	[53]	[64]	[76]	[99]	[146]	[152]	[157]	[214]	[217]	[260]
	15	1 1153	3 1140	5 1135	6 1129	7 1124	9 1117	11 1101	16 1060	17 1051	18 1044	24 982	25 975	29 924
	[5.5]		[19]	[30]	[42]	[54]	[65]	[89]	[136]	[142]	[148]	[205]	[209]	[251]
	21		2 1575	3 1566	5 1556	6 1547	7 1539	10 1521	15 1473	16 1466	17 1457	23 1396	24 1387	28 1330
Max. Continuous														
Max. Intermittent	[6.5]		[11]	[23]	[35]	[46]	[56]	[81]	[130]	[135]	[140]	[198]	[202]	[243]
	25		1 1859	3 1851	4 1842	5 1831	6 1820	9 1804	15 1755	15 1743	16 1734	22 1670	23 1663	27 1599

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

J Series (129-)

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.

 Continuous  Intermittent

B-1

Performance data is typical at 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

		19.8 cm³/r [1.21 in³/r] Δ Pressure bar [PSI]												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	166	
Flow LPM [GPM]	[1]	[32]	[67]	[85]	[102]	[119]	[136]	[170]	[236]	[244]	[253]	[321]	[325]	[374]	
	4	4	8	10	12	13	15	19	27	28	29	36	37	42	
		189	187	186	185	183	182	179	172	170	169	141	138	114	
	[2]	[30]	[65]	[83]	[101]	[119]	[136]	[172]	[223]	[248]	[257]	[328]	[333]	[388]	
	8	3	7	9	11	13	15	19	25	28	29	37	38	44	
		379	375	373	370	368	366	361	351	349	347	312	309	285	
	[3]	[21]	[57]	[75]	[93]	[111]	[128]	[163]	[231]	[240]	[248]	[325]	[330]	[405]	
	11	2	6	8	11	13	14	18	26	27	28	37	37	46	
		569	565	563	560	558	556	551	529	526	523	487	484	459	
	[4]	[12]	[47]	[65]	[83]	[101]	[119]	[154]	[221]	[230]	[239]	[316]	[320]	[382]	
	15	1	5	7	9	11	13	17	25	26	27	36	36	43	
		761	758	754	751	749	746	741	717	711	707	660	656	628	
Max. Continuous	[5.5]		[31]	[49]	[67]	[84]	[101]	[137]	[202]	[211]	[218]	[295]	[299]	[365]	
	21		4	6	8	9	11	15	23	24	25	33	34	41	
			1043	1040	1035	1033	1028	1021	997	993	990	938	934	899	
Max. Intermittent	[6.5]		[21]	[38]	[56]	[74]	[91]	[126]	[189]	[196]	[206]	[278]	[283]	[347]	
	25		2	4	6	8	10	14	21	22	23	31	32	39	
			1226	1222	1219	1215	1211	1204	1179	1174	1169	1121	1117	1079	

		31.6 cm³/r [1.93 in³/r] Δ Pressure bar [PSI]												Max. Continuous	Max. Intermittent
		[200]	[400]	[500]	[600]	[700]	[800]	[1000]	[1450]	[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]			
	4	6	12	15	18	21	24	30	41	42	43	50			
		118	116	115	113	112	111	107	91	85	81	70			
	[2]	[46]	[103]	[132]	[159]	[187]	[214]	[269]	[362]	[374]	[387]	[446]	[546]		
	8	5	12	15	18	21	24	30	41	42	44	50	62		
		236	234	232	230	228	225	221	187	179	175	165	145		
	[3]	[36]	[94]	[122]	[149]	[177]	[205]	[259]	[351]	[364]	[377]	[440]	[542]		
	11	4	11	14	17	20	23	29	40	41	43	50	61		
		355	352	349	347	345	342	336	296	292	287	273	245		
	[4]	[24]	[79]	[107]	[135]	[162]	[190]	[246]	[337]	[349]	[362]	[425]	[528]		
	15	3	9	12	15	18	21	28	38	39	41	48	60		
		474	472	469	466	462	460	452	404	397	393	373	346		
Max. Continuous		[5.5]		[55]	[83]	[111]	[139]	[167]	[221]	[307]	[320]	[334]	[400]	[505]	
21			6	9	13	16	19	25	35	36	38	45	57		
			650	647	645	640	636	629	584	580	575	550	513		
Max. Intermittent		[6.5]		[35]	[64]	[93]	[121]	[150]	[204]	[279]	[294]	[308]	[378]	[485]	
25			4	7	11	14	17	23	32	33	35	43	55		
			767	764	760	755	751	742	712	707	701	675	637		

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



Continuous



Intermittent

B-1

		50.0 cm ³ /r [3.00 in ³ /r] Δ Pressure bar [PSI]											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]										
	4	9 75	19 72	24 72										
	[2]	[70]	[156]	[201]	[243]	[286]	[327]							
	8	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	6 221	16 220	21 218	26 217	31 215	35 213	45 209	50 205	55 201	59 200	62 191		
Max. Continuous	[4]	[30]	[120]	[162]	[204]	[250]	[292]	[374]	[419]	[460]	[501]	[541]	[743]	
	15	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. Intermittent	[5.5]		[81]	[127]	[170]	[214]	[254]	[339]	[379]	[422]	[463]	[506]	[702]	
	21		9 393	14 392	19 389	24 387	29 383	38 377	43 372	48 369	52 364	57 358	79 302	
	[6.5]		[47]	[90]	[133]	[176]	[219]	[307]	[345]	[385]	[429]	[467]	[685]	
	25		5 465	10 462	15 460	20 458	25 455	35 448	39 445	43 440	48 435	53 430	77 364	

[81] } Torque [lb-in]
9 } Nm
393 } Speed RPM

J Series (129-)

Dimensions

Ports

Code: A 9/16-18 UNF-2B SAE O-ring ports, End ported

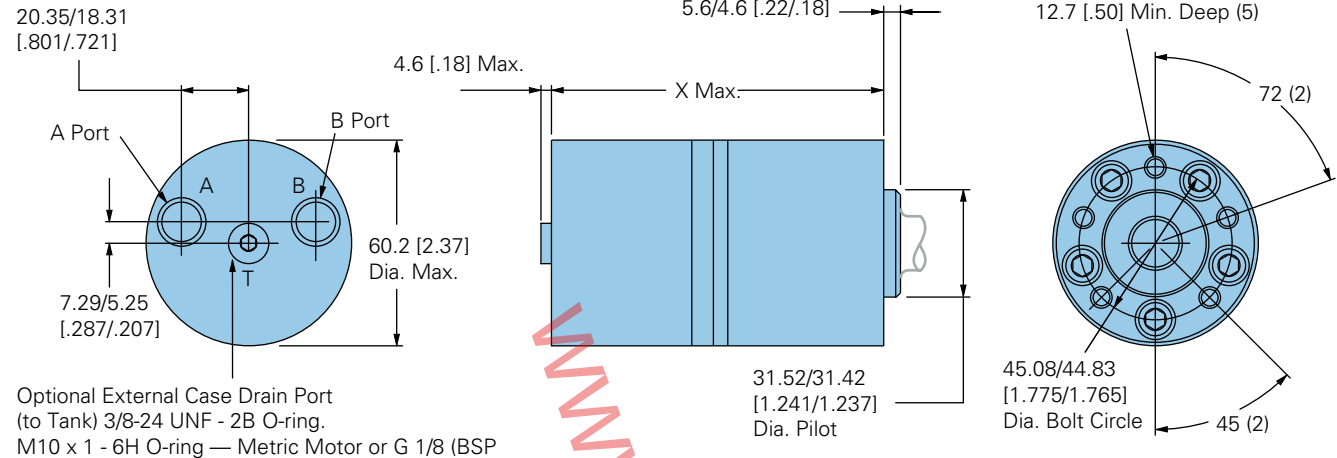
Code: C M14 x 1.5-6H O-ring, End ported

Standard rotation viewed from shaft end

Port A Pressurized — CW

Port B Pressurized — CCW

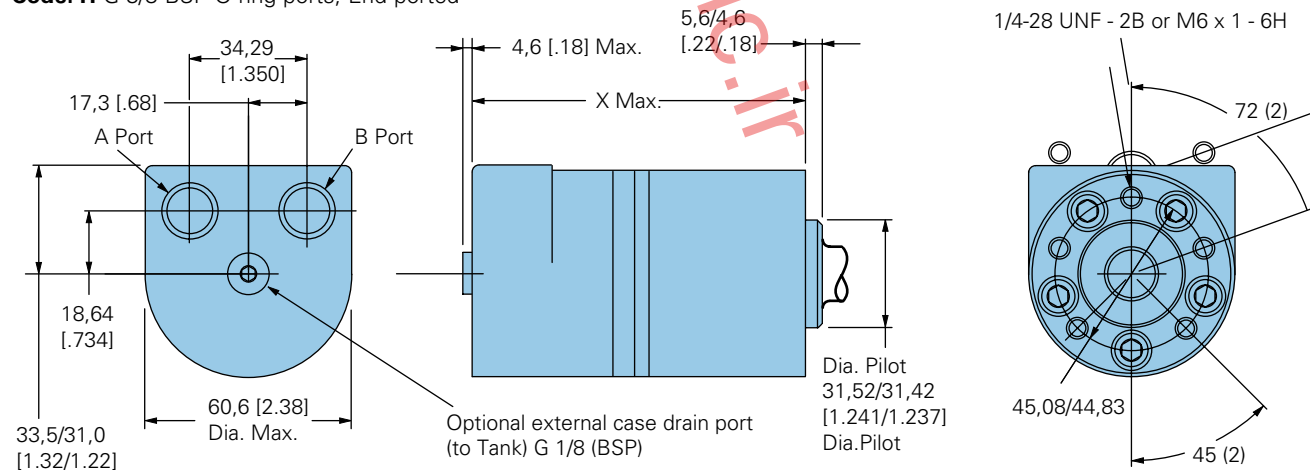
End Port



End port dimensions

Displacement cm ³ /r [in ³ /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]

Code: H G 3/8 BSP O-ring ports, End ported



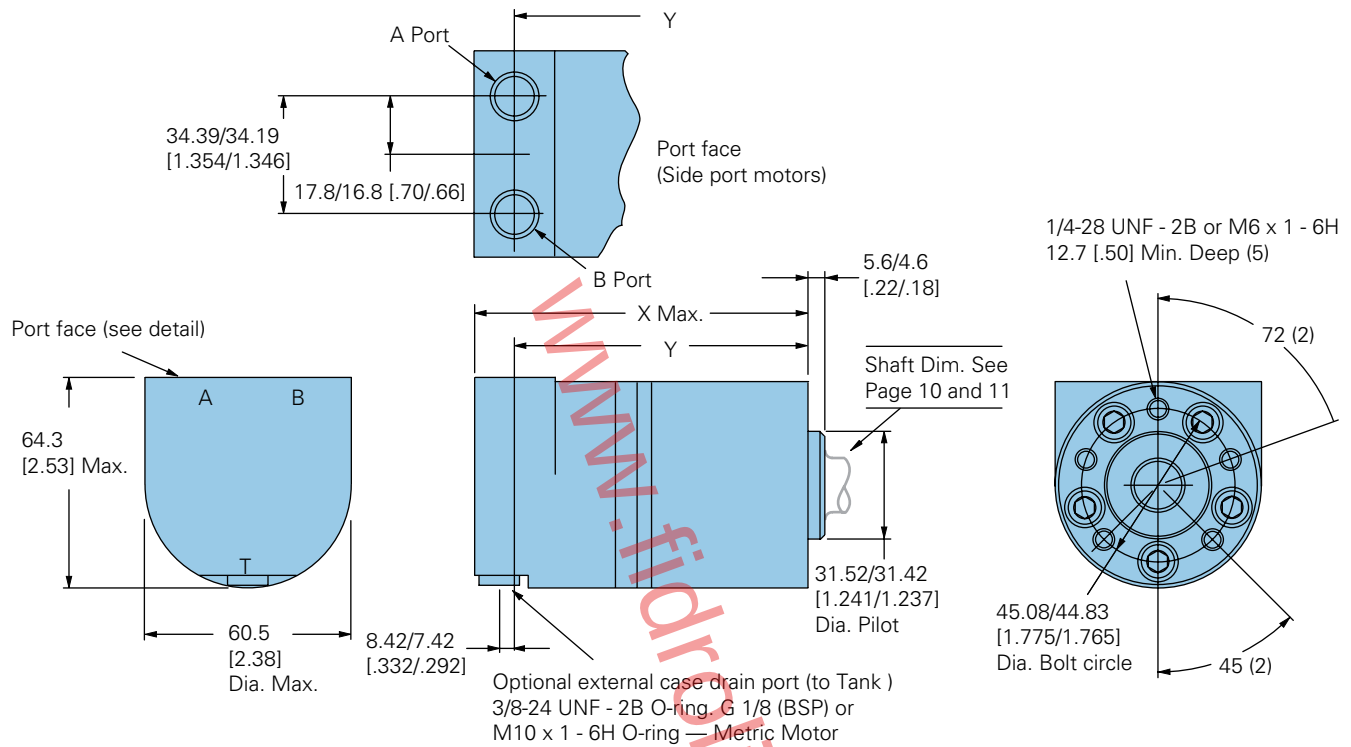
End port dimensions

Displacement cm ³ /r [in ³ /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]

Ports**Code: D** 9/16-18 UNF-2B SAE O-ring ports, Side ported**Code: E** G 3/8 BSP O-ring ports, Side ported**Standard rotation viewed from shaft end**

Port A Pressurized — CW

Port B Pressurized — CCW

B-1**Side port****Side port motors**

Displacement cm ³ /r [in ³ /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]

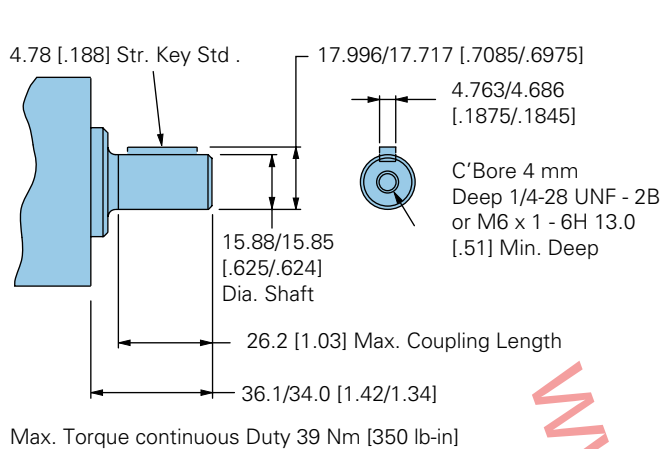
J Series (129-)

Dimensions

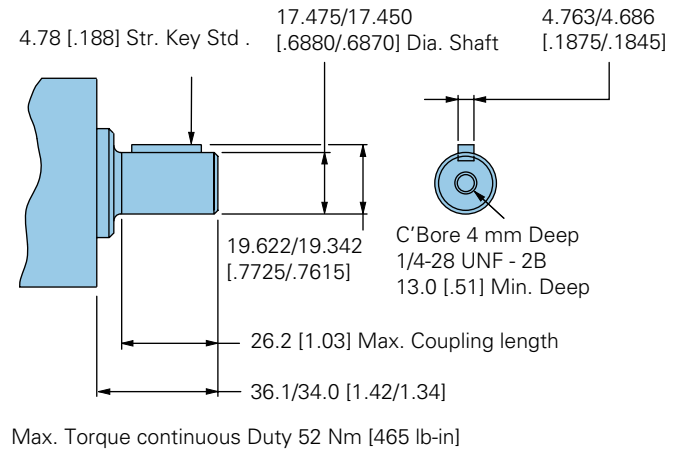
Shafts

B-1

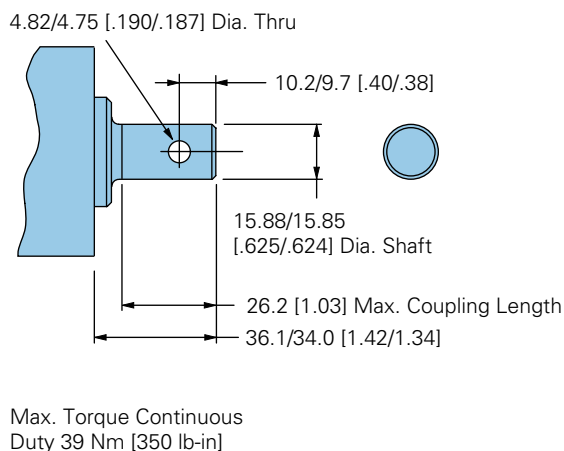
5/8 inch straight keyed



11/16 inch straight keyed

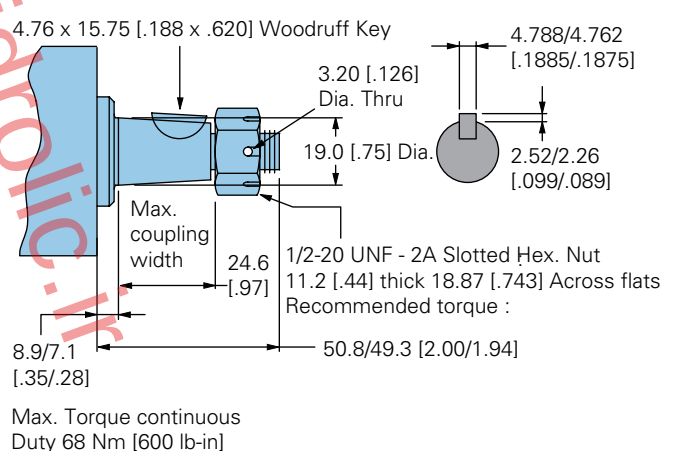


5/8 Inch straight keyed w/crosshole



3/4 inch tapered

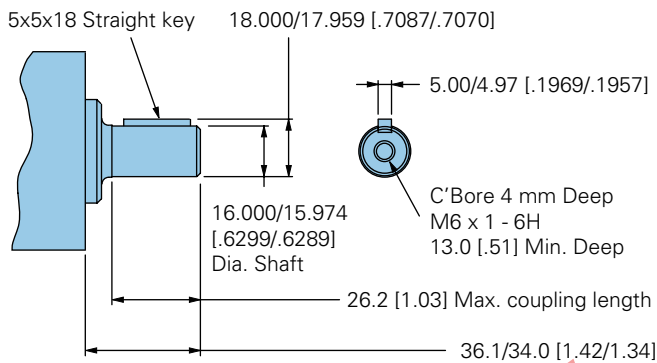
(Tapered shaft end per SAE J744 except as specified - 1.5 : 12 Ratio)



Shafts and flange kit

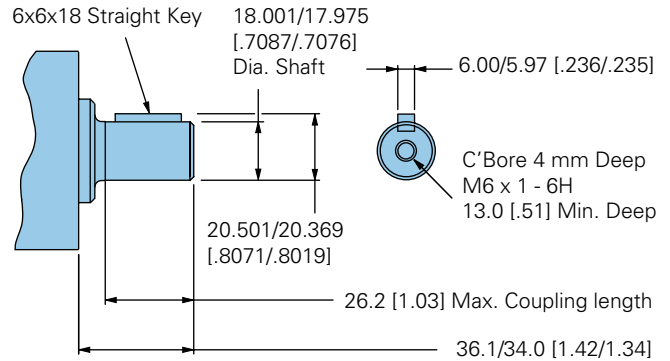
B-1

16 mm Straight keyed



Max. Torque continuous duty 39 Nm [350 lb-in]

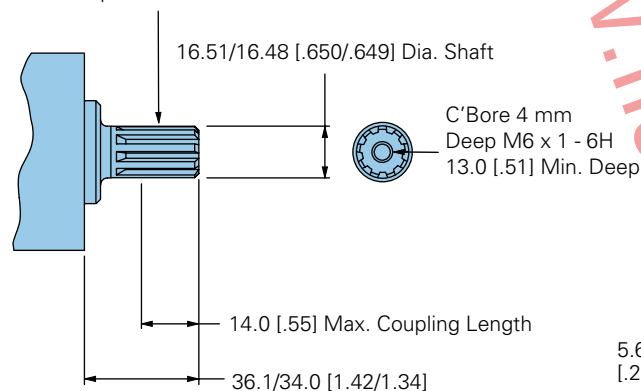
18 mm Straight keyed



Max. Torque continuous duty 58 Nm [510 lb-in]

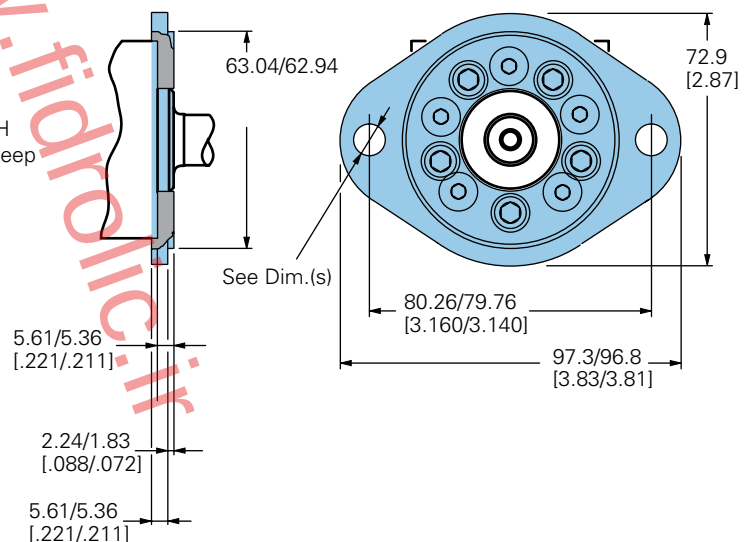
Involute 9T splined — metric

Involute splined shaft external B17x14 DIN 5482



Max. Torque Continuous Duty 44 Nm [390 lb-in]

2 Bolt flange kits (2)



Note: Kit 60552 for 3/8 Dia. Mounting Bolts (10.49/10.24 [.413/.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 [.359/.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.

Orders will not be accepted without three digit prefix.

B-1

End port

Mounting	Shaft	Port size	Displ. cm ³ / r [in ³ / 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	129-0295	-0296	-0297	-0298	-0459
	Splined — Metric	2B O-Ring (2)	129-0009	-0010	—	-0302	-0460
	3/4 inch Tapered		—				
M6 x 1 - 6H	16 mm Straight	M14 x 1,5 -	129-0041	-0042	-0043	-0044	—
	18 mm Straight	6H O-Ring (2)	129-0045	-0046	-0047	-0048	—
	Splined — Metric		129-0045	-0050	-0313	-0052	—
	16 mm Straight		129-0315	-0316	-0317	-0318	-0464
	18 mm Straight	G 1/4 (BSP) (2)	129-0137	-0320	-0321	-0322	—
	Splined — Metric		129-0323	-0324	-0325	-0326	—
	16 mm Straight		129-0327	-0328	-0329	-0330	-0467
	18 mm Straight	G 3/8 (BSP) (2)*	129-0331	—	-0159 or -0649	-0160	—
	Splined — Metric		129-0141	-0336	-0143	—	-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 ³ / r [in ³ / 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	129-0343	-0344	-0345	-0346	-0471
	Splined — Metric	2B O-Ring (2)	129-0347	-0348	-0031	-0350	-0472
	3/4 inch Tapered		129-0481				
M6 x 1 - 6H	16 mm Straight	M14 x 1,5 -	129-0053	-0054	-0055	-0056	-0650
	18 mm Straight	6H O-Ring (2)	—	-0058	-0059	-0060	—
	Splined — Metric		—	—	-0063	—	—
	16 mm Straight		129-0363	-0364	-0365	-0366	—
	18 mm Straight	G 1/4 (BSP) (2)	—	—	—	-0370	-0477
	Splined — Metric		—	—	—	-0370	-0477
	16 mm Straight		129-0371	-0372	-0373	-0374	-0403
	18 mm Straight	G 3/8 (BSP) (2)	129-0375	-0376	-0377	-0378	-0478
	Splined — Metric		129-0379	-0034	-0381	-0036	-0479

Two bolt mounting flange kit (for 3/8 inch mounting bolts) — kit number 60552 (includes 5 screws — 1/4 -28 UNF-2B)

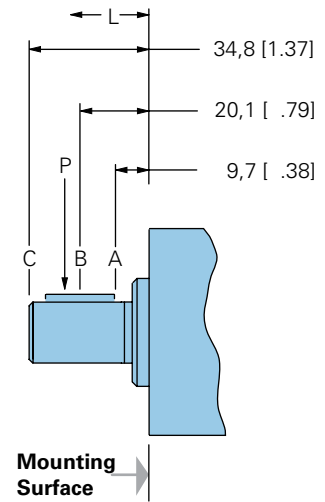
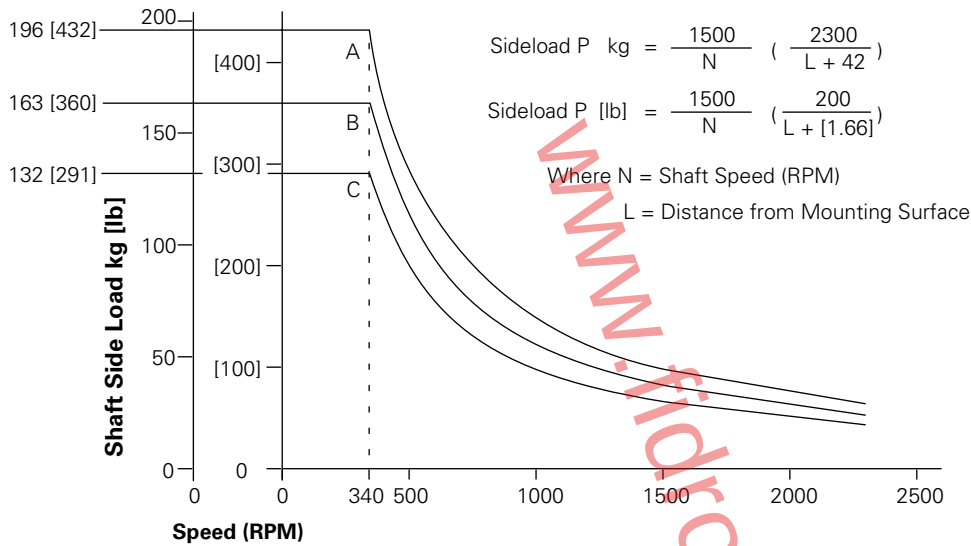
Two bolt mounting flange kit (for M8 mounting bolts) — kit number 60553 (includes 5 screws — M6 x 1-6H)

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.

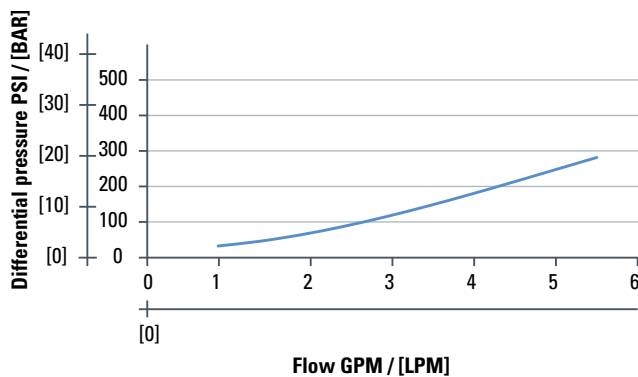
Allowable side load chart, shaft load location drawing (right) and load curves (below) are based on the side or radial loads being applied to shaft at locations A, B, and C, to determine the shaft side load capacity at locations other than those shown use the formula (shown below). For more information 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 NLPD - no load pressure drop



J Series (129-)

Case pressure and case drain

B-1

The J Series 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.

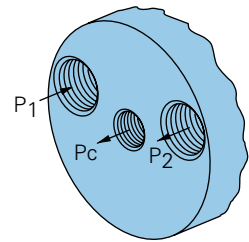
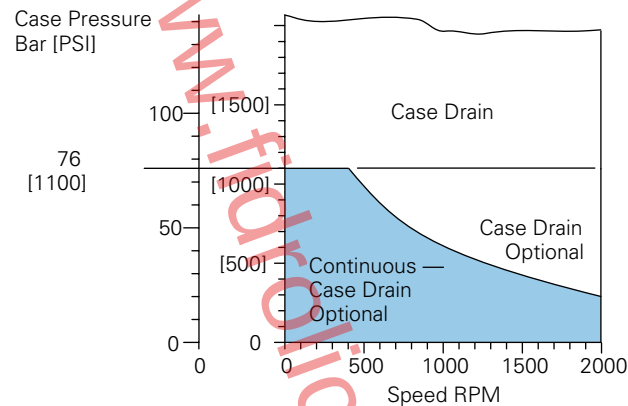
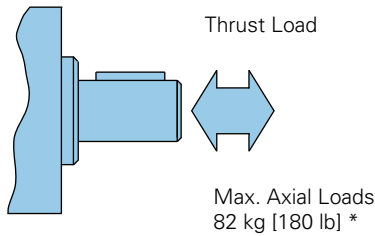
Motor Cooler — exiting oil draws motor heat away.

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].



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.

M	0 J		**		*	**		*	*	**		*	*	0	B
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

1

Product**M** Motor

2

3

Series**0J** J Series

4

5

Displacement cm³/r [in³/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

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 straight key w/ crosshole

9

Ports**A** 9/16 -18 UNF - 2B O-Ring 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**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**08** Digital speed pickup (15 pulse), M12 connector
(A=Power, B=Common, C=Signal)

13

Special features (assembly)**0** None**1** Reverse rotation

14

Paint/special packaging**0** No paint, individual box**A** Low gloss black primer, individual box**B** Environmental coated black**E** Nickel plated motor (excluding shaft)

15

Eaton assigned code when applicable**0** None

16

Eaton assigned design code**B** Two

See Eatonpowersource.com/ for more options and configurations.

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.

B-2



Specifications

Gerotor Element	13 Displacements
Flow l/min [GPM]	61[16] Continuous*** 76 [20] Intermittent**
Speed	Up to 1021 RPM
Pressure bar [PSI]	141[2050] Cont.*** 177[2565] 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



Conveyor



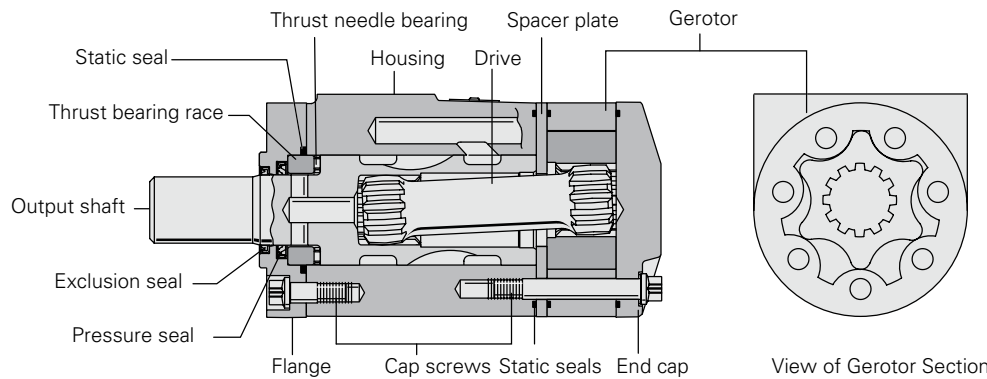
Combine



Sweeper



Salt and sand spreader



Specification data — H motors

Displ. cm ³ /r [in ³ /r]	36	46	59	74	97	120	146	159	185	231	293	370	739
	[2.2]	[2.8]	[3.6]	[4.5]	[5.9]	[7.3]	[8.9]	[9.7]	[11.3]	[14.1]	[17.9]	[22.6]	[45.1]
Max. Speed (RPM) @ continuous flow	1021	969	993	796	620	501	411	377	324	259	205	162	79
Flow LPM [GPM]													
Continuous	38 [10]	45 [12]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]
Intermittent	38 [10]	53 [14]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]
Torque Nm [lb-in]													
Continuous	64 [566]	84 [745]	103 [913]	134 [1189]	176 [1559]	219 [1936]	268 [2370]	275 [2434]	339 [3004]	319 [2821]	351 [3110]	407 [3604]	389 [3440]
Intermittent	81 [715]	106 [937]	130 [1153]	170 [1507]	222 [1962]	276 [2442]	353 [3126]	336 [2974]	426 [3773]	427 [3780]	466 [4121]	484 [4283]	520 [4600]
Min. Starting torque Nm [lb-in]													
@ Cont. Pressure	53 [467]	67 [592]	86 [763]	108 [957]	142 [1253]	175 [1549]	213 [1881]	232 [2050]	271 [2396]	252 [2234]	282 [2500]	330 [2920]	316 [2800]
@ Int. Pressure	68 [599]	87 [770]	111 [983]	139 [1229]	182 [1614]	225 [1988]	275 [2431]	299 [2645]	349 [3090]	347 [3075]	388 [3430]	408 [3610]	434 [3840]
Pressure Δ bar [Δ PSI]													
Continuous	141 [2050]	141 [2050]	141 [2050]	141 [2050]	141 [2050]	141 [2050]	141 [2050]	141 [2050]	141 [2050]	106 [1535]	93 [1350]	86 [1250]	41 [600]
Intermittent	177 [2565]	177 [2565]	177 [2565]	177 [2565]	177 [2565]	177 [2565]	177 [2565]	177 [2565]	177 [2565]	141 [2050]	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]

Maximum case pressure: See case pressure seal limitation graph.

*See shaft torque ratings for limitations.

A simultaneous maximum torque and maximum speed NOT recommended.

Note: To assure best motor life, run motor in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

Maximum inlet pressure:

177 Bar [2565 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

Premium quality, anti-wear type hydraulic oil. Minimum oil viscosity (at operating temperature) should be the highest of the following: 20 cSt [100 SUS] or

$$\left[\begin{array}{l} 300 \times \text{Bar} = \text{SUS} \\ \text{RPM} \\ 20 \times \text{PSI} = \text{SUS} \\ \text{RPM} \end{array} \right]$$

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

Note: Δ pressure is derated for end ported units.

Thermal shock warning:

Do not operate the motor with fluid that is 70°F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (except when switching direction of rotation)

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.

Continuous

Intermittent

B-2

Performance data is typical at 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

		Δ Pressure bar [PSI] 36 cm³/r [2.2 in³/r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2400]	[2565]
		14	28	41	55	69	83	97	110	124	141	166	177
Flow LPM [GPM]	[2]	[49]	[103]	[162]	[216]	[270]	[325]	[379]	[432]	[489]	[556]	[650]	[694]
	8	6	12	18	24	31	37	43	49	55	63	73	78
		204	201	198	194	189	184	177	170	162	146	122	112
	[4]	[47]	[106]	[160]	[217]	[274]	[327]	[384]	[439]	[495]	[561]	[654]	[698]
	15	5	12	18	25	31	37	43	50	56	63	74	79
		408	407	402	399	394	387	381	373	365	348	323	312
	[6]	[44]	[102]	[158]	[215]	[272]	[328]	[383]	[440]	[496]	[565]	[661]	[706]
	23	5	12	18	24	31	37	43	50	56	64	75	80
		613	612	609	604	599	591	586	576	565	549	523	510
	[8]	[40]	[97]	[153]	[212]	[270]	[326]	[383]	[440]	[497]	[566]	[668]	[715]
Max. Continuous	30	5	11	17	24	31	37	43	50	56	64	75	81
		817	817	814	807	799	793	785	776	762	747	721	707
	[10]	[36]	[90]	[148]	[207]	[265]	[322]	[380]	[438]	[495]	[565]	[664]	[713]
	38	4	10	17	23	30	36	43	49	56	64	75	81
		1021	1021	1015	1008	1001	991	981	969	959	944	920	906

[90] } Torque [lb-in]
10 } Nm
1021 } Speed RPM

		Δ Pressure bar [PSI] 46 cm³/r [2.8 in³/r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2400]	[2565]
		14	28	41	55	69	83	97	110	124	141	166	177
Flow LPM [GPM]	[2]	[64]	[136]	[212]	[284]	[355]	[426]	[497]	[567]	[641]	[728]	[852]	[909]
	8	7	15	24	32	40	48	56	64	72	82	96	103
		161	158	156	153	148	145	139	133	127	114	95	87
	[4]	[61]	[139]	[209]	[286]	[359]	[429]	[503]	[576]	[649]	[735]	[857]	[915]
	15	7	16	24	32	41	48	57	65	73	83	97	103
		323	320	316	314	310	304	300	293	287	273	253	245
	[6]	[58]	[134]	[207]	[282]	[356]	[430]	[502]	[577]	[650]	[740]	[867]	[927]
	23	7	15	23	32	40	49	57	65	73	84	98	105
		486	481	479	475	471	464	461	453	444	431	410	401
	[8]	[52]	[128]	[200]	[276]	[354]	[428]	[502]	[577]	[651]	[745]	[876]	[937]
Max. Continuous	30	6	14	23	31	40	48	57	65	74	84	99	106
		648	643	640	635	628	623	617	610	599	586	566	556
	[10]	[47]	[118]	[194]	[269]	[347]	[423]	[498]	[575]	[649]	[742]	[871]	[934]
	38	5	13	22	30	39	48	56	65	73	84	98	106
		808	803	798	793	787	779	771	761	753	741	722	712
Max. Intermittent	[12]	[36]	[109]	[188]	[260]	[340]	[417]	[492]	[567]	[643]	[735]	[864]	[926]
	45	4	12	21	29	38	47	56	64	73	83	98	105
		969	964	960	952	946	938	931	922	914	899	877	867
	[14]	[25]	[98]	[175]	[249]	[327]	[404]	[484]	[559]	[634]	[733]		
	53	3	11	20	28	37	46	55	63	72	83		
		1127	1123	1115	1108	1100	1093	1086	1079	1068	1058		

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous

Intermittent

		Δ Pressure bar [PSI] 59 cm³/r [3.6 in³/r]											Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2400]	[2565]	
		14	28	41	55	69	83	97	110	124	141	166	177	
Flow LPM [GPM]	[2]	[79]	[169]	[260]	[349]	[437]	[526]	[616]	[704]	[796]	[903]	[1055]	[1128]	
	8	9	19	29	39	49	59	70	80	90	102	119	127	
		127	125	123	121	117	114	109	103	96	84	65	56	
	[4]	[76]	[168]	[257]	[349]	[441]	[529]	[620]	[710]	[800]	[910]	[1065]	[1138]	
	15	9	19	29	39	50	60	70	80	90	103	120	129	
		254	254	251	249	246	241	236	230	224	211	193	184	
	[6]	[73]	[161]	[252]	[346]	[439]	[529]	[618]	[709]	[802]	[913]	[1069]	[1143]	
	23	8	18	28	39	50	60	70	80	91	103	121	129	
		381	381	380	377	373	368	364	358	349	338	319	309	
	[8]	[64]	[151]	[243]	[336]	[428]	[519]	[609]	[701]	[794]	[911]	[1076]	[1153]	
	30	7	17	27	38	48	59	69	79	90	103	122	130	
		508	508	508	504	500	496	491	484	476	465	446	436	
	[10]	[57]	[141]	[234]	[327]	[419]	[512]	[602]	[693]	[786]	[905]	[1071]	[1149]	
	38	6	16	26	37	47	58	68	78	89	102	121	130	
		635	635	634	630	626	621	614	608	601	589	571	561	
	[12]	[45]	[131]	[227]	[318]	[409]	[505]	[593]	[684]	[778]	[895]	[1058]	[1138]	
	45	5	15	26	36	46	57	67	77	88	101	120	129	
		762	762	762	757	753	747	741	734	728	714	694	684	
	[14]	[33]	[118]	[213]	[305]	[396]	[492]	[583]	[676]	[770]	[889]	[1055]	[1135]	
	53	4	13	24	34	45	56	66	76	87	100	119	128	
		889	889	887	882	877	872	866	860	851	836	813	803	
	[15]	[29]	[111]	[205]	[297]	[389]	[486]	[576]	[670]	[765]	[885]	[1055]	[1132]	
	57	3	13	23	34	44	55	65	76	86	100	119	128	
		953	953	951	945	940	935	929	921	913	896	872	861	
	[16]	[25]	[108]	[201]	[293]	[384]	[482]	[573]	[666]	[762]	[881]	[1050]	[1129]	
	61	3	12	23	33	43	54	65	75	86	100	119	128	
		993	992	991	991	984	978	972	965	957	944	918	905	
Max. Continuous	[20]	[17]	[98]	[192]	[285]	[377]	[475]	[567]	[660]	[757]	[877]			
Max. Intermittent		2	11	22	32	43	54	64	75	86	99			
	76	1080	1080	1077	1071	1067	1062	1055	1049	1040	1029			

[111] } Torque [lb-in]
13 } Nm
953 } 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.

 Continuous

 Intermittent

B-2

Performance data is typical at 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

		Δ Pressure bar [PSI] 74 cm³/r [4.5 in³/r]												Max. Continuous		Max. Intermittent	
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2400]	[2565]				
		14	28	41	55	69	83	97	110	124	141	166	177				
Flow LPM [GPM]	[2]	[103]	[220]	[339]	[454]	[569]	[685]	[801]	[916]	[1036]	[1175]	[1373]	[1468]				
	8	12	25	38	51	64	77	91	103	117	133	155	166				
		101	99	98	96	93	90	86	81	76	66	51	44				
	[4]	[99]	[219]	[335]	[457]	[574]	[689]	[808]	[925]	[1042]	[1185]	[1386]	[1481]				
	15	11	25	38	52	65	78	91	105	118	134	157	167				
		203	201	199	197	194	191	187	182	177	167	153	147				
	[6]	[94]	[210]	[328]	[451]	[571]	[689]	[805]	[924]	[1044]	[1189]	[1392]	[1489]				
	23	11	24	37	51	65	78	91	104	118	134	157	168				
		305	303	301	298	296	292	288	283	276	267	252	245				
	[8]	[86]	[196]	[319]	[438]	[558]	[676]	[793]	[913]	[1033]	[1186]	[1401]	[1507]				
	30	10	22	36	49	63	76	90	103	117	134	158	170				
		406	404	402	399	396	393	388	383	377	367	352	345				
	[10]	[74]	[183]	[310]	[422]	[545]	[667]	[784]	[903]	[1024]	[1178]	[1394]	[1495]				
	38	8	21	35	48	62	75	89	102	116	133	158	169				
		507	505	502	499	496	492	486	482	476	466	452	445				
	[12]	[58]	[171]	[295]	[408]	[533]	[657]	[773]	[891]	[1013]	[1165]	[1377]	[1477]				
	45	7	19	33	46	60	74	87	101	114	132	156	167				
		608	606	603	600	596	591	587	581	576	565	549	542				
	[14]	[43]	[154]	[277]	[396]	[515]	[640]	[760]	[880]	[1002]	[1157]	[1374]	[1470]				
	53	5	17	31	45	58	72	86	99	113	131	155	166				
		709	706	702	698	694	691	686	681	674	661	643	636				
	[15]	[36]	[145]	[268]	[387]	[506]	[632]	[750]	[873]	[996]	[1153]	[1373]	[1468]				
	57	4	16	30	44	57	71	85	99	113	130	155	166				
		760	757	753	749	744	740	735	729	723	709	690	683				
	[16]	[31]	[138]	[261]	[382]	[500]	[627]	[744]	[869]	[991]	[1150]	[1371]	[1466]				
	61	4	16	29	43	56	71	84	98	112	130	155	166				
		796	793	790	786	782	778	773	768	761	750	734	723				
Max. Continuous		[20]	[14]	[121]	[233]	[351]	[482]	[609]	[725]	[856]	[981]	1140					
Max. Intermittent		76	2	14	26	40	54	69	82	97	111	129					
			904	902	898	895	891	887	882	877	869	861					

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous

Intermittent

B-2

		Δ Pressure bar [PSI] 97 cm³/r [5.9 in³/r]											Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2400]	[2565]	
		14	28	41	55	69	83	97	110	124	141	166	177	
Flow LPM [GPM]	[2]	[134]	[292]	[442]	[593]	[746]	[899]	[1054]	[1209]	[1365]	[1546]	[1806]	[1933]	
	8	15 78	33 76	50 75	67 73	84 71	102 68	119 65	137 61	154 55	175 47	204 33	218 27	
	[4]	[131]	[281]	[436]	[596]	[750]	[903]	[1059]	[1212]	[1367]	[1559]	[1828]	[1955]	
	15	15 156	32 155	49 153	67 151	85 149	102 147	120 143	137 139	154 134	176 126	207 113	221 107	
	[6]	[126]	[269]	[425]	[588]	[747]	[900]	[1054]	[1206]	[1368]	[1556]	[1823]	[1951]	
	23	14 234	30 233	48 231	66 230	84 228	102 224	119 221	136 217	155 210	176 202	206 189	220 182	
	[8]	[110]	[246]	[408]	[566]	[718]	[873]	[1023]	[1177]	[1339]	[1542]	[1829]	[1962]	
	30	12 312	28 311	46 310	64 308	81 305	99 303	116 300	133 295	151 291	174 282	207 269	222 263	
	[10]	[96]	[231]	[392]	[539]	[699]	[859]	[1005]	[1156]	[1318]	[1528]	[1821]	[1956]	
	38	11 390	26 389	44 387	61 385	79 383	97 380	114 376	131 373	149 368	173 359	206 346	221 340	
	[12]	[77]	[218]	[378]	[522]	[681]	[844]	[990]	[1142]	[1301]	[1506]	[1792]	[1925]	
	45	9 468	25 467	43 465	59 463	77 460	95 457	112 453	129 449	147 445	170 435	202 421	217 415	
	[14]	[60]	[197]	[358]	[513]	[662]	[828]	[973]	[1131]	[1293]	[1493]	[1776]	[1906]	
	53	7 546	22 544	40 542	58 539	75 537	94 535	110 531	128 526	146 521	169 512	201 499	215 493	
	[15]	[52]	[189]	[346]	[495]	[651]	[819]	[963]	[1126]	[1286]	[1490]	[1778]	[1899]	
	57	6 585	21 583	39 581	56 578	74 575	93 573	109 569	127 564	145 559	168 550	201 536	215 530	
	[16]	[46]	[181]	[339]	[489]	[643]	[813]	[960]	[1121]	[1283]	[1488]	[1773]	[1893]	
	61	5 620	20 617	38 613	55 610	73 608	92 607	108 601	127 599	145 594	168 585	200 569	214 561	
Max. Continuous		[20]	[25]	[157]	[311]	[455]	[625]	[790]	[941]	[1110]	[1272]	[1482]		
Max. Intermittent		76	3 701	18 700	35 697	51 694	71 691	89 688	106 684	125 681	144 674	167 668		

[189] } Torque [lb-in]
21 } Nm
583 } 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.

 Continuous

 Intermittent

B-2

Performance data is typical at 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

		Δ Pressure bar [PSI] 120 cm³/r [7.3 in³/r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2400]	[2565]
		14	28	41	55	69	83	97	110	124	141	166	177
Flow LPM [GPM]	[2]	[162]	[357]	[544]	[736]	[927]	[1116]	[1305]	[1498]	[1687]	[1913]	[2231]	[2385]
	8	18	40	61	83	105	126	147	169	191	216	252	269
		62	61	61	59	58	55	53	49	45	38	26	21
	[4]	[160]	[348]	[539]	[736]	[930]	[1119]	[1316]	[1506]	[1698]	[1936]	[2268]	[2426]
	15	18	39	61	83	105	126	149	170	192	219	256	274
		125	124	123	121	120	119	116	114	110	102	90	86
	[6]	[155]	[338]	[530]	[729]	[923]	[1116]	[1310]	[1500]	[1699]	[1936]	[2271]	[2432]
	23	18	38	60	82	104	126	148	169	192	219	257	275
		188	187	186	185	183	180	178	175	170	163	152	147
	[8]	[139]	[319]	[515]	[710]	[901]	[1094]	[1283]	[1476]	[1673]	[1925]	[2278]	[2442]
Max. Continuous	30	16	36	58	80	102	124	145	167	189	217	257	276
		250	250	249	247	245	243	241	237	233	226	216	211
	[10]	[121]	[303]	[497]	[686]	[883]	[1081]	[1267]	[1460]	[1655]	[1911]	[2268]	[2433]
	38	14	34	56	78	100	122	143	165	187	216	256	275
		313	312	311	309	308	306	302	300	296	289	278	273
	[12]	[102]	[288]	[480]	[664]	[862]	[1060]	[1246]	[1440]	[1640]	[1885]	[2232]	[2397]
	45	12	33	54	75	97	120	141	163	185	213	252	271
		375	374	373	371	370	367	365	361	358	350	338	333
	[14]	[78]	[263]	[458]	[652]	[841]	[1041]	[1228]	[1420]	[1616]	[1865]	[2213]	[2375]
	53	9	30	52	74	95	118	139	160	183	211	250	268
Max. Intermittent		438	437	435	433	431	430	427	423	419	412	401	396
	[15]	[67]	[253]	[446]	[632]	[828]	[1030]	[1214]	[1411]	[1608]	[1856]	[2205]	[2370]
	57	8	29	50	71	94	116	137	159	182	210	249	268
		469	468	466	464	462	460	458	454	450	442	430	425
	[16]	[59]	[241]	[436]	[619]	[819]	[1020]	[1206]	[1402]	[1602]	[1847]	[2196]	[2363]
	61	7	27	49	70	93	115	136	158	181	209	248	267
		501	499	497	495	493	491	488	485	482	476	465	460
	[20]	[20]	[202]	[384]	[581]	[778]	[971]	[1169]	[1356]	[1559]	1810		
	76	2	23	43	66	88	110	132	153	176	205		
		626	624	621	618	617	614	611	609	606	603		

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.



Continuous



Intermittent

Performance data is typical at 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

B-2

		Δ Pressure bar [PSI] 146 cm³/r [8.9 in³/r]												Max. Continuous	Max. Intermittent	
		[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1700] 117	[1800] 124	[2050] 141	[2300] 159	[2565] 177		
Flow LPM [GPM]	[2] 8	[198] 22 51	[435] 49 50	[664] 75 50	[897] 101 49	[1130] 128 47	[1361] 154 45	[1591] 180 43	[1827] 206 40	[1942] 219 39	[2050] 232 36	2333 264 31	[2611] 295 24	[2911] 329 17		
	[4] 15	[196] 22 103	[424] 48 102	[657] 74 101	[898] 101 99	[1133] 128 99	[1365] 154 97	[1604] 181 95	[1836] 207 93	[1954] 221 92	[2068] 234 89	2359 267 84	[2648] 299 78	[2957] 334 72		
	[6] 23	[189] 21 154	[412] 47 153	[646] 73 152	[889] 100 151	[1125] 127 150	[1361] 154 148	[1598] 181 146	[1829] 207 143	[1951] 220 141	[2066] 233 139	2360 267 134	[2653] 300 128	[2967] 335 121		
	[8] 30	[169] 19 205	[389] 44 205	[628] 71 204	[866] 98 203	[1098] 124 201	[1333] 151 200	[1564] 177 197	[1799] 203 195	[1919] 217 193	[2043] 231 191	2343 265 186	[2649] 299 180	[2969] 335 173		
	[10] 38	[148] 17 257	[369] 42 256	[605] 68 255	[836] 94 253	[1076] 122 252	[1318] 149 251	[1544] 174 248	[1780] 201 246	[1899] 215 244	[2030] 229 242	2370 268 237	[2789] 315 231	[3126] 353 225		
	[12] 45	[125] 14 308	[351] 40 307	[586] 66 306	[810] 92 305	[1051] 119 303	[1293] 146 301	[1519] 172 299	[1756] 198 296	[1878] 212 295	[1999] 226 292	2301 260 287	[2606] 294 281	[2930] 331 275		
	[14] 53	[95] 11 359	[321] 36 358	[558] 63 357	[795] 90 355	[1026] 116 354	[1290] 146 352	[1497] 169 350	[1731] 196 347	[1851] 209 346	[1978] 223 343	2276 257 338	[2580] 292 331	[2895] 327 325		
	[15] 57	[82] 9 385	[308] 35 384	[544] 61 383	[771] 87 381	[1010] 114 379	[1256] 142 378	[1480] 167 375	[1720] 194 373	[1840] 208 371	[1962] 222 368	2264 256 363	[2569] 290 356	[2893] 327 349		
	[16] 61	[76] 9 411	[299] 34 410	[532] 60 408	[765] 86 406	[1003] 113 405	[1249] 141 403	[1475] 167 400	[1710] 193 398	[1832] 207 396	[1955] 221 394	[2245] 254 390	[2547] 288 385	[2873] 325 375		
	Max. Continuous	[20] 76	[24] 3 513	[246] 28 512	[468] 53 509	[708] 80 507	[948] 107 506	[1184] 134 504	[1425] 161 501	[1653] 187 499	[1780] 201 498	1902 215 497	2208 249 494			
Max. Intermittent																

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.

Continuous

Intermittent

B-2

Performance data is typical at 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

		Δ Pressure bar [PSI] 159 cm ³ /r [9.7 in ³ /r]												Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2400]	[2565]		
		14	28	41	55	69	83	97	110	124	141	166	177		
Flow LPM [GPM]	[2]	[209]	[465]	[715]	[973]	[1228]	[1478]	[1724]	[1981]	[2046]	[2401]	[2764]	[2903]		
	8	24	53	81	110	139	167	195	224	231	271	312	328		
		47	46	46	45	44	42	40	38	37	31	23	20		
	[4]	[210]	[460]	[710]	[971]	[1229]	[1480]	[1745]	[1996]	[2059]	[2432]	[2813]	[2959]		
	15	24	52	80	110	139	167	197	226	233	275	318	334		
		94	94	93	91	91	90	89	87	87	82	76	74		
	[6]	[205]	[454]	[704]	[965]	[1216]	[1477]	[1738]	[1991]	[2055]	[2434]	[2824]	[2974]		
	23	23	51	80	109	137	167	196	225	232	275	319	336		
		141	141	140	139	138	136	134	132	132	126	119	116		
	[8]	[186]	[440]	[693]	[951]	[1205]	[1461]	[1716]	[1973]	[2038]	[2417]	[2808]	[2956]		
	30	21	50	78	107	136	165	194	223	230	273	317	334		
		188	188	187	186	185	183	181	179	178	173	166	163		
Max. Continuous	[10]	[164]	[422]	[671]	[930]	[1189]	[1451]	[1702]	[1965]	[2032]	[2404]	[2789]	[2938]		
	38	19	48	76	105	134	164	192	222	230	272	315	332		
		235	234	234	232	230	228	226	225	220	213	210			
	[12]	[144]	[404]	[652]	[900]	[1163]	[1421]	[1674]	[1937]	[2004]	[2379]	[2770]	[2922]		
	45	16	46	74	102	131	161	189	219	226	269	313	330		
		282	281	281	279	279	277	275	273	272	267	260	257		
	[14]	[109]	[374]	[623]	[883]	[1140]	[1396]	[1653]	[1900]	[1963]	[2342]	[2727]	[2873]		
	53	12	42	70	100	129	158	187	215	222	265	308	325		
		330	329	328	327	325	323	322	319	319	313	306	304		
	[15]	[92]	[359]	[612]	[861]	[1123]	[1381]	[1633]	[1886]	[1950]	[2326]	[2712]	[2847]		
	57	10	41	69	97	127	156	185	213	220	263	306	322		
		353	352	351	350	348	347	345	343	342	337	330	328		
Max. Intermittent	[16]	[87]	[344]	[591]	[848]	[1108]	[1366]	[1624]	[1877]	[1938]	[2299]	[2665]	[2808]		
	61	10	39	67	96	125	154	183	212	219	260	301	317		
		377	376	374	373	372	370	368	366	365	361	356	354		
	[20]	[26]	[268]	[510]	[772]	[1034]	[1290]	[1553]	[1802]	[1865]	[2179]				
		3	30	58	87	117	146	175	204	211	246				
	76	471	470	467	465	464	462	460	458	458	456				

[359]

41

352

} Torque [lb-in]
Nm
Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous

 Intermittent

		Δ Pressure bar [PSI] 185 cm³/r [11.3 in³/r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2050]	[2150]	[2565]
		14	28	41	55	69	83	97	110	124	141	148	177
Flow LPM [GPM]	[2]	[257]	[554]	[847]	[1150]	[1447]	[1739]	[2035]	[2320]	[2607]	[2963]	[3103]	
	8	29	63	96	130	163	196	230	262	295	335	351	
		40	40	39	38	37	36	33	29	23	16	12	
	[4]	[254]	[546]	[845]	[1145]	[1448]	[1744]	[2049]	[2343]	[2635]	[3003]	[3147]	[3758]
	15	29	62	95	129	164	197	232	265	298	339	356	425
		81	81	80	79	78	77	76	74	70	66	63	55
	[6]	[246]	[540]	[834]	[1137]	[1434]	[1736]	[2036]	[2337]	[2631]	[3004]	[3151]	[3773]
	23	28	61	94	128	162	196	230	264	297	339	356	426
		121	121	120	120	119	117	115	112	108	103	100	89
	[8]	[224]	[520]	[820]	[1117]	[1414]	[1716]	[2014]	[2315]	[2611]	[2985]	[3133]	[3754]
	30	25	59	93	126	160	194	228	262	295	337	354	424
		162	162	161	160	159	157	155	152	148	143	140	129
	[10]	[202]	[499]	[793]	[1095]	[1394]	[1699]	[1997]	[2299]	[2593]	[2966]	[3112]	[3733]
	38	23	56	90	124	158	192	226	260	293	335	352	422
		202	202	201	201	200	198	196	193	189	184	181	170
	[12]	[176]	[475]	[767]	[1063]	[1368]	[1664]	[1969]	[2268]	[2565]	[2940]	[3088]	[3715]
	45	20	54	87	120	155	188	222	256	290	332	349	420
		243	242	242	241	240	238	236	234	230	225	222	212
	[14]	[140]	[443]	[735]	[1035]	[1340]	[1637]	[1936]	[2227]	[2529]	[2902]	[3051]	[3667]
	53	16	50	83	117	151	185	219	252	286	328	345	414
		283	283	282	281	280	279	277	274	270	265	262	252
	[15]	[120]	[425]	[719]	[1014]	[1320]	[1618]	[1914]	[2205]	[2510]	[2885]	[3023]	[3648]
	57	14	48	81	115	149	183	216	249	284	326	342	412
		304	303	302	301	300	299	297	294	290	286	283	274
	[16]	[108]	[407]	[700]	[998]	[1301]	[1598]	[1895]	[2185]	[2490]	[2863]	[3012]	[3630]
	61	12	46	79	113	147	181	214	247	281	323	340	410
		324	323	322	321	320	318	316	314	312	308	306	295
	[20]	[27]	[321]	[612]	[911]	[1211]	[1504]	[1795]	[2070]	[2387]	[2756]		
	76	3	36	69	103	137	170	203	234	270	311		
		405	404	402	401	400	398	397	395	394	389		
Max. Continuous													
Max. Intermittent													

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.



Continuous



Intermittent

B-2

Performance data is typical at 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

		Δ Pressure bar [PSI] 231 cm ³ /r [14.1 in ³ /r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1450]	[1535]	[2000]	[2050]	
		14	28	41	55	69	83	97	100	106	138	141	
Flow LPM [GPM]	[2]	[338]	[707]	[1074]	[1456]	[1827]	[2192]	[2572]	[2657]	[2819]			
	8	38	80	121	165	206	248	291	300	319			
		32	32	31	30	30	28	26	25	24			
	[4]	[328]	[695]	[1076]	[1447]	[1827]	[2201]	[2577]	[2669]	[2821]	[3671]	[3780]	
	15	37	79	122	163	206	249	291	302	319	415	427	
		65	65	64	63	62	62	60	60	58	50	49	
	[6]	[317]	[687]	[1057]	[1434]	[1811]	[2186]	[2555]	[2650]	[2806]	[3668]	[3766]	
	23	36	78	119	162	205	247	289	299	317	414	426	
		97	97	97	96	95	94	92	91	89	80	78	
	[8]	[289]	[659]	[1038]	[1406]	[1777]	[2160]	[2531]	[2625]	[2781]	[3644]	[3742]	
	30	33	74	117	159	201	244	286	297	314	412	423	
		130	130	130	129	128	127	124	124	122	112	112	
	[10]	[265]	[631]	[1004]	[1381]	[1751]	[2131]	[2510]	[2602]	[2753]	[3608]	[3713]	
	38	30	71	113	156	198	241	284	294	311	408	420	
		162	162	162	162	160	158	156	156	154	145	144	
	[12]	[230]	[599]	[968]	[1345]	[1722]	[2088]	[2480]	[2571]	[2718]	[3571]	[3678]	
	45	26	68	109	152	195	236	280	290	307	403	416	
		195	195	194	194	193	192	189	189	187	178	172	
	[14]	[191]	[563]	[927]	[1299]	[1686]	[2058]	[2428]	[2519]	[2675]	[3532]	[3633]	
	53	22	64	105	147	190	233	274	285	302	399	410	
		227	227	227	226	226	224	222	221	220	212	210	
	[15]	[167]	[538]	[904]	[1279]	[1661]	[2030]	[2404]	[2493]	[2645]	[3488]	[3598]	
	57	19	61	102	145	188	229	272	282	299	394	407	
		243	243	243	242	242	240	238	238	236	229	228	
	[16]	[143]	[517]	[887]	[1258]	[1634]	[2002]	[2369]	[2462]	[2611]	[3444]	[3557]	
	61	16	58	100	142	185	226	268	278	295	389	402	
		259	259	259	258	258	256	254	253	252	245	244	
	[20]	[29]	[411]	[785]	[1152]	[1520]	[1877]	[2222]	[2318]	[2462]			
	76	3	46	89	130	172	212	251	262	278			
		324	324	323	322	322	320	319	318	318			
Max. Continuous													
Max. Intermittent													

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

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



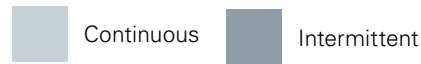
		Δ Pressure bar [PSI] 293 cm³/r [17.9 in³/r]						Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1350]	[1800]
		14	28	41	55	69	83	93	124
Flow LPM [GPM]	[2]	[427]	[893]	[1361]	[1829]	[2293]	[2672]	[2977]	
	8	48	101	154	207	259	302	336	
		26	25	25	24	22	16	13	
	[4]	[419]	[886]	[1362]	[1833]	[2305]	[2771]	[3110]	[4107]
	15	47	100	154	207	260	313	351	464
		51	51	51	50	49	47	44	22
	[6]	[402]	[872]	[1342]	[1819]	[2291]	[2757]	[3098]	[4121]
	23	45	99	152	206	259	312	350	466
		77	77	76	76	74	71	68	54
	[8]	[367]	[838]	[1316]	[1785]	[2252]	[2723]	[3070]	[4086]
Max. Continuous	30	41	95	149	202	254	308	347	462
		102	102	102	101	100	98	95	84
	[10]	[332]	[803]	[1276]	[1749]	[2215]	[2684]	[3034]	[4061]
	38	38	91	144	198	250	303	343	459
		128	128	128	127	126	123	120	108
	[12]	[289]	[760]	[1230]	[1706]	[2177]	[2634]	[2989]	[4012]
	45	33	86	139	193	246	298	338	453
		153	153	153	153	151	149	146	135
	[14]	[241]	[712]	[1176]	[1650]	[2126]	[2592]	[2935]	[3963]
	53	27	80	133	186	240	293	332	448
Max. Intermittent		179	179	179	179	177	175	172	161
	[15]	[211]	[683]	[1149]	[1623]	[2096]	[2558]	[2905]	[3914]
	57	24	77	130	183	237	289	328	442
		192	192	192	191	190	188	185	174
	[16]	[182]	[657]	[1128]	[1598]	[2066]	[2534]	[2884]	[3886]
	61	21	74	127	181	233	286	326	439
		205	205	204	204	203	201	198	189
	[20]	[43]	[527]	[1001]	[1463]	[1919]	[2375]	[2720]	
	76	5	60	113	165	217	268	307	
		256	256	255	255	254	252	249	

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



B-2

		Δ Pressure bar [PSI] 370 cm³/r [22.6 in³/r]						Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1250]	[1500]
		14	28	41	55	69	83	86	103
Flow LPM [GPM]	[2]	[537]	[1121]	[1715]	[2285]	[2862]			
	8	61	127	194	258	323			
		20	20	20	19	16			
	[4]	[532]	[1123]	[1715]	[2308]	[2893]	[3467]	[3604]	[4274]
	15	60	127	194	261	327	392	407	483
		40	40	40	39	38	36	35	27
	[6]	[508]	[1100]	[1693]	[2294]	[2884]	[3458]	[3598]	[4283]
	23	57	124	191	259	326	391	407	484
		61	61	61	60	58	55	53	47
	[8]	[463]	[1060]	[1661]	[2255]	[2840]	[3414]	[3557]	[4254]
Max. Continuous	30	52	120	188	255	321	386	402	481
		81	81	81	80	79	76	74	68
	[10]	[414]	[1017]	[1613]	[2203]	[2788]	[3363]	[3506]	[4212]
	38	47	115	182	249	315	380	396	476
		101	101	101	101	99	96	94	88
	[12]	[363]	[960]	[1553]	[2152]	[2737]	[3305]	[3446]	[4152]
	45	41	108	175	243	309	373	389	469
		121	121	121	121	119	116	115	109
	[14]	[303]	[897]	[1484]	[2086]	[2667]	[3246]	[3386]	[4092]
	53	34	101	168	236	301	367	383	462
Max. Intermittent		142	142	142	142	140	137	136	130
	[15]	[266]	[862]	[1452]	[2050]	[2630]	[3206]	[3347]	[4054]
	57	30	97	164	232	297	362	378	458
		152	152	152	152	150	148	147	140
	[16]	[230]	[832]	[1426]	[2020]	[2597]	[3168]	[3307]	[4010]
	61	26	94	161	228	293	358	374	453
		162	162	162	162	161	158	157	151
	[20]	[61]	[671]	[1269]	[1847]	[2410]	[2987]	[3119]	
		7	76	143	209	272	337	352	
	76	202	202	202	202	202	199	198	

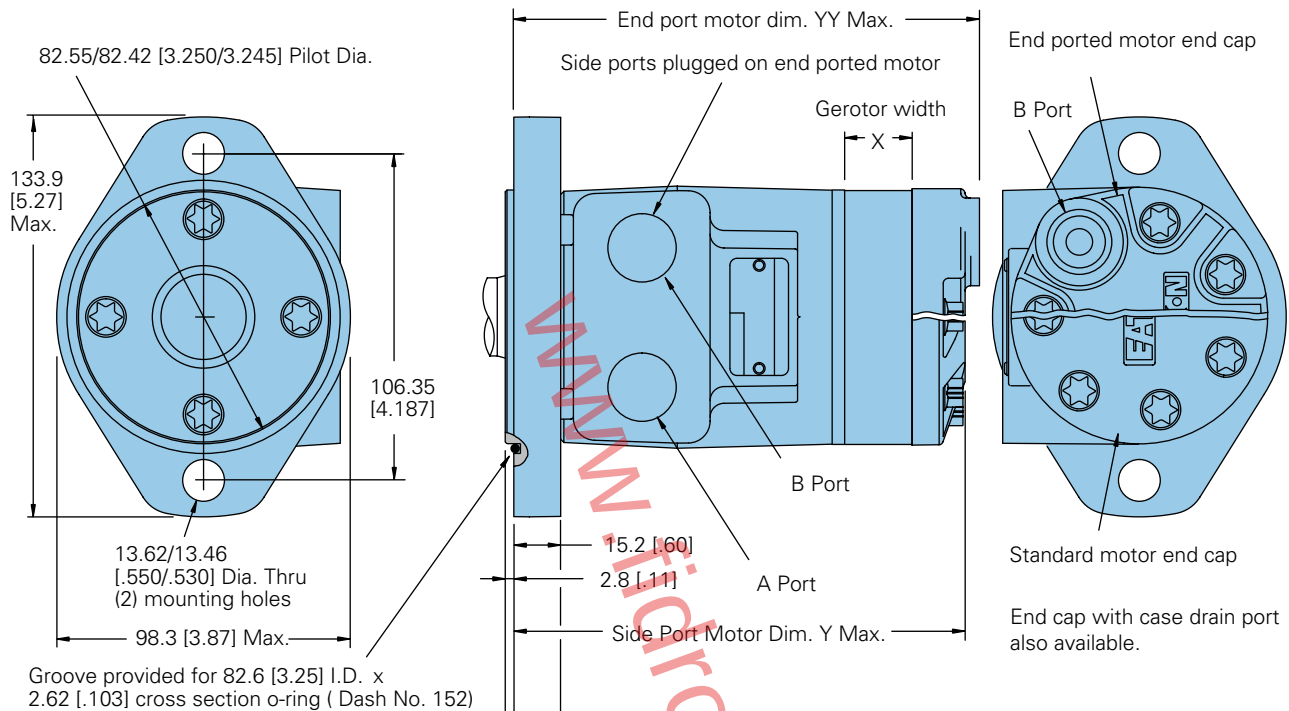
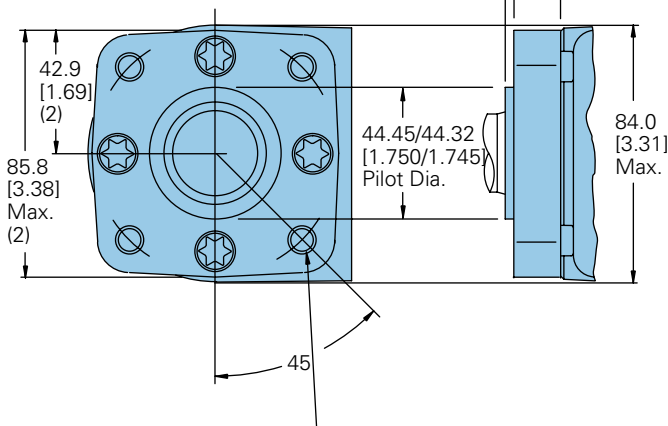
[862] } Torque [lb-in]
 97 } Nm
 152 } Speed RPM

		Δ Pressure bar [PSI] 739 cm³/r [45.1 in³/r]				Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]		
		14	28	41	55		
Flow LPM [GPM]	[2]	[1080]	[2250]	[3440]	[4570]		
	8	122	254	389	516		
		10	10	10	9		
	[4]	[1070]	[2250]	[3440]	[4600]		
	15	121	254	389	520		
		20	20	19	18		
	[6]	[1020]	[2200]	[3390]	[4590]		
	23	115	249	383	519		
		30	30	29	27		
	[8]	[945]	[2135]	[3330]	[4515]		
Max. Continuous	30	107	241	376	510		
		40	40	39	37		
	[10]	[840]	[2050]	[3250]	[4430]		
	38	95	232	367	501		
		50	50	48	46		
	[12]	[740]	[1945]	[3130]	[4320]		
	45	84	220	354	488		
		60	59	58	55		
	[14]	[630]	[1820]	[3005]	[4195]		
	53	71	206	340	474		
Max. Intermittent		69	68	68	66		
	[15]	[540]	[1735]	[2905]	[4130]		
	57	61	196	328	467		
		74	74	73	72		
	[16]	[478]	[1681]	[2860]	[4060]		
	61	54	190	323	459		
		79	79	78	77		
	[20]	[143]	[1350]	[2565]	[3705]		
		16	153	290	419		
	76	99	98	97	96		

Standard rotation viewed from shaft end

Port A pressurized — CW

Port B pressurized — CCW

Note: Mounting surface flatness requirement is 13 mm [.005 inch] Max.**Note:** End ported motor pressure is derated. Reference page B-2-18 for ratings.**Code: AA 2 Bolt flange****Code: BA 4 Bolt flange****2 and 4 bolt flange**

Displacement cm ³ /r [in ³ /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]	

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

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

B-2

Shaft	Port size	Displ. cm³/ r [in³/ r] / product number													
		36	46	59	74	97	120	146	159	185	231	293	370	740	
		[2.2]	[2.8]	[3.6]	[4.5]	[5.9]	[7.3]	[8.9]	[9.7]	[11.3]	[14.1]	[17.9]	[22.6]	[45.0]	
1 in. Straight w/ Woodruff key	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	—	—	—	—	—	—	—	
	Manifold*	101-1811	-1812	-1813	-1814	-1815	-1816	—	-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. cm³/ r [in³/ r] / product number													
		36	46	59	74	97	120	146	159	185	231	293	370	740	
		[2.2]	[2.8]	[3.6]	[4.5]	[5.9]	[7.3]	[8.9]	[9.7]	[11.3]	[14.1]	[17.9]	[22.6]	[45.0]	
1 in. Straight w/ Woodruff key 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	-1762	-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	—	-1847	—	—	—	—	—	
	Manifold*	101-1811	-1466	-1849	-1459	-1850	—	-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	-1824	-1312	-1314	-1863	-1827	-1315	—	—	—	—	—	
	Manifold*	101-1829	-1305	-1830	-1306	-1307	-1833	-1868	-1871	—	—	—	—	—	

101-1834

4 Bolt Flange with corrosion protection

Shaft	Port size	Displ. cm ³ / r [in ³ / r] / product number												
		36	46	59	74	97	120	146	159	185	231	293	370	740
		[2.2]	[2.8]	[3.6]	[4.5]	[5.9]	[7.3]	[8.9]	[9.7]	[11.3]	[14.1]	[17.9]	[22.6]	[45.0]
1 in. Straight w/ Woodruff key O-Ring	1/2 NPTF	101-2032	-2014	—	—	—	—	—	-2015	-2028	—	-2030	-2031	—
	Manifold*	—	-2067	—	—	-2223	—	—	-2151	—	—	—	—	—

* 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-2-32 to specify the product in detail.

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.

B-2

M	H 0		***			**		**		**		**		*	*	**		**		00		**		*	**		00		J
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

1	Product
M	Motor
2 3	Series
H0	H Motor
4 5 6	Displacement cm³/r [in³/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 the displacement code "022", "035", or "451" must also specify free running gerotor. (option "A" in position 15).

7 8	Mounting type
AA	2 Bolt (standard) 82.50 [3.248] Dia. x 3.05 [.120] pilot, 13.59 [.535] Dia. mounting holes on 106.35 [4.187] Dia. B.C.
BA	4 Bolt (standard) 44.40 [1.748] Dia. x 3.05 [.120] pilot, .375-16 UNC-2B mounting holes on 82.55 [3.250] Dia. B.C.
DD	2 Bolt (standard) 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)
FA	4 Bolt (standard) 44.40 [1.748] Dia. x 3.05 [.120] pilot, M10 x 1.5-6H mounting holes on 82.55 [3.250] Dia. B.C.
MA	2 Bolt (standard) 82.50 [3.248] Dia. x 8.13 [.320] 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
08	25.4 [1.00] Dia. Straight, 10.31 [.406] Dia. Cross hole 15.7 [.62] from End, .250-20 UNC-2B hole in shaft end
16	22.22 [.875] Dia. SAE 13 Tooth Spline (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
39	25.00 [.984] Dia. Straight (k6), 8.00 [.315] 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
††	End ported motor pressure is derated.
Note	Reference page B-2-18 for ratings.

13 14	Case flow options
00	None
01	.4375-20 UNF-2B SAE o-ring port (end cap)
02	G 1/4 BSP straight THD port (end cap)
A	Internal check valves

15	Gerotor options
0	None
A	Free running

Model code

B-2

16	Shaft options		23 24	Special features (hardware)
	0	None		00 None
	N	Electroless nickel plated		AB Low speed valving
17 18	Seal options			JM Low flow housing and low speed valving
	00	Standard seals		EX ATEX certification
	02	Seal guard	25	Special features (assembly)
	03	Viton seals		0 None
	07	High pressure shaft seal		1 Reverse rotation
	A	Extreme duty shaft seal		2 Flange rotated 90°
19 20	Speed sensor options		26 27	Paint/special packaging
	00	None		00 No paint
	AA	Digital speed pickup (15 pulse), M12 connector (A=Power, B=Common, C=Signal)		AA Low gloss black primer
	AB	Magnetic speed pickup (60 pulse by quadrature), with M12 connector (A=Power, B=Common, C=Signal)		AF Environmental coated black
	AE	Digital Speed Pickup (15 pulse), 127 [5.0] lead wire with weather pack shroud connector (A=Power, B=Signal, C=Common)		AY Nickel plated motor (excluding shaft)
21 22	Manifold block options		28 29	Eaton assigned code when applicable
	00	None		00 None
	*	Contact your Eaton sales representative for available options.	30	Eaton assigned design code
				J Nine

See Eatonpowersource.com/ for more options and configurations.

Description

The Char-Lynn S Series motors with optimized Geroler geometry offers enhanced performance with reduced drive-running angle while retaining a compact package size. Design features include a steel end cap and optimized Geroler set for high performance. 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. The S Series motor provides reliable leak-free performance and smooth operation at start-up conditions.



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

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:

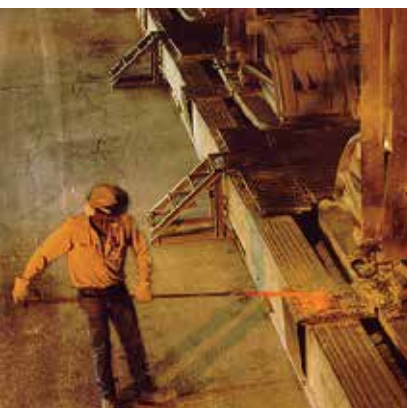
- Agricultural augers, harvesters, seeders
- Car wash brushes
- Food processing
- Railroad maintenance equipment
- Machine tools
- Conveyors
- Industrial sweepers and floor polishers
- Saw mill works
- Turf equipment
- Concrete and asphalt equipment
- Skid steer attachments

Specifications

Geroler element	10 Displacements
Flow l/min [GPM]	55 [15] Continuous*** 75 [20] Intermittent**
Speed	Up to 960 RPM
Pressure bar [PSI]	135 [2000] Cont.*** 170 [2500] Inter.**
Torque Nm [lb-in]	465 [4112] Cont.*** 530 [4687] Inter.**

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

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



Casting



Conveyor



Amusement ride

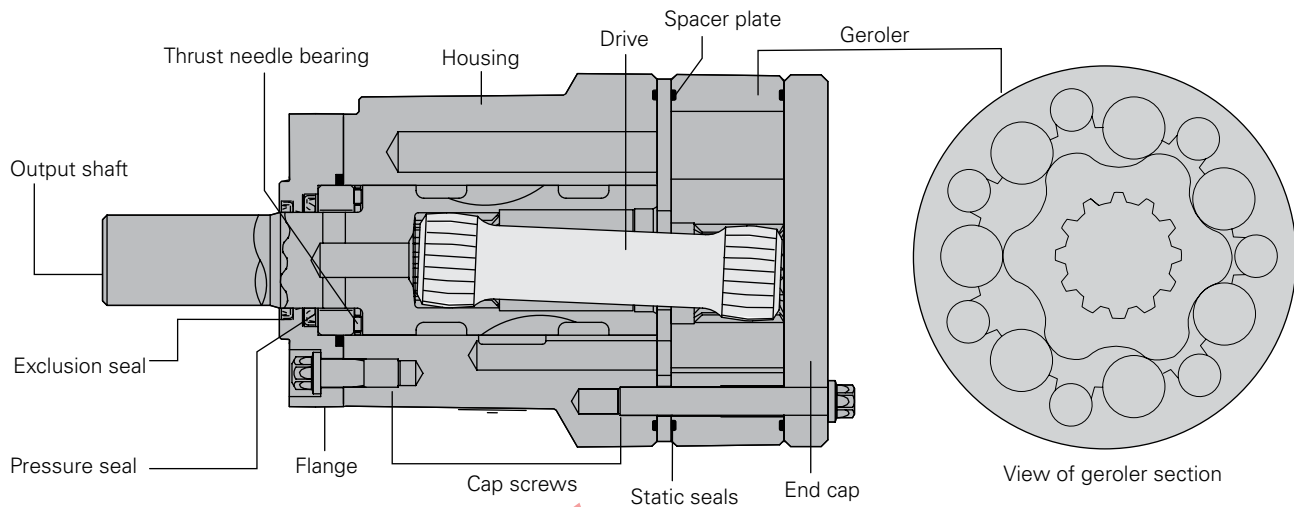


Combine

S Series (103-)

Specifications

B-3



Specification data — S motors

Displ. cm³/r [in³/r]		59	75	97	120	144	166	187	225	298	372
		[3.6]	[4.6]	[5.7]	[7.3]	[8.8]	[10.1]	[11.4]	[13.7]	[18.2]	[22.7]
Max. Speed (RPM) @ continuous flow		960	741	602	469	389	341	304	253	190	153
Flow LPM [GPM]	Continuous	57	57	57	57	57	57	57	57	57	57
		[15]	[15]	[15]	[15]	[15]	[15]	[15]	[15]	[15]	[15]
	Intermittent	68	76	76	76	76	76	76	76	76	76
		[18]	[20]	[20]	[20]	[20]	[20]	[20]	[20]	[20]	[20]
Torque Nm [lb-in]	Continuous	114	147	182	233	266	304	331	369	433	465
		[1011]	[1297]	[1610]	[2059]	[2358]	[2692]	[2932]	[3265]	[3835]	[4112]
	Intermittent	143	184	227	289	327	366	400	440	512	530
		[1264]	[1628]	[2012]	[2559]	[2894]	[3239]	[3539]	[3894]	[4536]	[4687]
Min. Starting torque @ Cont. Pressure Nm[lb-in]		90	113	148	184	212	232	263	302	338	369
		[800]	[1000]	[1310]	[1630]	[2050]	[2330]	[2670]	[2990]	[3270]	[3270]
	@ Int. Pressure	116	146	190	236	271	289	329	374	417	438
		[1030]	[1290]	[1680]	[2090]	[2400]	[2560]	[2910]	[3310]	[3690]	[3880]
Pressure Δ Bar [Δ PSI]	Continuous	138	138	138	138	131	131	128	117	103	90
		[2000]	[2000]	[2000]	[2000]	[1900]	[1900]	[1850]	[1700]	[1500]	[1300]
	Intermittent	172	172	172	172	162	159	155	141	124	103
		[2500]	[2500]	[2500]	[2500]	[2350]	[2300]	[2250]	[2050]	[1800]	[1500]
Weight kg [lbs]		6.1	6.2	6.4	6.6	6.8	6.9	7.1	7.4	7.9	8.4
		[13.4]	[13.7]	[14.1]	[14.6]	[15.0]	[15.2]	[15.7]	[16.3]	[17.4]	[18.5]

Maximum case pressure: See case pressure seal limitation graph.

*See shaft torque ratings for limitations.

A simultaneous maximum torque and maximum speed NOT recommended.

Note: To assure best motor life, run motor in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

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 operating 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 13 cSt [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

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (expect when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



		Δ Pressure bar [PSI] S Motor 59 cm ³ /r [3.6 in ³ /r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]	
		14	28	41	55	69	83	97	110	124	138	172	
Flow LPM [GPM]	[2]	[86]	[190]	[292]	[390]	[484]	[578]	[662]	[729]	[764]	[803]		
	8	10	22	33	44	55	65	75	82	86	91		
		126	121	115	107	97	85	75	63	45	24		
	[4]	[79]	[185]	[289]	[395]	[498]	[600]	[702]	[804]	[903]	[998]	[1156]	
	15	9	21	33	45	56	68	79	91	102	113	131	
		256	250	243	235	224	212	199	183	166	147	89	
	[6]	[71]	[177]	[280]	[387]	[495]	[602]	[704]	[808]	[909]	[1011]	[1257]	
	23	8	20	32	44	56	68	80	91	103	114	142	
		383	377	369	360	349	336	320	302	284	266	207	
	[8]	[62]	[166]	[274]	[379]	[488]	[594]	[699]	[806]	[907]	[1007]	[1264]	
Max. Continuous	30	7	19	31	43	55	67	79	91	102	114	143	
		514	508	500	490	477	464	448	430	409	390	333	
	[10]	[52]	[155]	[264]	[369]	[475]	[583]	[686]	[793]	[897]	[1000]	[1257]	
	38	6	17	30	42	54	66	78	90	101	113	142	
		642	635	628	617	605	591	575	557	538	517	461	
	[12]	[38]	[141]	[248]	[354]	[462]	[568]	[674]	[777]	[884]	[987]	[1244]	
	45	4	16	28	40	52	64	76	88	100	111	141	
		772	764	757	747	736	722	706	687	670	648	592	
	[14]	[21]	[125]	[231]	[337]	[445]	[551]	[658]	[763]	[868]	[972]	[1233]	
	53	2	14	26	38	50	62	74	86	98	110	139	
Max. Intermittent		900	893	885	876	866	852	836	819	798	778	721	
	[15]	[8]	[116]	[223]	[328]	[434]	[543]	[648]	[756]	[862]	[965]	[1225]	
	57	1	13	25	37	49	61	73	85	97	109	138	
		960	958	949	940	929	915	900	882	863	842	784	
	[18]		[86]	[191]	[296]	[403]	[511]	[617]	[726]	[831]	[935]	[1195]	
	68		10	22	33	46	58	70	82	94	106	135	
			1151	1139	1128	1117	1105	1090	1074	1054	1033	977	

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous  Intermittent

B-3

		Δ Pressure bar [PSI] S Motor 75 cm³/r [4.6 in³/r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]	
		14	28	41	55	69	83	97	110	124	138	172	
Flow LPM [GPM]	[2]	[91]	[218]	[343]	[467]	[590]	[708]	[815]	[900]	[981]	[1086]		
	8	10	25	39	53	67	80	92	102	111	123		
		93	89	81	75	66	59	43	31	23	16		
	[4]	[87]	[217]	[352]	[484]	[616]	[748]	[874]	[1001]	[1123]	[1236]	[1472]	
	15	10	25	40	55	70	85	99	113	127	140	166	
		193	188	181	173	163	150	139	125	107	89	37	
	[6]	[82]	[219]	[355]	[492]	[627]	[763]	[898]	[1027]	[1155]	[1284]	[1590]	
	23	9	25	40	56	71	86	101	116	131	145	180	
		292	286	277	269	258	244	228	214	202	186	140	
	[8]	[69]	[202]	[341]	[481]	[619]	[761]	[896]	[1032]	[1165]	[1296]	[1618]	
Max. Continuous	30	8	23	38	54	70	86	101	117	132	146	183	
		390	384	375	364	355	342	326	309	295	276	230	
	[10]	[56]	[193]	[330]	[471]	[610]	[751]	[887]	[1025]	[1162]	[1297]	[1628]	
	38	6	22	37	53	69	85	100	116	131	147	184	
		489	484	476	467	457	444	431	416	399	381	336	
	[12]	[39]	[175]	[315]	[453]	[595]	[736]	[873]	[1011]	[1148]	[1284]	[1617]	
	45	4	20	36	51	67	83	99	114	130	145	183	
		587	582	573	564	552	540	526	510	494	476	427	
	[14]	[12]	[153]	[290]	[431]	[571]	[716]	[856]	[993]	[1129]	[1265]	[1605]	
	53	1	17	33	49	65	81	97	112	128	143	181	
Max. Intermittent		691	680	673	665	654	641	628	613	594	578	533	
	[15]	[9]	[143]	[281]	[424]	[567]	[708]	[846]	[985]	[1121]	[1259]	[1599]	
	57	1	16	32	48	64	80	96	111	127	142	181	
		741	729	723	714	704	690	675	661	644	628	580	
	[20]	[82]	[220]	[362]	[505]	[645]	[784]	[922]	[1061]	[1200]	[1545]		
		9	25	41	57	73	89	104	120	136	175		
	76	970	963	957	948	935	921	906	888	871	825		

[143]
16 } Torque [lb-in]
Nm
729 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



Continuous



Intermittent

B-3

		Δ Pressure bar [PSI] S Motor 93 cm³/r [5.7 in³/r]										Max. Continuous	Max. Intermittent
		[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2500] 172	
Flow LPM [GPM]	[2] 8	[146] 16 76	[308] 35 72	[466] 53 64	[620] 70 55	[771] 87 48	[913] 103 34	[1031] 116 22	[1086] 123 7	[1176] 133 4	[1281] 145 1		
	[4] 15	[136] 15 158	[301] 34 153	[466] 53 146	[633] 72 138	[797] 90 126	[959] 108 115	[1116] 126 103	[1275] 144 90	[1430] 162 77	[1570] 177 59	[1798] 203 17	
	[6] 23	[113] 13 238	[278] 31 232	[446] 50 225	[616] 70 215	[786] 89 206	[952] 108 191	[1116] 126 175	[1280] 145 161	[1444] 163 145	[1603] 181 129	[1971] 223 87	
	[8] 30	[98] 11 319	[262] 30 313	[431] 49 306	[604] 68 296	[777] 88 284	[947] 107 270	[1112] 126 255	[1279] 144 240	[1446] 163 224	[1610] 182 208	[2006] 227 165	
	[10] 38	[81] 9 400	[246] 28 394	[415] 47 388	[590] 67 378	[763] 86 366	[935] 106 353	[1100] 124 340	[1271] 144 324	[1439] 163 306	[1604] 181 288	[2012] 227 244	
	[12] 45	[65] 7 481	[232] 26 476	[401] 45 469	[574] 65 460	[746] 84 448	[916] 103 435	[1081] 122 423	[1255] 142 408	[1425] 161 394	[1591] 180 374	[2001] 226 326	
	[14] 53	[42] 5 561	[207] 23 557	[376] 43 549	[552] 62 541	[721] 81 531	[893] 101 519	[1064] 120 504	[1235] 140 489	[1405] 159 470	[1570] 177 455	[1983] 224 412	
	[15] 57	[31] 4 602	[196] 22 597	[364] 41 591	[538] 61 582	[708] 80 571	[881] 100 559	[1052] 119 546	[1223] 138 530	[1391] 157 514	[1560] 176 498	[1974] 223 453	
	[20] 76		[119] 13 799	[290] 33 792	[461] 52 785	[633] 72 775	[807] 91 762	[976] 110 748	[1145] 129 734	[1315] 149 717	[1485] 168 702	[1904] 215 660	

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



B-3

		Δ Pressure bar [PSI] S Motor 120 cm³/r [7.3 in³/r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]	
		14	28	41	55	69	83	97	110	124	138	172	
Flow LPM [GPM]	[2]	[191]	[403]	[605]	[801]	[978]	[1146]	[1288]	[1440]	[1552]	[1679]		
	8	22 60	46 56	68 50	91 43	110 36	129 29	146 19	163 15	175 8	190 6		
	[4]	[188]	[403]	[617]	[829]	[1031]	[1236]	[1438]	[1632]	[1816]	[1990]	[1914]	
	15	21 122	46 118	70 112	94 106	117 98	140 87	162 78	184 67	205 56	225 49	216 16	
	[6]	[172]	[391]	[607]	[821]	[1030]	[1241]	[1449]	[1654]	[1858]	[2056]	[2522]	
	23	19 186	44 180	69 175	93 167	116 159	140 149	164 137	187 126	210 114	232 103	285 73	
	[8]	[156]	[375]	[593]	[807]	[1015]	[1229]	[1439]	[1648]	[1855]	[2059]	[2557]	
	30	18 249	42 244	67 237	91 229	115 220	139 210	163 199	186 185	210 174	233 162	289 128	
	[10]	[130]	[349]	[567]	[785]	[995]	[1210]	[1420]	[1630]	[1838]	[2045]	[2559]	
	38	15 311	39 307	64 301	89 293	112 286	137 275	160 264	184 252	208 239	231 227	289 193	
Max. Continuous	[12]	[103]	[320]	[539]	[756]	[965]	[1175]	[1383]	[1593]	[1799]	[2003]	[2500]	
	45	12 374	36 369	61 363	85 355	109 346	133 336	156 327	180 314	203 303	226 288	282 253	
	[14]	[70]	[285]	[502]	[715]	[923]	[1131]	[1335]	[1540]	[1745]	[1948]	[2452]	
	53	8 437	32 433	57 427	81 419	104 411	128 402	151 391	174 379	197 369	220 355	277 322	
	[15]	[54]	[267]	[485]	[705]	[913]	[1122]	[1329]	[1540]	[1746]	[1947]	[2441]	
	57	6 469	30 465	55 459	80 452	103 444	127 433	150 423	174 411	197 400	220 386	276 349	
Max. Intermittent	[20]		[159]	[377]	[600]	[815]	[1026]	[1232]	[1444]	[1651]	[1859]	[2383]	
	76		18 621	43 618	68 612	92 603	116 594	139 583	163 571	186 560	210 549	269 515	

[267] } Torque [lb-in]
30 } Nm
465 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



Continuous



Intermittent

B-3

**Δ Pressure bar [PSI]
S Motor 144 cm³/r [8.8 in³/r]**

**Max.
Continuous**
**Max.
Intermittent**

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1900]	[2350]
		14	28	41	55	69	83	97	110	124	131	162
Flow LPM [GPM]	[2]	[222]	[480]	[729]	[967]	[1190]	[1402]	[1591]	[1786]	[2031]	[2107]	
	8	25	54	82	109	134	158	180	202	229	238	
		49	45	40	34	29	21	17	15	14	13	
	[4]	[217]	[475]	[728]	[987]	[1237]	[1488]	[1727]	[1957]	[2181]	[2292]	[2310]
	15	24	54	82	112	140	168	195	221	246	259	261
		101	97	91	84	77	69	61	52	45	42	22
	[6]	[193]	[453]	[715]	[976]	[1234]	[1494]	[1746]	[1995]	[2239]	[2358]	[2867]
	23	22	51	81	110	139	169	197	225	253	266	324
		153	149	143	136	128	119	110	101	91	86	66
	[8]	[173]	[434]	[699]	[961]	[1218]	[1479]	[1735]	[1984]	[2235]	[2358]	[2894]
	30	20	49	79	109	138	167	196	224	252	266	327
		205	202	195	187	179	170	160	150	139	134	109
	[10]	[144]	[407]	[673]	[940]	[1197]	[1459]	[1715]	[1967]	[2218]	[2344]	[2890]
	38	16	46	76	106	135	165	194	222	251	265	327
		259	254	247	240	231	221	211	202	191	185	158
	[12]	[118]	[380]	[644]	[907]	[1167]	[1429]	[1685]	[1941]	[2194]	[2319]	[2878]
	45	13	43	73	102	132	161	190	219	248	262	325
		312	307	301	294	286	277	267	257	246	241	217
	[14]	[87]	[346]	[610]	[871]	[1131]	[1395]	[1651]	[1907]	[2163]	[2289]	[2851]
	53	10	39	69	98	128	158	187	215	244	259	322
		363	359	354	346	339	330	319	309	299	293	266
	[15]	[69]	[327]	[592]	[853]	[1113]	[1376]	[1633]	[1890]	[2146]	[2271]	[2835]
	57	8	37	67	96	126	156	185	214	242	257	320
		389	386	380	372	364	355	344	336	323	317	289
	[20]		[200]	[460]	[726]	[987]	[1251]	[1512]	[1770]	[2025]	[2153]	[2724]
	76		23	52	82	112	141	171	200	229	243	308
			516	513	507	499	491	480	470	459	454	427

**Max.
Continuous**

**Max.
Intermittent**

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous  Intermittent

B-3

		Δ Pressure bar [PSI] S Motor 166 cm³/r [10.1 in³/r]										Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1900]	[2300]	
		14	28	41	55	69	83	97	110	124	131	159	
Flow LPM [GPM]	[2]	[267]	[563]	[841]	[1105]	[1364]	[1622]	[1852]	[2081]	[2288]			
	8	30	64	95	125	154	183	209	235	259			
		43	39	35	30	27	21	16	13	10			
	[4]	[247]	[544]	[838]	[1129]	[1418]	[1707]	[1988]	[2255]	[2514]	[2641]	[3116]	
	15	28	61	95	128	160	193	225	255	284	298	352	
		89	85	80	74	68	60	53	47	41	38	28	
	[6]	[217]	[517]	[813]	[1108]	[1401]	[1700]	[1994]	[2281]	[2559]	[2692]	[3214]	
	23	25	58	92	125	158	192	225	258	289	304	363	
		134	131	125	120	113	105	96	88	79	75	58	
	[8]	[195]	[494]	[794]	[1089]	[1387]	[1687]	[1983]	[2269]	[2552]	[2691]	[3239]	
Max. Continuous	30	22	56	90	123	157	191	224	256	288	304	366	
		180	176	171	164	156	147	138	128	118	114	96	
	[10]	[176]	[477]	[776]	[1072]	[1371]	[1668]	[1960]	[2249]	[2537]	[2676]	[3228]	
	38	20	54	88	121	155	188	221	254	287	302	365	
		227	222	217	210	203	194	185	175	165	160	136	
	[12]	[136]	[436]	[737]	[1037]	[1335]	[1636]	[1928]	[2217]	[2509]	[2651]	[3210]	
	45	15	49	83	117	151	185	218	251	284	300	363	
		272	269	264	258	249	241	233	223	214	208	186	
	[14]	[93]	[394]	[696]	[995]	[1296]	[1599]	[1890]	[2185]	[2475]	[2617]	[3178]	
	53	11	44	79	112	146	181	214	247	280	296	359	
Max. Intermittent		318	315	310	303	296	287	279	269	259	254	230	
	[15]	[73]	[371]	[672]	[973]	[1272]	[1575]	[1867]	[2159]	[2453]	[2596]	[3158]	
	57	8	42	76	110	144	178	211	244	277	293	357	
		341	338	333	326	319	309	300	290	280	274	253	
	[20]	[227]	[527]	[829]	[1128]	[1430]	[1724]	[2020]	[2313]	[2457]	[3030]		
	76	26	60	94	127	162	195	228	261	278	278	342	
		452	449	443	435	426	417	407	396	390	386	366	

[371]
42 } Torque [lb-in]
338 } Nm
Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



Continuous



Intermittent

B-3

Δ Pressure bar [PSI]
S Motor 187 cm³/r [11.4 in³/r]

**Max.
Continuous**
**Max.
Intermittent**

[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1850]	[2250]
14	28	41	55	69	83	97	110	124	128	155

Flow LPM [GPM]	[2]	[298]	[627]	[944]	[1244]	[1532]	[1805]	[2030]	[2250]	[2478]		
	8	34	71	107	141	173	204	229	254	280		
		37	34	31	25	22	18	10	9	7		
	[4]	[298]	[640]	[969]	[1291]	[1607]	[1919]	[2219]	[2511]	[2799]	[2869]	[3411]
	15	34	72	109	146	182	217	251	284	316	324	385
		78	75	70	65	60	53	47	41	35	33	19
	[6]	[279]	[621]	[953]	[1283]	[1608]	[1930]	[2243]	[2551]	[2850]	[2922]	[3502]
	23	32	70	108	145	182	218	253	288	322	330	396
		119	115	110	104	97	89	82	74	66	64	50
	[8]	[252]	[593]	[928]	[1257]	[1579]	[1905]	[2224]	[2542]	[2855]	[2932]	[3539]
Max. Continuous	30	28	67	105	142	178	215	251	287	323	331	400
		160	156	151	144	137	129	120	110	101	99	78
	[10]	[211]	[555]	[888]	[1217]	[1546]	[1872]	[2193]	[2516]	[2831]	[2909]	[3518]
	38	24	63	100	138	175	211	248	284	320	329	397
		201	198	193	187	180	173	164	154	143	141	114
	[12]	[162]	[502]	[835]	[1164]	[1490]	[1818]	[2139]	[2463]	[2780]	[2857]	[3476]
	45	18	57	94	131	168	205	242	278	314	323	393
		243	240	235	229	222	214	206	196	184	181	154
	[14]	[118]	[452]	[786]	[1117]	[1443]	[1772]	[2095]	[2417]	[2736]	[2814]	[3438]
	53	13	51	89	126	163	200	237	273	309	318	388
Max. Intermittent		283	280	276	270	262	254	245	235	224	221	194
	[15]	[91]	[425]	[759]	[1089]	[1418]	[1747]	[2068]	[2389]	[2708]	[2786]	[3410]
	57	10	48	86	123	160	197	234	270	306	315	385
		304	301	296	290	283	274	265	256	243	240	214
	[20]		[259]	[590]	[925]	[1255]	[1585]	[1907]	[2229]	[2552]	[2633]	[3265]
	76		29	67	105	142	179	216	252	288	297	369
			403	400	394	387	379	370	359	347	344	319

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous Intermittent

Δ Pressure bar [PSI]
S Motor 225 cm³/r [13.7 in³/r]

Max.
Continuous
Max.
Intermittent

[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1700]	[2050]
14	28	41	55	69	83	97	110	117	141

Max. Continuous	Flow LPM [GPM]	[2]	[358]	[765]	[1139]	[1498]	[1842]	[2163]	[2474]	[2738]	[2894]	
		8	40	86	129	169	208	244	280	309	327	
		[4]	32	29	27	23	20	16	12	10	8	
		15	[367]	[774]	[1177]	[1577]	[1956]	[2325]	[2680]	[3022]	[3191]	[3753]
		[6]	41	87	133	178	221	263	303	341	361	424
		23	66	63	60	55	50	46	40	34	31	23
		[8]	[348]	[758]	[1161]	[1567]	[1960]	[2344]	[2716]	[3083]	[3264]	[3863]
		30	39	86	131	177	221	265	307	348	369	437
		[10]	99	96	92	88	82	76	70	63	59	45
		38	[313]	[721]	[1124]	[1529]	[1921]	[2312]	[2696]	[3073]	[3265]	[3894]
Max. Intermittent	Flow LPM [GPM]	[4]	35	81	127	173	217	261	305	347	369	440
		45	133	132	127	123	117	111	104	96	92	76
		[12]	[262]	[669]	[1069]	[1473]	[1859]	[2247]	[2627]	[2997]	[3184]	[3810]
		53	30	76	121	166	210	254	297	339	360	430
		[14]	167	165	161	157	152	146	139	130	126	107
		57	[203]	[609]	[1006]	[1400]	[1782]	[2160]	[2531]	[2912]	[3098]	[3721]
		[15]	23	69	114	158	201	244	286	329	350	420
		76	202	199	196	191	186	180	173	165	160	141
		[20]	[143]	[544]	[938]	[1324]	[1700]	[2079]	[2452]	[2824]	[3008]	[3639]
		76	16	62	106	150	192	235	277	319	340	411

[504]
57
251

Torque [lb-in]
Nm
Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous

Intermittent

B-3

		Δ Pressure bar [PSI] S Motor 298 cm³/r [18.2 in³/r]								Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1500]	[1800]	
		14	28	41	55	69	83	97	103	124	
Flow LPM [GPM]	[2]	[487]	[1009]	[1509]	[1991]	[2460]	[2931]	[3360]	[3577]	[4113]	
	8	55	114	170	225	278	331	380	404	465	
		24	22	20	18	17	14	11	10	8	
	[4]	[498]	[1043]	[1576]	[2093]	[2597]	[3087]	[3567]	[3798]	[4500]	
	15	56	118	178	236	293	349	403	429	508	
		49	47	45	41	38	34	31	29	25	
	[6]	[470]	[1017]	[1552]	[2080]	[2594]	[3097]	[3594]	[3835]	[4536]	
	23	53	115	175	235	293	350	406	433	513	
		74	72	69	66	62	57	52	49	42	
	[8]	[423]	[967]	[1502]	[2031]	[2549]	[3062]	[3563]	[3807]	[4526]	
	30	48	109	170	229	288	346	403	430	511	
		100	98	95	92	88	83	77	73	64	
	[10]	[357]	[901]	[1433]	[1961]	[2477]	[2989]	[3486]	[3730]	[4456]	
	38	40	102	162	222	280	338	394	421	504	
		126	124	121	118	113	108	101	97	87	
	[12]	[287]	[826]	[1357]	[1884]	[2402]	[2917]	[3410]	[3652]	[4363]	
	45	32	93	153	213	271	330	385	413	493	
		152	150	147	144	140	134	126	121	109	
	[14]	[199]	[733]	[1261]	[1786]	[2303]	[2818]	[3316]	[3561]	[4276]	
	53	22	83	142	202	260	318	375	402	483	
		177	176	173	170	165	160	152	147	134	
	[15]	[154]	[688]	[1218]	[1742]	[2258]	[2771]	[3273]	[3518]	[4241]	
	57	17	78	138	197	255	313	370	398	479	
		190	189	186	183	178	173	165	160	146	
	[20]		[418]	[945]	[1471]	[1986]	[2502]	[3004]	[3253]	[3997]	
	76		47	107	166	224	283	339	368	452	
			253	251	248	244	239	231	226	212	

		Δ Pressure bar [PSI] S Motor 372 cm³/r [22.7 in³/r]								Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1300]	[1500]		
		14	28	41	55	69	83	90	103		
Flow LPM [GPM]	[2]	[629]	[1287]	[1905]	[2501]	[3066]	[3624]	[3886]	[4370]		
	8	71	145	215	283	346	409	439	494		
		19	18	16	14	13	11	9	7		
	[4]	[628]	[1304]	[1962]	[2600]	[3206]	[3799]	[4082]	[4642]		
	15	71	147	222	294	362	429	461	525		
		40	38	36	34	30	27	25	23		
	[6]	[587]	[1261]	[1926]	[2578]	[3203]	[3813]	[4112]	[4687]		
	23	66	142	218	291	362	431	465	530		
		60	59	56	54	50	45	43	38		
	[8]	[529]	[1201]	[1867]	[2518]	[3148]	[3769]	[4072]	[4657]		
	30	60	136	211	285	356	426	460	526		
		81	79	77	75	71	66	64	58		
	[10]	[451]	[1124]	[1779]	[2429]	[3056]	[3678]	[3983]	[4583]		
	38	51	127	201	274	345	416	450	518		
		102	100	98	96	92	86	84	78		
	[12]	[359]	[1030]	[1688]	[2333]	[2963]	[3587]	[3889]	[4482]		
	45	41	116	191	264	335	405	439	506		
		122	121	119	117	113	107	104	98		
	[14]	[256]	[922]	[1577]	[2226]	[2864]	[3487]	[3787]	[4381]		
	53	29	104	178	252	324	394	428	495		
		143	142	140	137	134	128	126	119		
	[15]	[199]	[862]	[1514]	[2167]	[2797]	[3424]	[3727]	[4322]		
	57	22	97	171	245	316	387	421	488		
		153	152	150	148	144	138	135	129		
	[20]		[534]	[1187]	[1832]	[2470]	[3093]	[3402]	[4004]		
	76		60	134	207	279	349	384	452		
			204	202	200	197	192	189	183		

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

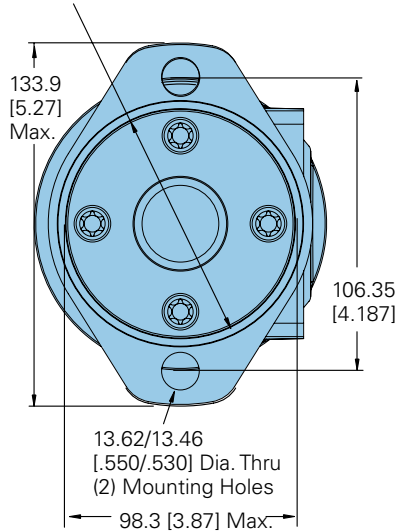
S Series (103-)

Dimensions

B-3

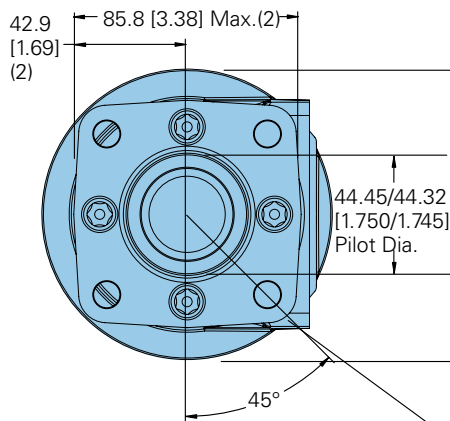
Code: AA 2 Bolt flange

82.55/82.42 [3.250/3.245] Pilot Dia.



Groove Provided for 82.6 [3.25] I.D. x 2.62 [.103] Cross Section O-ring (Dash No. 152)

Code: BA 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

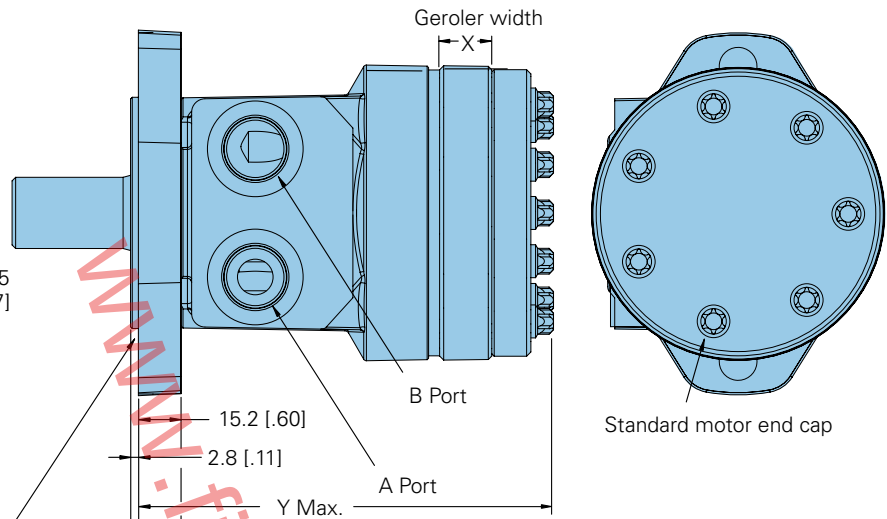
Ports

Standard rotation viewed from shaft end

Port A pressurized — CW

Port B pressurized — CCW

Note: Mounting surface flatness requirement is 13 mm [.005 inch] Max.



Standard motor end cap

2 and 4 bolt flange

Displacement cm ³ /r [in ³ /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]

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 ³ /r [in ³ /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

103-1560

4 Bolt flange

Shaft	Port size	Displ. cm ³ /r [in ³ /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 O-Ring	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 6B Splined	7/8-14 O-Ring	—	-1058	-1059	—	-1581	-1060	-1061	-1062	-1063	-1064
	1/2 NPTF	—	-1050	-1051	-1583	-1584	-1052	-1053	-1054	-1055	-1056
	Manifold	103-1585	-1066	-1067	—	-1587	-1068	-1069	-1070	—	-1072

103-1587

For S Series Motors with a configuration Not Shown in the charts above:
Use the model code system on page B-3-48 to specify the product in detail.

B-3

S Series with low speed valving

Product numbers

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 (A minimum of 300 psi delta must be maintained between A port pressure and case pressure). 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.

B-3

2 Bolt flange

Shaft	Port size	Displ. cm ³ / r [in ³ / 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	—	-2764	—	-3373	-3155
	1/2 NPTF	103- —	—	-1634	—	—	-2690	—	—	—	—
	Manifold*	103- —	-1522	—	—	—	—	—	—	—	-1527

4 Bolt flange

Shaft	Port size	Displ. cm ³ / r [in ³ / 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- —	-1410	-1411	-1626	-2531	-1412	—	—	-1415	-1416
	1/2 NPTF	103- —	-1402	-1403	—	—	-1404	-1405	-1406	-1407	-1408
							103-1404				
											103-1408

* 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 a configuration Not Shown in the charts above: Use the model code system on page B-3-48 to specify the product in detail.

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.

M	S0		***			**		**		**		**		0	*	**		**		00		**		*	**		00		M
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

B-3

1	Product	9 10	Output shaft
M	Motor	01	25.4 [1.00] Dia. Straight, woodruff key, .250-20 UNC-2B hole in shaft end
2 3	Series	02	25.4 [1.00] Dia. SAE 6B Spline, .250-20 UNC-2B hole in shaft end
S0	S Series Motor	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
4 5 6	Displacement cm³/r [in³/r]	16	22.22 [.875] Dia. SAE 13 tooth spline (SAE B)
036	58 [3.6]	18	25.4 [1.00] Dia. Tapered, woodruff key and nut, 34.92 [1.375] taper length
046	76 [4.6]	24	25.00 [.984] Dia. Straight, 8.00 [.315] Key, M8 x 1.25-6H Hole in shaft end
057	93 [5.7]	39	25.00 [.984] Dia. Straight (k6), 8.00 [.315] Key, M8 x 1.25-6H hole in shaft end
073	120 [7.3]	11 12	Port type
088	144 [8.8]	AA	.875-14 UNF-2B SAE O-Ring ports
101	165 [10.1]	AB	.500-14 NPTF Dryseal pipe thread ports
114	186 [11.4]	AC	Manifold ports (.3125-18 UNC-2B mounting holes)
137	224 [13.7]	AD	Manifold ports (M8 x 1.25-6H Mounting Holes)
182	299 [18.2]	AF	G 1/2 BSP Straight thread ports
227	371 [22.7]	13 14	Case flow options ††
7 8	Mounting type	00	None specified
AA	2 Bolt Std: 82.50 [3.248] Dia. x 3.05 [.120] Pilot, 13.59 [.535] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.	01	4375-20 UNF-2B SAE O-Ring port (end cap)
BA	4 Bolt Std: 44.40 [1.748] Dia. x 3.05 [.120] Pilot, .375-16 UNC-2B Mounting Holes on 82.55 [3.250] Dia. B.C.	02	G 1/4 BSP straight THD port (end cap)
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)	03	Manifold case drain
EA	4 Bolt Magneto: 82.50 [3.248] Dia. x 3.05 [.120] Pilot, 13.59 [.535] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.	††	Internal check valves are standard features.
FA	4 Bolt Std: 44.40 [1.748] Dia. x 3.05 [.120] Pilot, M10 x 1.5-6h Mounting Holes on 82.55 [3.250] Dia. B.C.	15	Geroler options
MA	2 Bolt (Standard) 82.50 [3.248] Dia. x 8.13 [.320] Pilot, 13.59 [.535] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.	0	None specified
		16	Shaft options
		0	None specified
		N	Electroless nickel plated

Description

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

Geroler element	11 Displacements
Flow l/min [GPM]	61[16] Continuous*** 75 [20] Intermittent**
Speed	Up to 1021 RPM
Pressure bar [PSI]	177[2565] Cont.*** 202[2930] 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 mills
- Turf equipment
- Concrete and asphalt equipment
- Skid steer attachments

B-4



Crane (winch)



Paving



Harvester

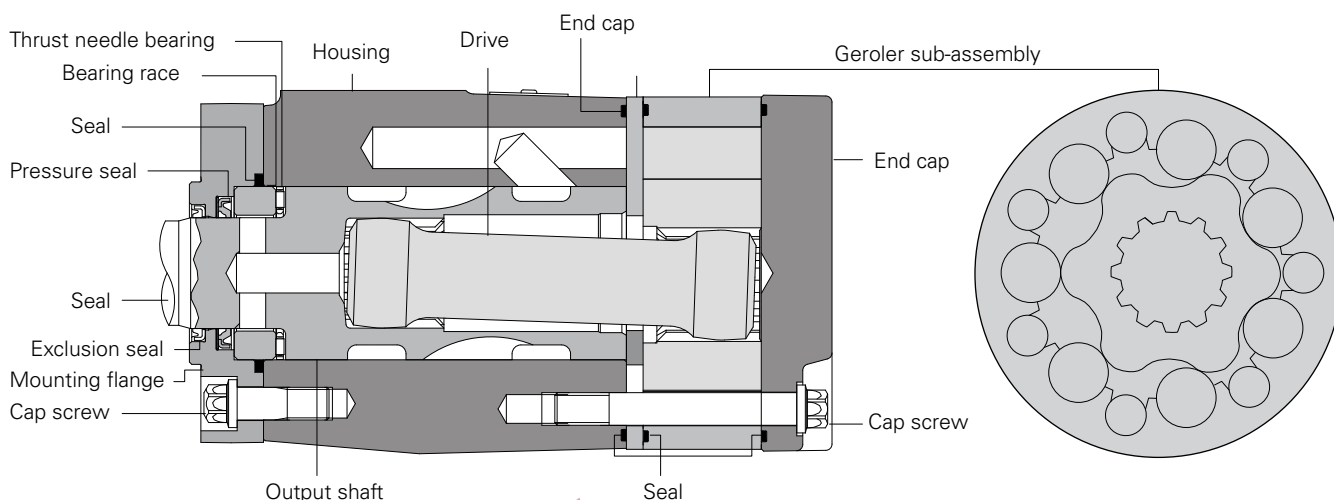


Marine

T Series (158-)

Specifications

B-4



Specification data – T Motors

Displ. cm ³ /r [in ³ /r]	36	49	66	80	102	131	157	195	244	306	370
	[2.2]	[3.0]	[4.0]	[4.9]	[6.2]	[8.0]	[9.6]	[11.9]	[14.9]	[18.7]	[22.6]
Max. speed (RPM) @continuous flow	1021	906	898	740	586	454	379	306	244	195	162
Flow LPM [GPM]	Continuous	38 [10]	45 [12]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]
	Intermittent	38 [10]	57 [15]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]
Torque Nm [lb-in]	Continuous	87	119	157	198	248	315	349	359	410	441
		[766]	[1055]	[1389]	[1749]	[2192]	[2785]	[3091]	[3178]	[3633]	[3905]
	Intermittent	99	135	178	225	280	353	410	445	485	483
		[872]	[1197]	[1578]	[1992]	[2478]	[3123]	[3631]	[3936]	[4290]	[4275]
Pressure Δ bar [ΔPSI]	Continuous	177	177	177	177	177	177	167	138	127	110
		[2565]	[2565]	[2565]	[2565]	[2565]	[2565]	[2415]	[2000]	[1850]	[1600]
	Intermittent	202	202	202	202	202	202	177	155	124	103
		[2930]	[2930]	[2930]	[2930]	[2930]	[2930]	[2565]	[2250]	[1800]	[1500]
Weight kg [lbs]		5.2	5.3	5.5	5.6	5.7	5.9	6.1	6.4	6.8	7.2
		[11.5]	[11.7]	[12.1]	[12.3]	[12.6]	[13.0]	[13.4]	[14.1]	[15.0]	[15.9]

Maximum case pressure: See case pressure seal limitation graph.

A simultaneous maximum torque and maximum speed NOT recommended.

Note: To assure best motor life, run motor in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

Maximum inlet pressure:

202 Bar [2900 PSI] without regard to Bar [ΔPSI] 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

*See shaft torque ratings for limitations.

Recommended fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 13 cSt [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

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (except when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous  Intermittent

B-4

		Δ Pressure bar [PSI] 36 cm³/r [2.2 in³/r]																Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	[2565]	[2750]	[2930]			
		14	28	41	55	69	83	97	110	124	138	152	155	177	190	202			
Flow LPM [GPM]	[2]	[50]	[110]	[172]	[233]	[291]	[348]	[401]	[455]	[501]	[546]	[590]	[596]	[630]	[635]	[673]			
	8	6 209	12 203	19 197	26 191	33 189	39 181	45 167	51 164	57 153	62 139	67 122	67 116	71 87	72 64	76 49			
	[4]	[50]	[109]	[172]	[233]	[296]	[355]	[414]	[475]	[534]	[584]	[646]	[659]	[741]	[786]	[836]			
	15	6 415	12 411	19 398	26 388	33 384	40 381	47 368	54 357	60 354	66 323	73 304	74 302	89 289	283 89	94 259			
	[6]	[43]	[108]	[171]	[233]	[298]	[361]	[420]	[479]	[538]	[595]	[657]	[672]	[766]	[824]	[872]			
	23	5 617	12 613	19 602	26 595	34 585	41 570	47 563	54 558	61 534	67 520	74 504	76 496	87 456	93 425	99 409			
Max. Continuous	[8]	[39]	[101]	[164]	[226]	[292]	[354]	[415]	[475]	[538]	[592]	[656]	[670]	[764]	[819]	[870]			
	30	4 821	11 815	19 803	26 797	33 784	40 774	47 758	54 747	61 732	67 707	74 688	76 680	86 638	92 607	98 585			
	[10]	[30]	[93]	[155]	[214]	[278]	[342]	[406]	[473]	[532]	[590]	[650]	[668]	[756]	[805]	[861]			
Max. Intermittent	38	3 1021	11 1014	18 1002	24 999	31 981	39 965	46 953	53 937	60 921	67 903	73 880	75 873	85 830	91 799	97 778			
	[93] 11 1014 } Torque [lb-in] Nm Speed RPM																		

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

		Δ Pressure bar [PSI] 49 cm³/r [3.0 in³/r]														Max. Contin.	Max. Interm.
		[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2200] 152	[2250] 155	2565 177	[2750] 190	2930 202	
Flow LPM [GPM]	[2] 8	[73] 8 152	[161] 18 152	[245] 28 148	[327] 37 147	[408] 46 142	[486] 55 141	[563] 64 134	[641] 72 124	[710] 80 115	[786] 89 109	[849] 96 95	[866] 98 92	968 109 72	[1023] 116 58	1079 122 44	
	[4] 15	[72] 8 303	[160] 18 298	[246] 28 294	[329] 37 290	[416] 47 276	[500] 56 273	[584] 66 265	[668] 75 261	[746] 84 245	[825] 93 243	[901] 102 235	[922] 104 228	1048 118 187	[1123] 127 152	1188 134 149	
	[6] 23	[58] 7 461	[148] 17 450	[234] 26 445	[326] 37 438	[413] 47 434	[500] 56 421	[583] 66 419	[663] 75 410	[746] 84 407	[827] 93 389	[909] 103 376	[928] 105 373	1055 119 356	[1131] 128 344	1197 135 332	
	[8] 30	[44] 5 607	[127] 14 603	[216] 24 600	[306] 35 590	[392] 44 583	[480] 54 576	[566] 64 564	[652] 74 554	[734] 83 545	[815] 92 536	[897] 101 522	[917] 104 520	1048 118 508	[1125] 127 503	1195 135 488	
	[10] 38	[39] 4 755	[128] 14 750	[213] 24 745	[302] 34 738	[391] 44 732	[477] 54 719	[562] 63 713	[647] 73 702	[731] 83 696	[815] 92 682	[897] 101 663	[917] 104 661	1041 118 646	[1121] 127 638	1191 135 621	
	[12] 45	[33] 4 906	[119] 13 902	[203] 23 895	[291] 33 883	[378] 43 875	[464] 52 862	[551] 62 859	[635] 72 844	[719] 81 835	[802] 91 819	[883] 100 806	[900] 102 804	1028 116 792	[1061] 120 788	1163 131 775	
	[15] 57	[26] 3 1132	[86] 10 1124	[172] 19 1113	[256] 29 1115	[342] 39 1106	[430] 49 1106	[505] 57 1098	[591] 67 1093	[674] 76 1079	[745] 84 1070	[830] 94 1058	[851] 96 1056	980 111 1039			

T Series (158-, 185-)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous  Intermittent

B-4

**Δ Pressure bar [PSI]
66 cm³/r [4.0 in³/r]**

**Max.
Continuous**

**Max.
Intermittent**

Flow LPM [GPM]

**Max.
Continuous**

**Max.
Intermittent**

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	[2565]	[2750]	[2930]
	14	28	41	55	69	83	97	110	124	138	152	155	177	190	202
[2]	[78]	[191]	[303]	[414]	[522]	[625]	[706]	[804]	[898]	[991]	[1081]	[1103]	[1237]	[1318]	[1384]
8	9	22	34	47	59	71	80	91	101	112	122	125	140	149	156
	114	111	110	107	105	101	96	92	87	81	73	72	58	48	41
[4]	[97]	[209]	[325]	[441]	[548]	[657]	[766]	[873]	[972]	[1077]	[1181]	[1205]	[1354]	[1437]	[1524]
15	11	24	37	50	62	74	87	99	110	122	133	136	153	162	172
	229	229	217	216	212	205	194	190	186	183	181	178	172	170	166
[6]	[79]	[192]	[309]	[426]	[534]	[649]	[760]	[874]	[984]	[1090]	[1190]	[1218]	[1389]	[1488]	[1578]
23	9	22	35	48	60	73	86	99	111	123	134	138	157	168	178
	344	343	335	334	321	320	319	315	291	288	279	276	270	270	255
[8]	[75]	[191]	[304]	[419]	[532]	[645]	[759]	[871]	[982]	[1092]	[1197]	[1222]	[1379]	[1458]	[1557]
30	8	22	34	47	60	73	86	98	111	123	135	138	156	165	176
	456	451	447	442	431	426	419	415	412	401	391	386	361	339	334
[10]	[49]	[163]	[283]	[398]	[509]	[623]	[742]	[856]	[971]	[1080]	[1186]	[1209]	[1371]	[1425]	[1528]
38	6	18	32	45	58	70	84	97	110	122	134	137	155	161	173
	569	565	560	552	547	541	532	525	512	504	498	496	482	475	464
[12]	[24]	[156]	[270]	[385]	[502]	[614]	[729]	[845]	[963]	[1067]	[1182]	[1209]	[1373]	[1472]	[1570]
45	3	18	31	43	57	69	82	95	109	121	134	137	155	166	177
	681	678	671	665	658	651	641	635	623	612	604	601	582	571	559
[14]	[19]	[143]	[261]	[370]	[485]	[602]	[718]	[837]	[948]	[1064]	[1175]	[1199]	[1359]	[1436]	[1542]
53	2	16	29	42	55	68	81	95	107	120	133	135	154	162	174
	793	788	787	778	771	762	753	746	733	723	715	711	690	677	665
[15]	[13]	[120]	[236]	[352]	[471]	[590]	[707]	[823]	[939]	[1052]	[1165]	[1192]	[1351]	[1462]	[1567]
57	1	14	27	40	53	67	80	93	106	119	132	135	153	165	177
	849	844	839	832	826	819	806	800	786	779	770	766	742	725	714
[16]		[122]	[234]	[347]	[464]	[579]	[695]	[812]	[927]	[1041]	[1152]	[1179]	[1346]	[1451]	[1551]
61		14	26	39	52	65	79	92	105	118	130	133	152	164	175
		898	894	888	880	870	863	855	842	831	820	815	793	774	757
[18]		[107]	[215]	[326]	[442]	[555]	[669]	[786]	[900]	[1016]	[1123]	[1152]	[1327]		
68		12	24	37	50	63	76	89	102	115	127	130	150		
		1006	1003	998	988	976	975	965	952	940	924	919	896		
[20]		[76]	[182]	[290]	[408]	[520]	[623]	[737]	[845]	[960]	[1075]	[1104]	[1304]		
76		9	21	33	46	59	70	83	95	108	121	125	147		
		1115	1115	1109	1103	1088	1086	1075	1064	1052	1035	1030	1003		

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous Intermittent

**Δ Pressure bar [PSI]
80 cm³/r [4.9 in³/r]**

**Max.
Continuous**
**Max.
Intermittent**

B-4

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	[2565]	[2750]	[2930]
		14	28	41	55	69	83	97	110	124	138	152	155	177	190	202
Flow LPM [GPM]	[2]	[123]	[265]	[405]	[544]	[680]	[804]	[934]	[1052]	[1181]	[1079]	[937]	[895]			
	8	14	30	46	61	77	91	106	119	133	122	106	101			
		93	90	86	83	80	75	70	63	57	43	24	20			
	[4]	[120]	[264]	[406]	[551]	[689]	[828]	[965]	[1101]	[1237]	[1369]	[1505]	[1537]	[1740]	[1857]	[1973]
	15	14	30	46	62	78	94	109	124	140	155	170	174	197	210	223
		187	185	183	179	175	171	166	162	156	150	142	140	129	121	113
	[6]	[113]	[255]	[398]	[542]	[682]	[823]	[963]	[1101]	[1239]	[1373]	[1508]	[1541]	[1749]	[1868]	[1986]
	23	13	29	45	61	77	93	109	124	140	155	170	174	198	211	224
		279	275	271	267	265	258	253	248	240	232	223	221	207	198	188
	[8]	[99]	[243]	[386]	[528]	[669]	[812]	[954]	[1094]	[1233]	[1368]	[1503]	[1537]	[1749]	[1872]	[1992]
	30	11	27	44	60	76	92	108	124	139	155	170	174	198	212	225
		372	367	364	359	354	351	343	338	333	324	315	313	299	289	280
	[10]	[84]	[228]	[371]	[514]	[655]	[798]	[941]	[1080]	[1219]	[1357]	[1496]	[1530]	[1745]	[1870]	[1992]
	38	9	26	42	58	74	90	106	122	138	153	169	173	197	211	225
		463	460	456	450	446	441	435	428	420	412	403	399	381	368	358
	[12]	[63]	[209]	[354]	[498]	[638]	[782]	[926]	[1067]	[1208]	[1346]	[1484]	[1520]	[1737]	[1864]	[1987]
	45	7	24	40	56	72	88	105	121	136	152	168	172	196	211	225
		557	552	547	543	537	530	523	515	509	500	489	487	476	470	459
	[14]	[55]	[185]	[331]	[476]	[620]	[762]	[904]	[1046]	[1188]	[1327]	[1467]	[1502]	[1718]	[1842]	[1969]
	53	6	21	37	54	70	86	102	118	134	150	166	170	194	208	222
		649	646	642	635	630	622	616	609	599	592	581	578	561	550	539
	[15]	[51]	[176]	[316]	[463]	[609]	[748]	[891]	[1037]	[1177]	[1316]	[1457]	[1491]	[1715]	[1844]	[1960]
	57	6	20	36	52	69	85	101	117	133	149	165	168	194	208	221
		694	691	687	680	673	668	660	650	642	634	622	619	606	598	591
	[16]	[38]	[171]	[315]	[462]	[609]	[748]	[884]	[1029]	[1172]	[1317]	[1447]	[1487]	[1701]	[1822]	[1948]
	61	4	19	36	52	69	85	100	116	132	149	163	168	192	206	220
		740	735	731	721	717	707	699	697	681	672	668	665	657	650	643
Max. Continuous	[20]		[160]	[305]	[455]	[578]	[737]	[857]	[968]	[1144]	[1277]	[1412]	[1446]	[1668]		
Max. Intermittent	76		18	34	51	65	83	97	109	129	144	160	163	188		
			916	910	893	893	875	866	877	843	833	839	836	821		

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

T Series (158-, 185-)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production



B-4

		Δ Pressure bar [PSI] 102 cm³/r [6.2 in³/r]														Max. Continuous	Max. Intermittent	
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	[2565]	[2750]	[2930]		
		14	28	41	55	69	83	97	110	124	138	152	155	177	190	202		
Flow LPM [GPM]	[2]	[161]	[341]	[519]	[697]	[871]	[1030]	[1193]	[1349]	[1511]	[1496]	[1441]	[1421]					
	8	18	39	59	79	98	116	135	152	171	169	163	161					
		73	71	68	66	63	60	56	51	46	36	23	20					
	[4]	[157]	[340]	[520]	[702]	[879]	[1056]	[1229]	[1401]	[1567]	[1727]	[1889]	[1925]	[2151]	[2271]	[2412]		
	15	18	38	59	79	99	119	139	158	177	195	213	217	243	257	273		
		149	146	144	141	138	135	131	128	124	118	111	109	99	92	86		
	[6]	[147]	[329]	[510]	[692]	[871]	[1050]	[1227]	[1401]	[1571]	[1731]	[1895]	[1936]	[2192]	[2339]	[2478]		
	23	17	37	58	78	98	119	139	158	178	196	214	219	248	264	280		
		221	217	214	211	208	204	199	195	190	184	176	174	162	154	147		
	[8]	[132]	[315]	[497]	[675]	[857]	[1038]	[1216]	[1392]	[1564]	[1725]	[1891]	[1932]	[2184]	[2326]	[2470]		
30	15	36	56	76	97	117	137	157	177	195	214	218	247	263	279			
	294	290	287	284	280	277	271	267	262	255	247	245	231	220	213			
[10]	[109]	[293]	[477]	[657]	[839]	[1018]	[1198]	[1374]	[1542]	[1711]	[1878]	[1918]	[2178]	[2326]	[2470]			
38	12	33	54	74	95	115	135	155	174	193	212	217	246	263	279			
	367	363	360	355	351	347	343	337	332	325	318	315	299	287	277			
[12]	[84]	[271]	[457]	[638]	[818]	[999]	[1179]	[1354]	[1527]	[1697]	[1858]	[1901]	[2168]	[2323]	[2465]			
45	9	31	52	72	92	113	133	153	173	192	210	215	245	262	279			
	440	436	432	429	424	419	414	409	402	395	386	384	372	364	355			
[14]	[59]	[242]	[428]	[611]	[794]	[974]	[1151]	[1328]	[1502]	[1674]	[1841]	[1883]	[2148]	[2301]	[2447]			
53	7	27	48	69	90	110	130	150	170	189	208	213	243	260	276			
	513	510	506	501	497	492	487	482	475	469	458	456	440	428	420			
[15]	[39]	[227]	[411]	[595]	[780]	[957]	[1136]	[1314]	[1486]	[1658]	[1828]	[1869]	[2137]	[2285]	[2435]			
57	4	26	46	67	88	108	128	148	168	187	207	211	241	258	275			
	550	545	542	537	532	528	522	516	510	502	492	490	474	463	454			
[16]	[22]	[213]	[395]	[581]	[767]	[943]	[1119]	[1301]	[1471]	[1642]	[1825]	[1861]	[2124]	[2271]	[2425]			
61	2	24	45	66	87	107	126	147	166	186	206	210	240	257	274			
	586	581	576	574	567	563	556	549	544	535	526	524	508	497	486			
Max. Continuous	[20]		[154]	[328]	[515]	[710]	[874]	[1060]	[1243]	[1405]	[1579]	[1763]	[1803]	[2071]				
Max. Intermittent	76		17	37	58	80	99	120	140	159	178	199	204	234				
			724	718	720	709	707	696	684	683	670	659	660	640				

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous Intermittent

		Δ Pressure bar [PSI] 131 cm³/r [8.0 in³/r]												Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]	[2565]	[2930]	
		14	28	41	55	69	83	97	110	124	138	172	177	202	
Flow LPM [GPM]	[2]	[219]	[450]	[682]	[915]	[1144]	[1348]	[1561]	[1771]	[1979]	[2159]				
	8	25	51	77	103	129	152	176	200	224	244				
		57	55	53	51	49	47	43	40	36	30				
	[4]	[212]	[449]	[681]	[917]	[1148]	[1376]	[1600]	[1822]	[2025]	[2221]	[2629]	[2704]	[3043]	
	15	24	51	77	104	130	155	181	206	229	251	297	306	344	
		115	113	110	109	107	105	102	99	96	91	75	74	62	
	[6]	[197]	[435]	[669]	[903]	[1139]	[1370]	[1600]	[1818]	[2032]	[2226]	[2718]	[2785]	[3123]	
	23	22	49	76	102	129	155	181	205	230	252	307	315	353	
		171	168	166	163	160	157	154	150	147	142	125	124	112	
	[8]	[181]	[417]	[657]	[886]	[1122]	[1359]	[1589]	[1812]	[2022]	[2215]	[2699]	[2768]	[3101]	
	30	20	47	74	100	127	154	180	205	228	250	305	313	350	
		227	225	222	219	217	213	209	206	202	196	175	174	159	
	[10]	[144]	[389]	[631]	[859]	[1098]	[1330]	[1562]	[1783]	[1993]	[2198]	[2687]	[2755]	[3094]	
	38	16	44	71	97	124	150	176	201	225	248	304	311	350	
		284	281	278	275	271	267	265	261	258	252	231	230	217	
	[12]	[114]	[361]	[605]	[838]	[1075]	[1307]	[1532]	[1755]	[1965]	[2177]	[2671]	[2737]	[3079]	
	45	13	41	68	95	121	148	173	198	222	246	302	309	348	
		341	338	334	332	328	325	321	318	312	307	285	284	269	
	[14]	[82]	[327]	[569]	[803]	[1042]	[1273]	[1498]	[1722]	[1935]	[2147]	[2655]	[2721]	[3073]	
	53	9	37	64	91	118	144	169	195	219	243	300	307	347	
		397	394	391	387	384	361	378	374	370	365	339	338	329	
	[15]	[66]	[302]	[550]	[785]	[1025]	[1254]	[1480]	[1704]	[1915]	[2119]	[2648]	[2709]	[3066]	
	57	7	34	62	89	116	142	167	193	216	239	299	306	346	
		426	423	422	415	412	409	405	402	398	392	367	365	351	
	[16]	[41]	[281]	[529]	[767]	[1004]	[1238]	[1468]	[1685]	[1904]	[2106]	[2621]	[2678]	[3041]	
	61	5	32	60	87	113	140	166	190	215	238	296	303	344	
		454	451	448	443	440	436	433	429	425	418	401	396	374	
Max. Continuous	[20]	[177]	[429]	[678]	[908]	[1143]	[1375]	[1596]	[1811]	[2017]					
Max. Intermittent	76	20	48	77	103	129	155	180	205	228					
		565	560	556	553	549	546	541	536	527					

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

T Series (158-, 185-)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous  Intermittent

B-4

Δ Pressure bar [PSI] 157 cm³/r [9.6 in³/r]														Max. Continuous	Max. Intermittent
		[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2415] 167	[2500] 172	[2930] 202	
Flow LPM [GPM]	[2] 8	[264] 30 47	[541] 61 45	[819] 93 44	[1092] 123 42	[1357] 153 40	[1605] 181 37	[1847] 209 34	[2084] 235 30	[2311] 261 25	[1858] 210 16				
	[4] 15	[259] 29 96	[541] 61 95	[822] 93 92	[1101] 124 91	[1373] 155 90	[1638] 185 88	[1890] 214 85	[2145] 242 82	[2383] 269 78	[2613] 295 73	[3005] 340 63	[3063] 346 60	[3466] 392 47	
	[6] 23	[241] 27 142	[526] 59 140	[808] 91 138	[1090] 123 136	[1368] 155 134	[1638] 185 132	[1900] 215 129	[2150] 243 125	[2399] 271 121	[2628] 297 114	[3086] 349 102	[3169] 358 99	[3612] 408 84	
	[8] 30	[219] 25 189	[506] 57 187	[789] 89 185	[1068] 121 183	[1348] 152 181	[1625] 184 178	[1885] 213 175	[2140] 242 172	[2388] 270 166	[2619] 296 159	[3091] 349 144	[3178] 359 140	[3631] 410 122	
	[10] 38	[180] 20 237	[472] 53 234	[759] 86 232	[1037] 117 230	[1319] 149 227	[1590] 180 224	[1853] 209 222	[2111] 239 218	[2355] 266 211	[2594] 293 203	[3076] 348 188	[3170] 358 183	[3631] 410 163	
	[12] 45	[141] 16 284	[436] 49 282	[728] 82 279	[1010] 114 277	[1292] 146 274	[1561] 176 272	[1821] 206 269	[2079] 235 265	[2331] 263 257	[2573] 291 248	[3063] 346 230	[3162] 357 225	[3630] 410 202	
	[14] 53	[101] 11 332	[397] 45 329	[687] 78 326	[969] 109 323	[1252] 141 321	[1519] 172 319	[1778] 201 316	[2040] 230 311	[2295] 259 305	[2539] 287 296	[3043] 344 279	[3147] 356 274	[3629] 410 253	
	[15] 57	[81] 9 355	[367] 41 353	[665] 75 350	[944] 107 347	[1231] 139 344	[1497] 169 342	[1755] 198 339	[2018] 228 334	[2273] 257 327	[2512] 284 318	[3028] 342 304	[3136] 354 300	[3620] 409 280	
	[16] 61	[51] 6 379	[344] 39 377	[639] 72 373	[924] 104 370	[1209] 137 368	[1480] 167 365	[1743] 197 362	[2005] 227 357	[2261] 255 350	[2505] 283 343	[3009] 340 329	[3119] 352 325	[3594] 406 305	
	Max. Intermittent	[20] 76		[221] 25 472	[519] 59 467	[814] 92 464	[1095] 124 462	[1368] 155 459	[1631] 184 455	[1891] 214 450	[2149] 243 443	[2396] 271 433	[2895] 327 417		

T Series (158-, 185-)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous Intermittent

**Δ Pressure bar [PSI]
195 cm³/r [11.9 in³/r]**

**Max.
Continuous**

**Max.
Intermittent**

B-4

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1750]	[1800]	[2000]	[2500]	[2565]
		14	28	41	55	69	83	97	110	121	124	138	172	177
Flow LPM [GPM]	[2]	[330]	[671]	[1016]	[1345]	[1654]	[1969]	[2242]	[2507]	[2689]	[2748]	[2973]		
	8	37	76	115	152	187	222	253	283	304	310	336		
		38	36	34	33	31	28	25	20	16	14	8		
	[4]	[328]	[675]	[1026]	[1366]	[1692]	[2010]	[2289]	[2586]	[2799]	[2867]	[3144]	[3797]	[3867]
	15	37	76	116	154	191	227	259	292	316	324	355	429	437
		77	77	75	73	73	71	68	65	62	61	55	40	38
	[6]	[306]	[658]	[1011]	[1360]	[1698]	[2021]	[2324]	[2604]	[2829]	[2901]	[3178]	[3831]	[3905]
	23	35	74	114	154	192	228	263	294	320	328	359	433	441
		115	113	111	110	109	107	104	100	97	95	87	68	66
	[8]	[272]	[634]	[980]	[1331]	[1675]	[2003]	[2300]	[2592]	[2815]	[2888]	[3174]	[3864]	[3936]
	30	31	72	111	150	189	226	260	293	318	326	359	437	445
		153	151	150	148	146	144	142	139	134	132	123	99	98
	[10]	[238]	[596]	[945]	[1296]	[1637]	[1960]	[2255]	[2565]	[2786]	[2857]	[3140]	[3816]	[3894]
	38	27	67	107	146	185	221	255	290	315	323	355	431	440
		192	189	188	186	184	183	181	176	168	166	156	133	130
	[12]	[181]	[545]	[908]	[1260]	[1607]	[1924]	[2223]	[2529]	[2759]	[2836]	[3121]	[3807]	[3883]
	45	20	62	103	142	182	217	251	286	312	320	353	430	439
		230	228	226	224	222	221	219	213	207	204	192	160	159
	[14]	[154]	[500]	[860]	[1211]	[1556]	[1869]	[2175]	[2483]	[2713]	[2792]	[3080]	[3778]	[3860]
	53	17	56	97	137	176	211	246	281	307	315	348	427	436
		268	266	264	261	259	259	256	251	244	242	229	199	196
	[15]	[140]	[465]	[832]	[1179]	[1525]	[1835]	[2144]	[2459]	[2693]	[2768]	[3061]	[3764]	[3852]
	57	16	53	94	133	172	207	242	278	304	313	346	425	435
		287	285	283	281	279	278	275	269	262	260	247	220	216
	[16]	[105]	[438]	[800]	[1155]	[1505]	[1824]	[2128]	[2440]	[2678]	[2754]	[3056]	[3755]	[3843]
	61	12	49	90	130	170	206	240	276	303	311	345	424	434
		306	305	302	300	298	297	294	289	281	279	267	241	236
Max. Continuous	[20]		[291]	[653]	[1013]	[1366]	[1689]	[1987]	[2298]	[2540]	[2622]	[2928]		
		33	74	114	154	191	225	260	287	296	331			
Max. Intermittent	[76]		[382]	[378]	[375]	[373]	[372]	[368]	[363]	[356]	[353]	[342]		
			382	378	375	373	372	368	363	356	353	342		

[465]
53 } Torque [lb-in]
285 } Nm
Speed RPM

T Series (158-, 185-)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

 Continuous  Intermittent

B-4

		Δ Pressure bar [PSI] 244 cm ³ /r [14.9 in ³ /r]											Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1850]	[2250]		
		14	28	41	55	69	83	97	110	114	124	128	155	
Flow LPM [GPM]	[2]	[406]	[833]	[1260]	[1655]	[2038]	[2403]	[2707]	[2597]	[2552]	[2373]	[2299]		
	8	46	94	142	187	230	272	306	293	288	268	260		
		30	29	27	26	24	22	17	12	11	7	6		
	[4]	[404]	[843]	[1277]	[1695]	[2083]	[2468]	[2820]	[3177]	[3261]	[3509]	[3589]	[4194]	
	15	46	95	144	192	235	279	319	359	368	396	406	474	
		62	62	60	59	59	57	55	50	49	46	44	35	
	[6]	[382]	[823]	[1261]	[1687]	[2088]	[2477]	[2843]	[3196]	[3285]	[3547]	[3633]	[4290]	
	23	43	93	142	191	236	280	321	361	371	401	410	485	
		92	91	90	89	88	86	82	78	76	72	71	60	
	[8]	[341]	[787]	[1220]	[1651]	[2059]	[2454]	[2820]	[3177]	[3265]	[3530]	[3615]	[4285]	
Max. Continuous	30	39	89	138	187	233	277	319	359	369	399	408	484	
		123	122	121	120	119	116	113	108	106	101	99	85	
	[10]	[297]	[744]	[1177]	[1611]	[2017]	[2412]	[2774]	[3151]	[3241]	[3504]	[3593]	[4269]	
	38	34	84	133	182	228	273	313	356	366	396	406	482	
		154	152	151	150	148	146	143	136	134	127	125	107	
	[12]	[225]	[687]	[1132]	[1553]	[1967]	[2360]	[2734]	[3105]	[3194]	[3466]	[3554]	[4237]	
	45	25	78	128	175	222	267	309	351	361	392	402	479	
		184	183	181	180	179	177	173	166	163	156	153	134	
	[14]	[154]	[628]	[1072]	[1498]	[1910]	[2298]	[2674]	[3052]	[3148]	[3419]	[3510]	[4226]	
	53	17	71	121	169	216	260	302	345	356	386	397	477	
Max. Intermittent		214	213	212	211	209	207	202	195	193	185	182	161	
	[15]	[119]	[586]	[1035]	[1458]	[1872]	[2261]	[2637]	[3022]	[3116]	[3389]	[3488]	[4220]	
	57	13	66	117	165	212	255	298	341	352	383	394	477	
		229	228	227	226	224	222	217	209	207	200	197	174	
	[16]	[78]	[547]	[993]	[1415]	[1829]	[2218]	[2589]	[2956]	[3037]	[3299]	[3393]	[4170]	
	61	9	62	112	160	207	251	293	334	343	373	383	471	
		244	243	242	241	239	237	231	223	221	213	209	189	
	[20]		[372]	[816]	[1251]	[1663]	[2067]	[2448]	[2832]	[2928]	[3214]	[3312]		
	76		42	92	141	188	234	277	320	331	363	374		
			305	303	301	300	297	292	284	281	273	270		

T Series (158-, 185-)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous Intermittent

		Δ Pressure bar [PSI] 306 cm ³ /r [18.7 in ³ /r]										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]			
	8	56	117	176	230	283	329	366	323	271			
		24	23	22	21	19	16	11	8	5			
	[4]	[497]	[1052]	[1590]	[2101]	[2561]	[3023]	[3464]	[3680]	[3886]	[4221]		
	15	56	119	180	237	289	342	391	416	439	477		
		49	49	48	48	47	47	44	41	38	30		
	[6]	[480]	[1031]	[1578]	[2096]	[2564]	[3023]	[3464]	[3689]	[3905]	[4275]		
	23	54	116	178	237	290	342	391	417	441	483		
		74	74	72	72	71	69	64	62	60	51		
	[8]	[427]	[975]	[1520]	[2051]	[2525]	[2998]	[3448]	[3667]	[3881]	[4264]		
	30	48	110	172	232	285	339	390	414	438	482		
		99	98	97	97	96	94	89	86	83	73		
	[10]	[370]	[930]	[1467]	[2001]	[2477]	[2955]	[3406]	[3631]	[3852]	[4264]		
	38	42	105	166	226	280	334	385	410	435	482		
		123	122	121	120	120	117	112	108	104	92		
	[12]	[281]	[871]	[1410]	[1908]	[2400]	[2887]	[3352]	[3573]	[3790]	[4189]		
	45	32	98	159	216	271	326	379	404	428	473		
		147	146	145	145	145	142	136	131	127	112		
	[14]	[192]	[791]	[1338]	[1851]	[2338]	[2816]	[3281]	[3511]	[3743]	[4135]		
	53	22	89	151	209	264	318	371	397	423	467		
		171	171	170	170	169	165	159	154	150	133		
	[15]	[148]	[738]	[1288]	[1803]	[2287]	[2773]	[3243]	[3475]	[3705]	[4098]		
	57	17	83	146	204	258	313	366	393	419	463		
		183	183	182	182	181	177	171	165	160	146		
	[16]	[97]	[692]	[1236]	[1742]	[2229]	[2714]	[3195]	[3410]	[3639]	[4064]		
	61	11	78	140	197	252	307	361	385	411	459		
		195	195	194	194	193	189	182	177	171	157		
Max. Continuous													
Max. Intermittent	[20]		[476]	[1020]	[1544]	[2010]	[2519]	[3010]	[3243]	[3495]			
	76		54	115	174	227	285	340	366	395			
			243	242	242	241	238	231	226	209			

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

B-4

T Series (158-, 185-)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production

Continuous Intermittent

B-4

		Δ Pressure bar [PSI] 370 cm³/r [22.6 in³/r]						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]	
	8	67	140	210	272	334	383	405	
		20	19	18	17	15	12	11	
	[4]	[588]	[1263]	[1906]	[2506]	[3029]	[3557]	[3811]	[4252]
	15	66	143	215	283	342	402	431	480
		41	41	40	40	39	38	37	36
	[6]	[580]	[1245]	[1899]	[2506]	[3029]	[3544]	[3788]	[4300]
	23	66	141	215	283	342	400	428	486
		61	60	60	59	58	57	56	54
	[8]	[514]	[1164]	[1824]	[2452]	[2975]	[3518]	[3783]	[4284]
	30	58	132	206	277	336	397	427	484
		82	81	80	79	78	77	77	75
	[10]	[444]	[1119]	[1759]	[2391]	[2928]	[3479]	[3750]	[4275]
	38	50	126	199	270	331	393	424	483
		102	102	101	101	100	97	96	93
	[12]	[337]	[1062]	[1690]	[2256]	[2813]	[3393]	[3685]	[4273]
	45	38	120	191	255	318	383	416	483
		122	121	120	119	119	118	116	112
	[14]	[231]	[958]	[1608]	[2201]	[2748]	[3319]	[3610]	[4198]
	53	26	108	182	249	310	375	408	474
		142	141	140	139	138	137	134	129
	[15]	[178]	[896]	[1543]	[2147]	[2683]	[3272]	[3572]	[4187]
	57	20	101	174	243	303	370	404	473
		152	152	151	150	149	147	146	140
	[16]	[118]	[843]	[1481]	[2065]	[2609]	[3194]	[3495]	[4131]
	61	13	95	167	233	295	361	395	467
		162	162	161	160	159	157	155	150
Max. Continuous	[20]		[587]	[1228]	[1833]	[2331]	[2948]	[3273]	
Max. Intermittent			66	139	207	263	333	370	
	76		202	201	201	200	198	196	

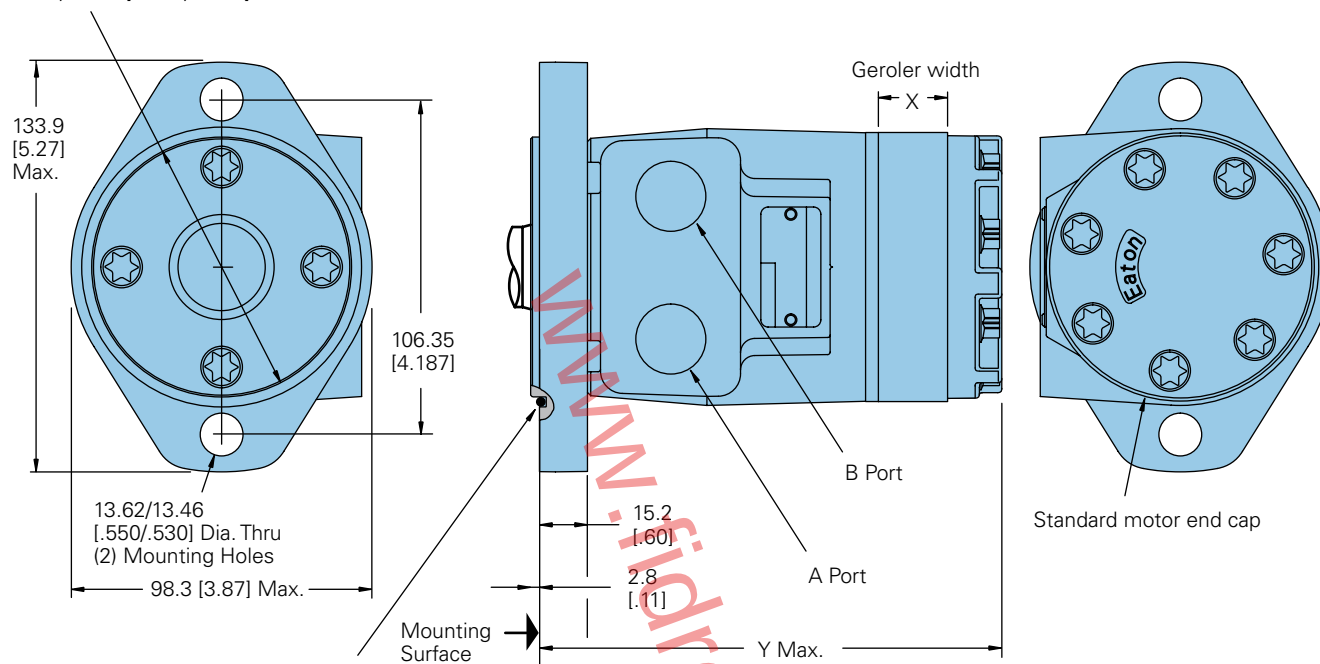
Standard rotation viewed from shaft end

Port A pressurized — CW

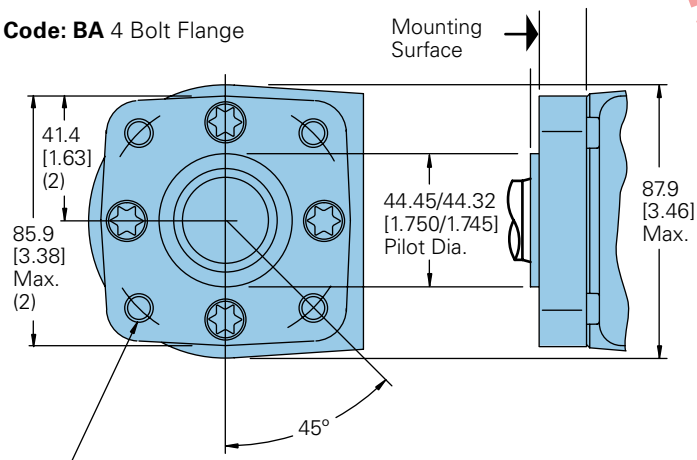
Port B pressurized — CCW

Code: AA 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 [.103] Cross Section O-ring (Dash No. 152)

Code: BA 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 port dimensions

Displacement cm ³ /r [in ³ /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. cm³/ r [in³/ 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	-2045	-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	-2074	-1075	—	-1076	-1077	-2078	-1079	-1080
		Manifold*	158-	—	—	-1558	-1647	-1091	-1559	-1092	-1093	-1094	-1095	-3065
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	-2051	-1583	-1052	-1053	—	-1055	-1056
		Manifold*	158-	—	—	-1585	-1066	-2067	-1586	—	-1069	-3976	-1071	-1072

158-2067

T Series motors with corrosion protection

Mounting	Shaft	Port size	Displ. cm³/ r [in³/ 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—	—	-4246	-3469	-4247	—	-3416	—	—	—	-3490
4 Bolt Flange		1/2 NPTF	158—	—	—	—	—	—	—	—	—	—	-1621

T Series motors with low speed valving

Mounting	Shaft	Port size	Displ. cm ³ / r [in ³ / 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	—	
		Manifold*	158—	—	—	—	—	—	—	—	—	—	—	
	1 in. SAE 6B Splined	7/8 -14 O-Ring	158—	—	—	-1525	—	—	—	—	-1675	—	—	
		1/2 NPTF	158—	—	—	—	-1634	—	—	—	—	—	—	
4 Bolt Flange	1 in. Straight w/ Woodruff Key	Manifold*	158—	—	—	-1522	—	—	—	—	—	—	-1527	
		7/8 -14 O-Ring	158—	—	—	-1625	-1410	-1411	-1626	-1412	-1413	-1414	-1415	-3385
		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.

The following 25-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 25-digits of the code must be present when ordering.

M	T0		***			**		**		**		**		*	*	**		**		00		**		*	**		00		A
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

B-4

1	Product	9 10	Output shaft description
M	Motor	01	25,4 [1.00] Dia. Straight, woodruff key, .250-20 UNC-2B hole in shaft end
2 3	Series	02	25,4 [1.00] Dia. SAE 6B Spline, .25-20 UNC-2B hole in shaft end
T0	T Series	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
4 5 6	Displacement cm³/r [in³/r]	16	22,22 [.875] Dia. SAE 13 tooth spline (SAE B)
022	35 [2.2]	18	25,4 [1.00] Dia. Tapered, Woodruff key and Nut, 34,92 [1.375] taper length
030	49 [3.0]	24	25.00 [.984] Dia. Straight, 8.0 [.315] key, MB x 1.25-6H hole in shaft end
040	65 [4.0]	39	25.00 [.984] Dia. Straight (k6), 8.00 [.315] Key, M8 x 1.25-6H hole in shaft end
049	80 [4.9]	11 12	Port type
062	102 [6.2]	AA	.875-14 UNF-2B SAE O-Ring ports
080	131 [8.0]	AB	.500-14 NPTF Dryseal pipe thread ports
096	158 [9.6]	AC	Manifold
119	195 [11.9]		(.3125-18 UNC-2B mounting holes)
149	244 [14.9]	AD	Manifold ports (MB x 1.25-6H mounting holes)
187	306 [18.7]	AF	G 1/2 BSP straight thread ports
226	370 [22.6]	13 14	Case flow options
7 8	Mounting type	00	None specified
AA	2 Bolt (standard) 82,6 [3.248] Dia. and 3,05 [.120] pilot, 13,59 [.535] Dia. Mounting holes 106,35 [4.187] Dia. B.C.	01	.4375-20 UNF-2B SAE O-ring port (end cap)
BA	4 Bolt (standard) 44,40 [1.748] Dia. x 3,05 [.120] pilot, .375-16 UNC-2B mounting holes 82,55 [3.250] Dia. B.C.	02	G 1/4 BSP straight thread port (end cap)
DD	2 Bolt (Std.) 101,60 [4.000] Dia. x 6.10 [.240] pilot, 14,35 [.565] Dia. Mounting holes 146,05 [5.750] Dia. B.C. (SAE B) (Ductile)	A	Internal check valves
EA	4 Bolt magneto 82,50 [3.248] Dia. x 3,05 [.120] Pilot, 13,59 [.535] Dia. Mounting holes 106,35 [4.187] Dia. B.C.	15	Geroler options
FA	4 Bolt (standard) 44,40 [1.748] Dia. x 3,05 [.120] pilot, M10 x 1.5-6H mounting holes on 82,55 [3.250] Dia. B.C.	0	None
MA	2 Bolt (standard) 82,50 [3.248] Dia. x 8.13 [.320] Pilot, 13.59 [.535] Dia. Mounting holes on 106.35 [4.187] Dia. B.C.	A	Free running
		16	Shaft options
		0	None
		N	Electroless nickel plated

T Series (158-)

Model code

The following 25-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 25-digits of the code must be present when ordering.

B-4

M	T0		***			**		**		**		**		*	*	**		**		00		**		*	**		00		A
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

17 18	Seal options	23 24	Special features (hardware)
00	Standard seals	00	None specified
02	Seal guard	AB	Low speed valving
03	Viton seals	JM	Low flow housing and low speed valving
07	High pressure shaft seal	EX	ATEX certification
11	High pressure shaft seal & seal guard		
19 20	Speed sensor options	25	Special assembly instructions
00	None	0	None
AA	Digital speed pickup (15 pulse), M12 connector (A=Power, B=Common, C=Signal)	1	Reverse rotation
AB	Magnetic speed pickup (60 pulse by quadrature), M12 connector, (A=Power, B=Common, C=Signal)	2	Flange rotation 90°
AE	Digital speed pickup (15 pulse), 127 [5.0] lead wire with weather pack shroud connector (A=Power, B=Signal, C=Common)		
21 22	Valve options	26 27	Paint/packaging options
00	None	00	No paint
		AA	Low gloss black primer
		AY	Nickel plated motor (excluding shaft)
		AF	Environmental coated black
		28 29	Eaton assigned code when applicable
		00	None
		30	Design code
		A	One

See Eatonpowersource.com/ for more options and configurations.

Description

The 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 operation, with similar performance, as the T Series Motor.



Specifications

Geroler element	11 Displacements
Flow l/min [GPM]	61[16] Continuous 75 [20] Intermittent
Speed	Up to 1021 RPM
Pressure bar [PSI]	177[2565] Cont. 202[2930] Inter.
Torque Nm [lb-in]	441 [3905] Cont. 486 [4300] Inter.

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

B-4



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-4-70). 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).

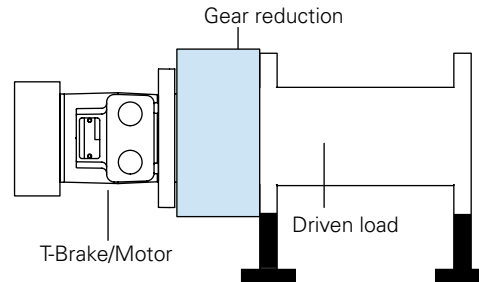
Note: Eaton Corporation does not approve any products for customer applications. It is the sole responsibility of the customer to qualify and verify the correct operation of products in their systems.

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.

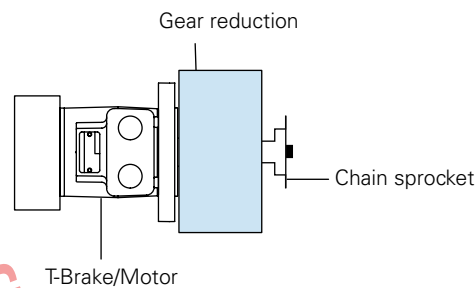
Note: The T Series with parking brake is not compatible with water based fluids.

Typical applications

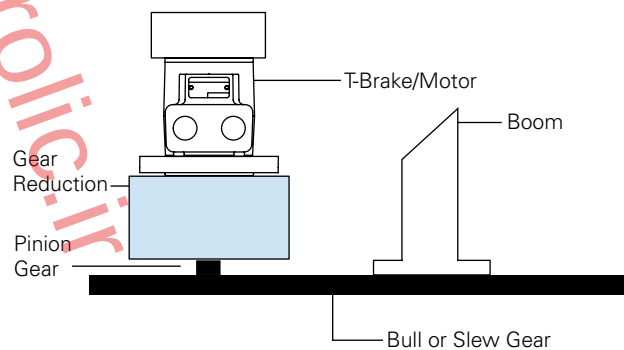
Winch

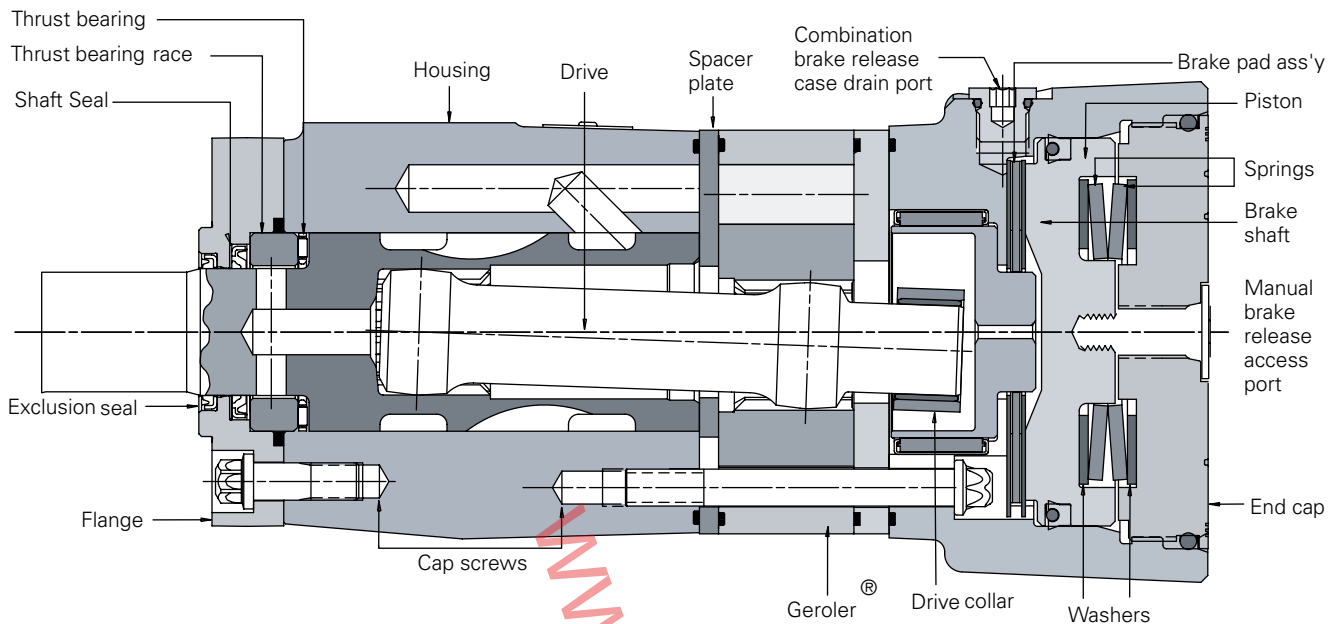


Machine drive



Swing boom





Specification Data — T Series with parking brake motors

Shaft		36	49	66	80	102	131	157	195	244	306	370
Displ. cm ³ /r [in ³ /r]		[2.2]	[3.0]	[4.0]	[4.9]	[6.2]	[8.0]	[9.6]	[11.9]	[14.9]	[18.7]	[22.6]
Max. Speed (RPM) @ continuous flow		1021	906	898	694	550	426	355	287	229	183	152
Flow LPM [GPM]	Continuous	38 [10]	45 [12]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]	61 [16]
	Intermittent	38 [10]	57 [15]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]
Torque Nm [lb-in]	Continuous	76	105	138	174	219	251	297	359	410	441	430
		[672]	[928]	[1222]	[1541]	[1936]	[2226]	[2628]	[3178]	[3633]	[3905]	[3811]
	Intermittent **	93	118	168	212	264	307	359	437	485	483	486
Pressure Δ Bar [Δ PSI]		[824]	[1131]	[1488]	[1872]	[2339]	[2718]	[3178]	[3864]	[4290]	[4275]	[4300]
	Continuous	177	177	177	177	177	177	167	138	127	110	90
		[2565]	[2565]	[2565]	[2565]	[2565]	[2565]	[2415]	[2000]	[1850]	[1600]	[1300]
Weight kg [lbs]	Intermittent***	202	202	202	202	202	202	202	177	155	124	103
		[2930]	[2930]	[2930]	[2930]	[2930]	[2930]	[2930]	[2565]	[2250]	[1800]	[1500]
		[18.7]	[19.0]	[19.4]	[19.6]	[19.8]	[20.5]	[20.9]	[21.4]	[22.3]	[23.1]	[24.5]

Maximum case pressure: See case pressure seal limitation graph. *See shaft torque ratings for limitations.

Note: See page B-4-51 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 ³ /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

Note: The factory setting values are used for each motor based on motor displacement and shaft type. Average Static torque may vary +/- 14% from rated values.

in-lbs Full capacity brake
in-lbs Limited capacity brake

T Series with Parking Brake (185-)

Dimensions

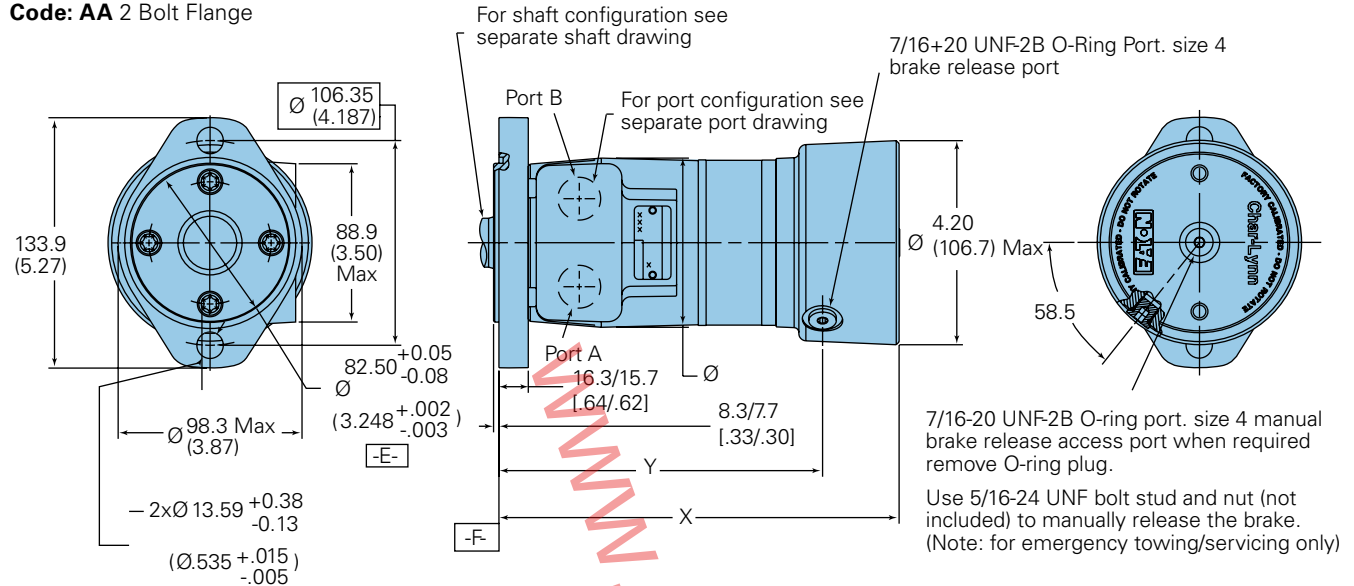
Standard rotation viewed from shaft end

Port A pressurized -- CW

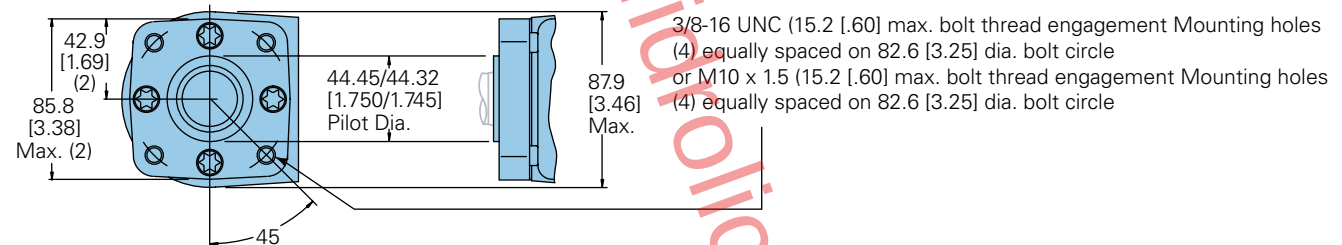
Port B pressurized -- CCW

Note: Mounting surface flatness requirement is 13 mm [.005 inch] Max.

Code: AA 2 Bolt Flange



Code: BA 4 Bolt Flange



T-Series with parking brake dimensions

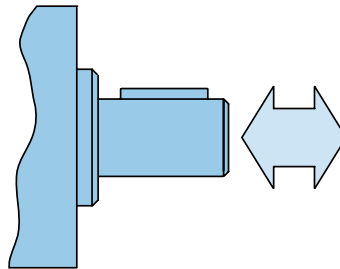
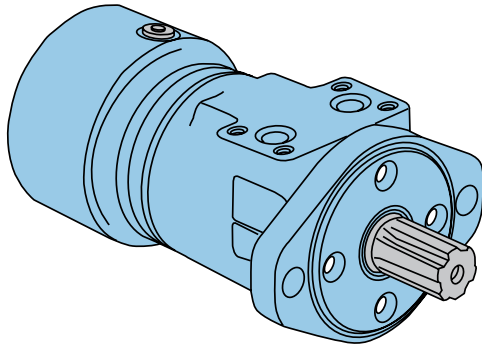
Displacement	X	Y
cm ³ /r [in ³ /r]	mm [inch]	mm [inch]
36 [2.2]	190.2 [7.49]	143.9±0.9 [5.66±0.3]
41 [2.5]	190.8 [7.51]	144.5±0.9 [5.69±0.3]
49 [3.0]	192.5 [7.58]	146.3±0.9 [5.76±0.3]
59 [3.6]	194.3 [7.65]	148.1±0.9 [5.83±0.3]
66 [4.0]	195.6 [7.70]	149.3±0.9 [5.88±0.3]
80 [4.9]	198.4 [7.81]	152.0±0.9 [5.98±0.3]
102 [6.2]	202.2 [7.96]	155.9±0.9 [6.14±0.3]
131 [8.0]	207.5 [8.17]	161.3±0.9 [6.35±0.3]
157 [9.6]	212.6 [8.37]	166.2±0.9 [6.54±0.3]
195 [11.9]	219.2 [8.63]	172.9±0.9 [6.81±0.3]
244 [14.9]	228.3 [8.99]	181.9±0.9 [7.16±0.3]
306 [18.7]	239.5 [9.43]	193.3±0.9 [7.61±0.3]
370 [22.6]	251.2 [9.89]	205.0±0.9 [8.07±0.3]

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.



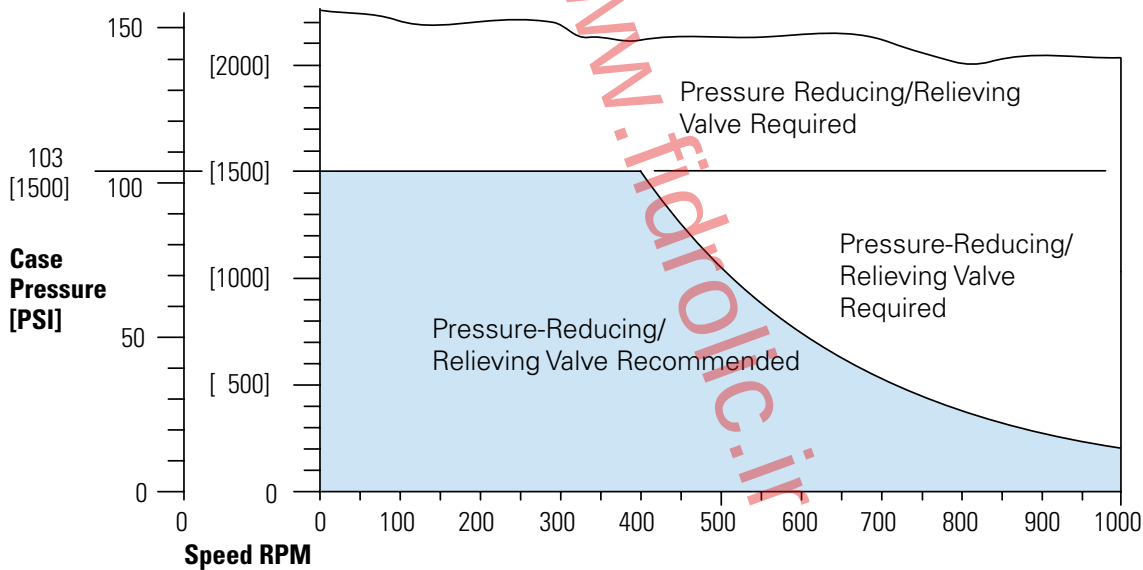
$$P_C \approx .6DP + P_2$$

P_C = Case Pressure
 P_1 = Inlet Line Pressure
 P_2 = Back Pressure
 $DP = P_1 - P_2$

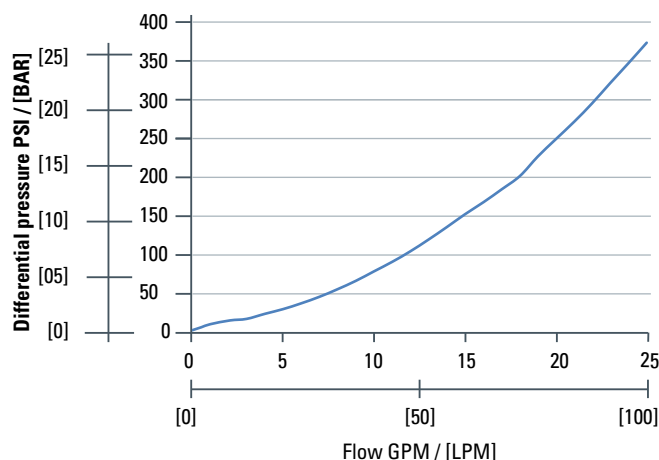
B-4

Max. Axial loads 454 kg [1000 lb]

Case pressure/shaft seal



T Series with Parking Brake NLPD - no load pressure drop



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 ³ / r [in ³ / 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	185-2000	—	2002	2003	2004	2005	2006	2007	2008	2009
		Manifold	185-2010	—	2012	—	2014	2015	2016	—	2018	2019
	6B Splined	7/8-14 O-Ring	185-2020	—	2022	2023	2024	2025	—	2027	2028	2029
		Manifold	185-2030	2031	2032	2033	—	2035	2036	2037	2038	2039
	13T Splined 16/32 pitch	7/8-14 O-Ring	185-2040	—	—	2043	2044	2045	—	2047	2048	—
		Manifold	185-2050	2051	—	—	2054	2055	2056	2057	2058	2059
4-Bolt	1 Keyed	7/8-14 O-Ring	—	—	2062	—	2064	2065	—	2067	—	2069
		Manifold	—	—	2072	2073	2074	—	—	2077	2078	—
	6B Splined	7/8-14 O-Ring	185-2080	2081	2082	—	2084	—	2086	—	2088	—
		Manifold	185-2090	2091	2092	2093	2094	2095	2096	2097	2098	2099
	13T Splined 16/32 pitch	7/8-14 O-Ring	185-2100	2101	2102	2103	2104	2105	2106	2107	2108	2109
		Manifold	185-2110	2111	2112	2113	2114	2115	—	2117	2118	2119
2-Bolt SAE B	1 Keyed	7/8-14 O-Ring	—	2121	—	2123	—	2125	2126	2127	2128	—
		Manifold	185-2130	2131	2132	2133	2134	2135	2136	2137	2138	2139
	6B Splined	7/8-14 O-Ring	185-2140	2141	2142	2143	2144	—	2146	2147	2148	—
		Manifold	185-2150	2151	2152	2153	2154	2155	2156	2157	2158	2159
	13T Splined 16/32 pitch	7/8-14 O-Ring	185-2160	—	—	—	2164	2165	2166	2167	—	2169
		Manifold	—	2171	—	2173	2174	—	2176	2177	2178	2179

Low speed valving

Mounting	Shaft	Port size	Displ. cm ³ / r [in ³ / 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	—	2181	2182	—	—	2185	2186	—	—	2189
		Manifold	185-2190	2191	2192	2193	2194	2195	2196	2197	—	2199
	6B Splined	7/8-14 O-Ring	185-2200	2201	2202	—	—	2205	—	—	—	—
		Manifold	185-2210	2211	2212	2213	—	2215	2216	2217	2218	2219
	13T Splined 16/32 pitch	7/8-14 O-Ring	185-2220	2221	2222	2223	2224	—	—	2227	2228	2229
		Manifold	185-2230	2231	2232	2233	—	2235	2236	2237	2238	2239
4-Bolt	1 Keyed	7/8-14 O-Ring	—	2241	2242	2243	—	2245	2246	—	2248	—
		Manifold	—	2251	2252	2253	2254	—	2256	2257	2258	2259
	6B Splined	7/8-14 O-Ring	185-2260	2261	2262	—	2264	2265	—	2267	2268	2269
		Manifold	185-2270	2271	2272	2273	2274	2275	2276	2277	2278	2279
	13T Splined 16/32 pitch	7/8-14 O-Ring	185-2280	2281	2282	—	2284	2285	2286	2287	2288	2289
		Manifold	185-2290	2291	2292	2293	2294	2295	2296	2297	2298	2299
2-Bolt SAE B	1 Keyed	7/8-14 O-Ring	185-2300	2301	2302	2303	2304	2305	2306	—	2308	2309
		Manifold	185-2310	2311	2312	2313	2314	2315	2316	2317	2318	2319
	6B Splined	7/8-14 O-Ring	185-2320	2321	2322	2323	2324	2325	2326	2327	2328	—
		Manifold	185-2330	2331	2332	2333	2334	2335	2336	2337	2338	2339
	13T Splined 16/32 pitch	7/8-14 O-Ring	185-2340	2341	2342	2343	2344	2345	2346	2347	2348	2349
		Manifold	185-2350	2351	2352	2353	2354	2355	2356	2357	2358	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 motors.

Motors with this valving are not intended for low pressure applications (A minimum of 300 psi delta must be maintained between A port pressure and case pressure).

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-4-72 to specify the product in detail.

T Series with Parking Brake (185-)

Model code

The following 25-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 25-digits of the code must be present when ordering.

M	TB		***			**		**		**		**		*	*	**		**		00		**		*	**		00		B
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

B-4

1		Product	9 10		Output shaft description
		M Motor			01 25,4 [1.00] Dia. Straight, Woodruff Key, .250-20 UNC-2B Hole in Shaft End
2 3		Series			02 25,4 [1.00] Dia. SAE 6B Spline, .25-20 UNC-2B Hole in Shaft End
		TB T Series motor with parking brake			16 SAE 13 Tooth Spline, 16/32 Pitch, 21,74 (.856) Dia. (SAE B)
4 5 6		Displacement cm³/r [in³/r]			18 25,4 [1.00] Dia. Tapered, Woodruff Key and Nut, 34,92 [1.375] Taper Length
		022 36 [2.2]			24 25.00 [.984] Dia. Straight, 8.0 [.315] Key, MB x 1.25-6H Hole in Shaft End
		030 49 [3.0]			
		040 66 [4.0]			
		049 80 [4.9]			
		062 102 [6.2]	11 12		Port type
		080 131 [8.0]			AA .875-14 UNF-2B SAE O-Ring Ports
		096 157 [9.6]			AB .500-14 NPTF Dryseal Pipe Thread Ports
		119 195 [11.9]			AC Manifold (.3125-18 UNC-2B Mounting Holes)
		149 244 [14.9]			AD Manifold Ports (MB x 1.25-6H Mounting Holes)
		187 306 [18.7]			
		226 370 [22.6]			
7 8		Mounting type	13 14		Case flow options
		AA 2 Bolt (Standard) 82,5 [3.248] Dia. and 3,05 [.120] pilot, 13,59 [.535] Dia. Mounting Holes 106,35 [4.187] Dia. B.C.			00 None specified
		BA 4 Bolt (Standard) 44,40 [1.748] Dia. x 3,05 [.120] pilot, .375-16 UNC-2B Mounting Holes 82,55 [3.250] Dia. B.C.			03 Manifold case drain
		DA 2 Bolt (Std.) 101,60 [4.000] Dia. x 6.10 [.240] pilot, 14,35 [.565] Dia. Mounting Holes 146,05 [5.750] Dia. B.C. (SAE B)	15		Geroler options
		EA 4 Bolt Magneto 82,50 [3.248] Dia. x 3,05 [.120] Pilot, 13,59 [.535] Dia. Mounting Holes 106,35 [4.187] Dia. B.C.			A Standard
		FA 4 Bolt (Standard) 44,40 [1.748] Dia. x 3,05 [.120] pilot, M10 x 1.5-6H Mounting Holes on 82,55 [3.250] Dia. B.C.			B Free running
			16		Shaft options
					0 None
					N Electroless nickel plated
			17 18		Seal options
					00 Standard seals
					03 Viton seals
					07 High pressure shaft seal
			19 20		Speed sensor options
					00 None
					AA Digital speed pickup (15 pulse), M12 connector (A=Power, B=Common, C=Signal)

T Series with Parking Brake (185-)

Model code

The following 25-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 25-digits of the code must be present when ordering.

B-4

M	TB		***			**		**		**		**		*	*	**		**		00		**		*	**		00		B
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

21	22	Valve options
00		None
23	24	Special features (hardware)
00		None specified
AB		Low speed valving
25		Special assembly instructions
0		None
2		Flange rotation 90°

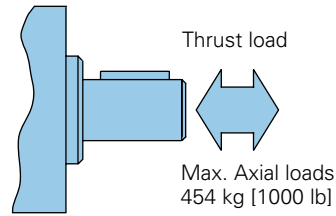
26	27	Paint/packaging options
00		No paint
AA		Low gloss black primer
28	29	Eaton assigned code when applicable
00		None
30		Design code
B		Two

See Eatonpowersource.com/ for more options and configurations.

Case Pressure and Case Drain — H, S, and T Series

Case pressure and case drain instead

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.



$$PC \approx .6 \Delta P + P_2$$

PC = Case Pressure

P_1 = Inlet Line Pressure

P_2 = Back Pressure

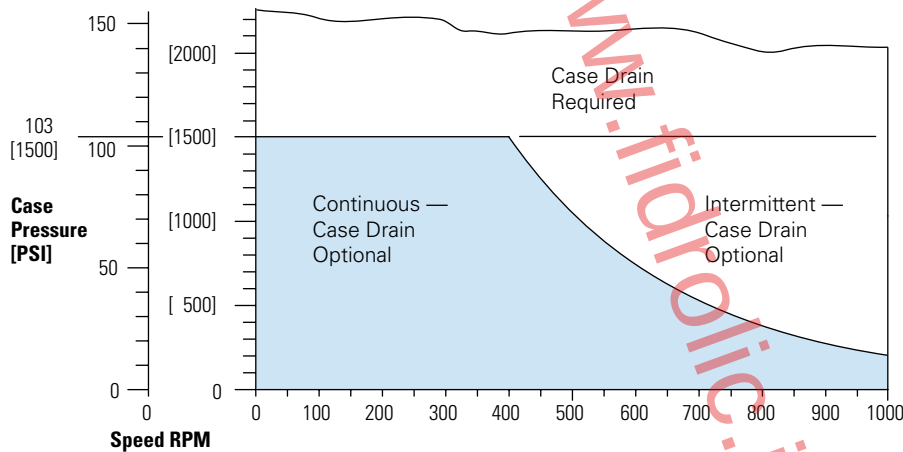
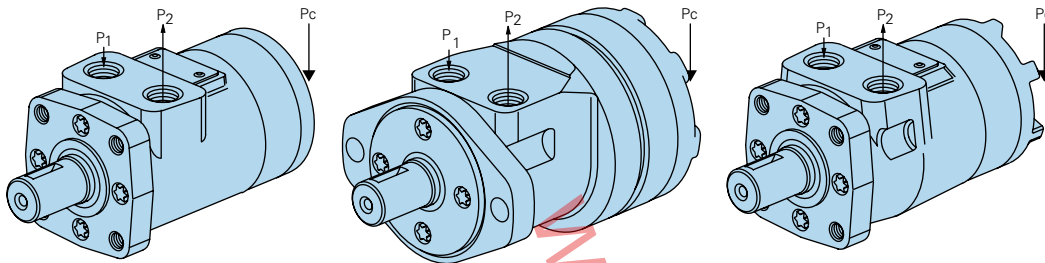
$$\Delta P = P_1 - P_2$$

B-4

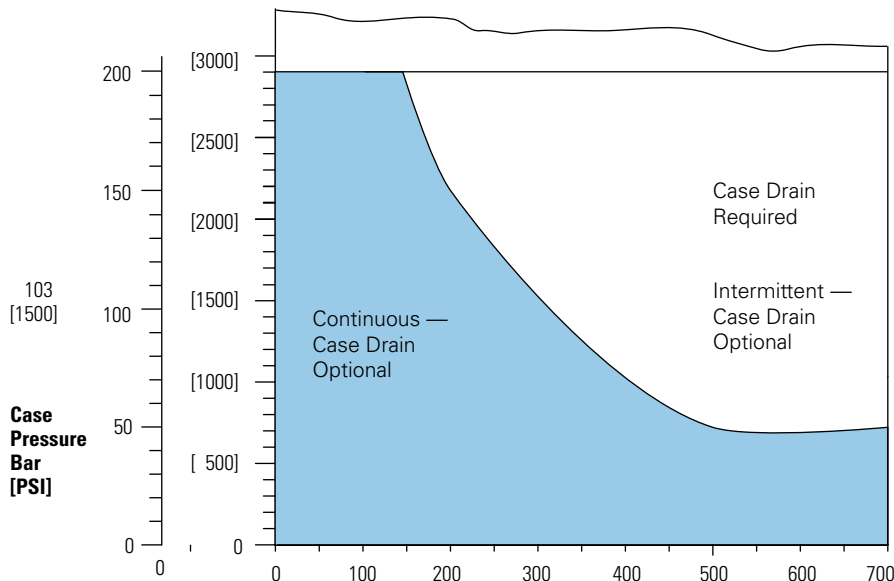
H Series

S Series

T Series



High pressure shaft seal



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]

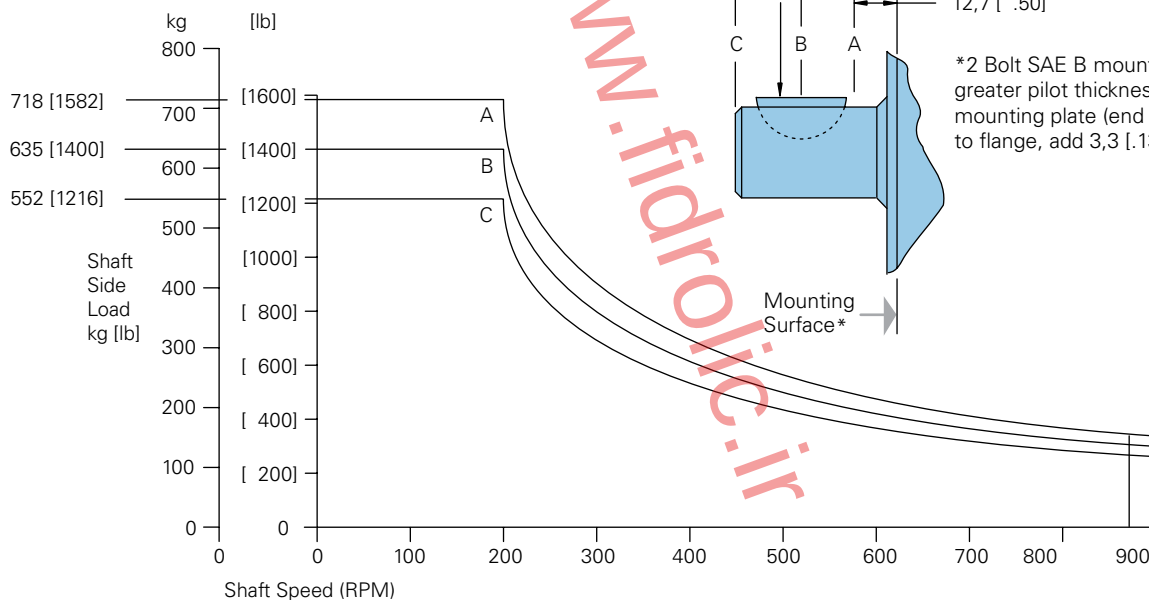
	A	B	C
900	154 [339]	136 [300]	118 [261]
625	205 [452]	181 [400]	158 [348]
500	256 [565]	227 [500]	197 [435]
400	307 [678]	272 [600]	237 [522]
300	410 [904]	363 [800]	316 [696]
200	718 [1582]	635 [1400]	552 [1216]

$$\text{Sideload } P \text{ kg} = \frac{900}{N} \left(\frac{16800}{L + 96,3} \right) \text{ for 200-900 RPM}$$

$$\text{Sideload } P \text{ [lb]} = \frac{900}{N} \left(\frac{1460}{L + [3.79]} \right) \text{ for 200-900 RPM}$$

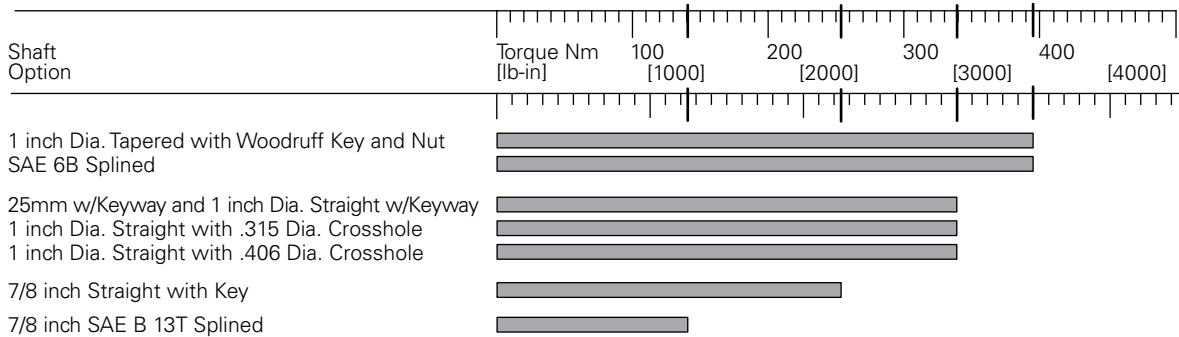
Where N = Shaft Speed (RPM)

L = Distance from Mounting Surface



Shafts

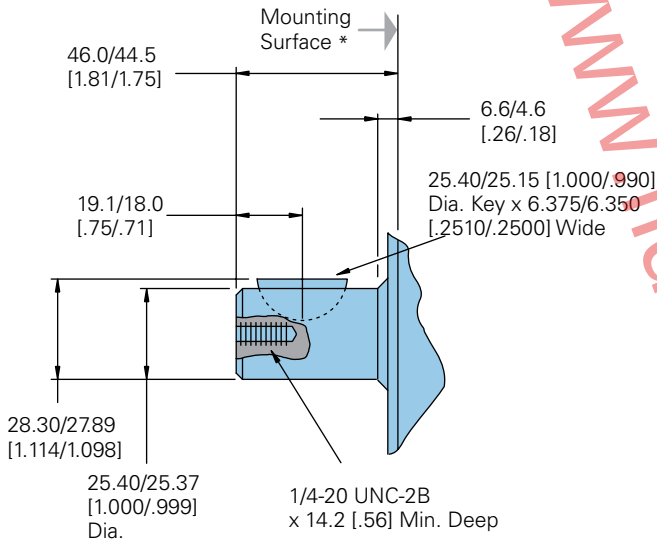
Shaft size motor torque combination limit guide



B-4

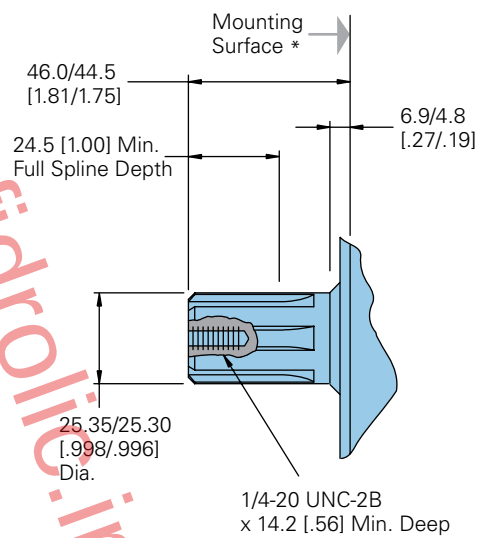
Code: 01

1 in. Dia. Straight with woodruff key



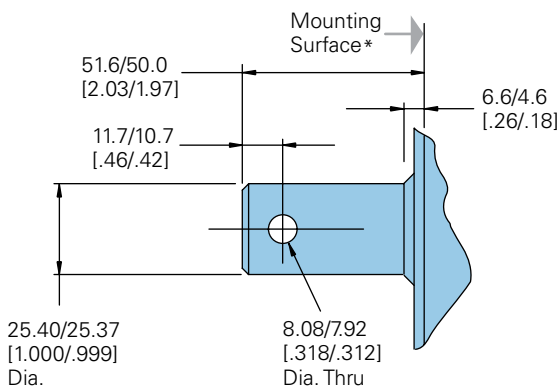
Code: 02

SAE 6B Splined shaft code: 02



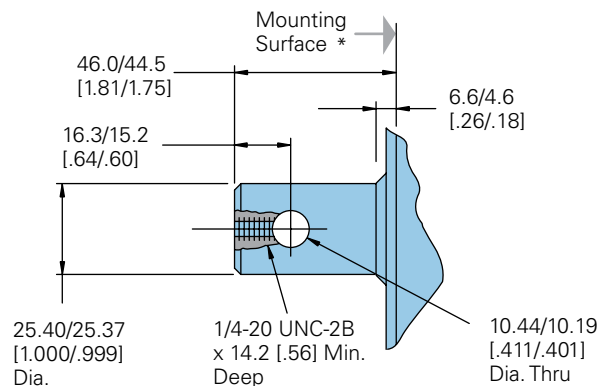
Code: 07

1 in. Dia. Straight Shaft with .315 Dia. Crosshole code: 07



Code: 08

1 in. Dia. Straight Shaft with .406 Dia. Crosshole code: 08



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

Dimensions

Shafts

Code: 18

1 in. Dia. Tapered Shaft with woodruff key and nut

25.40/25.15 x 6.38/6.35

[1.000/.990 x .251/.250] Woodruff Key

3/4-16 UNF-2A Slotted Hex. Nut

16.0 [.63] Thick 28.12 [1.107]

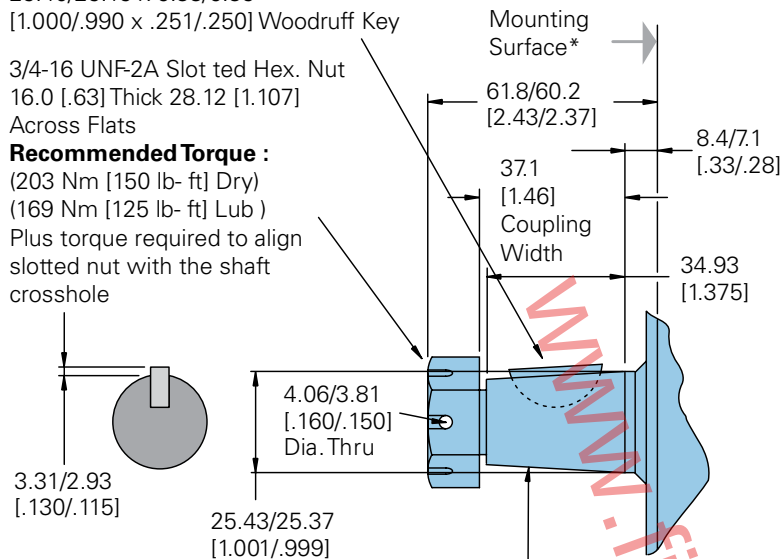
Across Flats

Recommended Torque :

(203 Nm [150 lb- ft] Dry)

(169 Nm [125 lb- ft] Lub)

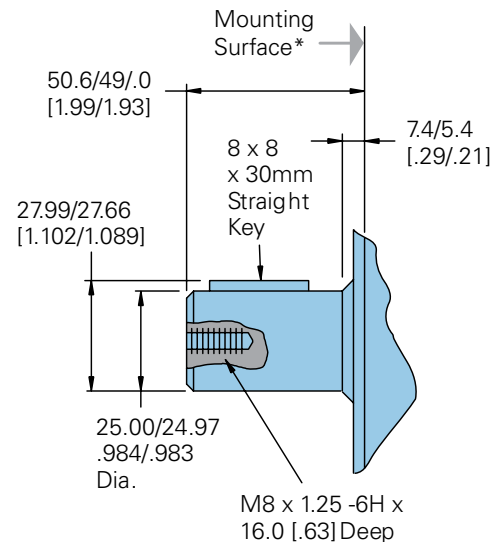
Plus torque required to align slotted nut with the shaft crosshole



125.000.17mm Taper Per Meter [1.500.002 inch Taper Per Foot]
Tapered Shaft End Per SAE J501 Except as specified

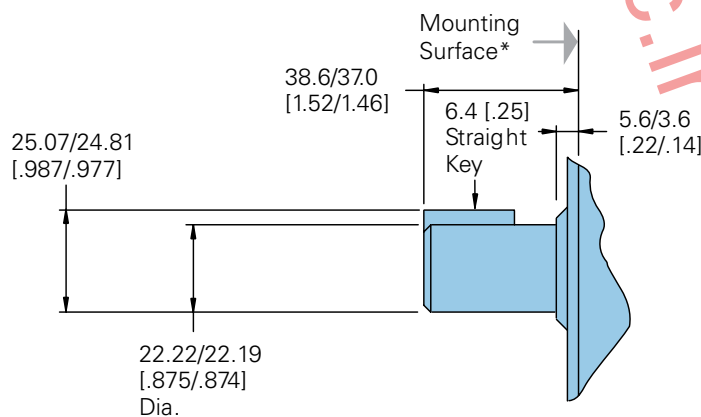
Code: 24

25mm Dia. Straight Shaft with 8mm Keyway



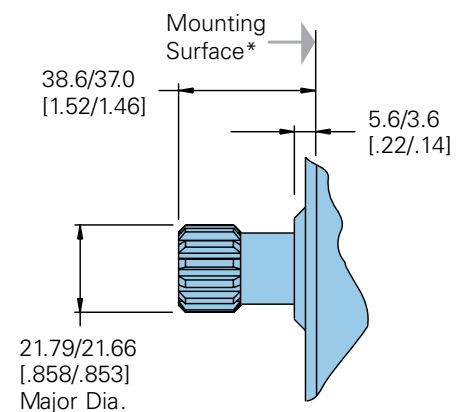
Code: 17

7/8 in. Dia. Straight shaft with key



Code: 16

7/8 in. Dia. SAE B Shaft 13T Splined



* 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]).

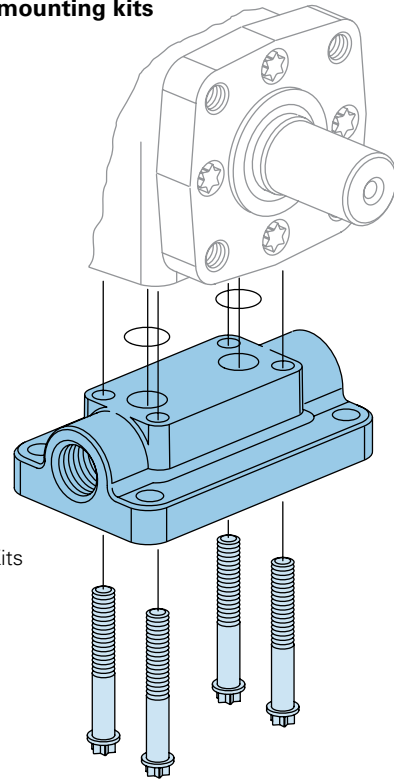
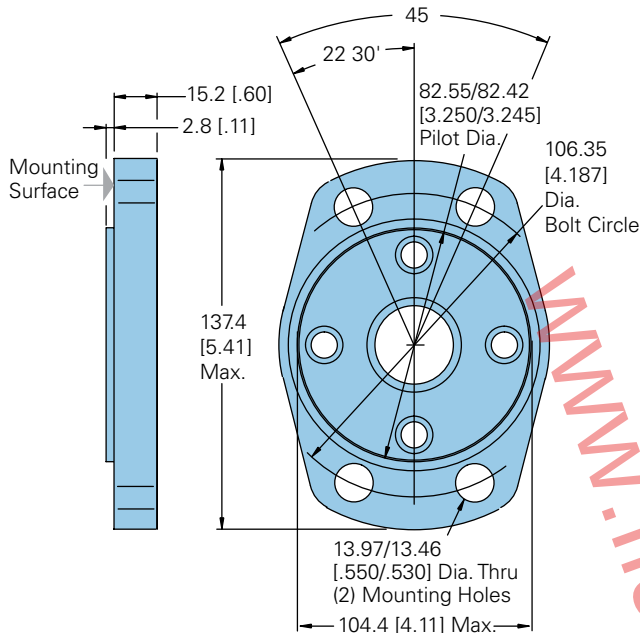
Mounting options

Note: Mounting surface flatness requirement is ,13 mm [.005 inch] Max.

Base block mounting kits

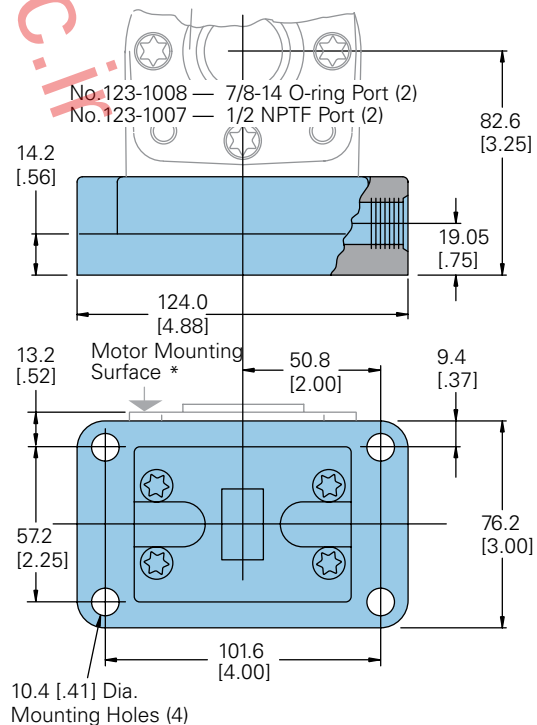
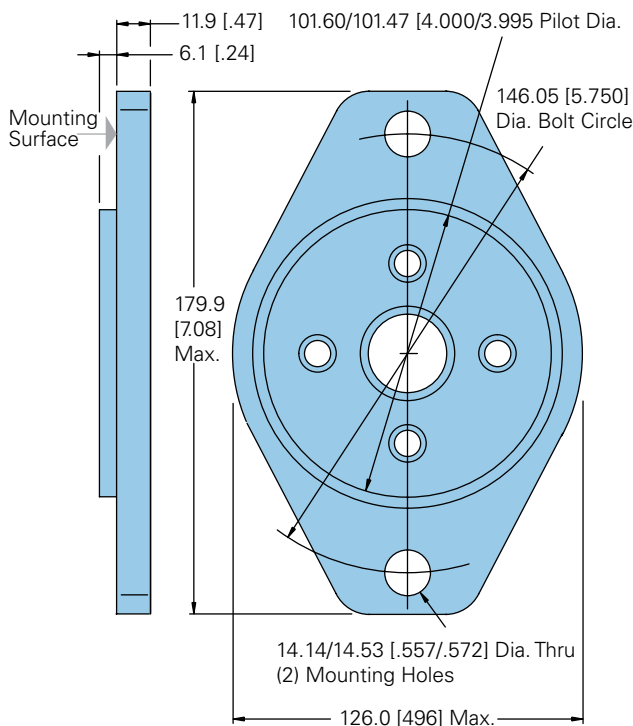
Code: MA

4 Bolt Magneto



Code: DD

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-)

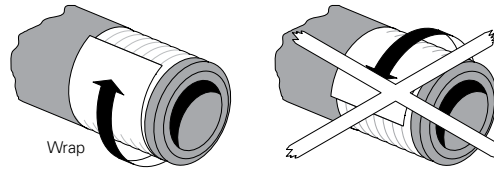
Dimensions

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.



Ports

End Ports — H Series only

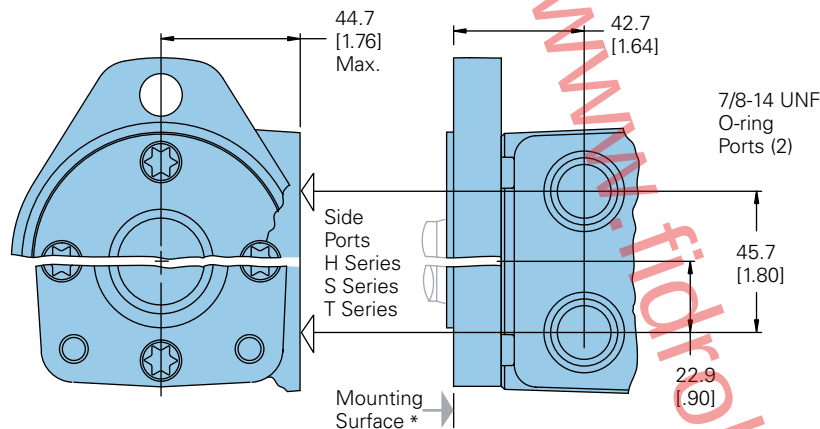
Code: EC G 1/2 (BSP) (2)

or

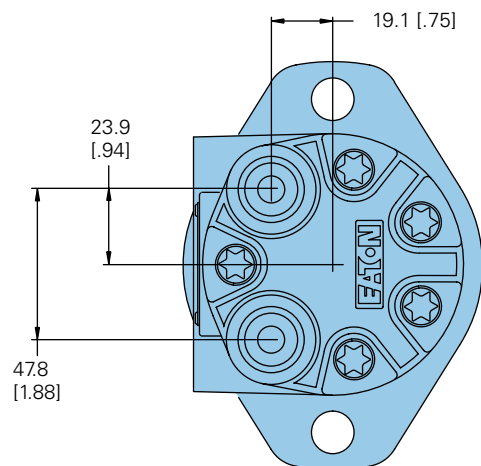
Code: EB 3/4-16 O-Ring (2)

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

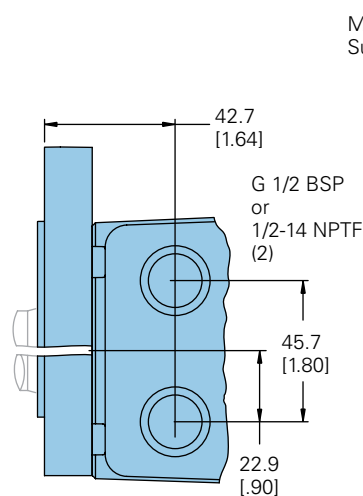
7/8-14 ports Code: AA



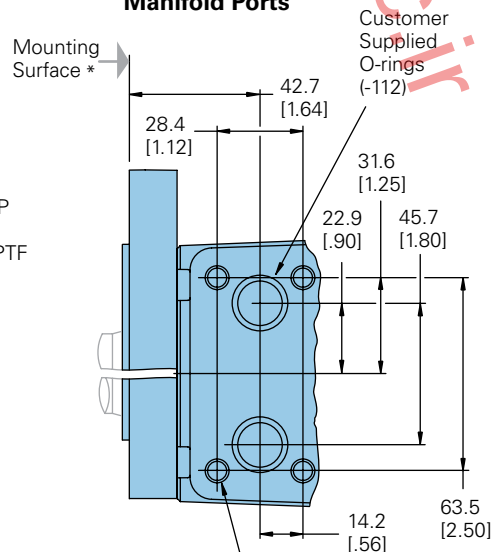
End Ports (H Series only)



G-1/2 or 1/2 NPTF ports

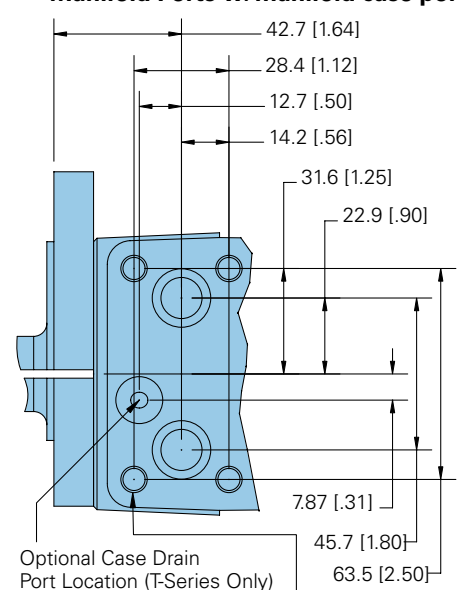


Manifold Ports



Code: AC 5/16-18 UNC (12.7 [0.50] Max. Screw Thread Engagement) (4)
or
Code: AD M8 x 1.25 (12.7 [0.50] Max. Screw Thread Engagement) (4)

Manifold Ports w/manifold case port

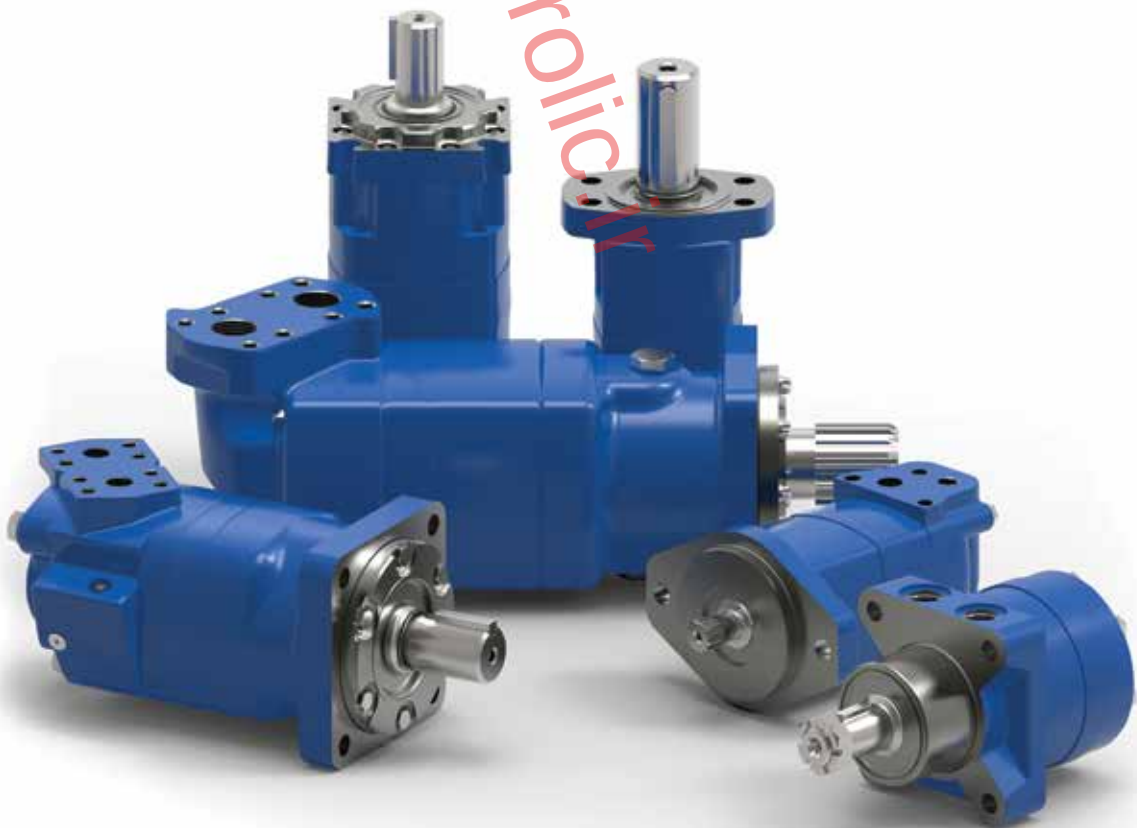


5/16-18 UNC (12.7 [0.50] Max. Screw Thread Engagement) (4)
or M8x1.25 (12.7 [0.50] Max. Screw Thread Engagement) (4)

Disc Valve Hydraulic Motors

**Disc Valve: 2000, 4000 Compact, Delta, 4000,
6000, 10,000 Series**

**State of the art motors benefiting from 65 years of
experience and innovation 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 gerotor 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.



C-1

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

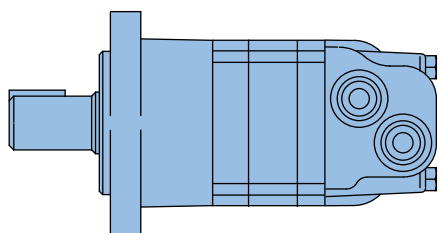
Benefits:

- Lowest pressure drop motor in the industry
- Widest range of options
- The most experienced manufacturer of LSHT motors

Applications:

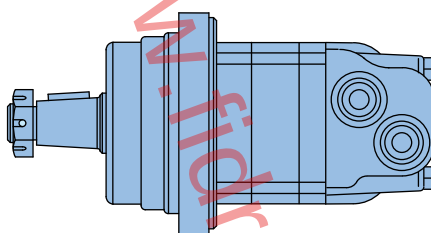
- Swing motor
- Brush cutters & mowers
- Harvesting equipment
- Directional boring
- Turf equipment
- Skid steer loaders
- Fairway mowers
- Harvesters
- Mowing
- Snow removal
- Sprayers
- Trencher
- Wood products
- Grinders and mixers
- Forestry equipment
- Irrigation reels

C-1



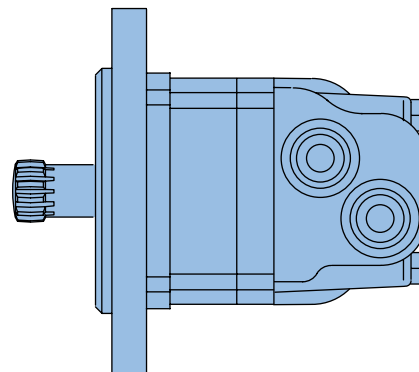
Standard motor

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.

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Description:

The popular 2000 Series provides torque up to 850 Nm. [7,500 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 expanded displacement range using patented "Drive in Drive" technology is the latest innovation in the 2000 series of motors.



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
- Proven reliability and performance in tough applications
- Compact design that maximizes power density

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

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2000 Series

Geroler element	13 Displacements
Flow l/min [GPM]	75 [20] Continuous** 115 [30] Intermittent*
Speed RPM	1215 Cont.** 1215 Inter.*
Pressure bar [PSI]	205 [3000] Cont.** 310 [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.



Harvester

Paving equipment

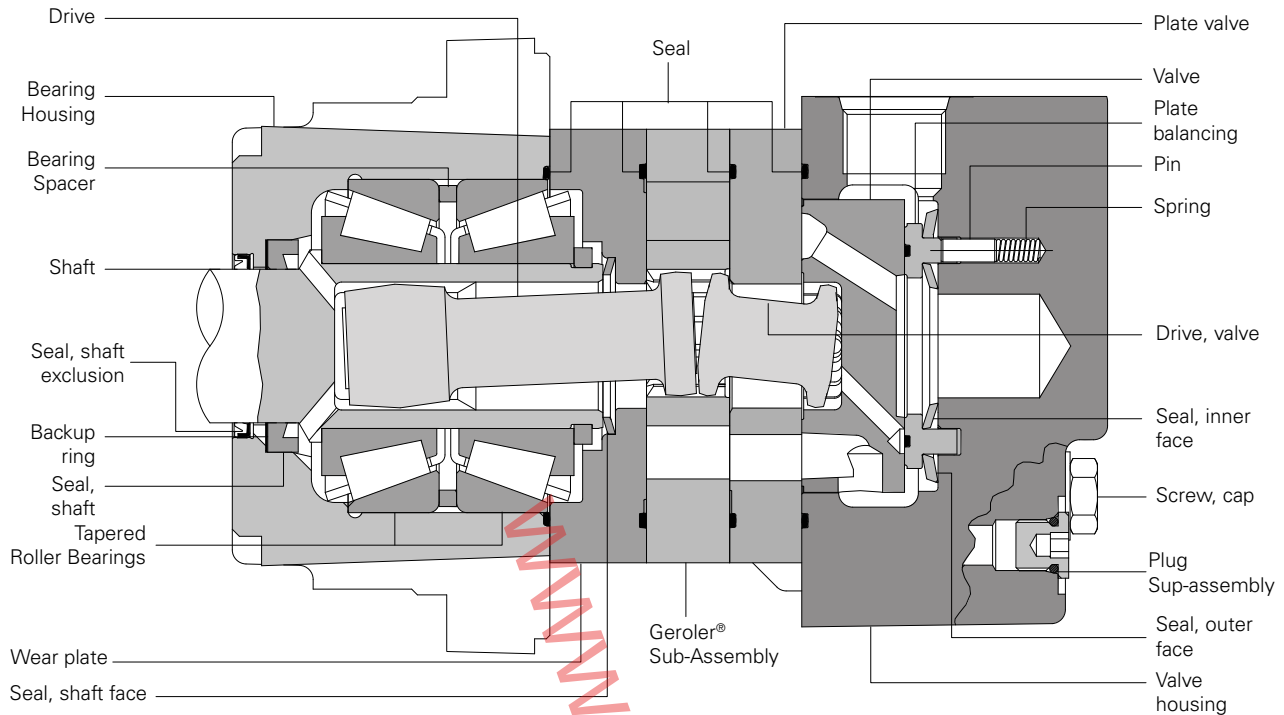
Conveyors

Boom lifts

2000 Series

Specifications

C-1



Specification data – 2000 series motors

Displ. cm ³ /r [in ³ /r]		34	41	66	80	90	100	130	160	195	245	305	395	490
		[2.1]	[2.5]	[4.0]	[4.9]	[5.5]	[6.2]	[8.0]	[9.6]	[11.9]	[14.9]	[18.7]	[24.0]	[29.8]
Max. Speed (RPM) @ Flow	Continuous	1215	1104	1075	908	836	742	576	477	385	308	246	191	153
	Intermittent	1215	1216	1214	908	1042	924	720	713	577	462	365	335	230
Flow l/min [GPM]	Continuous	42	45	72	75	75	75	75	75	75	75	75	75	75
		[11]	[12]	[19]	[20]	[20]	[20]	[20]	[20]	[20]	[20]	[20]	[20]	[20]
	Intermittent	42	53	87	75	95	95	95	115	115	115	115	115	115
		[11]	[14]	[23]	[20]	[25]	[25]	[25]	[30]	[30]	[30]	[30]	[30]	[30]
Torque* Nm [lb - in]	Continuous	98	112	186	235	265	295	385	455	540	660	765	775	845
		[864]	[988]	[1643]	[2065]	[2326]	[2630]	[3420]	[4040]	[4780]	[5850]	[6750]	[6840]	[7470]
	Intermittent	142	169	276	345	390	445	560	570	665	820	885	925	930
		[1261]	[1497]	[2446]	[3035]	[3458]	[3950]	[4970]	[5040]	[5890]	[7250]	[7820]	[8170]	[8225]
Pressure Δ bar [Δ PSI]	Continuous	205	205	205	205	205	205	205	205	205	205	205	155	120
		[3000]	[3000]	[3000]	[3000]	[3000]	[3000]	[3000]	[3000]	[3000]	[3000]	[3000]	[2250]	[1750]
	Intermittent	310	310	310	310	310	310	310	260	260	260	240	190	140
		[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[3750]	[3750]	[3750]	[3500]	[2750]	[2000]
	Peak	310	310	310	310	310	310	310	310	310	310	310	225	170
		[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[4500]	[3250]	[2500]
Weight kg [lb]	Standard or Wheel mount	8.8	8.8	8.8	9.3	9.3	9.5	9.8	10.0	10.4	11.3	11.3	11.8	12.2
		[19.4]	[19.4]	[19.4]	[20.5]	[20.5]	[21.0]	[21.5]	[22.0]	[23.0]	[25.0]	[25.0]	[26.0]	[27.0]
	Bearingless	6.8	6.8	6.8	7.3	7.3	7.5	7.7	7.9	8.4	9.3	9.3	9.8	10.2
		[15.0]	[15.0]	[15.0]	[16.0]	[16.0]	[16.5]	[17.0]	[17.5]	[18.5]	[20.5]	[20.5]	[21.5]	[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 in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

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 13 cSt [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: 20/18/13

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (expect when switching direction of rotation)

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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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.



Δ Pressure bar [PSI]
34 cm³/r [2.1 in³/r]

[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
34	69	103	138	172	207	241	276	310

Δ Pressure bar [PSI]
66 cm³/r [4.0 in³/r]

[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
34	69	103	138	172	207	241	276	310

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Flow LPM [GPM]		Δ Pressure bar [PSI]							
		[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]
[2]	8	[114]	[262]	[405]	[549]				
		13	30	46	62				
		210	189	178	162				
[4]	15	[110]	[256]	[404]	[552]	[704]	[828]	[962]	
		12	29	46	62	80	94	109	
		432	416	393	363	347	313	284	
[6]	23	[115]	[249]	[400]	[550]	[708]	[864]	[996]	[1250]
		13	28	45	62	80	98	113	124
		651	636	613	580	546	518	467	425
[8]	30	[126]	[232]	[393]	[548]	[702]	[856]	[1003]	[1135]
		14	26	44	62	79	97	113	128
		856	856	830	795	759	712	657	578
[10]	38	[114]	[239]	[386]	[541]	[697]	[850]	[995]	[1136]
		13	27	44	61	79	96	112	128
		1105	1077	1049	1015	975	923	859	775
[11]	42	[99]	[231]	[380]	[533]	[679]	[834]	[987]	[1133]
		11	26	43	60	77	94	112	128
		1215	1191	1160	1117	1073	1023	945	854

[231] } Torque [lb-in]
26 } Nm
1191 } Speed RPM

Flow LPM [GPM]		Δ Pressure bar [PSI]							
		[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]
[2]	8	[226]	[503]	[746]	[987]				
		26	57	84	112				
		103	102	93	88				
[4]	15	[226]	[508]	[791]	[1072]	[1342]	[1609]	[1810]	[2012]
		26	57	89	121	152	182	204	227
		214	208	194	188	181	172	158	136
[6]	23	[216]	[503]	[792]	[1075]	[1353]	[1629]	[1890]	[2123]
		24	57	89	121	153	184	214	240
		329	318	305	290	284	270	257	235
[8]	30	[208]	[495]	[781]	[1070]	[1352]	[1633]	[1910]	[2186]
		23	56	88	121	153	184	216	247
		444	430	415	401	387	372	355	339
[10]	38	[195]	[486]	[777]	[1070]	[1359]	[1643]	[1920]	[2191]
		22	55	88	121	154	186	217	248
		560	544	529	513	497	480	461	440
[12]	45	[182]	[472]	[757]	[1052]	[1345]	[1627]	[1912]	[2189]
		21	53	86	119	152	184	216	247
		672	658	643	623	606	586	565	547
[14]	53	[187]	[459]	[750]	[1045]	[1339]	[1633]	[1926]	[2198]
		21	52	85	118	151	184	218	248
		788	776	758	738	720	701	680	654
[16]	61	[182]	[436]	[724]	[1019]	[1313]	[1604]	[1915]	[2181]
		21	49	82	115	148	181	216	246
		901	887	870	849	829	808	785	753
[19]	72	[167]	[407]	[702]	[996]	[1283]	[1588]	[1866]	[2157]
		19	46	79	113	145	179	211	244
		1075	1061	1040	1017	996	967	950	919
[21]	79	[162]	[391]	[679]	[967]	[1255]	[1556]	[1840]	[2268]
		18	44	77	109	142	176	208	256
		1188	1175	1152	1129	1105	1075	1052	987
[23]	87					[1226]	[1523]	[1814]	[2185]
						139	172	205	224
						1214	1185	1155	1125

Δ Pressure bar [PSI]
41 cm³/r [2.5 in³/r]

[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
34	69	103	138	172	207	241	276	310

Flow LPM [GPM]		Δ Pressure bar [PSI]							
		[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]
[2]	8	[138]	[306]	[468]	[659]				
		16	35	53	74				
		171	160	156	135				
[4]	15	[129]	[296]	[466]	[552]	[807]	[966]	[1110]	[1316]
		15	33	53	62	91	109	125	149
		364	352	336	363	295	272	248	235
[6]	23	[135]	[300]	[473]	[550]	[818]	[985]	[1147]	[1292]
		15	34	53	62	92	111	130	146
		550	535	516	491	465	437	406	352
[8]	30	[130]	[285]	[461]	[548]	[816]	[988]	[1150]	[1320]
		15	32	52	62	92	112	130	149
		734	722	699	670	641	616	568	519
[10]	38	[137]	[276]	[455]	[541]	[802]	[979]	[1153]	[1329]
		15	31	51	61	91	111	130	150
		921	909	884	855	825	784	743	687
[12]	45	[119]	[268]	[441]	[618]	[794]	[969]	[1141]	[1321]
		13	30	50	70	90	109	129	149
		1104	1093	1068	1036	1003	972	902	833
[14]	53				[597]	[787]	[953]	[1124]	[1309]
					67	89	108	127	148
					1216	1184	1144	1073	997

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
80 cm³/r [4.9 in³/r]**

[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	Δ Pressure bar [PSI] 80 cm ³ /r [4.9 in ³ /r]								
	[210]	[420]							
[0.25]	25	45							
0.95	3	1							
[0.5]	[250]	[500]	[740]						
1.9	30	56	85						
	17	8	3						
[1]	[330]	[670]	[990]	[1300]	[1550]	[1800]	[1950]	[2110]	
4	35	75	110	145	175	205	220	240	
	44	40	37	34	28	22	14	2	
[2]	[330]	[670]	[995]	[1310]	[1580]	[1840]	[2100]	[2365]	[2630]
8	35	75	110	150	180	210	235	265	295
	90	85	81	78	72	65	57	49	42
[4]	[325]	[670]	[1005]	[1330]	[1620]	[1920]	[2200]	[2480]	[2765]
15	35	75	115	150	185	215	250	280	310
	182	176	170	166	159	152	140	128	117
[6]	[320]	[665]	[1010]	[1340]	[1655]	[1975]	[2270]	[2570]	[2880]
23	35	75	115	150	185	225	255	290	325
	273	267	259	254	246	238	223	207	192
[8]	[310]	[660]	[1015]	[1345]	[1685]	[2020]	[2330]	[2640]	[2960]
0	35	75	115	150	190	230	265	300	335
	365	375	349	341	333	325	306	286	266
[10]	[300]	[650]	[1010]	[1350]	[1700]	[2050]	[2370]	[2690]	[3010]
38	35	75	115	155	190	230	270	305	340
	456	448	439	429	420	411	388	364	341
[12]	[285]	[640]	[1005]	[1350]	[1705]	[2065]	[2390]	[2715]	[3035]
45	30	70	115	155	195	235	270	305	345
	547	537	530	516	507	497	470	442	415
[14]	[270]	[625]	[990]	[1340]	[1705]	[2065]	[2395]	[2720]	[3030]
53	30	70	110	150	195	235	270	305	340
	638	629	622	603	593	584	553	521	490
[16]	[255]	[610]	[975]	[1330]	[1690]	[2055]	[2385]	[2700]	[2995]
61	30	70	110	150	190	230	270	305	340
	729	720	714	689	679	670	635	599	564
[18]	[230]	[590]	[955]	[1310]	[1680]	[2025]	[2355]	[2660]	[2935]
68	25	65	110	150	190	230	265	300	330
	818	810	795	775	765	756	717	677	638
[20]	[210]	[570]	[930]	[1290]	[1645]	[1985]	[2305]	[2600]	[2845]
76	25	65	105	145	185	225	260	295	320
	908	901	880	861	851	842	799	755	712

**Δ Pressure bar [PSI]
90 cm³/r [5.5 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	Δ Pressure bar [PSI] 90 cm ³ /r [5.5 in ³ /r]								
	[124]	[233]	[471]						
[0.25]	14	26	53						
0.95	5	2	1						
[0.5]	[133]	[273]	[555]	[832]					
.9	15	31	63	94					
	15	13	6	2					
[1]	[151]	[358]	[744]	[1091]	[1424]	[1697]	[1952]	[2189]	[2368]
4	17	40	84	123	161	192	221	247	268
	39	39	35	32	28	21	13	12	2
[2]	[151]	[358]	[744]	[1099]	[1439]	[1737]	[2015]	[2293]	[2570]
8	17	40	84	124	163	196	228	259	290
	82	80	76	72	68	61	50	38	29
[4]	[151]	[350]	[732]	[1113]	[1473]	[1800]	[2132]	[2454]	[2775]
15	17	40	83	126	166	203	241	277	314
	167	163	158	152	148	139	126	115	102
[6]	[142]	[348]	[736]	[1114]	[1492]	[1851]	[2208]	[2552]	[2898]
23	16	39	83	126	169	209	249	288	327
	250	245	240	233	227	218	203	191	176
[8]	[133]	[338]	[729]	[1128]	[1509]	[1890]	[2269]	[2635]	[3000]
30	15	38	82	127	170	214	256	298	339
	335	328	329	314	306	295	281	266	249
[10]	[124]	[331]	[724]	[1130]	[1521]	[1912]	[2309]	[2670]	[3036]
38	14	37	82	128	172	216	261	302	343
	418	410	404	395	385	373	361	342	322
[12]	[106]	[315]	[714]	[1127]	[1525]	[1924]	[2326]	[2704]	[3082]
45	12	36	81	127	172	217	263	306	348
	502	493	485	477	464	451	441	417	394
[14]	[98]	[298]	[706]	[1115]	[1525]	[1924]	[2326]	[2707]	[3080]
53	11	34	80	126	172	217	263	306	348
	585	575	567	559	543	529	521	493	467
[16]	[80]	[285]	[688]	[1107]	[1510]	[1907]	[2311]	[2697]	[3070]
61	9	32	78	125	171	215	261	305	347
	670	658	650	641	622	607	610	568	541
[18]	[62]	[262]	[673]	[1087]	[1490]	[1892]	[2281]	[2662]	[3030]
68	7	30	76	123	168	214	258	301	342
	753	740	732	719	701	685	680	643	613
[20]	[53]	[242]	[644]	[1045]	[1447]	[1850]	[2246]	[2617]	[2988]
76	6	27	73	118	163	209	254	296	338
	836	822	814	796	780	765	748	719	686
[22]	[35]	[231]	[639]	[1047]	[1437]	[1836]	[2218]	[2599]	[2981]
83	4	26	72	118	162	207	251	294	337
	920	916	907	895	876	854	749	803	774
[24]	[18]	[204]	[612]	[1011]	[1366]	[1792]	[2182]	[2573]	[2963]
91	2	23	69	114	154	202	247	291	335
	1003	1000	991	978	960	940	918	882	850
[25]		[195]	[594]	[994]	[1384]	[1765]	[2173]	[2564]	
95		22	67	112	156	199	246	290	
		1042	1033	1020	1003	984	954	921	

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[570]
65 } Torque [lb-in]
1901 } 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.



**Δ Pressure bar [PSI]
100 cm³/r [6.2 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

**Δ Pressure bar [PSI]
130 cm³/r [8.0 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

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Flow LPM [GPM]

[0.25]	[140]	[260]							
0.95	15	30							
	4	2							
[0.5]	[150]	[300]	[620]	[940]					
1.9	15	35	70	105					
	13	9	5	2					
[1]	[170]	[390]	[830]	[1210]	[1570]	[1870]	[2130]		
4	20	45	95	135	175	210	240		
	35	34	31	28	23	15	6		
[2]	[170]	[390]	[830]	[1220]	[1590]	[1920]	[2220]	[2520]	[2810]
8	20	45	95	140	180	215	250	285	315
	73	71	68	63	59	51	38	24	14
[4]	[170]	[380]	[820]	[1240]	[1640]	[2010]	[2380]	[2750]	[3120]
15	20	45	90	140	185	225	270	310	355
	148	145	141	136	131	121	104	94	80
[6]	[160]	[380]	[820]	[1260]	[1670]	[2080]	[2480]	[2880]	[3280]
23	20	45	90	140	190	235	280	325	370
	222	219	215	209	202	192	172	163	149
[8]	[150]	[370]	[810]	[1260]	[1700]	[2130]	[2560]	[2990]	[3420]
30	15	40	90	140	190	240	290	340	385
	297	294	288	281	273	261	243	231	216
[10]	[140]	[368]	[810]	[1270]	[1720]	[2160]	[2610]	[3020]	[3440]
38	15	40	90	145	195	245	295	340	390
	371	367	362	354	344	330	316	300	283
[12]	[120]	[350]	[800]	[1270]	[1730]	[2180]	[2630]	[3070]	[3510]
45	15	40	90	145	195	245	295	345	395
	445	442	436	427	415	399	389	369	350
[14]	[110]	[330]	[800]	[1260]	[1740]	[2180]	[2630]	[3070]	[3500]
53	10	35	90	140	195	245	295	345	395
	519	516	509	500	486	469	463	437	417
[16]	[90]	[320]	[780]	[1260]	[1720]	[2160]	[2610]	[3060]	[3500]
61	10	35	90	140	195	245	295	345	395
	594	591	583	573	558	540	537	506	485
[18]	[70]	[300]	[770]	[1240]	[1700]	[2140]	[2580]	[3020]	[3460]
68	10	35	85	140	190	240	290	340	390
	668	665	657	646	630	611	609	574	552
[20]	[60]	[280]	[730]	[1180]	[1630]	[2090]	[2550]	[2980]	[3440]
76	5	30	80	135	185	235	290	335	390
	742	739	731	715	703	684	662	643	619
[22]	[40]	[260]	[720]	[1180]	[1620]	[2070]	[2500]	[2930]	[3360]
83	5	30	80	135	185	235	280	330	380
	816	813	805	794	777	758	749	712	687
[24]	[20]	[230]	[690]	[1140]	[1540]	[2020]	[2460]	[2900]	[3340]
91	1	23	80	130	175	230	280	330	375
	890	887	879	868	852	834	814	782	754
[25]		[220]	[670]	[1120]	[1560]	[1990]	[2450]	[2890]	
95		25	75	125	175	225	275	325	
		924	916	905	890	873	846	817	

Flow LPM [GPM]

[0.25]	[170]								
0.95	20								
	3								
[0.5]	[190]	[410]	[870]						
1.9	20	45	100						
	12	8	2						
[1]	[230]	[510]	[1070]	[1580]	[2050]	[2520]	[2920]	[3310]	
4	25	60	120	180	230	285	309	375	
	28	27	23	19	16	13	9	3	
[2]	[230]	[510]	[1080]	[1600]	[2090]	[2580]	[2930]	[3320]	[3640]
8	25	60	120	180	235	290	330	375	410
	56	56	53	47	42	39	36	28	21
[4]	[220]	[500]	[1080]	[1620]	[2150]	[2660]	[3100]	[3540]	[3980]
15	25	55	120	185	245	300	350	400	450
	114	113	111	104	97	95	92	85	77
[6]	[220]	[490]	[1080]	[1640]	[2190]	[2740]	[3260]	[3770]	[4280]
23	25	55	120	185	245	310	370	425	485
	172	171	169	161	153	149	146	132	118
[8]	[200]	[480]	[1080]	[1650]	[2220]	[2780]	[3310]	[3840]	[4360]
30	25	55	120	185	250	315	375	435	495
	230	224	222	219	210	204	201	192	184
[10]	[180]	[470]	[1070]	[1650]	[2230]	[2800]	[3420]	[3940]	[4450]
38	20	55	120	185	250	315	385	445	505
	287	286	282	276	269	261	255	243	231
[12]	[160]	[460]	[1060]	[1640]	[2230]	[2800]	[3350]	[3910]	[4440]
45	20	50	120	185	250	315	380	440	500
	345	344	338	333	327	317	307	295	284
[14]	[150]	[440]	[1030]	[1620]	[2220]	[3000]	[3350]	[3910]	[4440]
53	15	50	115	185	250	340	380	440	500
	403	402	395	391	385	373	360	348	336
[16]	[130]	[420]	[1010]	[1600]	[2200]	[2780]	[3330]	[3890]	[4440]
61	15	45	115	180	250	315	375	440	500
	461	460	452	447	443	430	411	397	384
[18]	[110]	[400]	[990]	[1580]	[2160]	[2750]	[3300]	[3860]	[4410]
68	10	45	110	180	245	310	375	435	500
	518	517	509	504	500	484	471	456	440
[20]	[90]	[380]	[960]	[1550]	[2130]	[2710]	[3280]	[3840]	
76	10	45	110	175	240	305	370	435	
	576	575	568	560	551	539	524	508	
[22]	[60]	[350]	[940]	[1520]	[2100]	[2680]	[3250]	[3820]	
83	5	40	105	170	235	305	365	430	
	634	633	624	619	604	597	579	560	
[24]	[40]	[325]	[920]	[1490]	[2070]	[2650]	[3220]	[3780]	
91	5	35	105	170	235	300	365	425	
	692	691	682	676	665	651	633	616	
[25]	[20]	[310]	[900]	[1480]	[2050]	[2630]	[3200]	[3700]	
95	1	35	100	165	230	295	360	420	
	720	719	712	705	692	679	662	656	

[1560]
175
890 } Torque [lb-in]
Nm
Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous
Intermittent

Peak
No operation

Δ Pressure bar [PSI] 160 cm³/r [9.6 in³/r]

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[3750]
17	34	69	103	138	172	207	241	259

Flow LPM [GPM]	Δ Pressure bar [PSI] 160 cm ³ /r [9.6 in ³ /r]								
	[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[3750]
[0.25]	25								
0.95	3								
[0.5]	[240]	[490]	[990]	[1570]	[2140]				
1.9	25	55	110	175	240				
	9	7	5	3	1				
[1]	[280]	[590]	[1170]	[1730]	[2290]	[2830]	[3330]	[3820]	[4070]
4	30	65	130	195	260	320	375	430	460
	23	21	19	17	13	8	3	2	1
[2]	[300]	[610]	[1210]	[1790]	[2350]	[2920]	[3480]	[4050]	[4330]
8	35	70	135	200	265	330	395	460	490
	46	45	42	39	35	34	33	28	22
[4]	[320]	[630]	[1260]	[1890]	[2530]	[3170]	[3820]	[4460]	[4780]
15	35	70	140	215	285	360	430	505	540
	93	92	89	85	79	77	75	58	43
[6]	[320]	[650]	[1300]	[1960]	[2620]	[3280]	[3940]	[4600]	[4930]
23	35	75	145	220	295	370	445	520	560
	142	140	137	131	124	118	113	104	96
[8]	[310]	[650]	[1330]	[2010]	[2670]	[3330]	[4000]	[4660]	[4990]
30	35	75	150	225	300	375	450	525	565
	190	187	184	178	170	166	164	153	142
[10]	[290]	[640]	[1340]	[2030]	[2850]	[3410]	[4030]	[4700]	[5030]
38	35	70	150	230	320	385	455	530	570
	237	235	231	226	217	212	209	193	187
[12]	[270]	[620]	[1320]	[2030]	[2700]	[3370]	[4040]	[4710]	[5040]
45	30	70	150	230	305	380	455	530	570
	286	283	279	274	265	254	246	235	224
[14]	[240]	[590]	[1300]	[2020]	[2690]	[3360]	[4030]	[4700]	
53	25	65	145	230	305	380	455	530	
	334	331	326	322	312	305	297	286	
[16]	[220]	[570]	[1270]	[1980]	[2660]	[3330]	[4010]	[4680]	
61	25	65	145	225	300	375	455	530	
	382	378	374	369	360	349	339	326	
[18]	[190]	[540]	[1240]	[1960]	[2640]	[3320]	[3990]		
68	20	60	140	220	300	375	450		
	429	426	422	416	407	394	387		
[20]	[170]	[510]	[1210]	[1920]	[2630]	[3310]	[3940]		
76	20	60	135	215	300	375	445		
	477	474	469	462	451	440	430		
[22]	[150]	[480]	[1170]	[1880]	[2600]	[3290]	[3920]		
83	15	55	130	210	295	370	445		
	525	522	517	510	501	484	473		
[24]	[120]	[450]	[1150]	[1860]	[2570]	[3260]	[3900]		
91	15	50	130	210	290	370	440		
	572	569	564	556	546	531	522		
[25]	[90]	[440]	[1140]	[1840]	[2560]	[3230]	[3880]		
95	10	50	130	210	290	365	440		
	596	593	587	580	566	553	544		
[30]		[330]	[1040]	[1750]	[2470]	[3140]	[3800]		
114		35	120	200	280	355	430		
		713	706	696	682	672	658		

[330] } Torque [lb-in]
35 } Nm
713 } 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 195 cm³/r [11.9in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]
17	34	52	69	86	103	121	138	155	172	190	207	224	241	259

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Flow LPM [GPM]

[0.25]	[240]	[590]													
0.95	25	65													
	4	2													
[0.5]	[290]	[640]	[990]	[1340]											
1.9	35	70	110	150											
	8	6	5	2											
[1]	[380]	[730]	[1100]	[1430]	[1790]	[2120]	[2450]	[2720]	[2990]	[3260]	[3540]	[3810]	[4080]	[4350]	[4620]
4	45	80	125	160	200	240	275	305	340	370	400	430	460	490	520
	17	16	15	14	13	11	9	7	5	4	3	2	2	1	
[2]	[390]	[755]	[1135]	[1470]	[1860]	[2195]	[2535]	[2880]	[3120]	[3680]	[4090]	[4500]	[4800]	[5100]	[5400]
8	45	85	130	165	210	250	285	325	355	415	460	510	540	575	610
	37	35	34	33	32	31	28	26	24	21	20	19	17	14	14
[4]	[405]	[795]	[1185]	[1540]	[1970]	[2310]	[2675]	[3040]	[3420]	[3790]	[4160]	[4520]	[4890]	[5260]	[5630]
15	45	90	135	175	225	260	300	345	385	430	470	510	550	595	635
	76	74	73	72	71	70	66	64	62	61	59	57	55	51	45
[6]	[405]	[815]	[1220]	[1590]	[2035]	[2395]	[2780]	[3170]	[3560]	[3940]	[4320]	[4700]	[5070]	[5450]	[5830]
23	45	90	140	180	230	270	315	360	400	445	490	530	570	615	660
	115	113	111	110	109	108	104	102	100	99	96	94	91	87	81
[8]	[400]	[820]	[1230]	[1625]	[2065]	[2450]	[2850]	[3260]	[3670]	[4040]	[4410]	[4780]	[5150]	[5520]	[5890]
30	45	90	140	185	235	275	320	370	415	455	500	540	580	625	665
	154	151	149	148	147	146	143	140	137	135	132	130	127	123	117
[10]	[380]	[810]	[1230]	[1645]	[2095]	[2480]	[2895]	[3310]	[3730]	[4100]	[4470]	[4840]	[5210]	[5590]	
38	45	95	140	185	235	280	325	375	420	465	505	545	590	630	
	193	190	188	187	186	184	181	177	175	173	170	168	164	160	
[12]	[355]	[790]	[1215]	[1650]	[2100]	[2485]	[2915]	[3340]	[3760]	[4120]	[4480]	[4850]			
45	40	90	135	185	235	280	330	375	425	465	505	550			
	231	229	227	226	224	221	219	218	215	211	208	204			
[14]	[320]	[765]	[1190]	[1645]	[2090]	[2475]	[2915]	[3350]	[3770]	[4130]	[4480]	[4860]			
53	35	85	135	185	235	280	330	380	425	465	505	550			
	269	267	267	264	261	260	257	254	250	248	245	241			
[16]	[290]	[730]	[1160]	[1625]	[2070]	[2455]	[2900]	[3340]	[3760]	[4130]	[4490]	[4860]			
61	30	80	130	185	235	275	330	375	425	465	505	550			
	308	306	305	303	299	296	294	290	286	283	279	276			
[18]	[290]	[690]	[1120]	[1590]	[2035]	[2420]	[2870]	[3310]	[3730]	[4100]	[4480]				
68	30	80	125	180	230	270	325	375	420	465	505				
	346	345	345	342	337	334	333	327	321	315	308				
[20]	[210]	[650]	[1080]	[1550]	[1995]	[2380]	[2830]	[3270]	[3690]	[4070]	[4450]				
76	25	75	120	175	225	270	320	370	415	460	500				
	385	384	383	380	375	372	371	367	363	359	355				
[22]	[170]	[610]	[1040]	[1500]	[1955]	[2340]	[2785]	[3220]	[3640]	[4050]					
83	20	70	120	170	220	265	315	365	410	460					
	424	423	422	418	414	410	408	404	399	395					
[24]	[135]	[570]	[1000]	[1440]	[1910]	[2300]	[2735]	[3170]	[3600]	[4020]					
91	15	65	115	165	215	260	304	353	402	451					
	462	461	460	457	453	449	441	436	432	432					
[25]	[120]	[550]	[980]	[1410]	[1890]	[2280]	[2695]	[3120]	[3560]	[3990]					
95	15	60	110	160	215	260	286	332	384	384					
	484	482	479	476	473	469	459	454	449	449					
[30]		[420]	[860]	[1290]	[1700]	[2120]	[2530]	[2940]	[3400]						
114		45	95	145	190	240	285	330	385						
		577	575	571	567	562	556	550	542						

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Intermittent

Peak

No operation

Δ Pressure bar [PSI] 245 cm³/r [14.9 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]
17	34	52	69	86	103	121	138	155	172	190	207	224	241	259

Flow LPM [GPM]	[0.5]	410	850																
	1.9	45	95																
		4	2																
	[1]	450	930	1420	1850	2320	2780	3250	3650	4100	4540	4980	5430	5870	6310				
		50	105	160	210	260	315	365	410	465	515	560	615	665	715				
	4	14	13	12	11	10	9	8	6	5	4	4	3	2	1				
	[2]	460	960	1460	1900	2400	2860	3340	3780	4320	4770	5210	5660	6110	6570	6950			
		50	110	165	215	270	325	375	425	490	540	590	640	690	740	785			
	8	29	28	27	26	25	23	22	20	19	18	17	15	14	12	10			
	[4]	470	1000	1540	1980	2510	3010	3480	3980	4450	4910	5380	5850	6320	6780	7250			
		55	115	175	225	285	340	395	450	505	555	610	660	715	765	820			
	15	60	59	58	56	54	53	51	49	48	47	47	46	45	44	42			
	[6]	460	1020	1550	2040	2580	3110	3590	4120	4580	5050	5520	5980	6440	6910				
		50	115	175	230	290	350	405	465	515	570	625	675	730	780				
	23	91	90	89	87	84	83	81	78	76	73	71	69	67	65				
	[8]	460	1010	1560	2080	2630	3170	3670	4210	4680	5160	5630	6110	6590					
		50	115	175	235	295	360	415	475	530	585	635	690	745					
	30	122	121	120	118	115	113	111	108	106	104	102	101	99					
	[10]	440	1000	1550	2110	2650	3200	3730	4250	4730	5210	5720	6230						
		50	115	175	240	300	360	420	480	535	589	645	705						
	38	153	152	150	148	146	144	142	139	137	135	133	130						
	[12]	410	960	1530	2100	2640	3190	3760	4260	4740	5220	5730							
		45	110	175	235	300	360	425	480	535	590	645							
	45	184	183	182	180	177	175	173	170	168	165	162							
	[14]	380	910	1500	2080	2600	3160	3760	4230	4710	5190								
		40	105	170	235	295	355	425	480	530	585								
	53	215	214	213	211	209	207	204	201	198	195								
	[16]	340	860	1460	2040	2570	3120	3740	4180	4660	5140								
		40	95	165	230	290	355	425	470	525	580								
	61	246	245	244	242	240	238	235	232	227	223								
	[18]	290	810	1420	2000	2520	3060	3700	4130	4610	5090								
		30	90	160	225	285	345	420	465	520	575								
	68	277	276	275	273	271	269	266	263	258	253								
	[20]	250	800	1350	1910	2460	3010	3630	4110	4610									
		30	90	155	215	280	340	410	465	520									
	76	308	306	304	302	300	298	295	291	288									
	[22]	200	710	1300	1870	2390	2940	3560	4010	4510									
		25	80	145	210	270	330	400	455	510									
	83	339	337	337	334	332	330	327	323	318									
	[24]	150	670	1240	1790	2330	2880	3460	3960	4460									
		15	75	140	200	265	325	390	445	505									
	91	370	369	367	364	362	360	357	353	344									
	[25]	120	660	1210	1750	2300	2860	3410	3950	4470									
		15	75	135	200	260	325	385	445	505									
	95	385	384	382	379	377	375	372	367	363									
	[30]		520	1080	1620	2180	2720	3260	3790										
			60	120	185	245	305	370	430										
	114		462	460	458	456	453	450	447										

[3790] Torque [lb-in]
430 } Nm
447 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Intermittent

Peak

No operation

Δ Pressure bar [PSI] 305 cm³/r [18.7in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]
17	34	52	69	86	103	121	138	155	172	190	207	224	241

C-1

Flow LPM [GPM]

[0.5]	[500]	[1050]											
1.9	55	120											
	4	2											
[1]	[610]	[1180]	[1750]	[2330]	[2870]	[3440]	[3930]	[4410]	[4900]	[5380]			
4	70	135	200	260	325	390	445	500	555	610			
	12	11	11	10	10	9	8	6	3	1			
[2]	[620]	[1210]	[1800]	[2400]	[2970]	[3510]	[4050]	[4600]	[5140]	[5680]	[6220]	[6750]	[7290]
8	70	135	205	270	335	395	460	520	580	640	705	765	825
	24	24	23	22	22	20	19	18	17	15	13	11	8
[4]	[680]	[1250]	[1880]	[2500]	[3120]	[3690]	[4260]	[4840]	[5410]	[5980]	[6550]	[7120]	[7690]
15	75	140	210	280	355	415	480	545	610	675	740	805	870
	49	49	48	47	47	45	43	42	40	38	36	34	33
[6]	[620]	[1270]	[1920]	[2560]	[3230]	[3810]	[4390]	[4970]	[5560]	[6130]	[6710]	[7290]	
23	70	145	215	290	365	430	495	560	630	695	760	825	
	74	74	72	72	71	69	66	64	61	58	55	52	
[8]	[600]	[1270]	[1940]	[2600]	[3290]	[3880]	[4470]	[5070]	[5660]	[6250]	[6840]		
30	70	145	220	295	370	440	505	575	640	705	775		
	98	98	97	96	95	93	90	86	83	80	77		
[10]	[570]	[1250]	[1940]	[2610]	[3310]	[3920]	[4530]	[5150]	[5760]	[6370]			
38	65	140	220	295	375	440	510	580	650	720			
	123	122	121	120	119	117	113	110	106	102			
[12]	[530]	[1220]	[1920]	[2600]	[3300]	[3920]	[4530]	[5150]	[5760]	[6370]			
45	60	140	215	295	375	440	510	580	650	720			
	148	147	145	144	143	142	138	133	128	124			
[14]	[480]	[1180]	[1870]	[2560]	[3260]	[3900]	[4510]	[5120]	[5730]				
53	55	135	210	290	370	440	510	580	645				
	172	172	170	168	167	165	160	156	152				
[16]	[430]	[1120]	[1820]	[2500]	[3210]	[3870]	[4480]	[5080]	[5690]				
61	50	125	205	280	365	440	505	575	645				
	196	196	194	192	191	188	183	178	174				
[18]	[370]	[1060]	[1760]	[2440]	[3140]	[3800]	[4420]	[5050]					
68	40	120	200	275	355	440	500	570					
	221	221	218	217	215	212	207	202					
[20]	[320]	[980]	[1680]	[2360]	[3050]	[3710]	[4370]	[5020]					
76	35	110	190	265	345	420	495	565					
	246	245	243	241	239	236	231	226					
[22]	[240]	[920]	[1620]	[2300]	[2990]	[3560]	[4190]	[4820]					
83	25	105	185	260	340	400	475	545					
	271	270	268	266	263	260	258	255					
[24]	[180]	[870]	[1550]	[2240]	[2920]	[3420]	[4020]	[4630]					
91	20	100	175	255	330	385	455	525					
	296	294	293	290	288	285	283	280					
[25]	[150]	[840]	[1520]	[2200]	[2890]	[3340]	[3930]	[4520]					
95	15	95	170	250	325	375	445	510					
	308	307	305	303	300	298	295	293					
[30]	[680]	[1360]	[2040]	[2720]	[3140]	[3810]							
114	75	155	230	305	355	430							
	365	362	360	357	356	352							

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous
Intermittent

Peak
No operation

Δ Pressure bar [PSI] 395 cm³/r [24.0 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]
17	34	52	69	86	103	121	138	155	172	190

Flow LPM [GPM]	[0.5]	[560]	[1310]																	
	1.9	65	150																	
		4	3																	
	[1]	[770]	[1540]	[2290]	[3080]	[3780]	[4480]	[5170]	[5880]	[6580]	[7270]	[7980]								
	4	85	175	260	350	430	505	585	665	745	820	900								
		9	9	9	8	8	7	7	6	5	4	3								
	[2]	[790]	[1580]	[2360]	[3180]	[3930]	[4680]	[5430]	[6180]	[6840]	[7500]	[8170]								
	8	90	180	265	360	445	530	615	700	775	845	925								
		18	18	18	17	17	16	15	14	13	11	10								
	[4]	[810]	[1660]	[2480]	[3320]	[4130]	[4940]	[5740]	[6550]	[7230]	[7880]									
	15	90	190	280	375	465	560	650	740	815	890									
		37	37	37	36	36	35	34	33	31	28									
	[6]	[820]	[1700]	[2550]	[3420]	[4250]	[5080]	[5920]	[6750]	[7420]	[8000]									
	23	90	190	290	385	480	575	670	765	840	905									
		57	56	56	55	54	52	50	49	47	45									
	[8]	[820]	[1700]	[2580]	[3460]	[4300]	[5130]	[5960]	[6800]											
	30	90	190	290	390	485	580	675	770											
		76	75	75	74	73	71	69	68											
	[10]	[800]	[1700]	[2590]	[3480]	[4320]	[5160]	[6000]	[6840]											
	38	90	190	295	395	490	585	680	775											
		95	94	94	93	92	90	88	86											
	[12]	[770]	[1680]	[2570]	[3470]	[4310]	[5150]	[5990]	[6830]											
	45	85	190	290	390	485	580	675	770											
		114	113	113	112	111	109	106	103											
	[14]	[740]	[1640]	[2530]	[3430]	[4280]	[5120]	[5960]												
	53	85	185	285	390	485	580	675												
		133	132	132	131	129	127	124												
	[16]	[690]	[1590]	[2480]	[3370]	[4220]	[5060]	[5910]												
	61	80	180	280	380	475	570	670												
		153	152	152	150	149	146	144												
	[18]	[640]	[1530]	[2420]	[3310]	[4160]	[5010]	[5870]												
	68	70	170	275	375	470	565	665												
		172	171	171	170	169	167	164												
	[20]	[580]	[1470]	[2370]	[3260]	[4110]	[4960]	[5820]												
	76	65	165	270	370	465	560	660												
		191	190	190	189	188	186	184												
	[22]	[510]	[1390]	[2290]	[3170]	[4030]	[4880]													
	83	60	155	260	360	455	550													
		210	209	209	208	207	206													
	[24]	[440]	[1330]	[2220]	[3100]	[3950]	[4800]													
	91	50	150	250	350	445	540													
		230	229	228	227	225	224													
	[26]	[350]	[1240]	[2130]	[3020]	[3880]	[4730]													
	98	40	140	240	340	440	535													
		249	248	247	246	244	242													
	[28]	[270]	[1150]	[2050]	[2930]	[3790]	[4650]													
	106	30	130	230	330	430	525													
		268	267	265	264	261	259													
	[30]	[180]	[1060]	[1960]	[2850]	[3710]	[4570]													
	114	20	120	220	320	420	515													
		287	286	284	283	281	277													
	[35]		[840]	[1760]	[2640]	[3480]														
	132		95	200	300	395														
			335	334	333	332														

[1760]
200 } Torque [lb-in]
334 } 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

 Continuous

 Intermittent

 Peak

 No operation

**Δ Pressure bar [PSI]
490 cm³/r [29.8in³/r]**

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]
17	34	52	69	86	103	121	138

C-1

Flow LPM [GPM]

[0.5]	[670]	[1600]						
1.9	75	180						
	2	1						
[1]	[920]	[2000]	[2990]	[3900]	[4880]			
4	105	225	340	440	550			
	7	6	5	4	2			
[2]	[950]	[2060]	[3110]	[4080]	[5110]	[6320]		
8	105	235	350	460	575	715		
	14	13	12	10	9	7		
[4]	[980]	[2130]	[3230]	[4270]	[5350]	[6370]	[7380]	[7980]
15	110	240	365	480	605	720	835	900
	30	29	28	27	26	24	22	20
[6]	[980]	[2120]	[3230]	[4300]	[5370]	[6420]	[7470]	[8225]
23	110	240	365	485	605	725	845	930
	45	44	43	42	41	39	37	35
[8]	[980]	[2110]	[3220]	[4330]	[5400]	[6470]	[7550]	
30	110	240	365	490	610	730	855	
	61	60	59	58	57	55	52	
[10]	[920]	[2050]	[3170]	[4300]	[5390]	[6460]	[7550]	
38	105	230	360	485	610	730	855	
	76	75	74	73	72	70	68	
[12]	[860]	[1990]	[3120]	[4260]	[5370]	[6460]	[7560]	
45	95	225	355	480	605	730	855	
	91	90	90	89	87	85	84	
[14]	[790]	[1930]	[3055]	[4185]	[5300]	[6400]		
53	90	220	345	475	600	725		
	106	105	105	104	102	100		
[16]	[720]	[1870]	[2990]	[4110]	[5230]	[6340]		
61	80	210	340	465	590	715		
	122	121	120	119	118	116		
[18]	[630]	[1770]	[2890]	[4020]	[5140]	[6260]		
68	70	200	325	455	580	705		
	137	136	135	134	133	131		
[20]	[550]	[1670]	[2800]	[3940]	[5060]	[6180]		
76	60	190	315	445	570	700		
	153	152	151	150	149	146		
[22]	[450]	[1570]	[2700]	[3830]	[4960]	[6070]		
83	50	175	305	435	560	685		
	168	168	167	165	164	161		
[24]	[360]	[1480]	[2600]	[3730]	[4860]	[5970]		
91	40	165	295	420	550	675		
	184	184	183	181	179	177		
[26]	[270]	[1390]	[2510]	[3640]	[4770]			
98	30	155	285	410	540			
	199	195	194	192	190			
[28]	[1260]	[2370]	[3520]	[4630]				
106	140	270	400	525				
	212	211	209	207				
[30]	[1130]	[2240]	[3400]	[4500]				
114	125	255	385	510				
	230	229	227	224				

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)
 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)
 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)

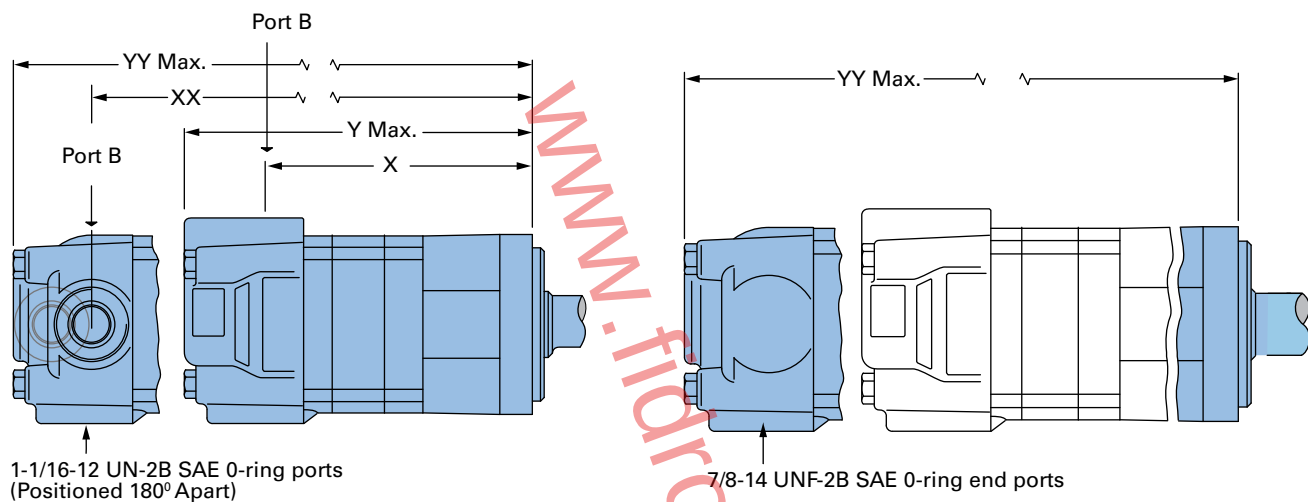
Manifold mount

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 cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
34 [2.1]	126.7 [4.99]	174.0 [6.85]	129.0 [5.08]	175.3 [6.90]
41 [2.5]	128.0 [5.04]	175.3 [6.90]	130.5 [5.14]	176.8 [6.96]
66 [4.0]	133.9 [5.27]	181.1 [7.13]	136.1 [5.36]	182.4 [7.18]
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]	257.0 [10.12]

2000 Series

Dimensions

Standard mount with integral relief valve

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

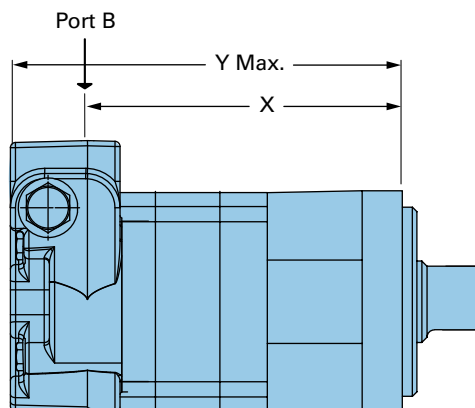
Standard mount with integral relief valve

C-1

2X 93.7/91.7
 [3.69/3.61]

64.0/62.0
 [2.52/2.44]

Case drain 7/16-20 UNF-2B
 SAE O-ring port or G 1/4 (BSP)



Standard mount motor dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
34 [2.1]	126.7 [4.99]	174.0 [6.85]
41 [2.5]	128.2 [5.05]	175.5 [6.91]
66 [4.0]	133.9 [5.27]	181.2 [7.13]
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]

Wheel 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)
 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)
 7/8 -14 UNF-2B SAE O-ring end 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)

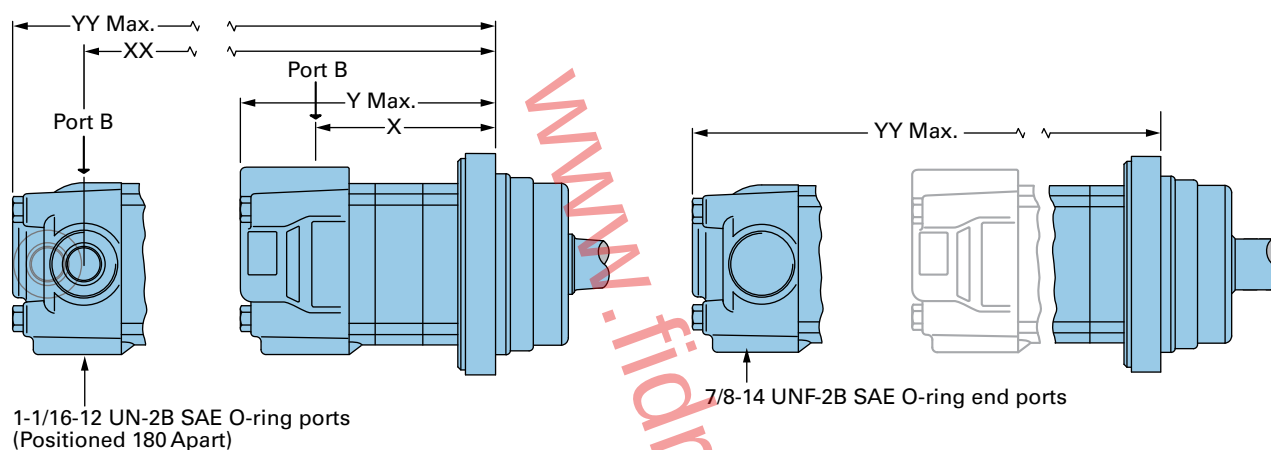
Manifold mount

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 cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
34 [2.1]	86.5 [3.41]	133.8 [5.27]	88.8 [3.50]	135.1 [5.32]
41 [2.5]	88.0 [3.47]	135.3 [5.33]	90.3 [3.56]	136.6 [5.38]
66 [4.0]	93.7 [3.69]	141.0 [5.55]	96.0 [3.78]	142.3 [5.60]
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]	125.8 [4.96]
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

Wheel mount with intergal relief valve

Ports

7/8 -14 UNF-2B SAE O-ring staggered ports (2)
7/16 -20 UNF-2B SAE O-ring case drain port (1)

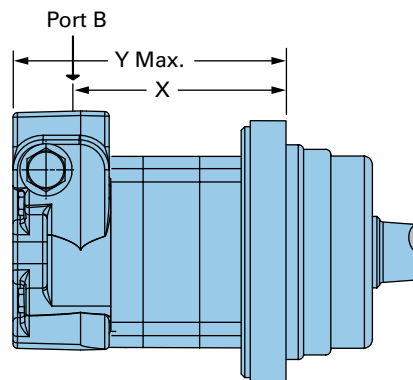
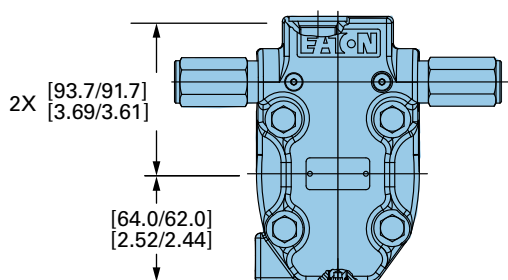
G 1/2 (BSP) staggered ports (2)
G 1/4 (BSP) case drain port (1)

Standard rotation viewed from shaft end

Port A pressurized — CW
Port B pressurized — CCW

Wheel mount with integral relief valve

C-1



Case drain 7/16-20 UNF-2B SAE O-ring port or G 1/4 (BSP)

Wheel mount motor dimensions

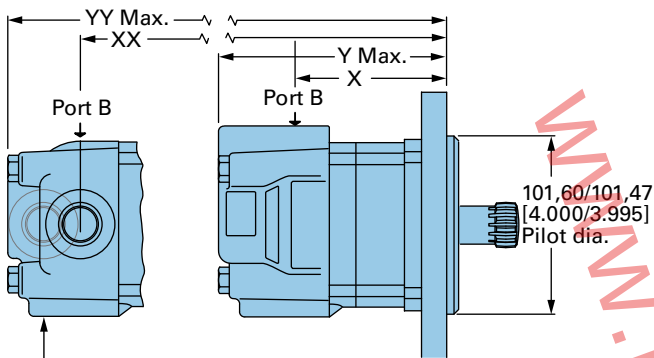
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
34 [2.1]	86.5 [3.41]	133.8 [5.27]
41 [2.5]	88.0 [3.47]	135.3 [5.33]
66 [4.0]	93.7 [3.69]	141.0 [5.55]
80 [4.9]	96.9 [3.82]	144.3 [5.68]
100 [6.2]	101.4 [4.00]	148.9 [5.86]
130 [8.0]	107.8 [4.25]	155.2 [6.11]
160 [9.6]	107.8 [4.25]	155.2 [6.11]
195 [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]

Bearingless

Ports

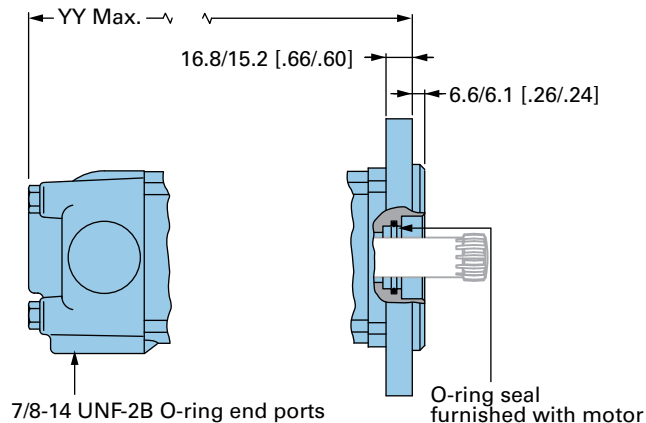
7/8 -14 UNF-2B SAE O-ring staggered ports (2)
 7/16 -20 UNF-2B SAE O-ring case drain port (1)
 1 1/16 -12 UN-2B SAE O-ring ports (positioned 180° apart) (2)
 7/16 -20 UNF-2B SAE O-ring case drain port (1)
 7/8 -14 UNF-2B SAE O-ring end ports (2)
 7/16 -20 UNF-2B SAE O-ring case drain port (1)
 G 1/2 (BSP) staggered ports (2)
 G 1/4 (BSP) case drain port (1)

Bearingless



1 1/16-12 UN-2B SAE O-ring ports (Positioned 180° Apart)

For 2000 Series bearingless motor application information contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).



7/8-14 UNF-2B O-ring end ports

Manifold mount

7/16 -20 UNF-2B SAE O-ring case drain port (1)

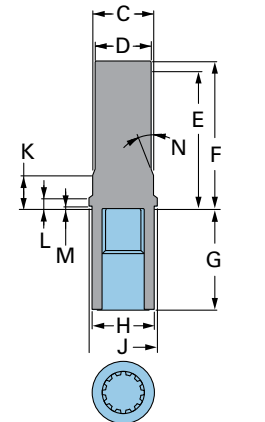
Standard rotation viewed from drive end

Port A pressurized — CW

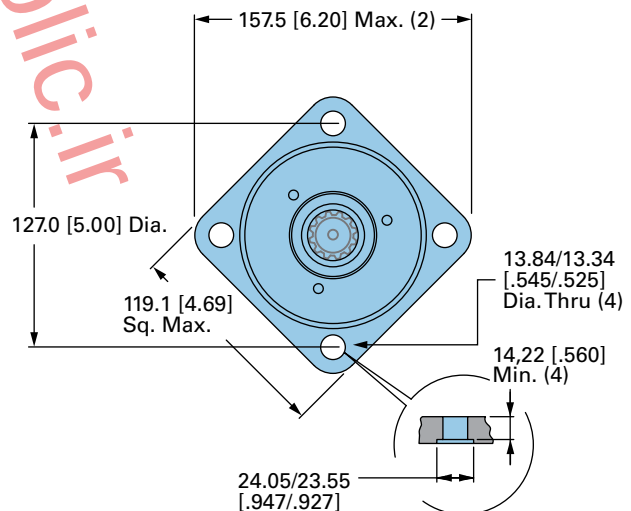
Port B pressurized — CCW

Blank Dimensions

C	35.87 [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	725.91 [1.020]
L	8.25 [.325]
M	0.89 [.035]
N	15°



Mating coupling blank
Eaton Part no. 13307-003



Bearingless motors dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
34 [2.1]	68.7 [2.70]	116.3 [4.58]	70.9 [2.79]	117.6 [4.63]
41 [2.5]	70.1 [2.76]	117.7 [4.63]	72.4 [2.85]	119.1 [4.69]
66 [4.0]	75.7 [2.98]	123.4 [4.86]	78.1 [3.08]	124.8 [4.91]
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]

Bearingless motors dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
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]	144.6 [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]	164.9 [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

Bearingless with integral relief valve

Ports

7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

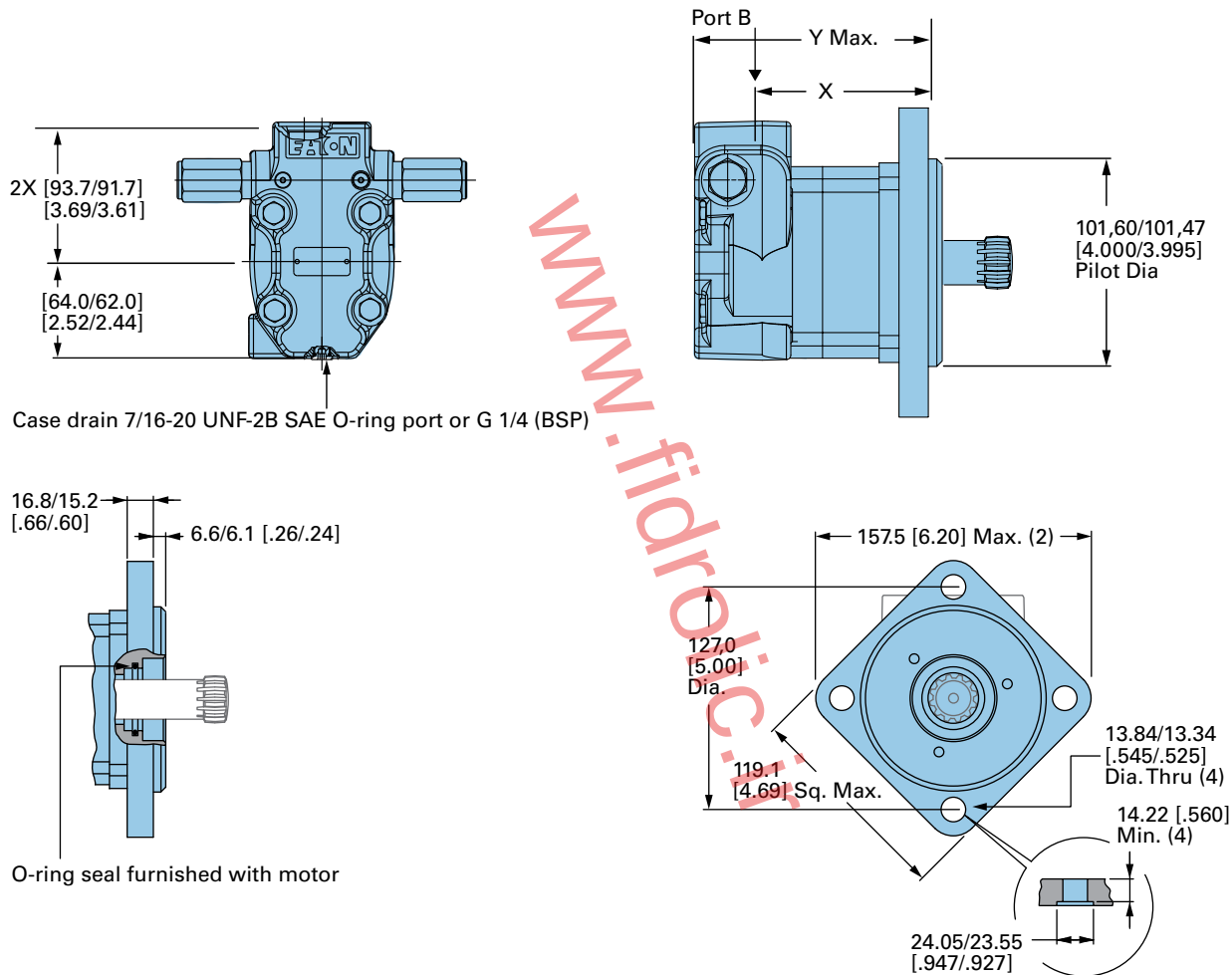
G 1/2 (BSP) Staggered Ports (2)
G 1/4 (BSP) Case Drain Port (1)

Standard rotation viewed from shaft end

Port A Pressurized — CW
Port B Pressurized — CCW

Bearingless with integral relief valve

C-1



Bearingless motors dimensions

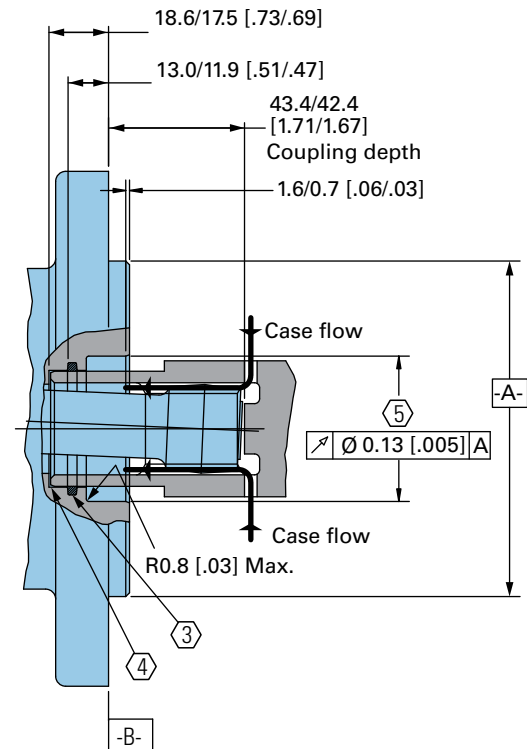
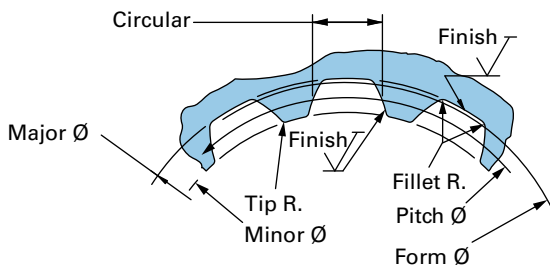
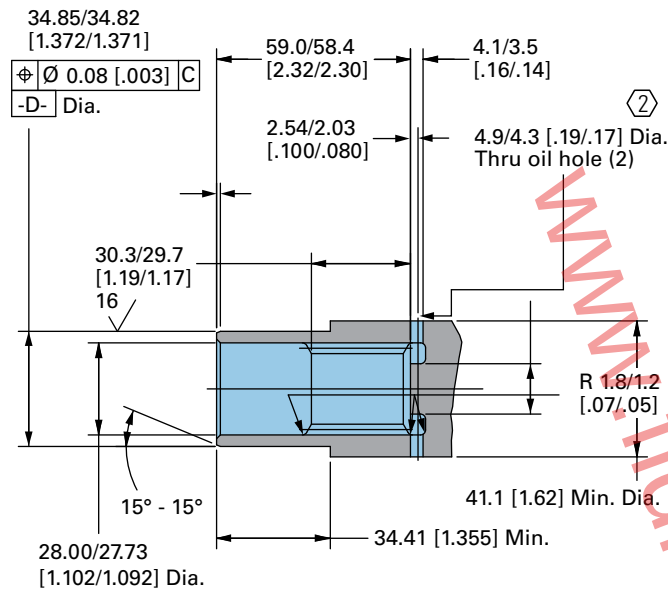
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
34 [2.1]	68.6 [2.70]	116.3 [4.58]
41 [2.5]	70.1 [2.76]	117.8 [4.64]
66 [4.0]	75.8 [2.99]	123.5 [4.86]
80 [4.9]	79.0 [3.11]	126.8 [4.99]
100 [6.2]	83.5 [3.29]	131.4 [5.17]
130 [8.0]	89.9 [3.54]	137.7 [5.42]

Bearingless motors dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
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]

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. Means of maintaining clearance between shaft and mounting flange must be provided.
5. Counter bore 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).

Bearingless



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] $\text{C} \text{ } 0.21 \text{ } .008 \text{ } \text{D}$
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]

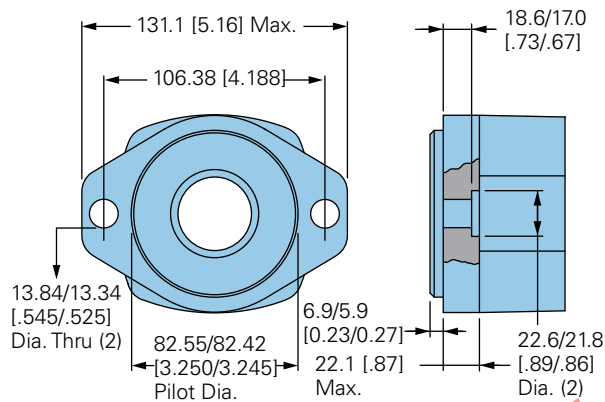
Finish	1.6 (63)
Involute profile variation	+0.000 -0.025 [+0.0000 -0.0010]
Total index variation	0.038 [.0015]
Lead variation	0.013 [.0005]
Circular space width:	
Maximum actual	4.318 [1.700]
Minimum effective	4.216 [1.660]
Maximum effective	Ref. 4.270 [1.681]
Minimum actual	Ref. 4.247 [1.672]
Dimension between two pins	Ref. 19.020 - 19.190 [.7488 - .7555]
Pin diameter	4.496 [1.770] Pins to have 3.38 [.133]
	Wide flat for root clearance

2000 Series

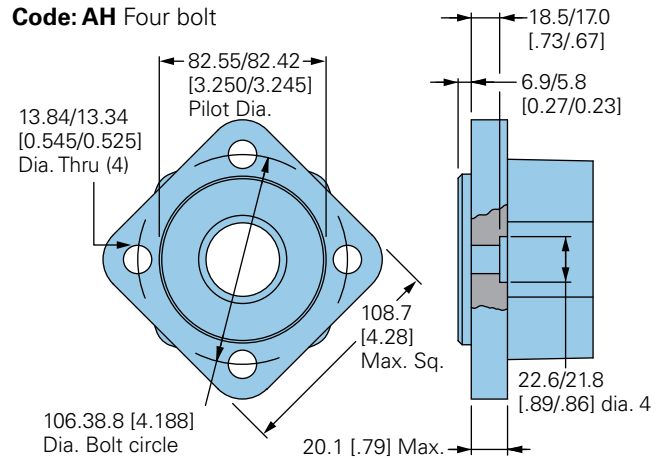
Dimensions

Mounting options

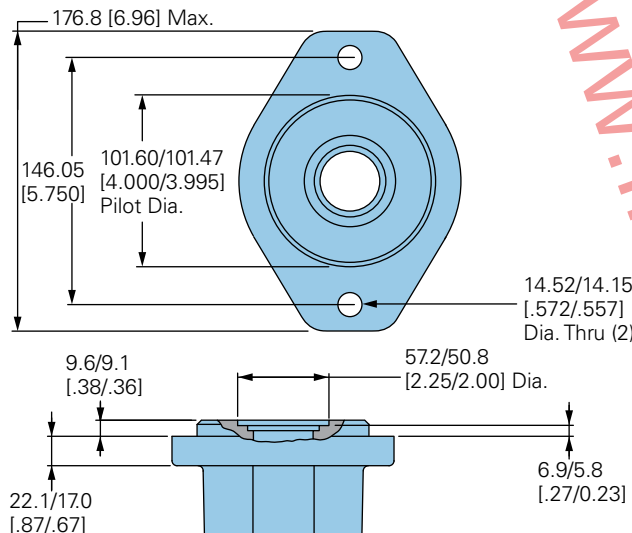
Code: AC SAE A - Two bolt (Standard motor)



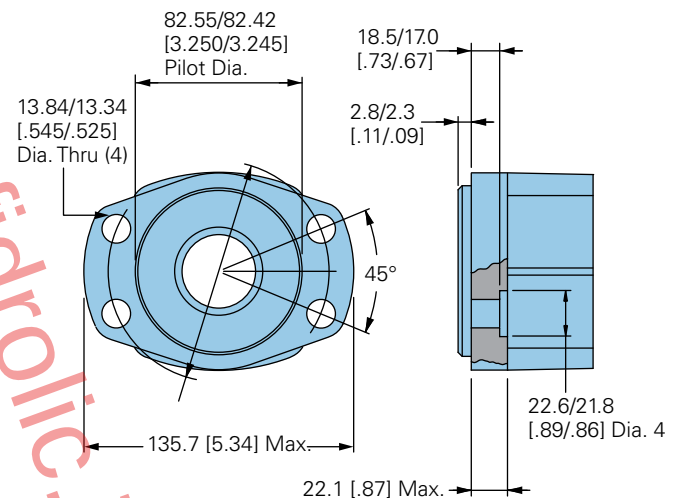
Code: AH Four bolt



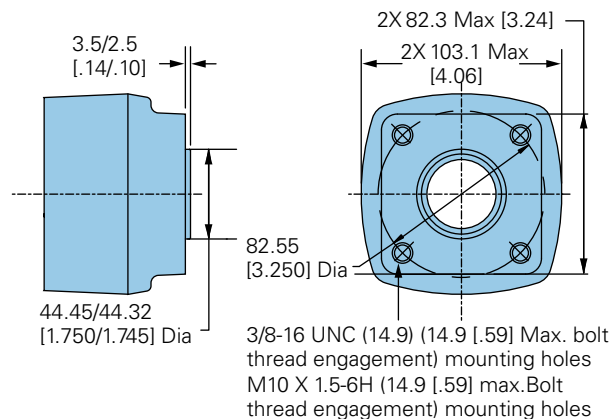
Code: AF SAE B - Two bolt



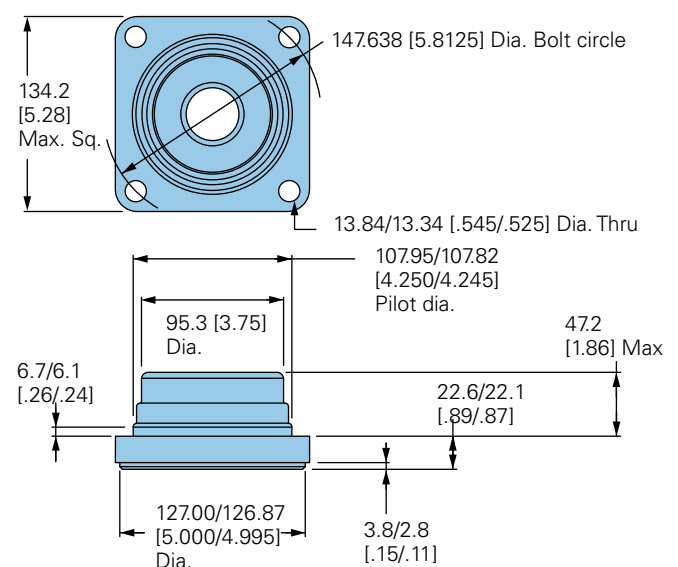
Code: AJ Four bolt magneto



Code: BY Four bolt (Standard motor)



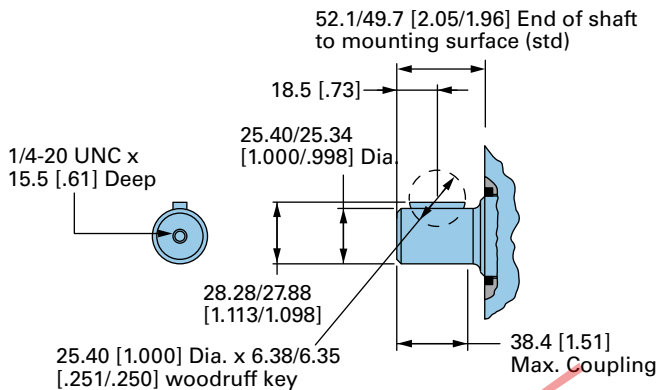
Code: AB Four bolt (Wheel motor)



Shafts

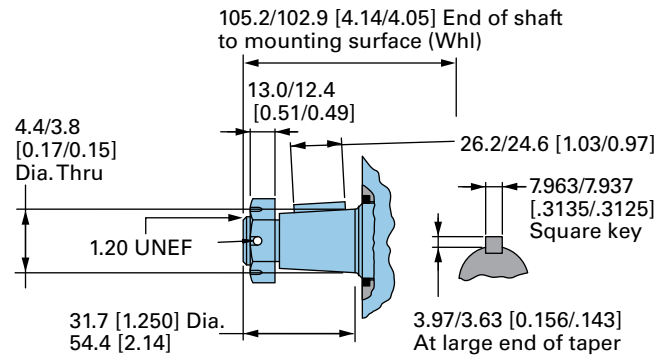
Code: 01 1 Inch straight

395 [3500] Max. Torque Nm [lb-in]

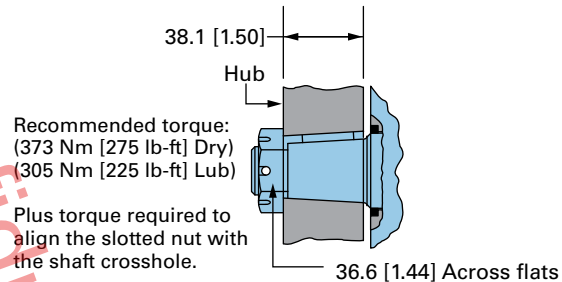


Code: 03 1 1/4 Inch tapered

768 [6800] Max. Torque Nm [lb-in]

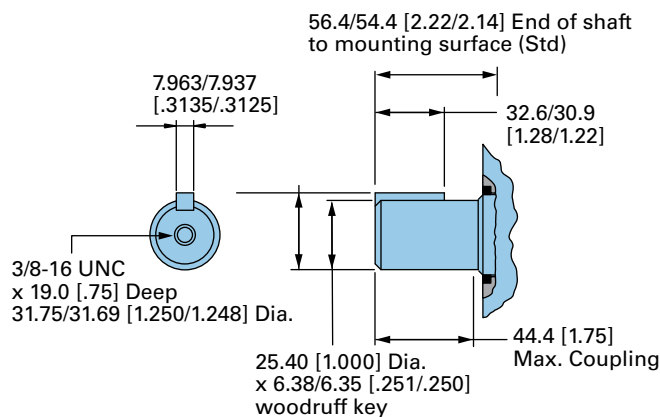


SAE J501 Standard tapered shaft 125.00±0.17 Taper per meter [1.500±.002 Taper per foot]



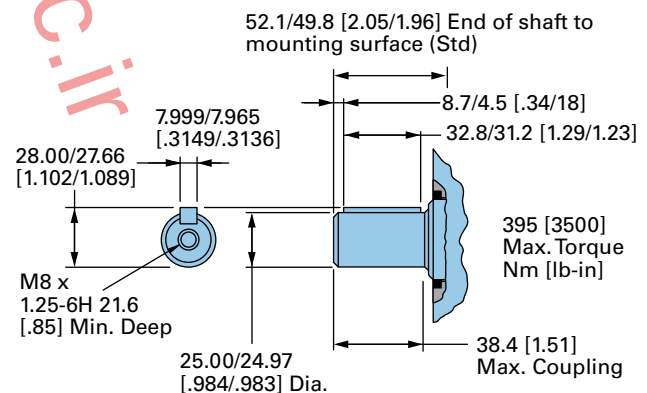
Code: 02 1 1/4 Inch straight

768 [6800] Max. Torque Nm [lb-in]



Code: 19 25 mm straight

395 [3500] Max. Torque Nm [lb-in]



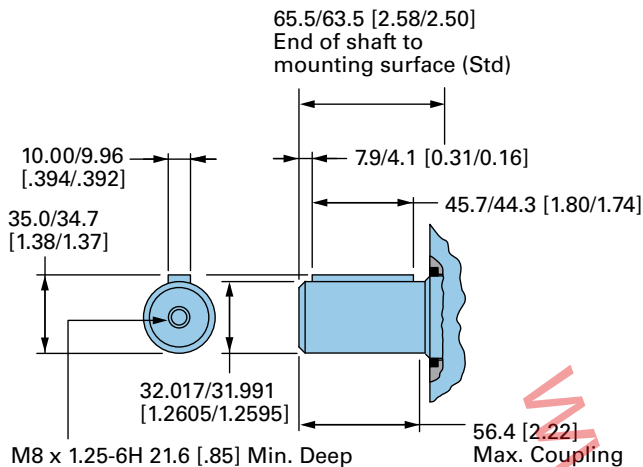
2000 Series

Dimensions

Shafts

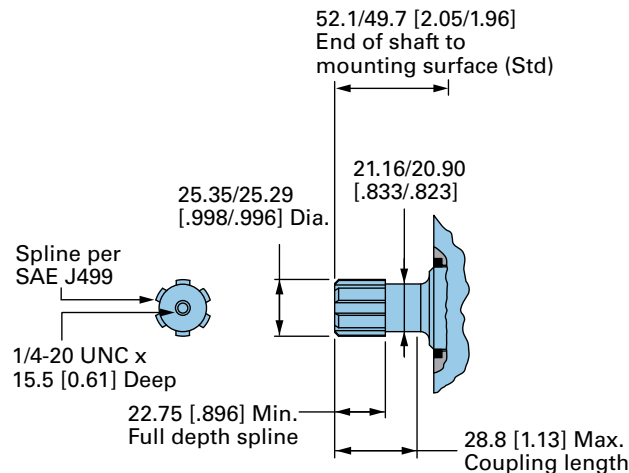
Code: 16 32 mm straight

768 [6800] Max. Torque Nm [lb-in]



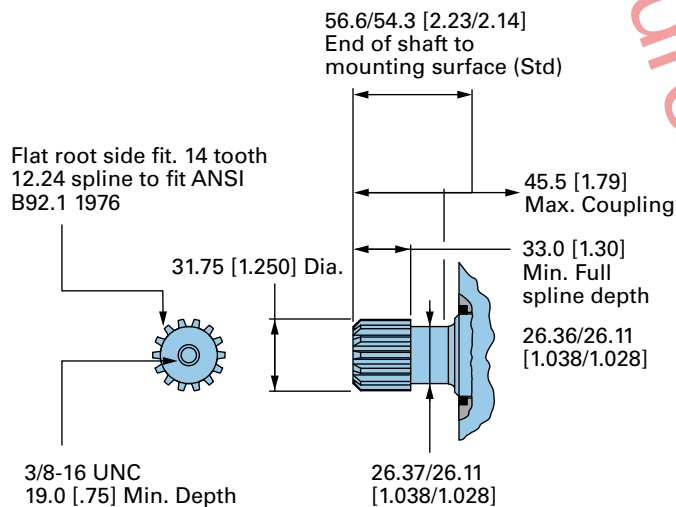
Code: 05 SAE 6B splined

395 [3500] Max. Torque Nm [lb-in]



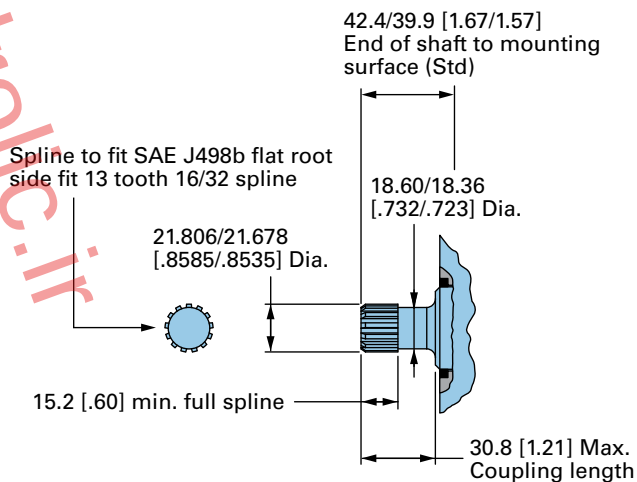
Code: 04 1 1/4 -14 Tooth splined

768 [6800] Max. Torque Nm [lb-in]



Code: 07 13 Tooth splined

141 [1250] Max. Torque Nm [lb-in]

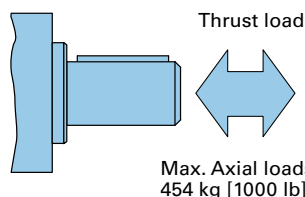


These curves indicate the radial load capacity on the motor shaft at various locations with an allowable external thrust load of 454 kg [1000 lb].

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.

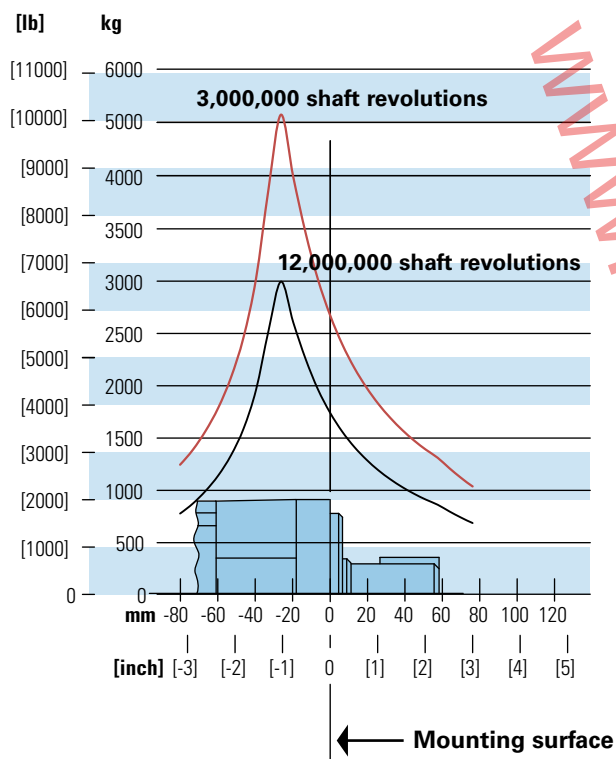
To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.



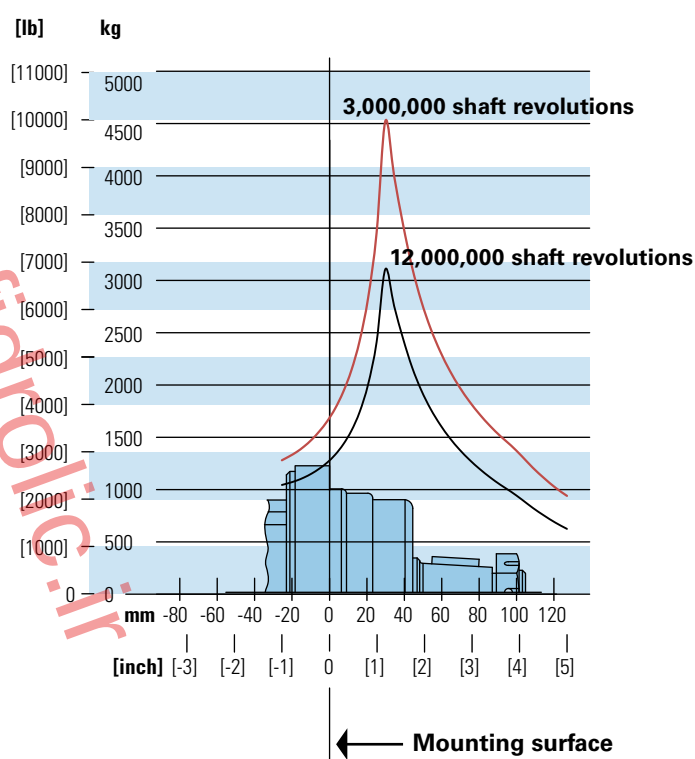
RPM	Multiplication factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

C-1

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 advantages:

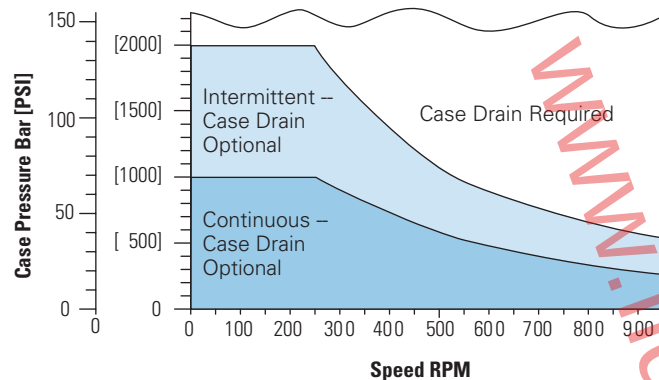
Contamination control — flushing the motor case.

Cooler motor — exiting oil draws motor heat away.

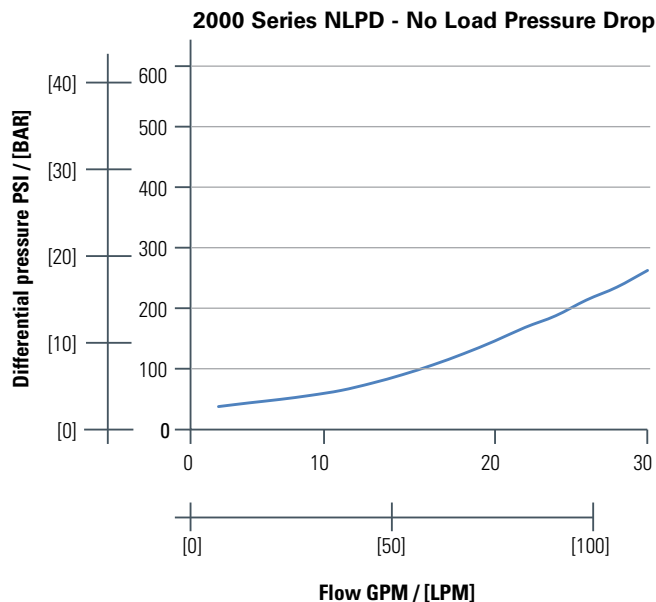
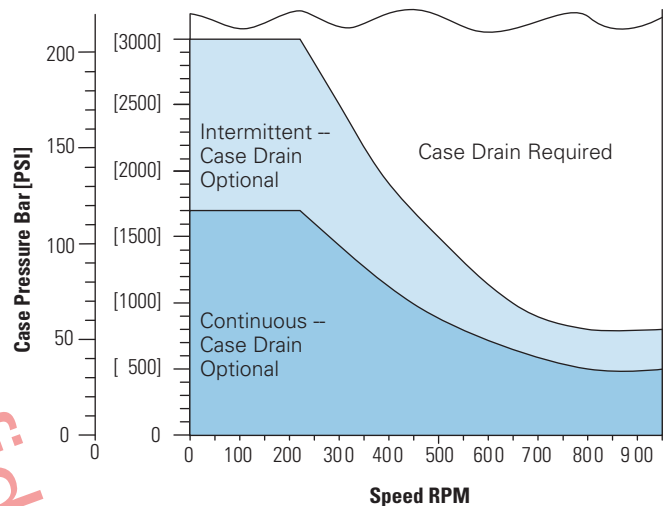
Extend motor seal life — maintain low case pressure with a preset restriction in the case drain line.

Case pressure seal limitation

Standard shaft seal



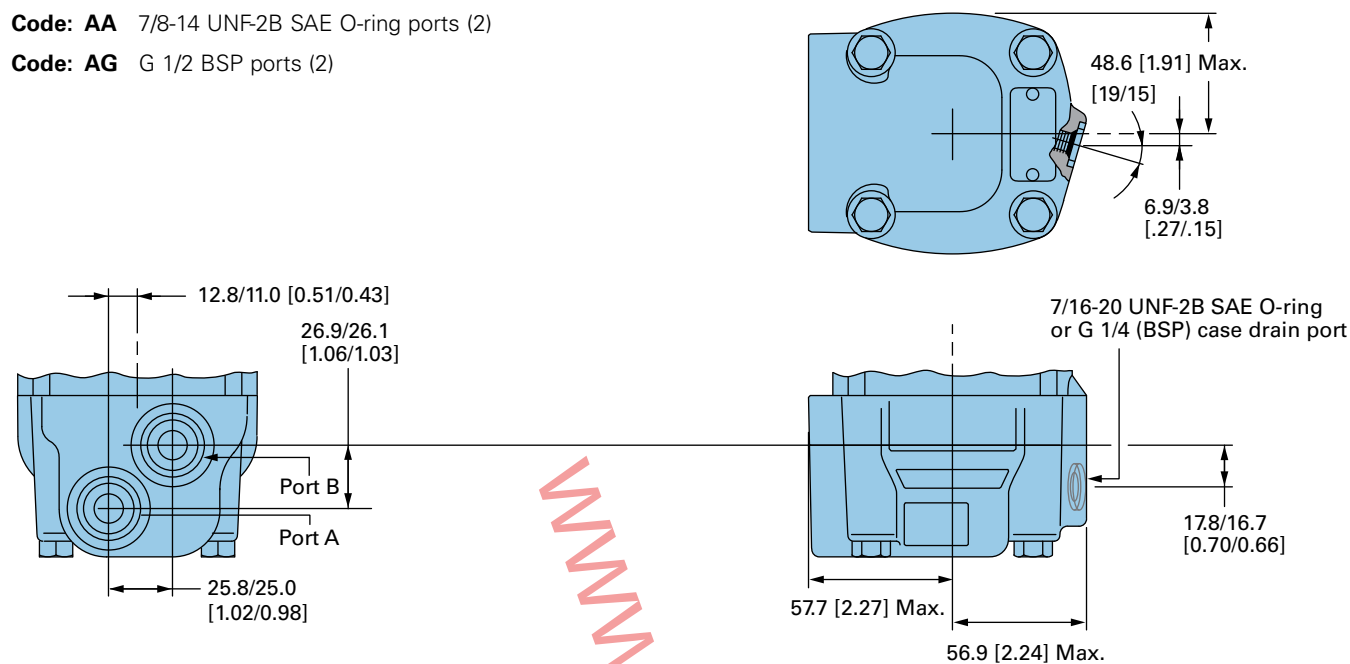
High pressure shaft seal



Ports

Code: AA 7/8-14 UNF-2B SAE O-ring ports (2)

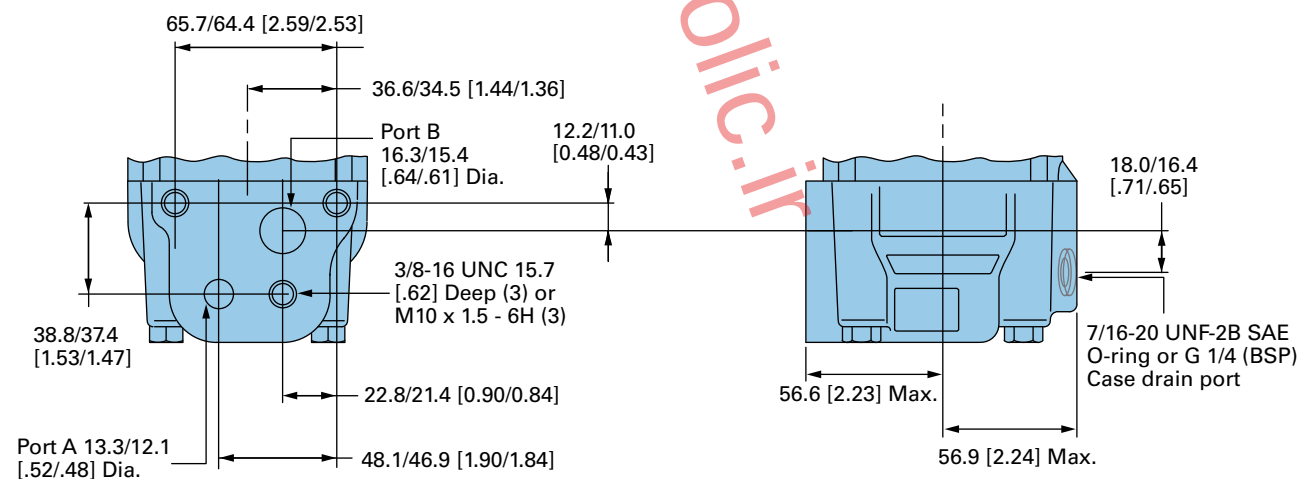
Code: AG G 1/2 BSP ports (2)



C-1

Code: AB 3/8-16 UNC threaded holes

Code: AE M10x1.5 -6H threaded holes



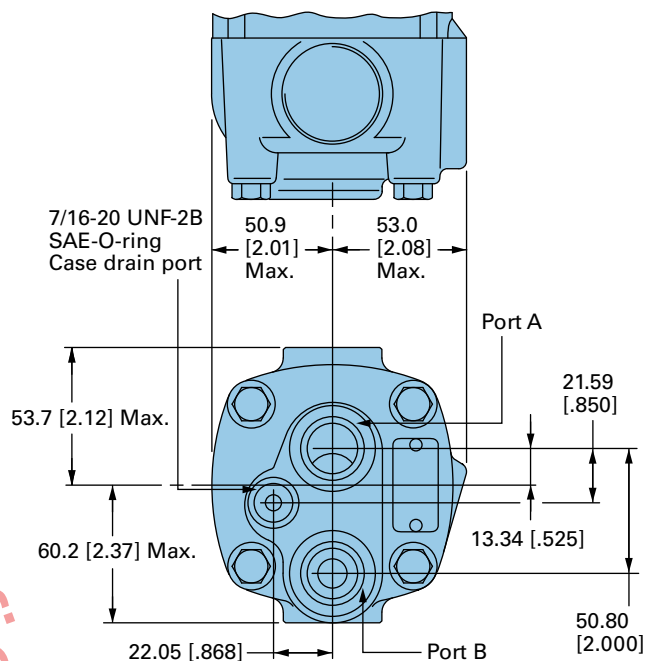
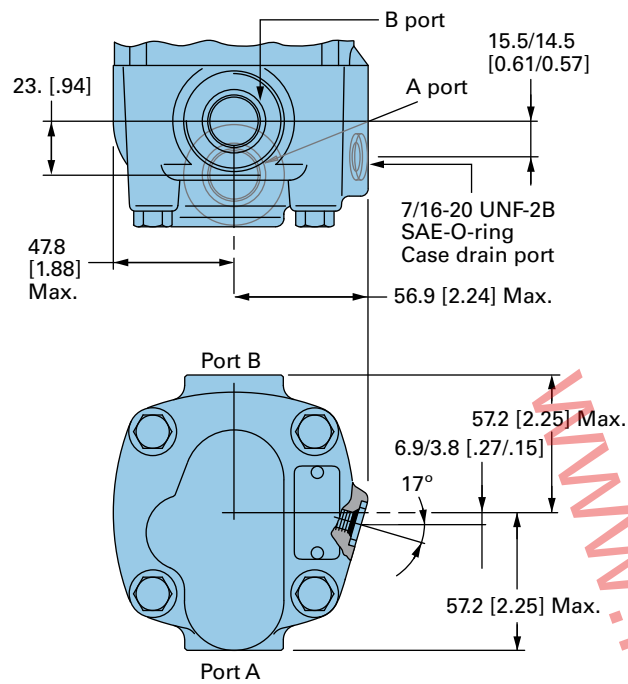
2000 Series

Dimensions

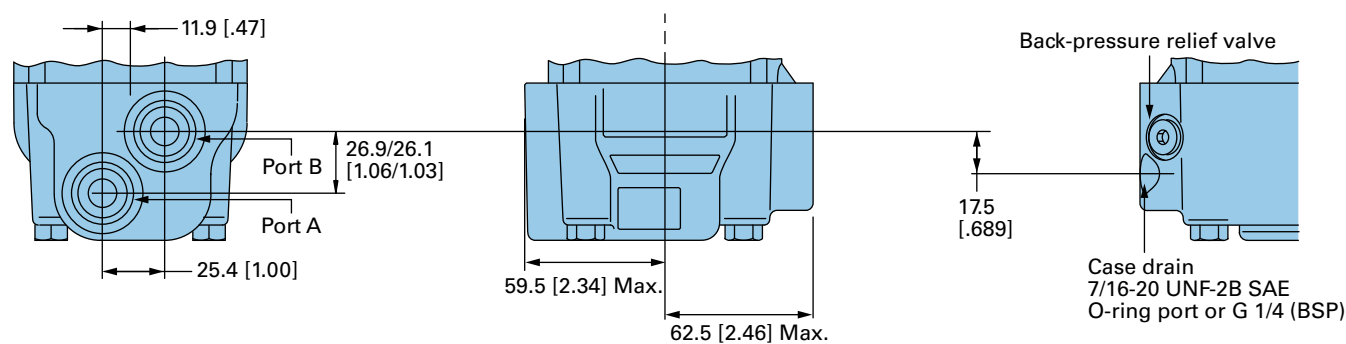
Ports

Code: AF 1-1/16-12 UN-2B SAE O-ring Ports (2) Positioned 180° Apart

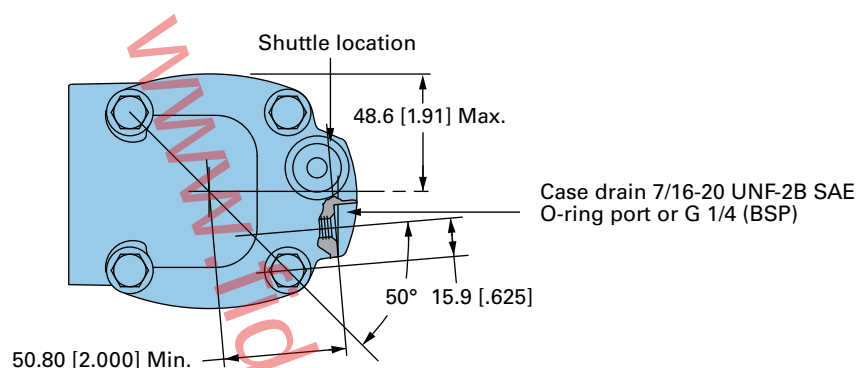
Code: AD 7/8-14 UNF-2B SAE O-ring end ports (2)



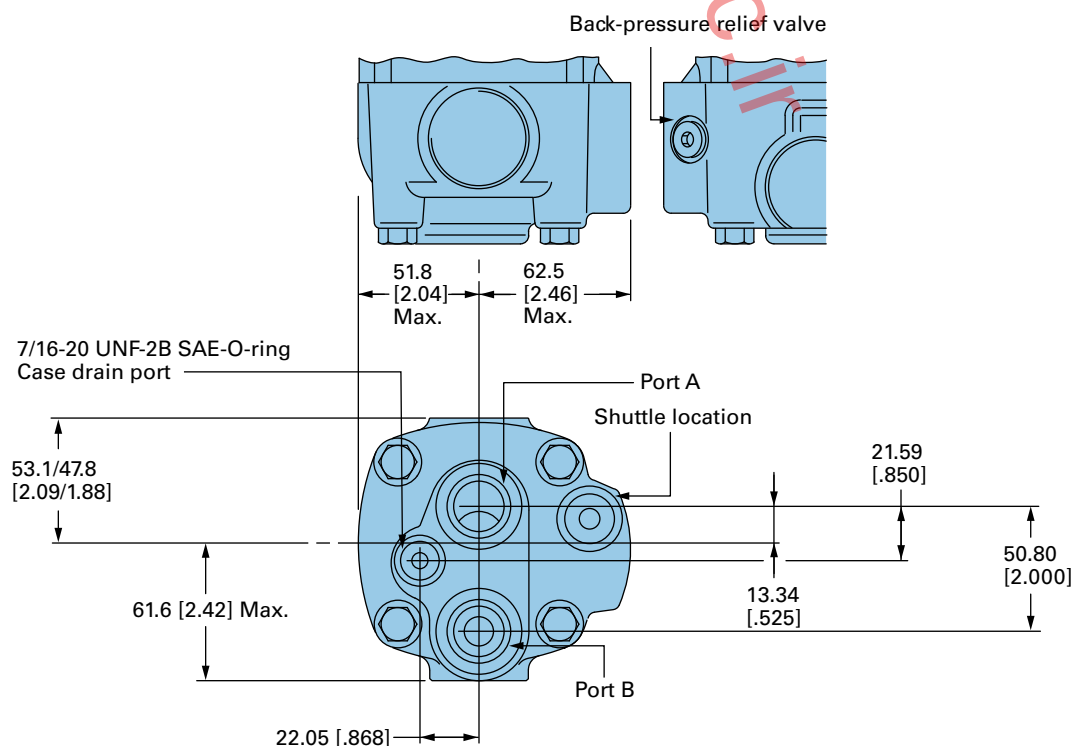
Ports with Shuttle



C-1



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.

C-1

Mounting	Shaft	Port size	Displ. cm³/ r [in³/r] / product number											
			41	80	90	100	130	160	195	245	305	395	490	
			[2.5]	[4.9]	[5.5]	[6.2]	[8.0]	[9.6]	[11.9]	[14.9]	[18.7]	[24.0]	[29.8]	
2 Bolt sae A flange	1 Inch straight	7/8 -14 O-ring staggered	104-4708	-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 ¼ Inch straight	7/8 -14 O-ring staggered	104-4774	-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 ½ Inch - 14 T splined	7/8 -14 O-ring staggered	104-4764	-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 ¼ Inch straight	7/8-14 O-ring staggered	104-----	-1200	—	1201	-1202	-1203	-1204	-1205	-1206	-1207	—	
	1 ½ 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))	104-4672	-1384	—	-1385	-1386	-1387	-1388	-1389	-1390	-1391	—	
	1 ¼ Inch 14 T splined	G 1/2 (BSP)	104-----	-1376	—	-1377	-1378	-1379	-1380	-1381	-1382	-1383	—	
Wheel motor	1 ¼ 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	—	
		7/8 -14 O-ring staggered	105-----	-1001	—	-1002	-1003	-1004	-1005	-1006	-1007	-1060	-1152	
	1 ½ Inch tapered	1 1/16 -12 O-ring 180° apart	105-----	-1071	—	-1072	-1073	-1074	-1075	-1076	-1077	-1078	—	
		7/8 -14 O-ring staggered	105-----	-1029	—	-1030	-1031	-1032	-1033	-1034	-1035	-1096	—	
1 ½ Inch 14 T splined	1 1/16 -12 O-ring 180° apart	105-----	-1079	—	—	—	-1082	-1083	-1084	-1085	-1086	—		
	7/8 -14 O-ring staggered	106-----	-1008	—	-1009	-1010	-1011	-1012	-1013	-1014	-1015	-1047		
Bearingless	7/8 -14 O-ring staggered	106-----	-1038	—	-1039	-1040	-1041	-1042	-1043	-1044	-1045	—		
	G 1/2 (BSP)	106-----	-1038	—	-1039	-1040	-1041	-1042	-1043	-1044	-1045	—		

106-1044

Mounting	Shaft	Port size	Displ. cm³/ r [in³/r] / product number										
			41	80	90	100	130	160	195	245	305	395	490
			[2.5]	[4.9]	[5.5]	[6.2]	[8.0]	[9.6]	[11.9]	[14.9]	[18.7]	[24.0]	[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----	-3615	—	-1536	-1537	-1568	-1539	-1452	-1479	-1509	-1489

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.

M	02		***			**		**		**		**		*	**		*	*	**		00		**		**		AA		F
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

1	Product		9	10	Output shaft	
M	2000 Series motor				00	None (Bearingless)
2	3	Product series			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	2000 Series Motor				02	31.75 [1.250] Dia. Straight shaft with .375-16UNC-2B Thread in end, 7.938 [.3125] Sq x 31.75 [1.250] straight key
4	5	6	Displacement		03	31.75 [1.250] Dia. 0.125:1 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 [1.0] straight key
021	34.0 cm ³ /r [in ³ /r]				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
025	40.8 cm ³ /r [in ³ /r]				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
040	66.5 cm ³ /r [in ³ /r]				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
049	80.6 cm ³ /r [4.92 in ³ /r]				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
055	90.6 cm ³ /r [5.53 in ³ /r]				17	31.75 [1.250] Dia. Straight shaft with 3/8 -16 UNC-2B Thread in end, 7.938 [.3125] Sq x 31.75 [1.250] straight key, corrosion resistant (seal area to shaft end)
062	101.6 cm ³ /r [6.20 in ³ /r]				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
080	130.6 cm ³ /r [7.97 in ³ /r]				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
096	158.1 cm ³ /r [9.65 in ³ /r]				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
119	194.8 cm ³ /r [11.89 in ³ /r]					
149	244.3 cm ³ /r [14.91 in ³ /r]					
187	306.6 cm ³ /r [18.71 in ³ /r]					
240	393.8 cm ³ /r [24.03 in ³ /r]					
298	489.0 cm ³ /r [29.84 in ³ /r]					
7	8	Mounting type				
AB	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					
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 [1.10] Pilot Length					
AL	Wheel (European), 4 Bolt: 125 [4.92] Pilot Dia. 13.79 [.543] Dia. Holes on 159.99 [6.299] Dia. Bolt Circle					
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)					

C-1

2000 Series

Model code

M	0 2		* * *			* *		* *		* *		* *		*	* *		*	*	* *		0 0		* *		* *		A A		F
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

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
- 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 only)

- 01** .4375-20 UNF-2B SAE O-Ring Port
- 02** G 1/4 BSP Straight THD Port
- 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/in²]
- B** Set at 15.2 bar [220 lbf/in²]
- C** Set at 20.7 bar [300 lbf/in²]
- E** Set at 11.03 bar [160 lbf/in²]

16 17

Pressure/flow option

- 0** None
- Integral cross-over relief valve:
- 30** Set at 103.4 bar [1500 lbf/in²]
- 31** Set at 120.6 bar [1750 lbf/in²]
- 32** Set at 137.9 bar [2000 lbf/in²]
- 33** Set at 155.1 bar [2250 lbf/in²]
- 34** Set at 172.4 bar [2500 lbf/in²]
- 35** Set at 189.6 bar [2750 lbf/in²]
- 36** Set at 206.8 bar [3000 lbf/in²]
- 37** Set at 234.4 bar [3400 lbf/in²]

18

Geroler option

- 1** Standard
- 2** Free running
- 6** Reduced side clearance, no warranty for galling

19

Seal option

- 0** Standard
- 1** Viton
- 2** Viton shaft seal
- 3** High pressure shaft seal
- 4** Seal guard
- 5** Extreme duty seal guard
- 6** High pressure shaft seal, seal guard

20 21

Accessories

- 00** None
- AA** Digital speed pickup (30 pulse), 127 [5.0] lead wire with weather pack shroud connector (A=Power, B=Signal, C=Common)
- AD** Digital speed pickup (30 pulse), M12 connector (A=Power, B=Common, C=Signal)
- AG** M12 connector (60 pulse per rev speed signal and one directional signal, (Pin 1=Power, Pin 2= Direction, Pin 3=Common, Pin 4=Speed)

22 23

Special features (hardware)

- 00** None

24 25

Special features (assembly)

- 00** None
- AA** Flange rotated 90 degrees
- AB** Reverse rotation
- AE** Flange rotated 45 degrees

26 27

Paint/packaging

- AA** No paint, indiv. Box
- AB** Low gloss black primer, indiv. Box
- AT** Epoxy coated black, individual box
- BJ** Nickel plated motor (excluding shaft), individual box

28 29

Customer ID

- AA** None

30

Design code

- F** Sixth

See Eatonpowersource.com/ for more options and configurations.

C-1



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 Bar [100 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 Bar [100 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.

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].

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: Displacements under 130 cm³/r [8.0 in³/r] have limited starting torque when started in high speed mode.

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.

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.

C-1

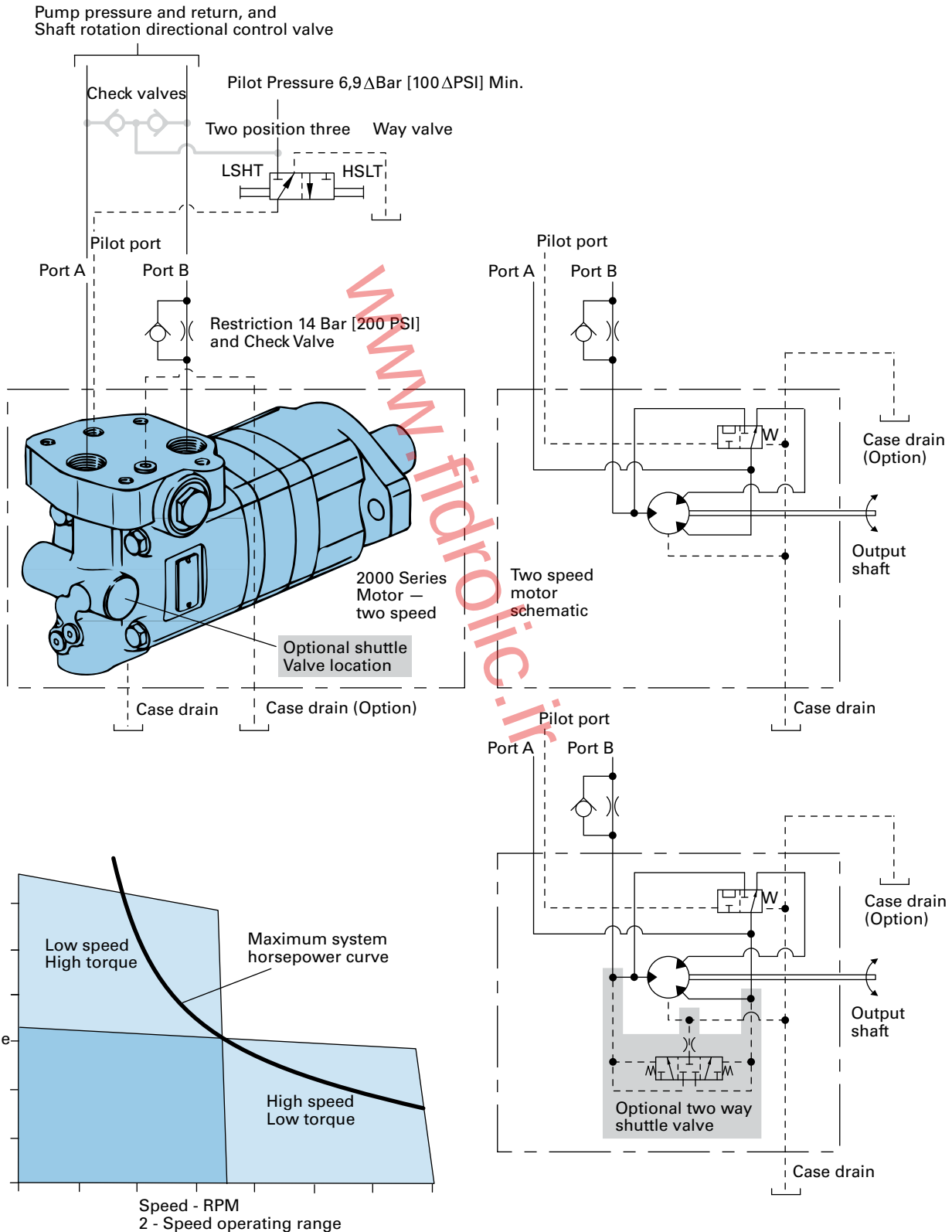
2000 Series Two-speed

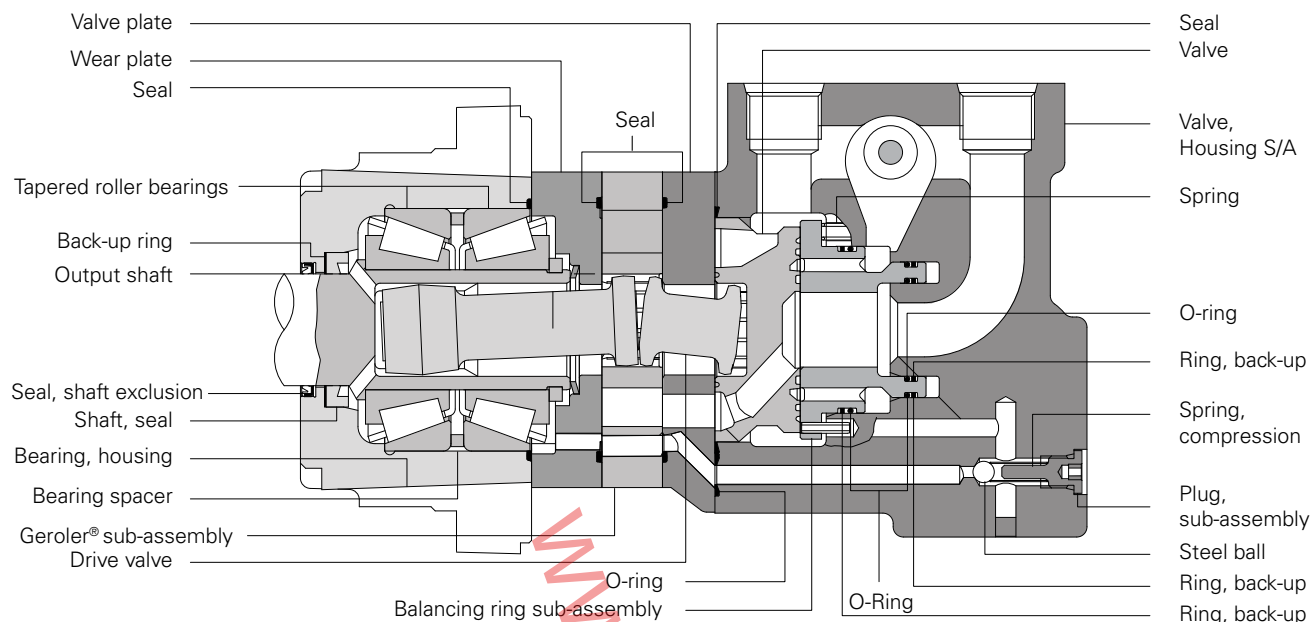
Typical hydraulic circuit

Note:

This is the low speed biased motor circuit. For the high speed biased motor circuit please contact your Eaton Hydraulics representative.

C-1





C-1

Specification data – 2000 series two-speed motors

Displ. cm ³ /r [in ³ /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	100 [880]	125 [1115]	165 [1450]	195 [1725]	240 [2150]	300 [2675]	380 [3350]	365 [3225]	448 [3970]
	continuous intermittent	145 [1300]	185 [1660]	240 [2150]	240 [2150]	300 [2650]	375 [3330]	440 [3900]	445 [3940]	486 [4300]
Torque* Nm [lb - in]	Low speed mode	235 [2065]	295 [2630]	385 [3420]	455 [4040]	540 [4780]	660 [5850]	765 [6750]	775 [6840]	845 [7470]
	continuous intermittent	345 [3035]	445 [3950]	560 [4970]	570 [5040]	665 [5890]	820 [7250]	885 [7820]	925 [8170]	930 [8225]
Pressure Δ bar [Δ PSI]	Continuous intermittent	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	155 [2250]	120 [1750]
		310 [4500]	310 [4500]	310 [4500]	260 [3750]	260 [3750]	260 [3750]	240 [3500]	190 [2750]	140 [2000]
Weight kg [lb]	Standard or wheel	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]
	mount 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 in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

High speed mode: (Reduced motor displacement)

Low speed mode: (Full motor displacement)

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 13 cSt [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: 20/18/13

Thermal shock warning:

Do not operate the motor with fluid that is 70°F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (except when switching direction of rotation)

2000 Series Two-speed

Dimensions

Standard and Wheel

Ports

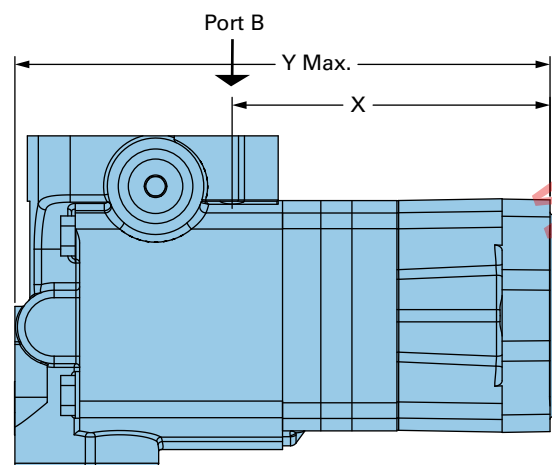
7/8 -14 UNF-2B SAE O-ring staggered ports (2)
 9/16 -18 UNF-2B SAE O-ring case drain port (1)
 7/16 -20 UNF-2B SAE O-ring pilot control port (1)

G 1/2 (BSP) staggered ports (2)
 G 1/4 (BSP) case drain port (1)
 G 1/4 (BSP) pilot control port (1)

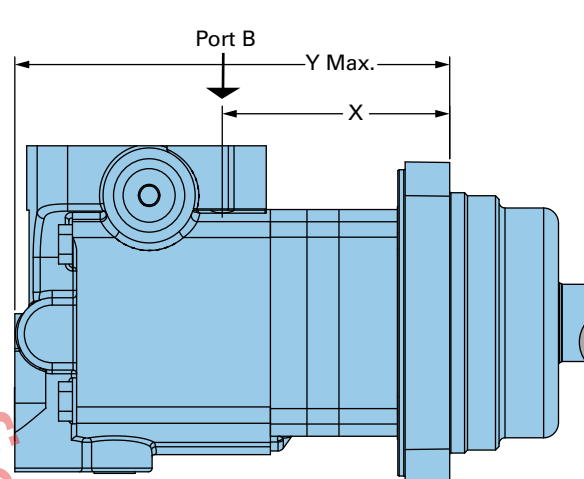
Standard rotation viewed from shaft end

Port A pressurized — CW
 Port B pressurized — CCW

Two-speed standard motors



Two-speed wheel motors



Standard mount motor dimensions

Displacement cm ³ /r [in ³ /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]

Wheel mount motor dimensions

Displacement cm ³ /r [in ³ /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]

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)
 G 1/2 (BSP) staggered ports (2)
 G 1/4 (BSP) case drain port (1)
 G 1/4 (BSP) pilot control port (1)

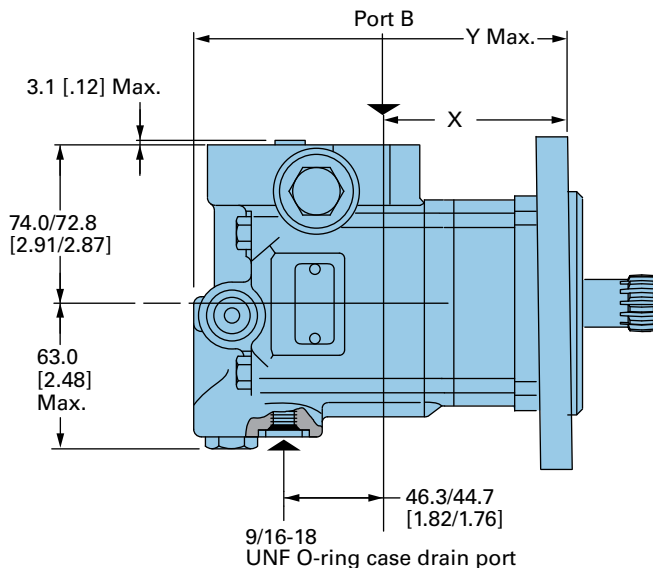
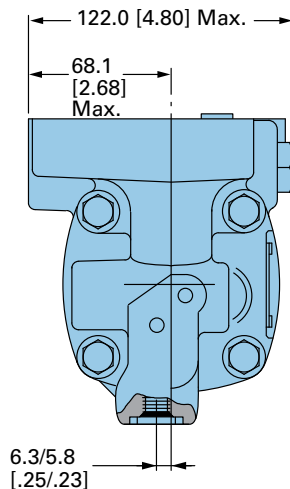
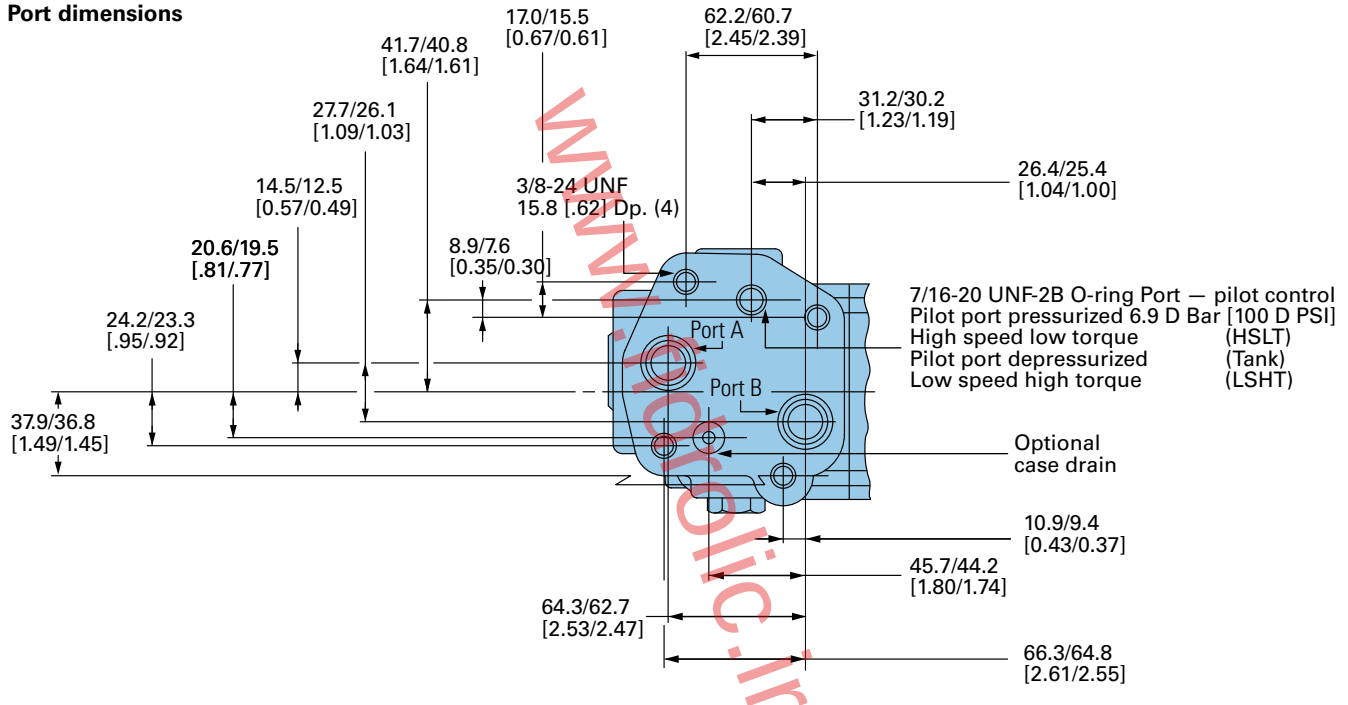
Standard rotation viewed from shaft end

Port A pressurized — CW
 Port B pressurized — CCW

Bearingless motor dimensions

Displacement cm ³ /r [in ³ /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]

Port dimensions



2000 Series Two-speed

Product numbers

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 — 193- plus four digit number from charts for complete product number—Example 193-0002.

Orders will not be accepted without three digit prefix.

Mounting	Shaft	Port size	Displ. cm ³ /r [in ³ /r] / product number								
			80	100	130	160	195	245	305	395	490
			[4.9]	[6.2]	[8.0]	[9.6]	[11.9]	[14.9]	[18.7]	[24.0]	[29.8]
2 Bolt SAE A flange	1 Inch straight	7/8 -14 O-ring staggered	193-0002-001	-0003	-0004	-0005	-0006	-0007	-0008	-0009	—
	1 1/4 Inch straight	7/8 -14 O-ring staggered	193-0010-001	-0011	-0012	-0013	-0014	-0015	-0016	-0017	-0070
	1 1/4 Inch 14 T splined	7/8 -14 O-ring staggered	193-0018-001	-0019	-0020	-0021	-0022	-0023	-0024	-0025	—
Wheel motor	1 1/4 Inch Tapered	7/8 -14 O-ring staggered	193-0222-001	—	—	-0225	-0226	-0227	-0228	-0229	—
	1 1/4 Inch 14 T splined	7/8 -14 O-ring staggered	—	—	-0232	-0257	-0234	-0235	-0236	-0237	—
Bearingless		7/8 -14 O-ring staggered	193-0282-001	-0283	-0234	-0285	-0286	-0287	-0288	-0289	—

193-0288-001

C-1

M	2 2		**			**		**		**		**		0	0 0		1	*	0 0		0 0		0 0		**		AA		A
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

C-1

4000 Compact Series

Highlights

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.

Features:

- Shuttle valve with back-pressure relief valve
- Speed sensors
- End ports
- Two Speed option

Benefits:

- Higher bearing capacity than 2000 Series
- Torque of 4000 Series

Applications:

- Skid steer loaders
- Fairway mowers
- Harvesters
- Vehicles where space is at a premium

C-2



Specifications

Geroler element	6 Displacements
Flow l/min [GPM]	75 [20] Continuous** 115 [30] Intermittent*
Speed RPM	464 Cont.** 699 Inter.*
Pressure bar [PSI]	225 [3250] Cont.** 310 [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



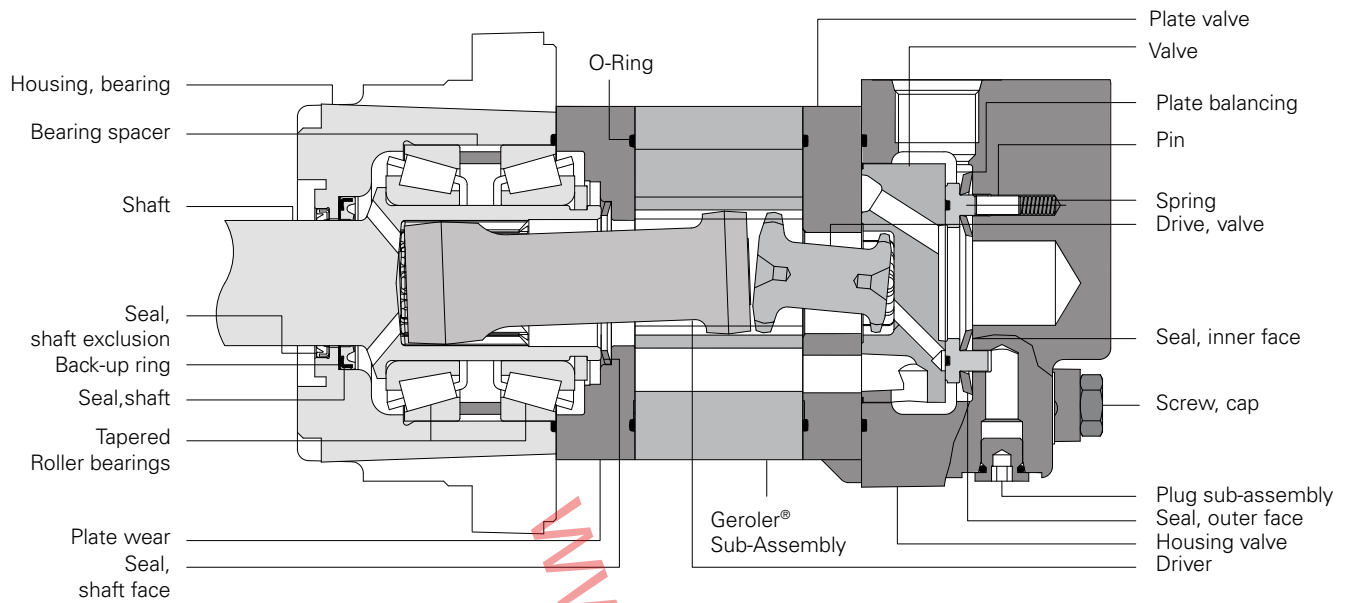
Paving equipment



Boom lift



Skid steer



C-2

Specification data – 4000 Compact Series motors

Displ. cm ³ /r [in ³ /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	563	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]	646 [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 [3250]	225 [3250]	205 [3000]	170 [2500]	140 [2000]	140 [2000]
	Intermittent	310 [4500]	295 [4250]	260 [3750]	240 [3500]	170 [2500]	170 [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 in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

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 13 cSt [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: 20/18/13

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

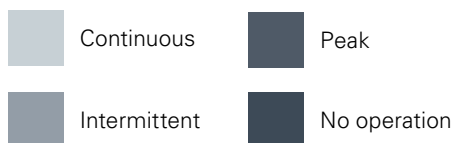
Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (except when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.



**Δ Pressure bar [PSI]
160 cm³/r [9.8 in³/r]**

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]	[4000]	[4250]	[4500]
15	35	50	70	85	105	120	140	155	170	190	205	225	240	260	275	295	310

C-2

Flow LPM [GPM]	Δ Pressure bar [PSI] 160 cm ³ /r [9.8 in ³ /r]																	
	[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]	[4000]	[4250]	[4500]
[0.5]	[244]	[543]																
2	28	61																
	4	3																
[1]	[274]	[554]	[854]															
4	31	63	96															
	10	8	7															
[2]	[274]	[593]	[899]	[1210]	[1513]	[1816]	[2092]	[2361]	[2621]	[2874]	[3088]							
8	31	67	102	137	171	205	236	267	296	325	349							
	22	21	20	19	17	14	12	10	9	7	6							
[4]	[301]	[623]	[940]	[1261]	[1579]	[1898]	[2197]	[2492]	[2766]	[3033]	[3270]	[3496]	[3761]	[4022]				
15	34	70	106	143	178	214	248	282	313	343	369	395	425	454				
	40	39	38	36	35	33	31	28	24	20	17	14	10	6				
[6]	[305]	[662]	[1004]	[1354]	[1699]	[2046]	[2386]	[2725]	[3049]	[3368]	[3693]	[4016]	[4319]	[4618]	[4828]	[5022]		
[23]	34	75	113	153	192	231	270	308	344	381	417	454	488	522	545	567		
	87	85	83	81	79	77	74	72	67	63	59	55	49	44	35	27		
[8]	[293]	[659]	[1003]	[1357]	[1705]	[2056]	[2399]	[2741]	[3074]	[3405]	[3751]	[4098]	[4417]	[4732]	[5023]	[5308]		
[30]	33	74	113	153	193	232	271	310	347	385	424	463	499	535	568	600		
	133	131	129	127	124	121	118	114	109	104	99	93	87	80	71	63		
[10]	[280]	[656]	[1002]	[1360]	[1711]	[2066]	[2412]	[2758]	[3100]	[3442]	[3809]	[4180]	[4514]	[4846]	[5218]	[5593]	[5856]	[6108]
[38]	32	74	113	154	193	233	273	312	350	389	430	472	510	548	590	632	662	690
	181	179	177	175	172	169	166	162	157	152	145	139	133	127	120	113	104	96
[12]	[259]	[630]	[978]	[1348]	[1701]	[2061]	[2408]	[2755]	[3102]	[3450]	[3806]	[4163]	[4500]	[4835]	[5191]	[5547]	[5784]	
[45]	29	71	110	152	192	233	272	311	351	390	430	470	508	546	586	627	653	
	228	225	223	220	217	213	209	204	199	193	186	179	172	165	157	150	141	
[14]	[238]	[604]	[954]	[1336]	[1692]	[2056]	[2403]	[2752]	[3105]	[3458]	[3802]	[4146]	[4485]	[4824]	[5163]	[5501]		
[53]	27	68	108	151	191	232	272	311	351	391	430	468	507	545	583	622		
	275	272	269	266	262	258	253	247	241	235	229	223	214	205	197	189		
[16]	[210]	[577]	[923]	[1308]	[1665]	[2034]	[2385]	[2739]	[3092]	[3447]	[3796]	[4144]	[4487]	[4830]				
[61]	24	65	104	148	188	230	269	310	349	390	429	468	507	546				
	322	319	316	313	308	304	298	293	286	279	272	265	256	247				
[18]	[182]	[550]	[893]	[1280]	[1638]	[2012]	[2367]	[2727]	[3080]	[3436]	[3789]	[4143]	[4489]	[4836]				
[68]	21	62	101	145	185	227	267	308	348	388	428	468	507	546				
	370	367	363	360	356	351	345	339	332	324	317	309	301	292				
[20]	[143]	[514]	[853]	[1247]	[1601]	[1973]	[2329]	[2692]	[3045]	[3401]	[3756]	[4114]						
[76]	16	58	96	141	181	223	263	304	344	384	424	465						
	417	414	410	406	401	397	390	383	375	366	358	350						
[22]	[105]	[478]	[814]	[1213]	[1564]	[1935]	[2291]	[2658]	[3010]	[3366]	[3724]	[4085]						
[83]	12	54	92	137	177	219	259	300	340	380	421	462						
	464	461	457	453	448	442	435	428	418	409	400	390						
[25]		[433]	[762]	[1167]	[1518]	[1893]	[2252]	[2623]	[2973]	[3328]	[3682]	[4040]						
[95]		49	86	132	172	214	254	296	336	376	416	456						
		508	504	500	495	489	482	474	465	456	446	436						
[30]		[387]	[711]	[1121]	[1472]	[1851]	[2212]	[2589]	[2937]	[3291]	[3641]	[3995]						
[114]		44	80	127	166	209	250	292	332	372	411	451						
		556	552	548	542	537	529	521	513	504	493	483						
[35]		[363]	[683]	[1095]	[1445]	[1824]	[2184]	[2561]	[2910]	[3266]								
[132]		41	77	124	163	206	247	289	329	369								
		580	576	572	566	560	552	544	535	526								
[35]		[244]	[546]	[967]	[1308]	[1689]	[2045]	[2421]	[2777]	[3144]								
[132]		28	62	109	148	191	231	274	314	355								
		699	695	692	685	678	669	660	648	637								

[2777] } Torque [lb-in]
314 } Nm
648 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 200 cm³/r [12.3 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]	[4000]	[4250]
15	35	50	70	85	105	120	140	155	170	190	205	225	240	260	275	295

[0.25]	[115]	[504]														
0.95	13	57														
	4	3														
[0.5]	[268]	[584]	[963]	[1274]												
1.9	30	66	109	144												
	8	7	4	3												
[1]	[306]	[721]	[1104]	[1516]	[1913]	[2243]	[2397]	[2772]								
3.8	35	81	125	171	216	253	271	313								
	17	16	14	13	12	10	9	6								
[2]	[402]	[841]	[1218]	[1647]	[2107]	[2478]	[2826]	[3238]	[3954]	[4451]	[4755]	[5127]	[5407]	[5569]	[5855]	
7.5	45	95	138	186	238	280	319	366	447	503	537	579	611	629	662	
	35	34	32	31	30	28	27	24	29	26	23	21	17	11	8	
[4]	[403]	[896]	[1361]	[1780]	[2247]	[2649]	[3068]	[3513]	[3947]	[4367]	[4710]	[5125]	[5509]	[5880]	[6249]	[6547]
15	46	101	154	201	254	299	347	397	446	493	532	579	622	664	706	740
	72	70	69	68	66	65	62	60	56	53	50	46	42	37	31	24
[6]	[385]	[863]	[1354]	[1785]	[2260]	[2657]	[3087]	[3547]	[3965]	[4389]	[4793]	[5218]	[5610]	[6015]	[6408]	[6754]
23	44	98	153	202	255	300	349	401	448	496	542	590	634	680	724	763
	109	107	106	104	102	100	97	93	90	86	81	77	72	66	60	52
[8]	[368]	[831]	[1347]	[1790]	[2273]	[2665]	[3106]	[3581]	[3982]	[4408]	[4876]	[5311]	[5712]	[6151]	[6567]	[6961]
30	42	94	152	202	257	301	351	405	450	498	551	600	645	695	742	786
	147	146	144	142	140	137	134	130	127	122	117	113	108	103	98	91
[10]	[353]	[822]	[1319]	[1774]	[2212]	[2642]	[3086]	[3556]	[3974]	[4410]	[4839]	[5297]	[5715]	[6147]	[6563]	
38	40	93	149	200	250	299	349	402	449	498	547	598	646	695	742	
	185	184	181	179	177	174	170	165	161	156	151	146	140	134	129	
[12]	[339]	[813]	[1291]	[1758]	[2151]	[2620]	[3067]	[3530]	[3965]	[4408]	[4802]	[5283]	[5718]	[6144]	[6568]	
45	38	92	146	199	243	296	346	399	448	498	543	597	646	694	742	
	223	222	219	217	214	211	207	202	197	192	186	180	174	167	164	
[14]	[282]	[762]	[1237]	[1693]	[2121]	[2601]	[2968]	[3504]	[3953]	[4368]	[4832]	[5261]	[5690]			
53	32	86	140	191	240	294	335	396	447	493	546	594	643			
	261	260	257	255	252	248	244	238	233	227	221	214	208			
[16]	[224]	[712]	[1183]	[1629]	[2091]	[2581]	[2870]	[3477]	[3940]	[4328]	[4861]	[5240]	[5661]			
61	25	80	134	184	236	292	324	393	445	489	549	592	640			
	299	298	296	293	290	286	282	275	269	263	256	249	243			
[18]	[200]	[667]	[1148]	[1619]	[2053]	[2520]	[2899]	[3442]	[3906]	[4337]	[4819]	[5245]	[5644]			
68	23	75	130	183	232	285	328	389	441	490	544	593	638			
	337	336	334	331	328	324	320	314	307	301	293	285	278			
[20]	[176]	[623]	[1112]	[1609]	[2014]	[2458]	[2929]	[3407]	[3872]	[4347]	[4777]	[5250]	[5627]			
76	20	70	126	182	228	278	331	385	437	491	540	593	636			
	375	374	372	369	366	363	358	353	346	339	331	322	315			
[22]		[565]	[1053]	[1530]	[1934]	[2387]	[2868]	[3347]	[3804]	[4254]	[4698]					
83		64	119	173	219	270	324	378	430	481	531					
		412	410	407	404	401	396	390	383	375	367					
[24]		[507]	[994]	[1450]	[1855]	[2316]	[2806]	[3287]	[3737]	[4162]	[4618]					
91		57	112	164	210	262	317	371	422	470	522					
		449	448	446	443	439	434	427	420	412	403					
[25]		[465]	[950]	[1411]	[1820]	[2276]	[2768]	[3233]	[3688]	[4116]	[4493]					
95		53	107	159	206	257	313	365	417	465	508					
		468	467	464	462	458	453	446	439	431	423					
[30]		[259]	[726]	[1214]	[1645]	[2072]	[2577]	[2961]	[3443]	[3889]	[3866]					
114		29	82	137	186	234	291	335	389	439	437					
		562	563	559	555	556	550	545	536	527	521					

[2072]
234 } Torque [lb-in]
556 } Nm
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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 250 cm³/r [15.4 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]
15	35	50	70	85	105	120	140	155	170	190	205	225	240	260

Flow LPM [GPM]	[0.5]	[384]	[833]															
	1.9	43	94															
		6	5															
	[1]	[438]	[904]	[1403]	[1887]	[2359]	[2798]	[3221]	[3657]	[3822]	[4326]							
	3.8	49	102	158	213	267	316	364	413	432	489							
		14	14	13	12	11	9	8	7	4	3							
	[2]	[492]	[1054]	[1563]	[2081]	[2623]	[3160]	[3717]	[4147]	[4585]	[5070]	[5470]	[5721]	[5962]				
	7.5	56	119	177	235	296	357	420	469	518	573	618	646	674				
		28	27	26	25	24	23	21	17	16	13	9	7	5				
	[4]	[603]	[1183]	[1771]	[2275]	[2817]	[3364]	[3895]	[4495]	[5005]	[5496]	[5982]	[6500]	[7054]	[7519]	[7941]		
	15	68	134	200	257	318	380	440	508	565	621	676	734	797	850	897		
		58	56	55	54	52	50	47	44	42	38	35	32	28	24	17		
	[6]	[587]	[1159]	[1741]	[2329]	[2815]	[3369]	[3951]	[4483]	[5021]	[5555]	[6068]	[6557]	[7131]	[7641]	[8107]		
	23	66	131	197	263	318	381	446	506	567	628	686	741	806	863	916		
		88	86	84	82	80	77	74	71	67	63	59	55	50	45	38		
	[8]	[571]	[1135]	[1710]	[2384]	[2813]	[3375]	[4008]	[4471]	[5038]	[5613]	[6154]	[6614]	[7209]	[7763]	[8272]		
	30	65	128	193	269	318	381	453	505	569	634	695	747	815	877	935		
		118	116	114	112	110	107	103	100	96	92	87	83	78	73	67		
	[10]	[552]	[1138]	[1671]	[2304]	[2804]	[3361]	[3950]	[4452]	[5006]	[5587]	[6123]	[6612]	[7201]				
	38	62	129	189	260	317	380	446	503	566	631	692	747	814				
		148	146	144	142	139	136	131	127	123	119	113	109	102				
	[12]	[532]	[1140]	[1631]	[2224]	[2796]	[3347]	[3892]	[4434]	[4974]	[5561]	[6093]	[6610]	[7193]				
	45	60	129	184	251	316	378	440	501	562	628	688	747	813				
		178	177	175	173	170	166	161	157	151	146	141	136	129				
	[14]	[441]	[1072]	[1600]	[2207]	[2754]	[3320]	[3888]	[4433]	[4958]	[5529]	[6066]	[6590]					
	53	50	121	181	249	311	375	439	501	560	625	685	745					
		209	207	205	202	199	195	190	185	179	174	168	162					
	[16]	[349]	[1003]	[1568]	[2190]	[2711]	[3292]	[3884]	[4431]	[4941]	[5496]	[6039]	[6570]					
	61	39	113	177	247	306	372	439	501	558	621	682	742					
		239	237	235	233	229	225	220	214	208	202	195	189					
	[18]	[306]	[940]	[1513]	[2114]	[2653]	[3251]	[3830]	[4380]	[4904]	[5446]	[5984]	[6518]					
	68	35	106	171	239	300	367	433	495	554	615	676	736					
		269	267	265	263	259	255	250	243	236	230	223	214					
	[20]	[263]	[876]	[1458]	[2038]	[2595]	[3210]	[3777]	[4328]	[4867]	[5395]	[5928]	[6471]					
	76	30	99	165	230	293	363	427	489	550	610	670	731					
		300	298	296	293	290	285	280	272	265	259	251	241					
	[22]		[826]	[1414]	[1991]	[2528]	[3144]	[3709]	[4262]	[4806]	[5354]	[5915]						
	83		93	160	225	286	355	419	482	543	605	668						
			328	326	323	320	315	309	302	295	288	279						
	[24]		[776]	[1370]	[1945]	[2462]	[3079]	[3642]	[4196]	[4745]	[5313]	[5901]						
	91		88	155	220	278	348	411	474	536	600	667						
			359	356	354	350	345	339	332	325	317	308						
	[25]		[732]	[1322]	[1959]	[2426]	[3026]	[3594]	[4153]	[4696]	[5152]							
	95		83	149	221	274	342	406	469	531	582							
			374	371	369	365	360	354	347	340	333							
	[30]		[509]	[1082]	[2029]	[2246]	[2761]	[3358]	[3939]	[4450]	[4347]							
	114		57	122	229	254	312	379	445	503	491							
			450	449	445	442	437	430	423	414	413							

[2246] } Torque [lb-in]
254 } Nm
442 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous
Intermittent

Peak
No operation

Δ Pressure bar [PSI] 325 cm³/r [19.8 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]
15	35	50	70	85	105	120	140	155	170	190	205	225	240

Flow LPM [GPM]	Δ Pressure bar [PSI] 325 cm ³ /r [19.8 in ³ /r]													
	[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]
[0.5]	[536]	[1152]												
1.9	61	130												
	5	4												
[1]	[555]	[1220]	[1900]	[2559]	[3222]	[3862]	[4522]	[5061]	[5580]	[6106]				
3.8	63	138	215	289	364	436	511	572	630	690				
	11	10	10	9	9	8	7	5	3	3				
[2]	[643]	[1349]	[2025]	[2712]	[3378]	[4051]	[4696]	[5335]	[5889]	[6366]	[6876]			
7.5	73	152	229	306	382	458	531	603	665	719	777			
	22	21	20	19	19	17	15	13	10	5	3			
[4]	[679]	[1420]	[2140]	[2852]	[3557]	[4259]	[4947]	[5628]	[6300]	[6960]	[7596]	[8201]	[8767]	[9320]
15	77	160	242	322	402	481	559	636	712	786	858	927	991	1053
	45	44	43	42	40	38	36	33	30	26	23	19	14	11
[6]	[654]	[1400]	[2132]	[2859]	[3575]	[4281]	[4977]	[5668]	[6346]	[7021]	[7678]	[8244]	[8792]	
23	74	158	241	323	404	484	562	640	717	793	868	931	993	
	68	67	66	64	62	59	56	53	49	44	40	38	35	
[8]	[629]	[1379]	[2125]	[2866]	[3592]	[4304]	[5007]	[5707]	[6392]	[7082]	[7760]	[8400]		
30	71	156	240	324	406	486	566	645	722	800	877	949		
	92	90	89	87	85	82	79	75	71	66	61	56		
[10]	[587]	[1337]	[2082]	[2827]	[3556]	[4272]	[4976]	[5672]	[6362]	[7053]				
38	66	151	235	319	402	483	562	641	719	797				
	115	114	112	110	107	103	100	94	90	85				
[12]	[546]	[1295]	[2040]	[2787]	[3520]	[4240]	[4944]	[5638]	[6332]	[7023]				
45	62	146	230	315	398	479	559	637	715	794				
	139	137	136	134	130	125	121	115	110	105				
[14]	[489]	[1238]	[1984]	[2729]	[3467]	[4193]	[4903]	[5600]	[6293]					
53	55	140	224	308	392	474	554	633	711					
	162	161	159	157	153	148	143	136	131					
[16]	[431]	[1182]	[1929]	[2671]	[3415]	[4145]	[4861]	[5562]	[6254]					
61	49	134	218	302	386	468	549	628	707					
	186	185	183	181	177	171	165	159	153					
[18]	[360]	[1110]	[1856]	[2600]	[3343]	[4073]	[4794]	[5499]						
68	41	125	210	294	378	460	542	621						
	210	208	206	204	200	195	189	183						
[20]	[288]	[1038]	[1784]	[2529]	[3271]	[4001]	[4726]	[5436]						
76	33	117	202	286	370	452	534	614						
	234	232	230	228	224	220	214	207						
[22]		[958]	[1706]	[2451]	[3194]	[3926]	[4650]	[5360]						
83		108	193	277	361	444	525	606						
		256	254	251	248	243	237	229						
[24]		[878]	[1628]	[2373]	[3116]	[3850]	[4574]	[5285]						
91		99	184	268	352	435	517	597						
		279	277	275	271	266	260	252						
[25]		[826]	[1576]	[2320]	[3063]	[3798]	[4523]							
95		93	178	262	346	429	511							
		291	289	287	283	277	271							
[30]		[566]	[1314]	[2056]	[2799]	[3536]	[4268]							
114		64	148	232	316	399	482							
		351	349	346	342	337	332							

[2799]
316 } Torque [lb-in]
342 } Nm
Speed RPM

C-2

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 405 cm³/r [24.6 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]
15	35	50	70	85	105	120	140	155	170

[0.5]	[719]	[1458]							
1.9	81	165							
	3	2							
[1]	[777]	[1631]	[2423]	[3148]	[3690]				
3.8	88	184	274	356	417				
	8	7	5	4	3				
[2]	[853]	[1812]	[2596]	[3375]	[4179]	[4845]	[5375]	[5841]	[6501]
7.5	96	205	293	381	472	547	607	660	735
	17	15	14	12	11	9	8	3	2
[4]	[878]	[1859]	[2687]	[3667]	[4554]	[5388]	[6232]	[7004]	[7660]
15	99	210	304	414	515	609	704	791	865
	35	34	32	30	28	25	23	19	16
[6]	[882]	[1836]	[2716]	[3680]	[4577]	[5388]	[6269]	[7079]	[7856]
23	100	207	307	416	517	609	708	800	888
	54	52	51	48	46	42	39	35	31
[8]	[885]	[1813]	[2746]	[3694]	[4600]	[5388]	[6307]	[7153]	[8052]
30	100	205	310	417	520	609	713	808	910
	73	72	70	68	65	62	58	55	50
[10]	[810]	[1736]	[2693]	[3639]	[4540]	[5390]	[6310]	[7151]	[7994]
38	92	196	304	411	513	609	713	808	903
	92	90	89	86	84	80	75	71	67
[12]	[735]	[1660]	[2640]	[3584]	[4480]	[5391]	[6314]	[7149]	
45	83	188	298	405	506	609	713	808	
	111	110	108	106	103	98	93	88	
[14]	[661]	[1622]	[2560]	[3512]	[4412]	[5330]	[6242]	[7059]	
53	75	183	289	397	498	602	705	798	
	130	128	127	124	121	117	112	108	
[16]	[587]	[1585]	[2480]	[3440]	[4343]	[5268]	[6170]		
61	66	179	280	389	491	595	697		
	149	147	146	143	141	137	131		
[18]	[492]	[1472]	[2379]	[3333]	[4270]	[5190]	[6084]		
68	56	166	269	377	482	586	687		
	168	167	165	162	160	156	150		
[20]	[397]	[1359]	[2279]	[3226]	[4197]	[5112]	[5999]		
76	45	153	257	365	474	578	678		
	188	186	184	182	179	175	170		
[22]		[1264]	[2194]	[3124]	[4093]	[5008]	[5904]		
83		143	248	353	462	566	667		
		205	203	201	198	193	188		
[24]		[1169]	[2110]	[3023]	[3989]	[4904]	[5810]		
91		132	238	342	451	554	656		
		224	222	220	216	212	207		
[25]		[1106]	[2049]	[2961]	[3929]	[4851]	[5766]		
95		125	231	335	444	548	651		
		233	232	229	226	222	217		
[30]		[790]	[1744]	[2655]	[3634]	[4587]	[5543]		
114		89	197	300	411	518	626		
		282	280	277	274	270	266		

[2655] } Torque [lb-in]
 300 } Nm
 227 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous
Intermittent

Peak
No operation

Δ Pressure bar [PSI] 490 cm³/r [29.8 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]
15	35	50	70	85	105	120	140	155	170

Flow LPM [GPM]		Δ Pressure bar [PSI] 490 cm ³ /r [29.8 in ³ /r]									
		[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]
[0.5]	1.9	[375] 42 3	[1669] 189 3								
[1]	3.8	[525] 59 7	[1762] 199 7	[2945] 333 6	[3965] 448 6	[5099] 576 6	[5926] 670 5	[6715] 759 4	[7503] 848 3		
[2]	7.5	[639] 72 14	[2108] 238 14	[3287] 371 13	[4169] 471 13	[5416] 612 11	[6570] 742 11	[7188] 812 9	[8295] 937 6	[8959] 1012 5	
[4]	15	[981] 111 30	[2201] 249 29	[3333] 377 29	[4574] 517 28	[5558] 628 27	[6634] 750 26	[7694] 869 24	[8627] 975 21	[9567] 1081 18	[10399] 1175 13
[6]	23	[1049] 119 45	[2218] 251 45	[3332] 376 44	[4584] 518 43	[5604] 633 42	[6670] 754 40	[7711] 871 38	[8713] 984 35	[9698] 1096 31	[10588] 1196 26
[8]	30	[1118] 126 61	[2236] 253 60	[3331] 376 60	[4593] 519 59	[5650] 638 58	[6705] 758 56	[7727] 873 54	[8798] 994 51	[9828] 1110 48	[10778] 1218 44
[10]	38	[1060] 120 76	[2230] 252 76	[3304] 373 75	[4503] 509 75	[5607] 633 73	[6693] 756 72	[7721] 872 69	[8836] 998 66		
[12]	45	[1003] 113 92	[2223] 251 91	[3276] 370 91	[4413] 499 90	[5564] 629 89	[6680] 755 88	[7715] 872 85	[8874] 1003 82		
[14]	53	[858] 97 108	[2127] 240 107	[3136] 354 107	[4320] 488 106	[5496] 621 105	[6542] 739 103	[7653] 865 100			
[16]	61	[713] 81 124	[2030] 229 123	[2997] 339 122	[4226] 477 122	[5428] 613 121	[6403] 723 119	[7590] 858 115			
[18]	68	[631] 71 139	[1907] 215 139	[2935] 332 138	[4133] 467 137	[5330] 602 136	[6339] 716 134	[7431] 840 130			
[20]	76	[548] 62 155	[1784] 202 154	[2872] 325 153	[4041] 457 153	[5232] 591 152	[6275] 709 150	[7362] 832 148			
[22]	83		[1669] 189 170	[2704] 306 169	[3928] 444 169	[5048] 570 168	[6124] 692 166	[7208] 814 164			
[24]	91		[1553] 175 186	[2536] 287 185	[3816] 431 185	[4864] 550 184	[5972] 675 182	[7055] 797 179			
[25]	95		[1469] 166 193	[2475] 280 193	[3737] 422 193	[4810] 543 192	[5909] 668 190	[6959] 786 187			
[30]	114		[1047] 118 232	[2172] 245 232	[3341] 378 232	[4538] 513 231	[5592] 632 229	[6482] 732 227			

[3341]
378
232 } Torque [lb-in]
Nm
Speed RPM

C-2

4000 Compact 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)
 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)
 7/8 -14 UNF-2B SAE O-ring end 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)

Manifold Mount

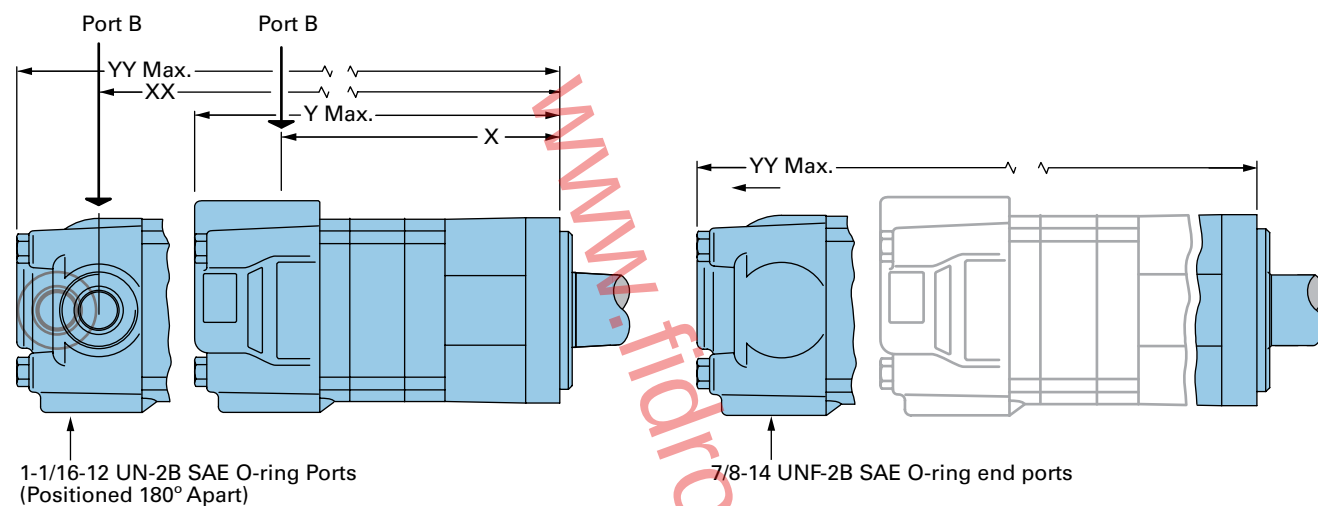
7/16 -20 UNF-2B SAE O-ring case drain port (1)

Standard rotation viewed from shaft end

Port A pressurized — CW
 Port B pressurized — CCW

Standard mount

C-2



Standard mount motor dimensions

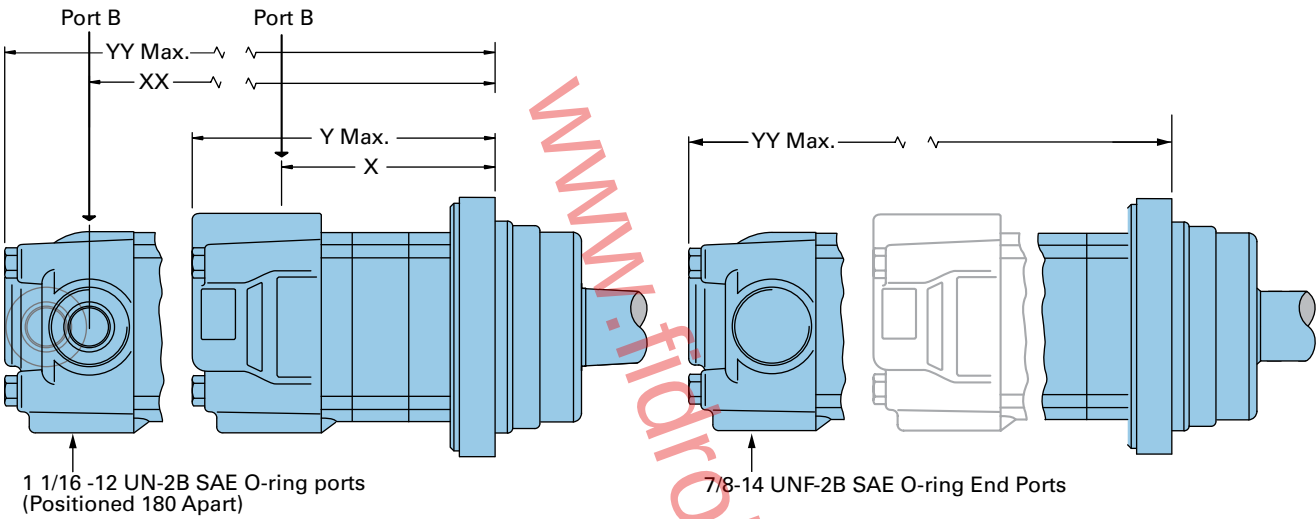
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
160 [9.8]	154.7 [6.09]	201.9 [7.95]	157.0 [6.18]	203.3 [8.00]
200 [12.3]	163.8 [6.45]	211.1 [8.31]	166.1 [6.54]	212.3 [8.36]
250 [15.4]	175.3 [6.90]	222.5 [8.76]	177.5 [6.99]	223.8 [8.81]
325 [19.8]	191.0 [7.52]	238.5 [9.39]	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]

Wheel 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)
- 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)
- 7/8 -14 UNF-2B SAE O-ring end 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 wheel



Wheel mount motor dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY 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]

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

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)
 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)
 7/8 -14 UNF-2B SAE O-ring end 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)

Manifold mount

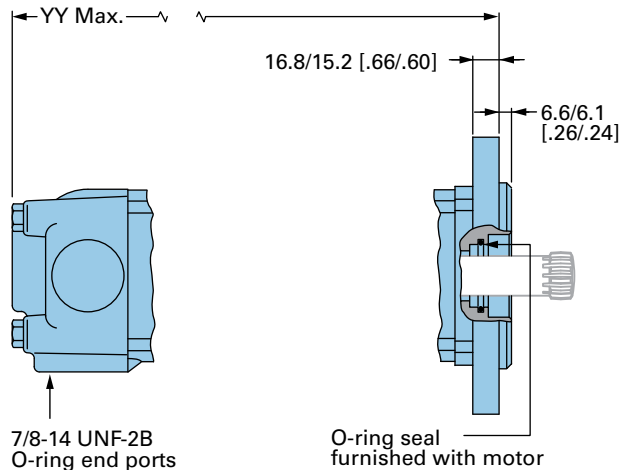
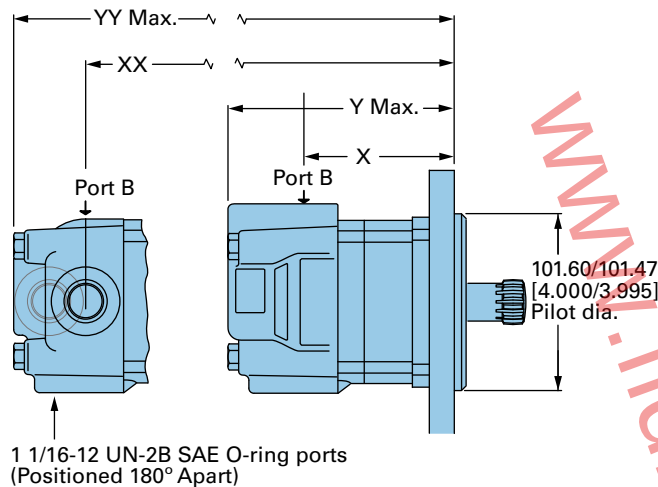
7/16 -20 UNF-2B SAE O-ring case drain port (1)

Standard rotation viewed from drive end

Port A pressurized — CW
 Port B pressurized — CCW

Bearingless

C-2



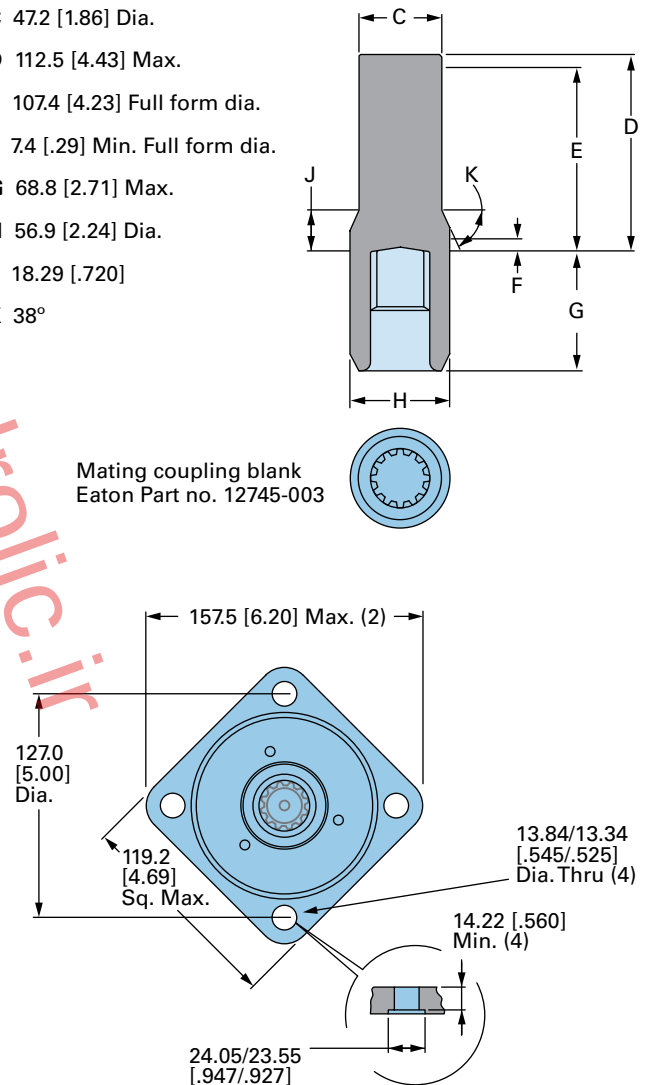
Bearingless motor dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY 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]

Shaft blank dimensions

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

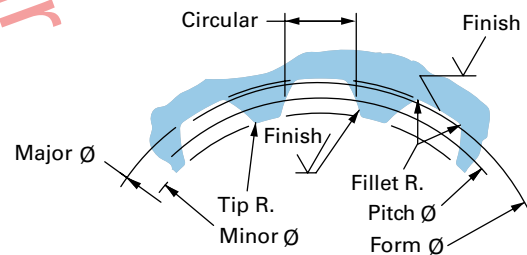
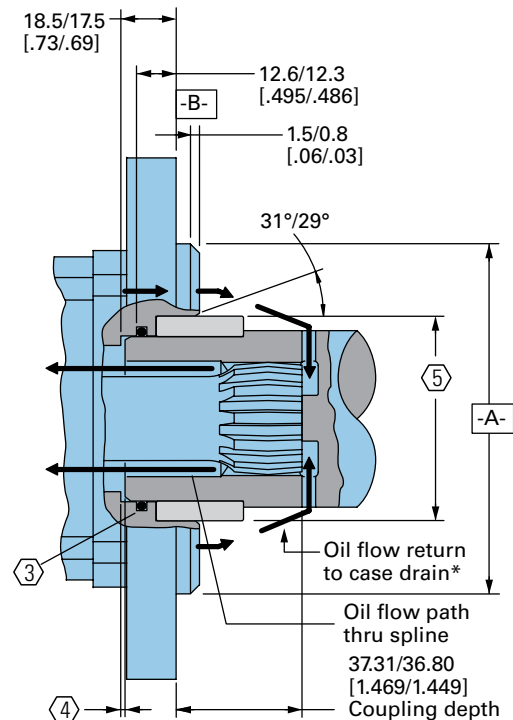


For 4000 compact series bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

Note: After machining blank, part must be hardened per Eaton specification.

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. Counter bore 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]
Base diameter	Ref. 26.396455 [1.0392305]  0.21 [.008] 
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]

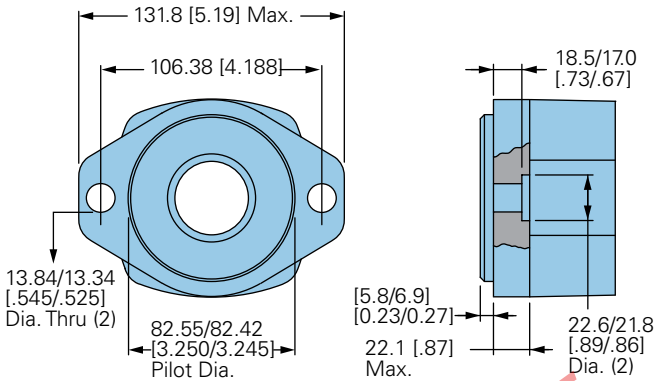
Finish	1.6 [63]
Involute profile variation	+0.000 -0.025 [+ .0000 -.0010]
Total index variation	0.038 [.0015]
Lead variation	0.013 [.0005]
Circular space width:	
Maximum actual	5.045 [.1986]
Minimum effective	4.995 [.1951]
Maximum effective	Ref. 5.009 [.1972]
Minimum actual	Ref. 4.986 [.1963]
Dimension 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

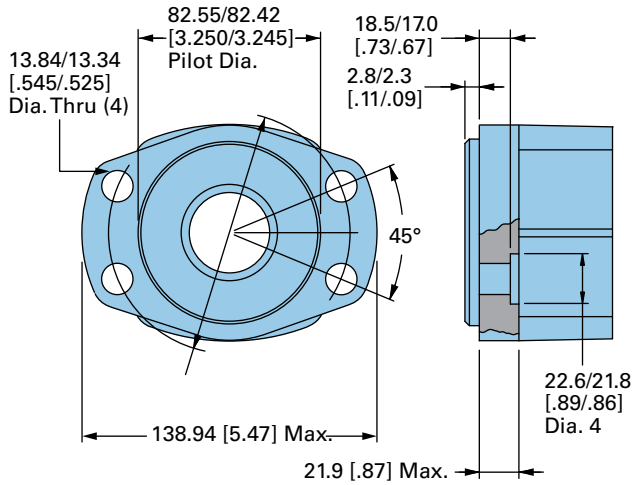
Dimensions

Mounting options

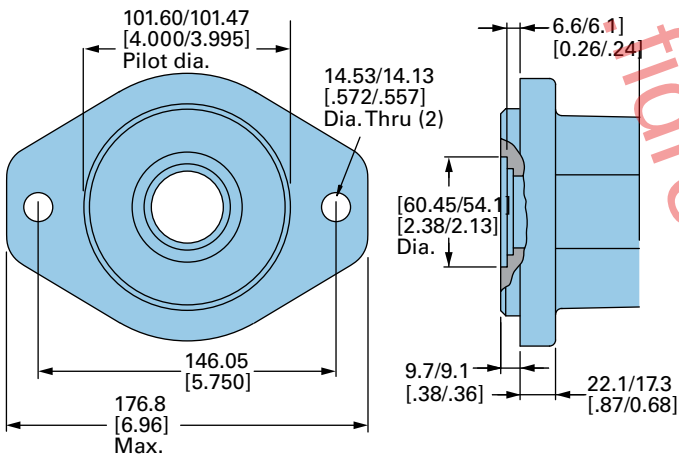
Code: AC SAE A - Two bolt (Standard motor)



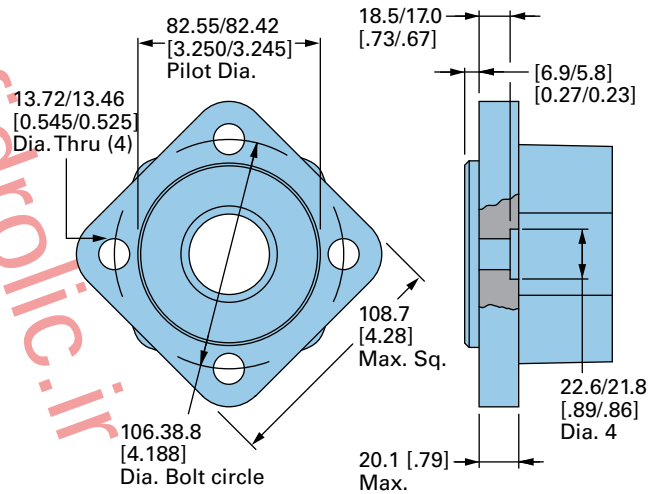
Code: AJ Four bolt magneto



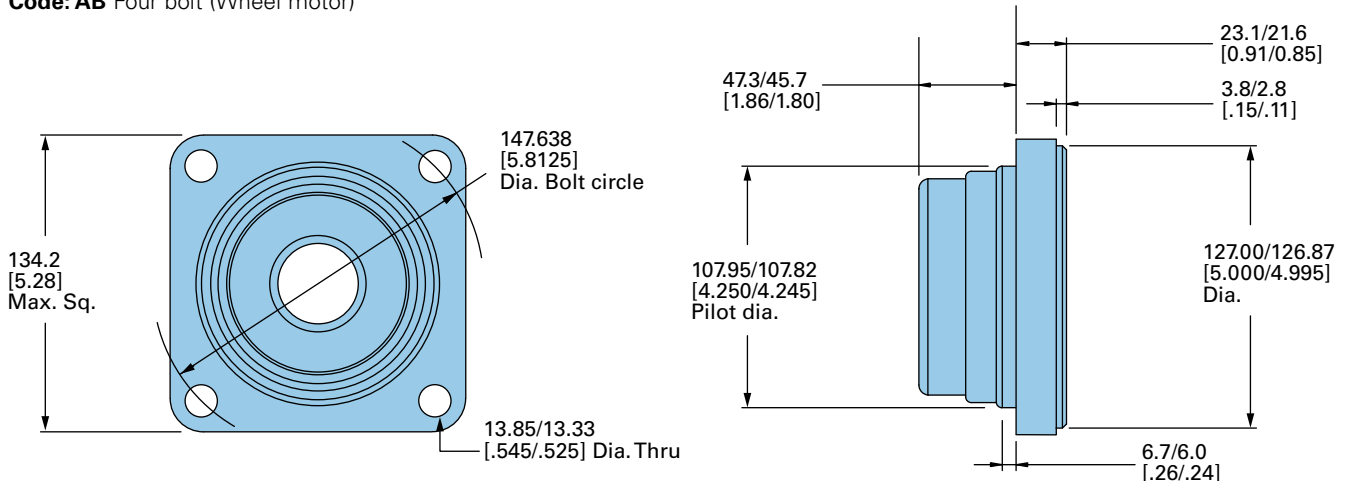
Code: AF Two bolt SAE B



Code: AH Four bolt

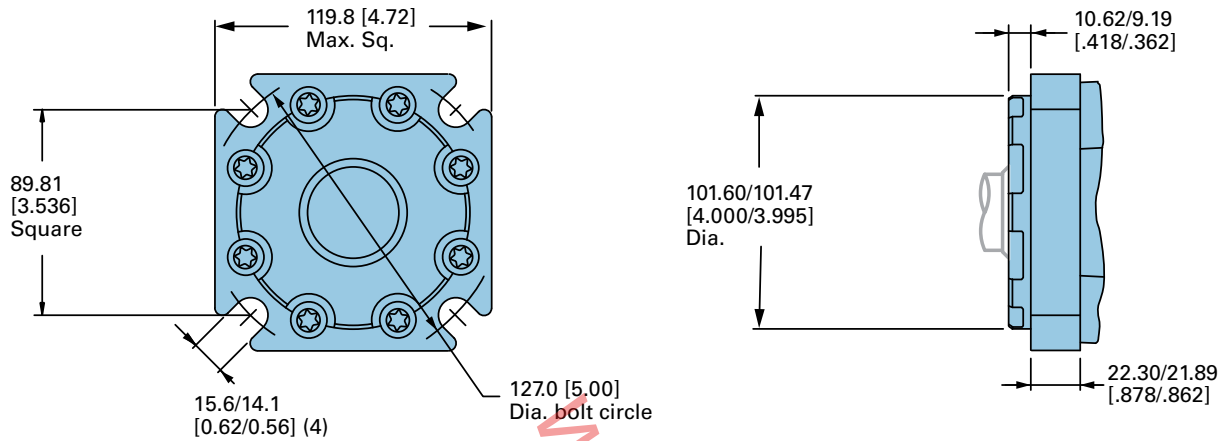


Code: AB Four bolt (Wheel motor)

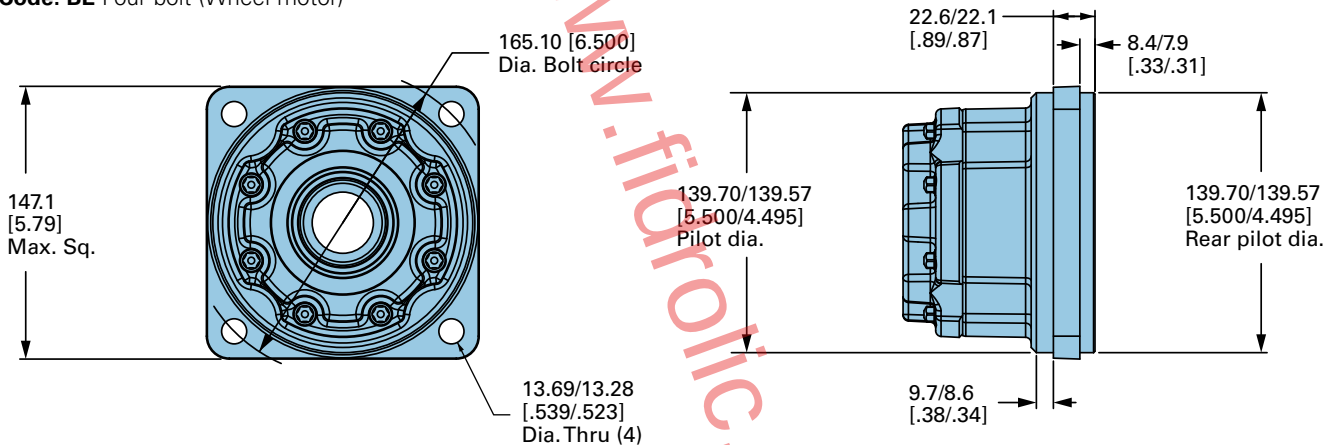


Mounting options for use with enhanced bearings

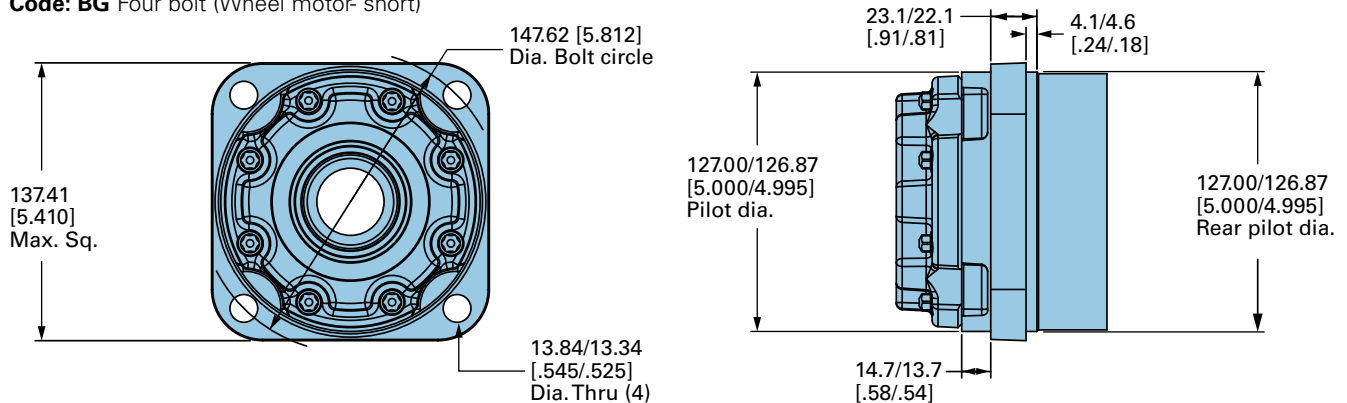
Code: BB Standard flange- Similar to SAE B type



Code: BE Four bolt (Wheel motor)



Code: BG Four bolt (Wheel motor- short)



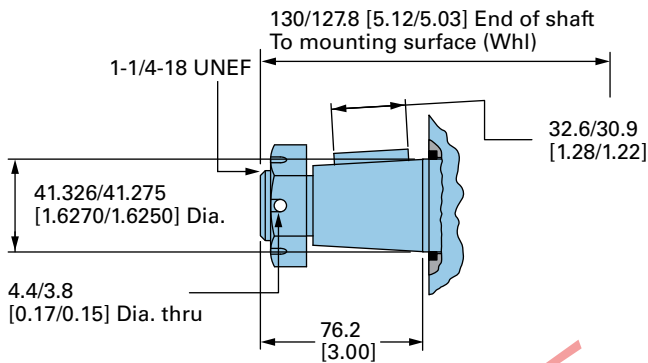
4000 Compact Series

Dimensions

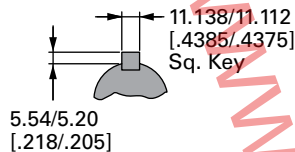
Shafts

Code: 98 1-5/8 Inch tapered

972 [8600] Max. Torque Nm [lb-in]

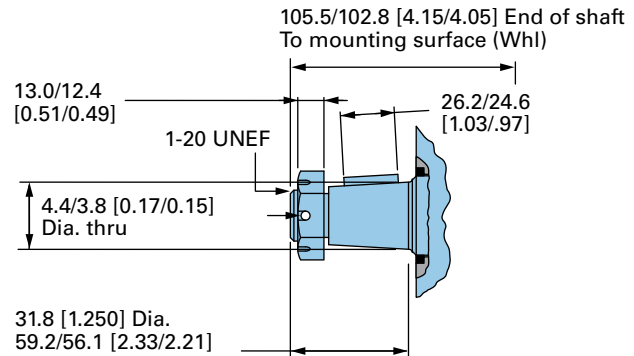


SAE J501 Standard Tapered Shaft
125.00 0.17 Taper per Meter
[1.500±.002 Taper per Foot]

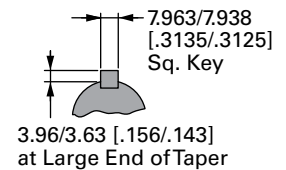


Code: 03 1-1/4 Inch tapered

768 [6800] Max. Torque Nm [lb-in]



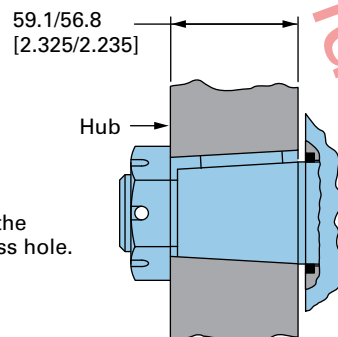
SAE J501 Standard tapered shaft
125.00 0.17 Taper per Meter
[1.500±.002 Taper per Foot]



Tapered shaft hub data

Recommended torque:
(645 Nm [475 lb-ft] Dry)
(510 Nm [375 lb-ft] Lub)

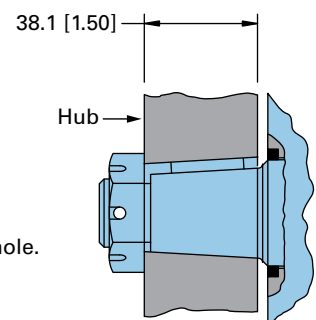
Plus torque required to align the
slotted nut with the Shaft Cross hole.



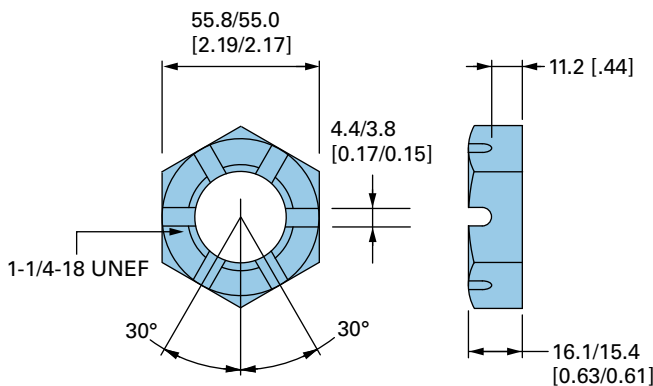
Tapered shaft hub data

Recommended torque:
(373 Nm [275 lb-ft] Dry)
(305 Nm [225 lb-ft] Lub)

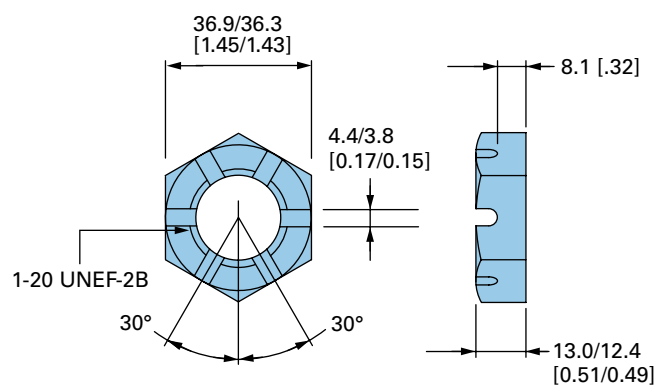
Plus torque required to align the
slotted nut with the Shaft Cross hole.



Tapered shaft hub data



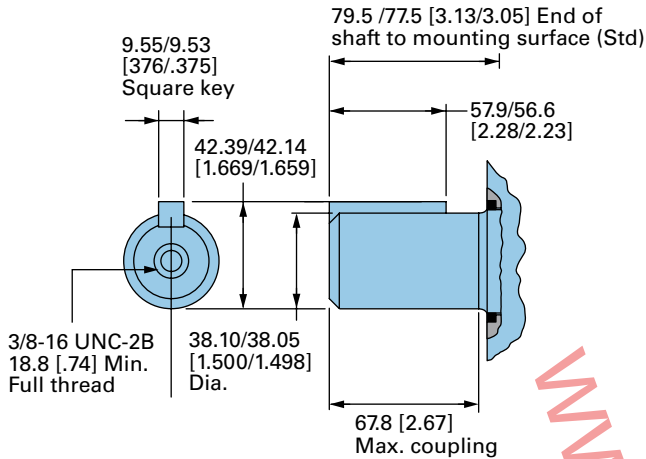
Tapered shaft hub data



Shafts

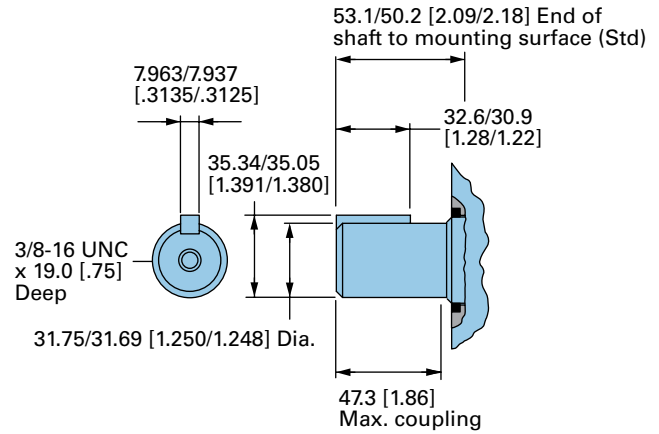
Code: 11 1-1/2 Inch straight

972 [8600] Max. torque Nm [lb-in]



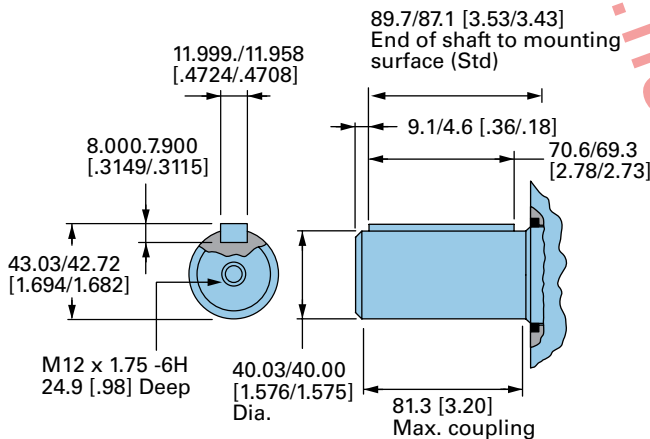
Code: 02 1-1/4 Inch straight

768 [6800] Max. torque Nm [lb-in]



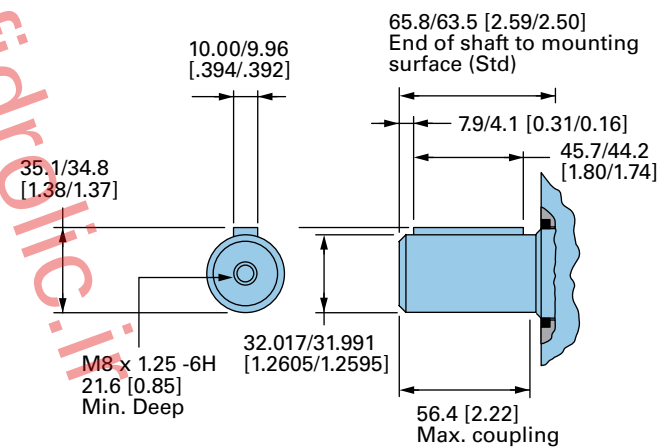
Code: 08 40 mm straight

972 [8600] Max. torque Nm [lb-in]



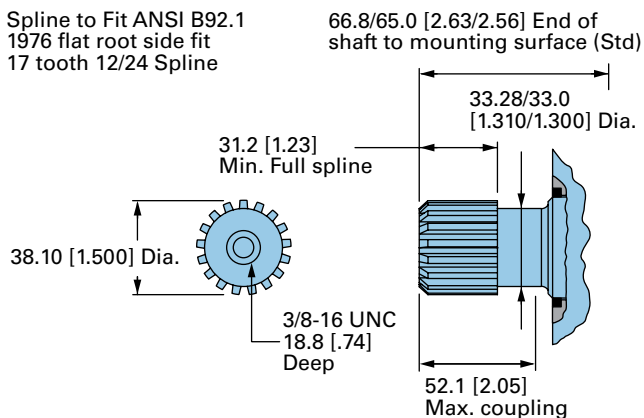
Code: 10 32 mm straight

768 [6800] Max. torque Nm [lb-in]



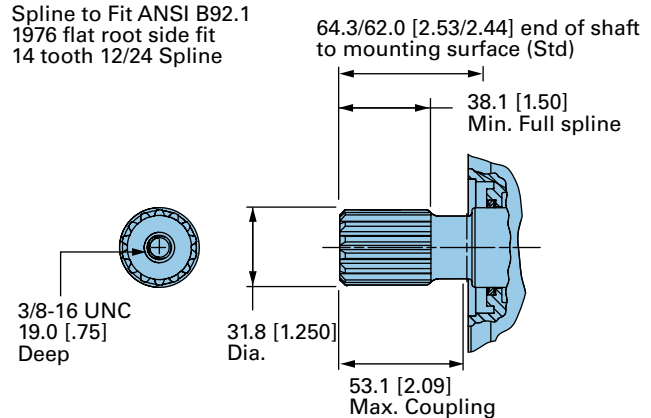
Code: 99 1-1/2 Inch 17 tooth straight

972 [8600] Max. torque Nm [lb-in]



Code: 06 1-1/4 Inch 14 tooth splined

768 [6800] Max. torque Nm [lb-in]



4000 Compact Series

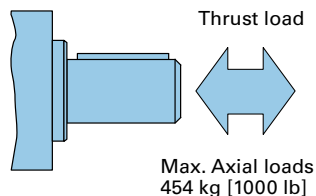
Shaft side load capacity

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 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.

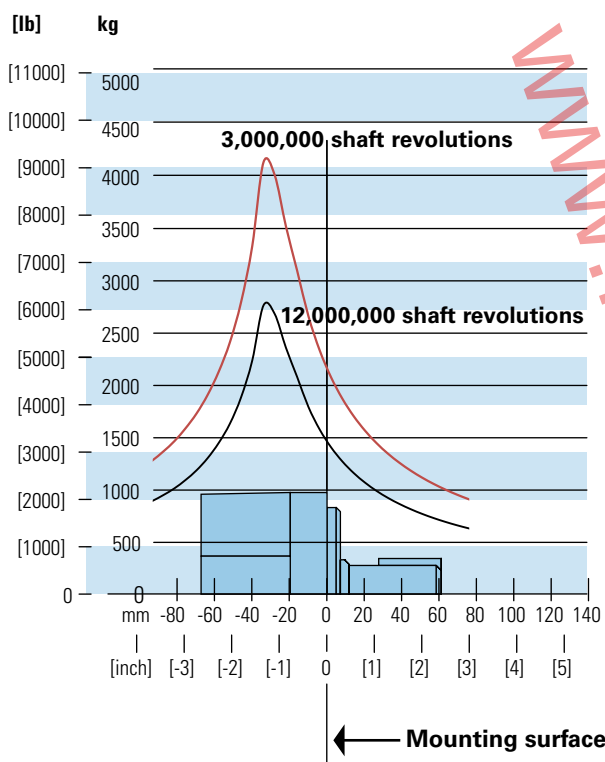
To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.



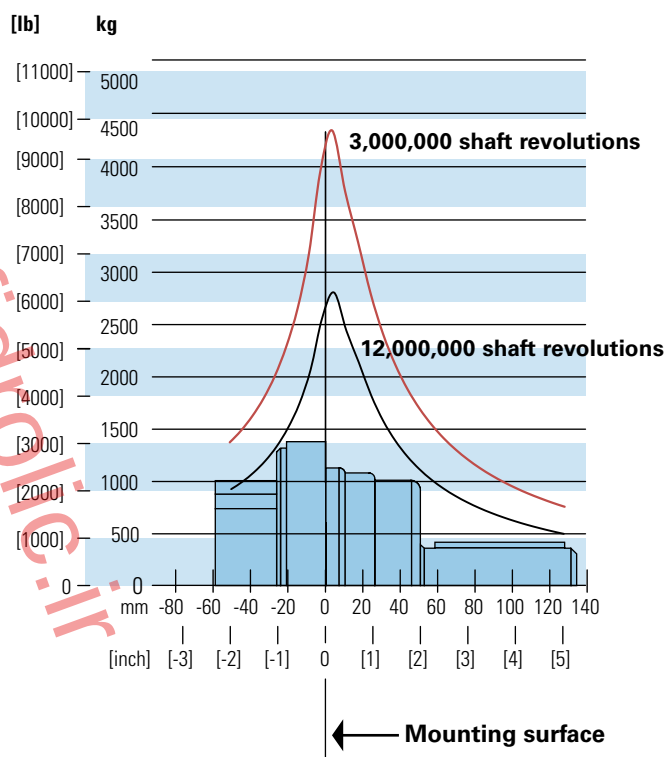
RPM	Multiplication factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

C-2

Standard mount- all shaft options 1-1/4 inch and larger



Wheel mount- all shaft options 1-1/4 inch and larger

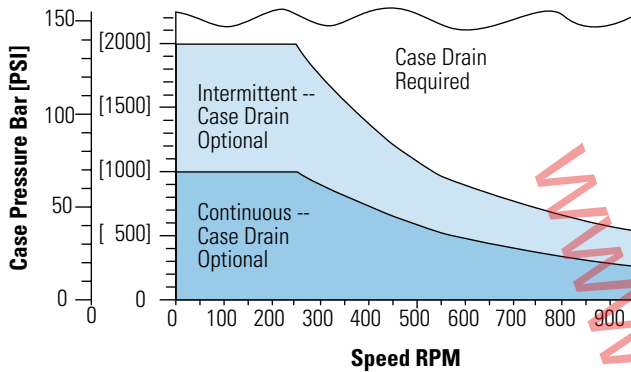


Char-Lynn 4000 Compact Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation charts.

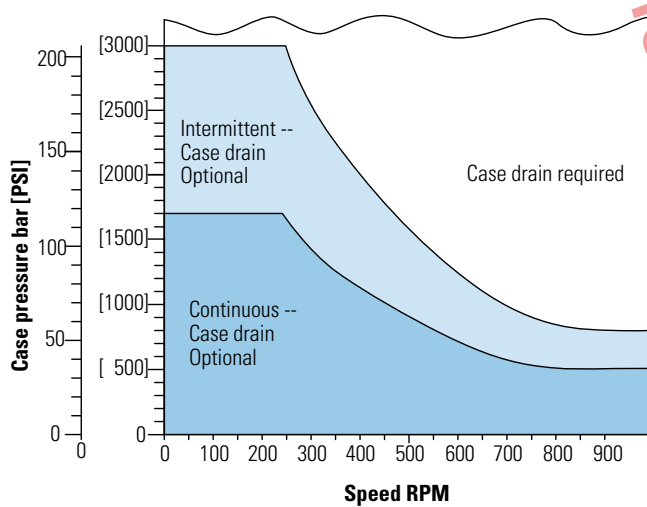
All shaft options 1-1/4 inch and smaller

Case pressure seal limitation

Standard shaft seal



High Pressure Shaft seal



Case porting advantage

Contamination control — flushing the motor case.

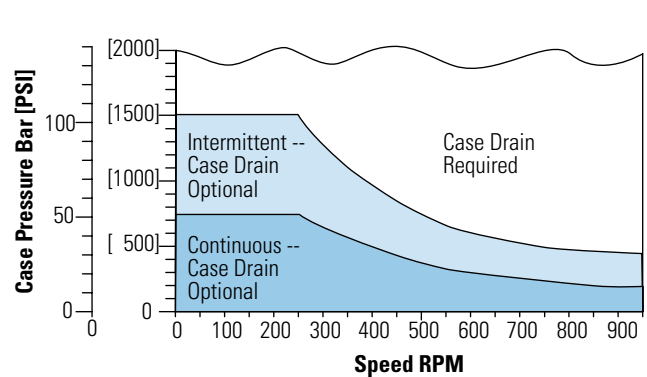
Cooler motor — exiting oil draws motor heat away.

Extend motor seal life — maintain low case pressure with a preset restriction in the case drain line.

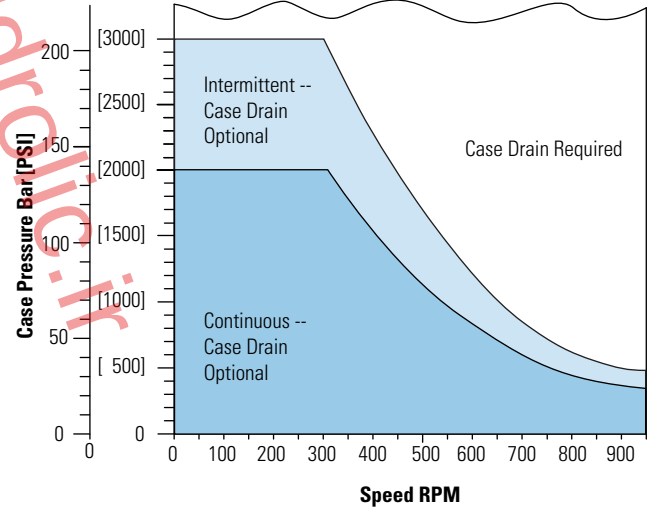
All shaft options larger than 1-1/4 inch.

Case pressure seal limitation

Standard shaft seal

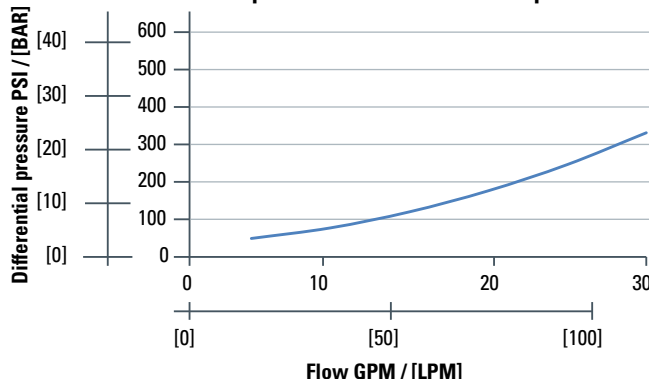


High Pressure Shaft seal



C-2

4000 compact series NLPD No load pressure drop

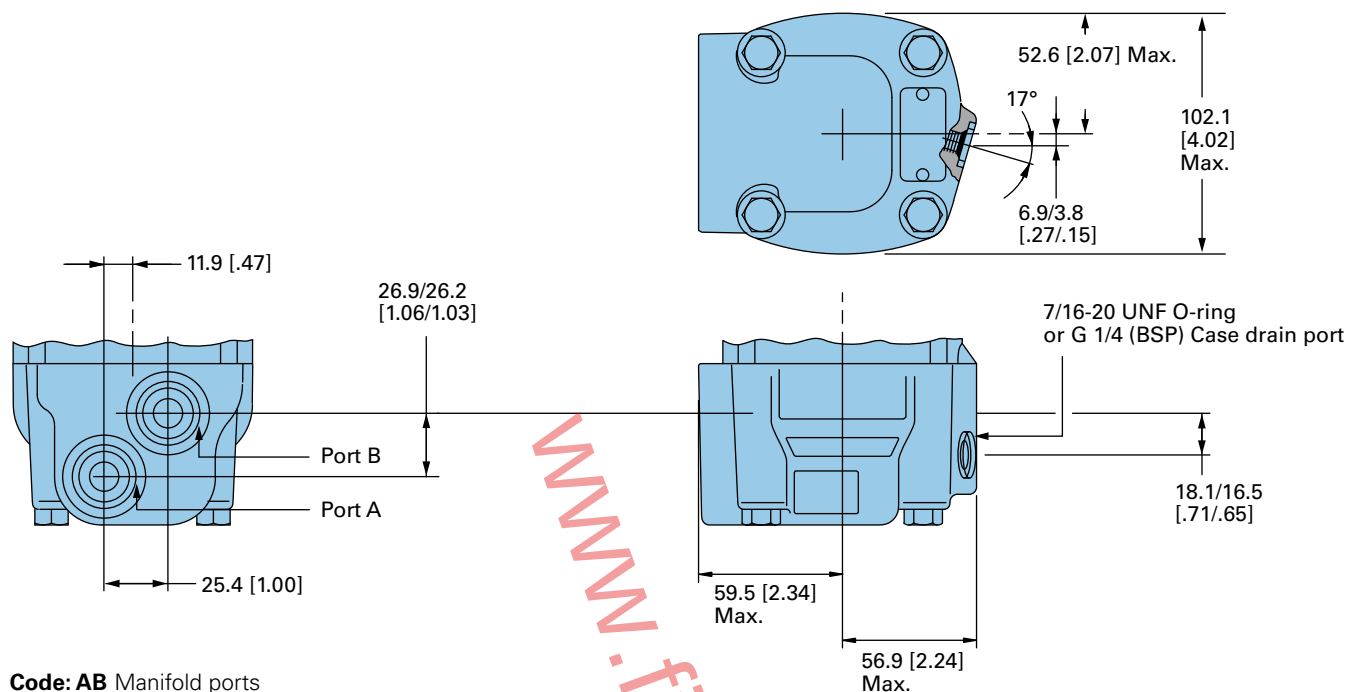


4000 Compact Series

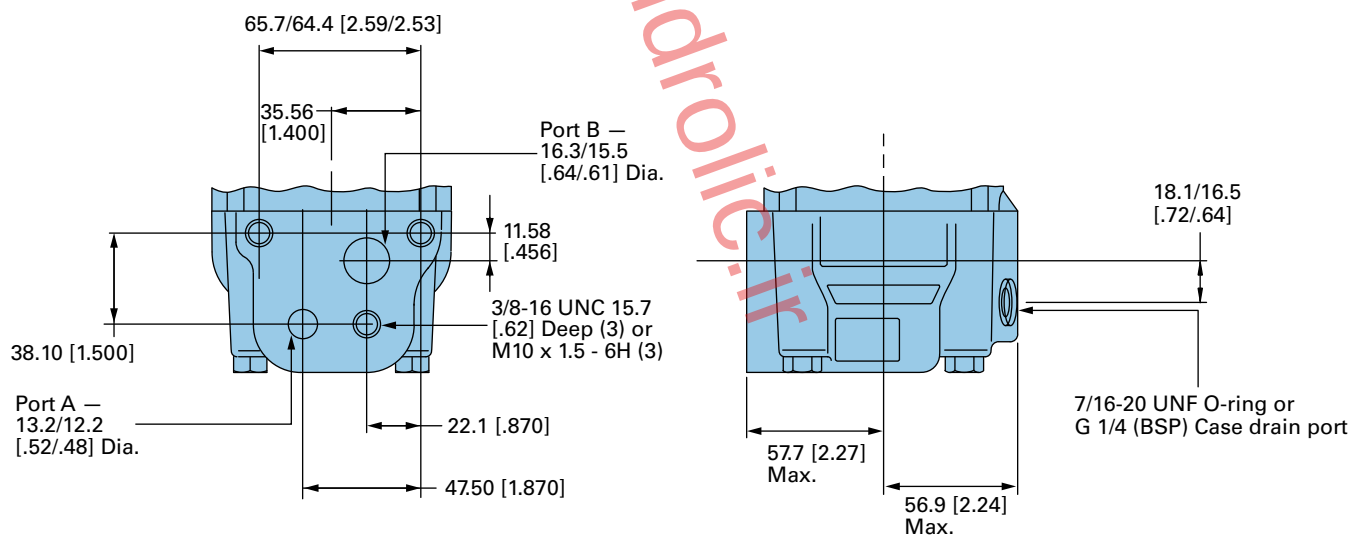
Dimensions

Ports

Code: AA Standard flange- Similar to SAE B type



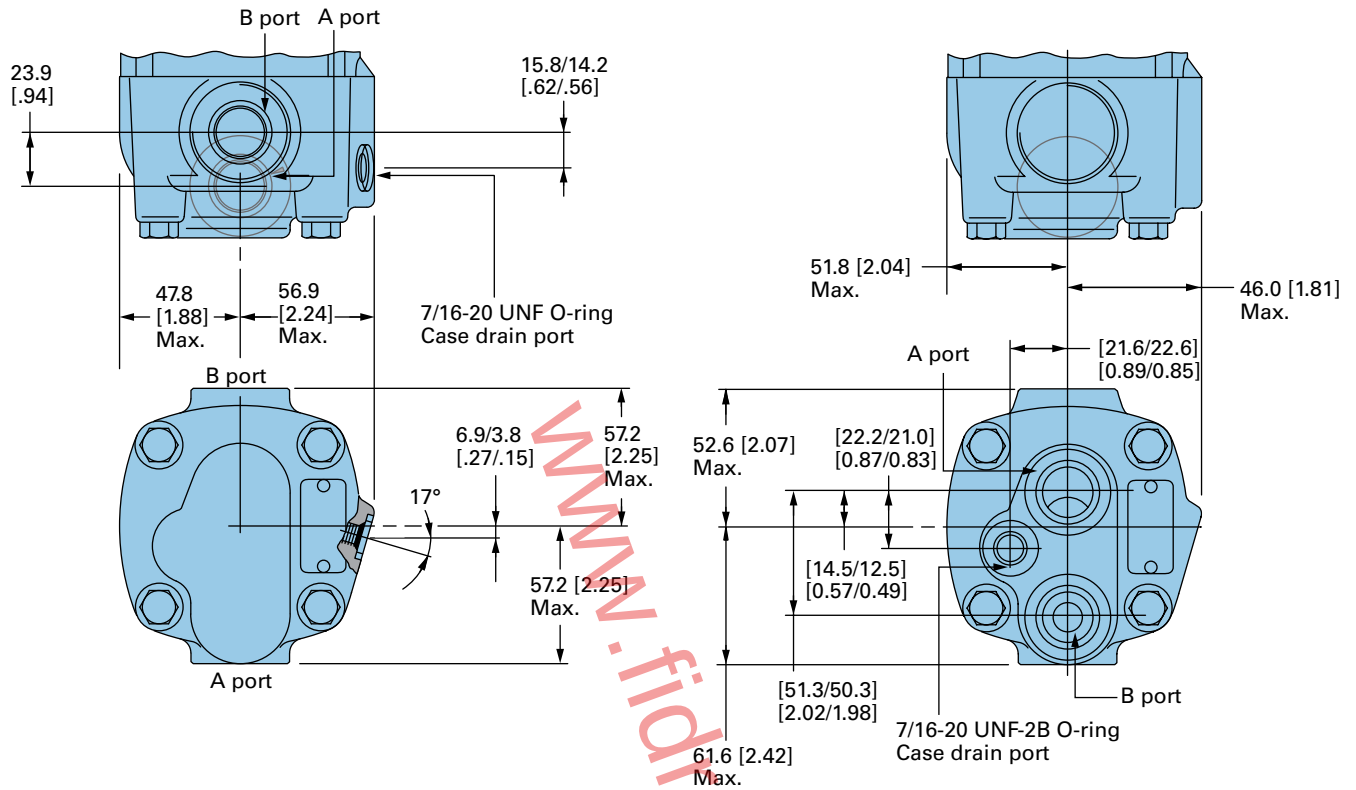
Code: AB Manifold ports



Ports

Code: AH 1-1/16-12 O-ring Ports Positioned 180° apart

Code: AD 7/8-14 O-ring end ports



C-2

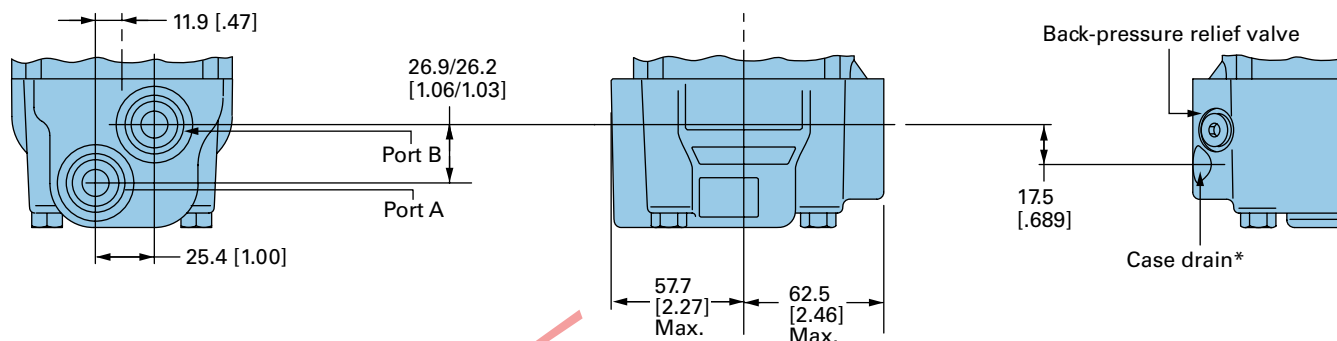
4000 Compact Series

Dimensions

Ports with shuttle

7/8-14 O-ring ports (2)

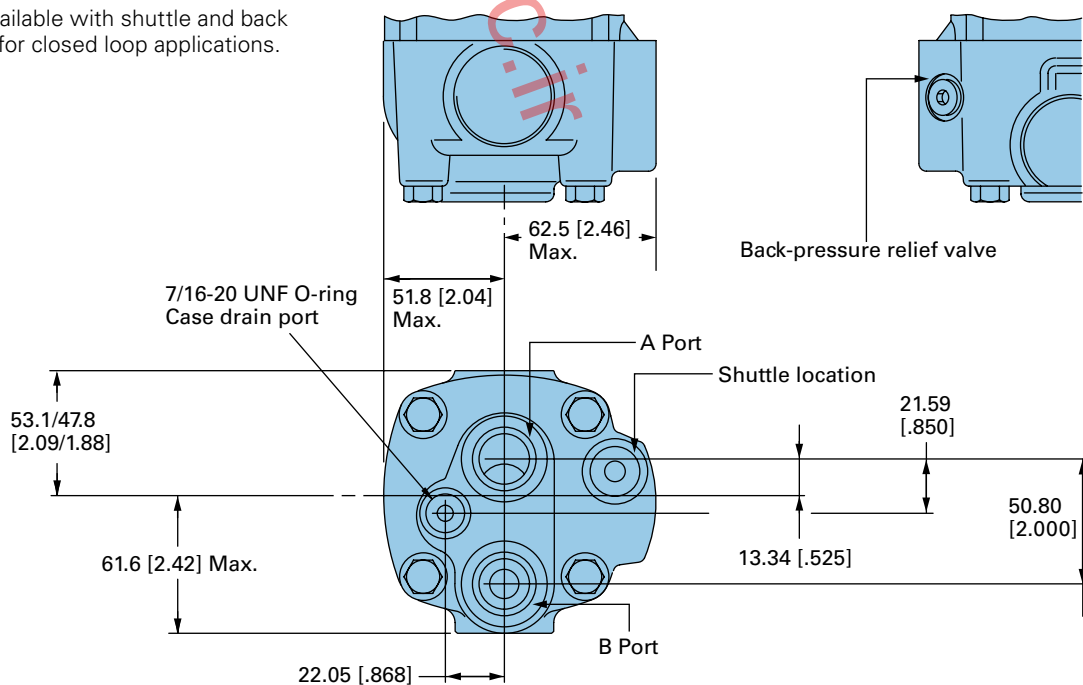
G 1/2 (BSP) ports (2)



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.



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.

A D K	**	**	**	**	**	*	0 0	**	0 0	*	*	0	A
1 2 3	4 5	6 7	8 9	10 11	12 13	14	15 16	17 18	19 20	21	22	23	24

1 2 3**Product series**

ADK 4000 Compact Series Motor

4 5**Displacement cm³/r [in³/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.
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 [.110] pilot length
AG	4 Bolt (wheel - short) 91,9 [3.62] pilot Dia. 14,35 [.565] Dia. Holes on 147,6 [5.81] Dia. Bolt circle with O-ring groove
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. Bolt circle
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. Bolt circle

* These mounting options are available with shaft options 08, 11, 98 and 99.

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
04	31.75 [1.250] Dia. Flat root side fit, 14 tooth, 12/24 DP 30° involute spline with .375-16 UNC-2B Thread in End, 33.0 [1.30] minimum full spline length
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
17	28.22 [1.111] Dia. Flat root side fit, 17 tooth, 16/32 DP 30° involute spline, 28.58 [1.125] Minimum full spline length
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)

C-2

4000 Compact Series

Model code

ADK			**		**		**		**		**		*		00		**		00		*	*	0	A
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

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

Back-pressure relief valve

- 0** None
- A** Set at 4,5 bar [65 PSI]

15 16

Valve options

- 00** None

17 18

Accessories

- 00** None
- AA** Seal guard
- AF** M12 threaded connector, (two 30 pulse per rev signals, Pin 1=Power, Pin 2=Output 1, Pin 3=Common, Pin 4=Output 2)
- AG** M12 threaded connector, digital speed and direction pickup (one 60 pulse per rev speed signal and one directional signal (Pin 1=Power, Pin 2=Direction, Pin 3=Common, Pin 4=Speed))

19 20

Special features (hardware)

- 00** None

21

Special features (assembly)

- 0** None
- A** Flange rotated 90°
- B** Reverse rotation

22

Paint/ special packaging

- 0** No Paint, Individual Box
- A** Low gloss black primer, individual box
- S** Epoxy coated black, individual box

23

Eaton assigned code when applicable

- 0** None

24

Eaton assigned design code

- A** First

See Eatonpowersource.com/ for more options and configurations.

C-2

Description

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.



Features:

- Excellent reliability with time proven Char-Lynn design
- Proven disc valve technology with high efficiencies
- 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

Benefits:

- Perfect replacement for Parker® TF-TG and White™ RE motors
- Torque of 4000 Series
- Lowest no load pressure drop which leads to longer life and lower temperature operation
- High overall efficiency: more available HP to the system than competitive motors
- High side load capacity with 4,500 lbs at 3” from the mount face

Applications:

- Scissor lift
- Boom lift
- Industrial sweeper
- Mower

Delta series

Geroler element	13 Displacements
Flow l/min [GPM]	76 [20] Continuous** 114 [30] Intermittent*
Speed RPM	668 Continuous** 831 Intermittent*
Pressure bar [PSI]	207 [3000] Continuous** 276 [4000] Intermittent*
Torque Nm [lb-in]	1039 [9199] Continuous** 1253[11100] Intermittent*

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

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

C-3

Parker is a registered trademark of Parker Intangibles LLC.
White is a trademark of Danfoss.



Boom lift



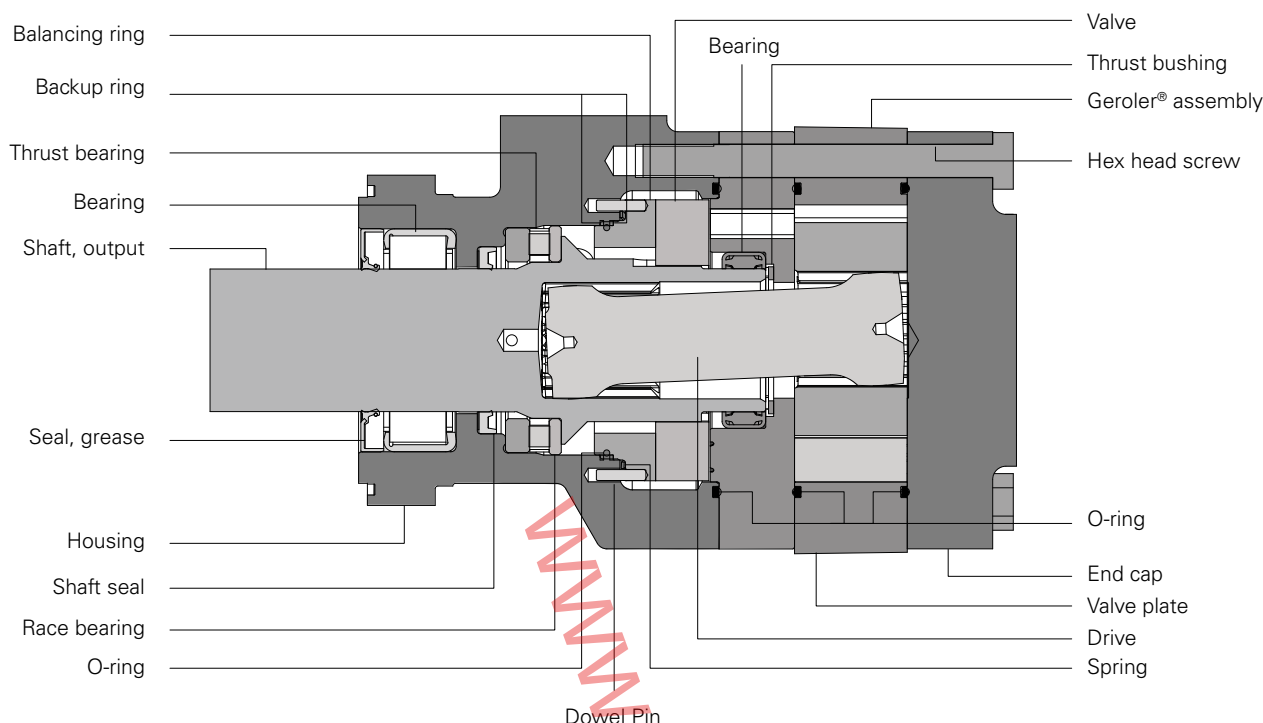
Sweeper



Mower

Delta Series

Specifications



C-3

Delta Series motors

Displ. cm ³ /r [in ³ /rev]		113 [6.9]	146 [8.9]	176 [10.7]	198 [12.1]	234 [14.3]	252 [15.4]	300 [18.3]	347 [21.2]	395 [24.1]	470 [28.7]	542 [33.1]	649 [39.6]	754 [46.0]
Max speed (RPM) @ Flow	Continuous	668	519	432	382	323	300	252	218	192	161	140	117	100
	Intermittent	831	778	615	516	485	450	379	327	288	241	209	175	151
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]	75 [20]	75 [20]	75 [20]
	Intermittent	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]
Torque* Nm [lb - in]	Continuous	320 [2834]	429 [3800]	500 [4427]	554 [4904]	651 [5763]	712 [6311]	844 [7472]	933 [8260]	972 [8607]	1039 [9199]	994 [8809]	1028 [9102]	985 [8721]
	Intermittent	417 [3697]	563 [4984]	658 [5822]	725 [6421]	852 [7543]	930 [8236]	1087 [9629]	1208 [10698]	1206 [10684]	1222 [10824]	1202 [10644]	1253 [11100]	1232 [10910]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	190 [2750]	170 [2500]	140 [2000]	120 [1750]	100 [1500]
	Intermittent	275 [4000]	275 [4000]	275 [4000]	275 [4000]	275 [4000]	275 [4000]	275 [4000]	275 [4000]	240 [3500]	205 [3000]	170 [2500]	155 [2250]	140 [2000]
Weight kg [lb]		12.7 [28.0]	12.9 [28.5]	13.5 [29.7]	13.8 [30.5]	14.3 [31.5]	15 [33.0]	15 [33.0]	15.4 [34.0]	16.1 [36.5]	16.8 [37.0]	17.5 [38.5]	18.4 [40.5]	19.1 [42.0]

*See shaft torque ratings for limitations.

Note: To assure best motor life, run motor in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

When pressurizing B port, all displacements have a continuous rating of 2000 psi.

Maximum inlet pressure:

310 bars (4500 PSI)

Do not exceed Δ pressure rating (see chart above).

Recommended fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 13 cSt [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: 20/18/13

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (except when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI]
113 cm³/r [6.9 in³/r]

	[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]	[259]	[276]
	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
[2]	[204]	[450]	[686]	[915]	[1140]	[1355]	[1593]	[1814]	[2018]	[2197]	[2349]	[2573]	[2776]	[2975]	[3182]	[3362]
7.6	23	51	77	103	129	153	180	205	228	248	265	290	313	336	359	380
	65	64	63	62	60	60	59	57	56	55	56	54	52	48	49	44
[4]	[210]	[457]	[706]	[950]	[1194]	[1436]	[1677]	[1906]	[2129]	[2351]	[2571]	[2790]	[3010]	[3231]	[3454]	[3660]
15	24	52	80	107	135	162	189	215	240	265	290	315	340	365	390	413
	132	131	130	129	128	127	126	125	123	122	120	118	115	113	112	110
[6]	[196]	[445]	[696]	[942]	[1186]	[1432]	[1674]	[1914]	[2144]	[2367]	[2587]	[2805]	[3027]	[3252]	[3476]	[3695]
23	22	50	79	106	134	162	189	216	242	267	292	317	342	367	392	417
	199	196	196	195	193	192	191	190	189	185	183	182	180	177	174	172
[8]	[176]	[425]	[677]	[921]	[1168]	[1420]	[1666]	[1906]	[2152]	[2386]	[2616]	[2834]	[3051]	[3265]	[3481]	[3697]
30	20	48	76	104	132	160	188	215	243	269	295	320	344	369	393	417
	266	264	263	261	261	259	257	257	255	252	250	248	246	244	241	237
[10]	[160]	[407]	[659]	[901]	[1149]	[1398]	[1650]	[1894]	[2134]	[2370]	[2601]	[2823]	[3044]	[3258]	[3457]	[3654]
38	18	46	74	102	130	158	186	214	241	268	294	319	344	368	390	413
	333	333	329	326	324	323	321	320	318	314	312	309	306	303	301	295
[12]	[134]	[382]	[632]	[876]	[1122]	[1372]	[1621]	[1868]	[2111]	[2353]	[2589]	[2821]	[3046]	[3270]	[3479]	[3680]
45	15	43	71	99	127	155	183	211	238	266	292	319	344	369	393	415
	399	398	396	393	392	389	387	386	383	381	377	374	372	370	367	364
[14]	[111]	[357]	[608]	[855]	[1102]	[1350]	[1599]	[1847]	[2090]	[2330]	[2569]	[2800]	[3024]	[3250]	[3455]	[3614]
53	13	40	69	97	124	152	181	208	236	263	290	316	341	367	390	408
	466	465	462	460	457	455	453	451	449	446	442	438	436	433	429	415
[16]	[81]	[325]	[577]	[822]	[1071]	[1321]	[1572]	[1817]	[2063]	[2307]	[2549]	[2781]	[3011]	[3237]	[3436]	[3578]
61	9	37	65	93	121	149	177	205	233	260	288	314	340	365	388	404
	533	532	529	527	524	522	520	517	516	513	509	506	503	500	496	477
[18]	[48]	[295]	[543]	[790]	[1036]	[1283]	[1535]	[1781]	[2027]	[2271]	[2512]	[2751]	[2984]	[3214]	[3431]	[3597]
68	5	33	61	89	117	145	173	201	229	256	284	311	337	363	387	406
	601	600	597	593	591	587	586	583	581	577	573	570	568	564	559	542
[20]	[14]	[263]	[510]	[758]	[1005]	[1249]	[1499]	[1746]	[1988]	[2231]	[2474]	[2712]	[2945]	[3176]	[3395]	[3597]
76	2	30	58	86	113	141	169	197	224	252	279	306	332	359	383	406
	668	666	664	661	658	654	652	649	646	644	640	637	634	630	628	621
[22]		[228]	[477]	[725]	[972]	[1218]	[1468]	[1712]	[1957]	[2201]	[2447]	[2686]	[2917]	[3149]	[3350]	[3523]
83		26	54	82	110	138	166	193	221	249	276	303	329	355	378	398
		733	731	728	724	721	718	715	713	710	705	704	700	697	688	664
[25]		[170]	[416]	[663]	[913]	[1153]	[1402]	[1646]	[1891]	[2136]	[2382]	[2622]	[2856]	[3081]	[3273]	[3452]
95		19	47	75	103	130	158	186	214	241	269	296	322	348	369	390
		831	829	827	825	821	818	815	812	809	805	803	800	794	776	745
[30]		[114]	[429]	[755]	[1076]	[1400]	[1725]	[2047]	[2368]	[2687]	[3003]	[3323]	[3635]	[3942]	[4249]	[4552]
114		13	48	85	122	158	195	231	267	303	339	375	410	445	480	514
		778	777	773	770	765	759	756	753	749	746	744	742	740	737	735

114 } Torque [lb-in]
13 } Nm
778 } Speed RPM

Delta 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 146 cm³/r [8.9 in³/r]

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]	[259]	[276]
250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000

Flow LPM [GPM]	[2]	[288]	[596]	[907]	[1184]	[1445]	[1718]	[1992]	[2247]	[2537]	[2810]	[3039]	[3290]	[3595]	[3846]	[3996]	[4265]
	7.6	32	67	102	134	163	194	225	254	286	317	343	371	406	434	451	482
		50	48	46	42	44	43	40	39	38	37	36	34	32	31	25	28
	[4]	[289]	[619]	[947]	[1267]	[1593]	[1914]	[2227]	[2482]	[2755]	[3042]	[3295]	[3615]	[3916]	[4135]	[4456]	[4680]
	15	33	70	107	143	180	216	251	280	311	343	372	408	442	467	503	528
		102	100	98	96	95	95	94	93	91	88	84	81	79	76	74	70
	[6]	[275]	[604]	[934]	[1259]	[1588]	[1908]	[2232]	[2552]	[2869]	[3181]	[3497]	[3800]	[4102]	[4397]	[4680]	[4955]
	23	31	68	105	142	179	215	252	288	324	359	395	429	463	496	528	559
		154	151	149	148	146	145	144	143	141	137	135	133	130	128	125	123
	[8]	[256]	[580]	[909]	[1235]	[1566]	[1887]	[2209]	[2528]	[2845]	[3160]	[3475]	[3783]	[4091]	[4397]	[4692]	[4984]
	30	29	66	103	139	177	213	249	285	321	357	392	427	462	496	530	563
		206	204	201	200	198	198	196	195	190	187	185	182	179	179	176	173
	[10]	[227]	[553]	[879]	[1204]	[1535]	[1861]	[2184]	[2504]	[2820]	[3133]	[3447]	[3757]	[4061]	[4369]	[4667]	[4963]
	38	26	62	99	136	173	210	247	283	318	354	389	424	459	493	527	560
		258	256	253	251	250	249	248	246	241	238	236	233	231	229	228	225
	[12]	[199]	[521]	[850]	[1172]	[1501]	[1825]	[2148]	[2469]	[2780]	[3091]	[3402]	[3714]	[4017]	[4324]	[4627]	[4922]
	45	23	59	96	132	170	206	243	279	314	349	384	419	454	488	522	556
		310	308	305	303	301	300	299	297	292	290	287	284	282	281	278	276
	[14]	[157]	[480]	[809]	[1130]	[1458]	[1784]	[2104]	[2426]	[2743]	[3057]	[3369]	[3679]	[3983]	[4291]	[4593]	[4892]
	53	18	54	91	128	165	201	238	274	310	345	380	415	450	484	519	552
		362	360	356	354	353	352	351	346	344	341	339	337	335	332	331	329
	[16]	[132]	[457]	[780]	[1102]	[1429]	[1753]	[2081]	[2397]	[2714]	[3025]	[3335]	[3645]	[3947]	[4255]	[4558]	[4857]
	61	15	52	88	124	161	198	235	271	306	342	377	412	446	480	515	548
		414	412	408	406	405	403	402	398	395	392	389	387	384	382	380	377
	[18]	[98]	[414]	[742]	[1065]	[1390]	[1715]	[2039]	[2360]	[2675]	[2986]	[3295]	[3605]	[3906]	[4213]	[4518]	[4817]
	68	11	47	84	120	157	194	230	266	302	337	372	407	441	476	510	544
		467	465	461	459	457	456	453	450	447	444	442	439	437	435	432	430
	[20]	[42]	[373]	[700]	[1020]	[1347]	[1670]	[1989]	[2308]	[2628]	[2944]	[3255]	[3568]	[3866]	[4172]	[4475]	[4774]
	76	5	42	79	115	152	189	225	261	297	332	368	403	436	471	505	539
		519	517	514	511	509	507	503	500	498	495	492	489	488	485	484	482
	[22]	[16]	[328]	[659]	[978]	[1306]	[1628]	[1950]	[2268]	[2586]	[2900]	[3211]	[3522]	[3823]	[4128]	[4429]	[4732]
	83	2	37	74	110	147	184	220	256	292	327	362	398	432	466	500	534
		571	569	565	562	559	559	555	552	549	546	544	541	538	536	534	531
	[25]		[253]	[576]	[899]	[1221]	[1544]	[1864]	[2179]	[2500]	[2811]	[3120]	[3433]	[3736]	[4036]	[4337]	[4639]
	95		29	65	102	138	174	210	246	282	317	352	388	422	456	490	524
			647	645	641	639	637	633	629	626	624	621	618	616	613	612	609
	[30]		[114]	[429]	[755]	[1076]	[1400]	[1725]	[2047]	[2368]	[2687]	[3003]	[3323]	[3635]	[3942]	[4249]	[4552]
	114		13	48	85	122	158	195	231	267	303	339	375	410	445	480	514
			778	777	773	770	765	759	756	753	749	746	744	742	740	737	735

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Delta Pressure bar [PSI]
176cm³/r[10.7 in³/r]

		[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]	[259]	[276]
		250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
Flow LPM [GPM]	[2]	[311]	[682]	[1037]	[1366]	[1695]	[2027]	[2027]	[2703]	[3049]	[3379]	[3679]	[3987]	[4317]	[4609]	[4837]	[5194]
	7.6	35	77	117	154	192	229	229	305	344	382	416	450	488	521	547	587
		41	40	38	36	36	35	35	32	31	30	28	27	25	23	20	22
	[4]	[336]	[730]	[1112]	[1487]	[1859]	[2228]	[2596]	[2922]	[3258]	[3602]	[3926]	[4286]	[4637]	[4938]	[5295]	[5588]
	15	38	82	126	168	210	252	293	330	368	407	444	484	524	558	598	631
		85	83	81	80	79	78	77	75	74	72	69	66	65	63	61	59
	[6]	[326]	[717]	[1106]	[1488]	[1868]	[2240]	[2614]	[2980]	[3345]	[3706]	[4068]	[4421]	[4772]	[5118]	[5455]	[5785]
	23	37	81	125	168	211	253	295	337	378	419	460	500	539	578	616	654
		127	126	125	123	121	120	119	117	115	113	111	109	106	106	103	102
	[8]	[305]	[694]	[1085]	[1471]	[1856]	[2232]	[2609]	[2979]	[3347]	[3709]	[4071]	[4425]	[4775]	[5122]	5463	[5803]
	30	35	78	123	166	210	252	295	337	378	419	460	500	539	579	617	656
		171	169	168	166	165	164	162	161	158	156	154	152	150	148	146	144
	[10]	[278]	[668]	[1059]	[1446]	[1835]	[2217]	[2597]	[2971]	[3342]	[3707]	[4069]	[4427]	[4780]	[5134]	[5480]	[5822]
	38	31	75	120	163	201	250	293	336	378	419	460	500	540	580	619	658
		214	213	211	209	208	206	205	203	200	198	196	194	192	190	188	186
	[12]	[245]	[631]	[1023]	[1408]	[1796]	[2179]	[2559]	[2934]	[3303]	[3669]	[4031]	[4392]	[4743]	[5095]	[5441]	[5782]
	45	28	71	116	159	203	246	289	331	373	415	455	496	536	576	615	653
		258	256	255	253	252	250	249	247	244	242	239	237	235	234	231	229
	[14]	[200]	[585]	[977]	[1359]	[1748]	[2132]	[2510]	[2886]	[3160]	[3628]	[3993]	[4354]	[4707]	[5061]	[5406]	[5751]
	53	23	66	110	154	197	241	284	326	368	410	451	492	532	572	611	650
		302	300	297	296	295	293	291	288	286	284	281	279	277	275	274	271
	[16]	[164]	[551]	[939]	[1323]	[1709]	[2091]	[2475]	[2848]	[3221]	[3588]	[3952]	[4314]	[4668]	[5023]	[5370]	[5712]
	61	19	62	106	149	193	236	280	322	364	405	446	487	527	568	607	645
		345	343	341	339	338	336	335	332	330	328	325	323	321	319	317	315
	[18]	[120]	[500]	[891]	[1276]	[1663]	[2048]	[2428]	[2804]	[3176]	[3544]	[3908]	[4271]	[4615]	[4961]	[5312]	[5658]
	68	14	56	101	144	188	231	274	317	359	400	442	483	521	561	600	639
		388	386	384	382	380	379	377	374	372	370	368	366	364	362	360	358
	[20]	[69]	[426]	[812]	[1195]	[1581]	[1962]	[2341]	[2717]	[3091]	[3460]	[3825]	[4188]	[4543]	[4904]	[5262]	[5615]
	76	8	48	92	135	179	222	264	307	349	391	432	473	513	554	594	634
		432	430	427	425	424	422	419	417	414	412	409	406	405	403	401	399
	[22]	[16]	[366]	[754]	[1138]	[1526]	[1906]	[2286]	[2663]	[3036]	[3405]	[3770]	[4133]	[4488]	[4842]	[5193]	[5539]
	83	2	41	85	129	172	215	258	301	343	385	426	467	507	547	587	626
		475	473	471	469	466	465	462	460	457	455	453	450	448	446	444	442
	[25]		[273]	[656]	[1040]	[1423]	[1806]	[2185]	[2558]	[2931]	[3299]	[3662]	[4028]	[4387]	[4738]	[5090]	[5438]
	95		31	74	118	161	204	247	289	331	373	414	455	496	535	575	614
			538	537	535	533	531	528	525	523	521	519	517	515	513	511	508
	[30]		[141]	[523]	[912]	[1299]	[1683]	[2061]	[2435]	[2809]	[3179]	[3544]	[3915]	[4280]	[4636]	[4993]	[5345]
	114		16	59	103	147	190	233	275	317	359	400	442	484	524	564	604
			615	609	601	595	592	592	594	596	597	599	600	600	600	598	596

Delta 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 198 cm³/r [12.1 in³/r]

	[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]	[259]	[276]
	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
[2]	[313]	[732]	[1113]	[1480]	[1870]	[2249]	[2668]	[3059]	[3447]	[3822]	[4189]	[4544]	[4875]	[5194]	[5508]	[5948]
7.6	35	83	126	167	211	254	301	345	389	432	473	513	550	586	622	671
	36	35	34	32	31	30	29	27	27	26	24	22	21	18	17	18
[4]	[367]	[809]	[1228]	[1640]	[2038]	[2437]	[2844]	[3234]	[3623]	[4010]	[4398]	[4779]	[5164]	[5545]	[5917]	[6275]
15	41	91	139	185	230	275	321	365	409	453	497	540	583	626	668	708
	75	74	72	71	69	68	67	65	63	62	61	58	56	56	54	52
[6]	[365]	[799]	[1231]	[1654]	[2066]	[2473]	[2878]	[3270]	[3665]	[4056]	[4446]	[4833]	[5215]	[5598]	[5975]	[6347]
23	41	90	139	187	233	279	325	369	414	458	502	546	589	632	675	717
	112	111	110	109	107	106	104	102	101	99	98	96	95	93	91	89
[8]	[343]	[782]	[1219]	[1648]	[2069]	[2484]	[2898]	[3300]	[3702]	[4093]	[4482]	[4865]	[5237]	[5607]	[5976]	[6349]
30	39	88	138	186	234	280	327	373	418	462	506	549	591	633	675	717
	151	150	149	147	146	145	143	142	140	138	135	134	133	131	129	127
[10]	[322]	[759]	[1201]	[1633]	[2063]	[2483]	[2904]	[3316]	[3726]	[4125]	[4515]	[4904]	[5290]	[5672]	[6048]	[6421]
38	36	86	136	184	233	280	328	374	421	466	510	554	597	640	683	725
	190	188	187	186	185	182	181	178	177	174	173	171	169	168	166	164
[12]	[283]	[719]	[1158]	[1590]	[2020]	[2448]	[2868]	[3279]	[3691]	[4096]	[4492]	[4883]	[5265]	[5644]	[6015]	[6385]
45	32	81	131	180	228	276	324	370	417	462	507	551	594	637	679	721
	229	227	226	224	223	221	220	218	216	215	212	211	209	206	205	202
[14]	[238]	[671]	[1110]	[1538]	[1970]	[2396]	[2816]	[3228]	[3644]	[4050]	[4451]	[4846]	[5231]	[5613]	[5982]	[6357]
53	27	76	125	174	222	271	318	364	411	457	503	547	591	634	675	718
	267	266	264	262	261	259	257	255	253	251	249	246	244	242	240	238
[16]	[191]	[625]	[1063]	[1493]	[1923]	[2345]	[2768]	[3182]	[3596]	[4003]	[4403]	[4801]	[5191]	[5576]	[5947]	[6316]
61	22	71	120	169	217	265	312	359	406	452	497	542	586	630	671	713
	305	304	303	301	300	298	296	295	293	291	289	287	285	284	281	279
[18]	[139]	[567]	[1006]	[1438]	[1871]	[2299]	[2720]	[3133]	[3547]	[3956]	[4359]	[4760]	[5128]	[5492]	[5871]	[6247]
68	16	64	114	162	211	260	307	354	400	447	492	537	579	620	663	705
	342	341	340	339	337	335	333	331	330	328	326	324	322	321	319	317
[20]	[99]	[457]	[886]	[1315]	[1745]	[2168]	[2590]	[3006]	[3418]	[3822]	[4224]	[4622]	[5018]	[5418]	[5816]	[6208]
76	11	52	100	148	197	245	292	339	386	432	477	522	567	612	657	701
	382	380	378	377	375	373	371	369	366	364	362	359	358	356	354	352
[22]	[15]	[383]	[810]	[1243]	[1676]	[2096]	[2520]	[2938]	[3351]	[3759]	[4161]	[4558]	[4953]	[5339]	[5722]	[6095]
83	2	43	91	140	189	237	284	332	378	424	470	515	559	603	646	688
	420	417	416	415	413	411	409	407	405	403	401	399	397	395	392	390
[25]		[272]	[700]	[1131]	[1559]	[1985]	[2408]	[2823]	[3231]	[3639]	[4042]	[4443]	[4842]	[5229]	[5617]	[5992]
95		31	79	128	176	224	272	319	365	411	456	502	547	590	634	677
		476	475	474	472	470	468	466	465	463	461	459	457	455	453	450
[30]		[163]	[600]	[1037]	[1474]	[1902]	[2315]	[2723]	[3134]	[3536]	[3933]	[4338]	[4737]	[5125]	[5516]	[5899]
114		18	68	117	166	215	261	307	354	399	444	490	535	579	623	666
		516	506	494	487	484	488	494	501	506	511	514	515	516	515	514

163 } Torque [lb-in]
18 } Nm
516 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

**Δ Pressure bar [PSI]
234 cm³/r [14.3 in³/r]**

	[17] 250	[34] 500	[52] 750	[69] 1000	[86] 1250	[103] 1500	[121] 1750	[138] 2000	[155] 2250	[172] 2500	[190] 2750	[207] 3000	[224] 3250	[241] 3500	[259] 3750	[276] 4000
[2] 7.6	[470] 53 31	[971] 110 30	[1457] 164 29	[1921] 217 28	[2414] 273 26	[2877] 325 25	[3348] 378 25	[3821] 431 25	[4275] 483 24	[4730] 534 23	[5164] 583 22	[5630] 636 21	[5997] 677 19	[6446] 728 20	[6863] 775 19	[7217] 815 15
[4] 15	[468] 53 64	[988] 112 62	[1504] 170 61	[1989] 225 60	[2482] 280 59	[2964] 335 58	[3447] 389 57	[3916] 442 56	[4384] 495 56	[4843] 547 55	[5302] 599 55	[5763] 651 54	[6213] 701 52	[6668] 753 51	[7113] 803 50	[7543] 852 48
[6] 23	[449] 51 96	[966] 109 95	[1484] 168 93	[1980] 224 92	[2470] 279 92	[2953] 333 91	[3445] 389 90	[3922] 443 89	[4397] 496 88	[4851] 548 88	[5304] 599 88	[5750] 649 87	[6197] 700 86	[6643] 750 86	[7085] 800 84	[7524] 849 83
[8] 30	[416] 47 129	[931] 105 128	[1446] 163 126	[1954] 221 125	[2458] 277 124	[2948] 333 123	[3438] 388 123	[3909] 441 121	[4381] 495 121	[4835] 546 120	[5280] 596 120	[5714] 645 119	[6150] 694 119	[6584] 743 118	[7015] 792 117	[7445] 841 116
[10] 38	[380] 43 161	[896] 101 160	[1410] 159 158	[1917] 216 157	[2425] 274 156	[2919] 330 155	[3412] 385 154	[3890] 439 153	[4373] 494 153	[4831] 545 152	[5280] 596 151	[5716] 645 150	[6148] 694 149	[6586] 744 148	[7017] 792 147	[7452] 841 146
[12] 45	[341] 39 194	[856] 97 193	[1366] 154 191	[1876] 212 190	[2384] 269 189	[2880] 325 188	[3370] 380 187	[3843] 434 186	[4319] 488 185	[4782] 540 185	[5229] 590 184	[5665] 640 183	[6102] 689 182	[6537] 738 181	[6962] 786 180	[7392] 835 178
[14] 53	[290] 33 226	[804] 91 225	[1312] 148 224	[1813] 205 222	[2320] 262 221	[2821] 318 220	[3315] 374 219	[3793] 428 218	[4268] 482 217	[4732] 534 216	[5181] 585 215	[5623] 635 214	[6057] 684 214	[6485] 732 212	[6907] 780 211	[7327] 827 209
[16] 61	[239] 27 258	[743] 84 258	[1249] 141 257	[1756] 198 255	[2264] 256 254	[2759] 312 253	[3255] 367 252	[3735] 422 251	[4207] 475 251	[4669] 527 250	[5122] 578 249	[5568] 629 247	[6004] 678 246	[6432] 726 245	[6845] 773 244	[7268] 820 242
[18] 68	[176] 20 291	[688] 78 291	[1187] 134 289	[1694] 191 287	[2203] 249 286	[2698] 305 285	[3195] 361 284	[3676] 415 283	[4146] 468 282	[4603] 520 281	[5055] 571 279	[5497] 621 278	[5930] 669 277	[6358] 718 276	[6774] 765 276	[7194] 812 275
[20] 76	[108] 12 323	[614] 69 323	[1121] 127 322	[1623] 183 320	[2124] 240 319	[2620] 296 317	[3118] 352 316	[3603] 407 316	[4077] 460 314	[4541] 513 312	[4990] 563 311	[5430] 613 310	[5865] 662 310	[6301] 711 310	[6720] 759 309	[7139] 806 309
[22] 83	[28] 3 355	[535] 60 355	[1081] 122 355	[1582] 179 352	[2082] 235 351	[2579] 291 350	[3071] 347 349	[3550] 401 348	[4018] 454 345	[4483] 506 343	[4943] 558 342	[5406] 610 341	[5855] 661 341	[6300] 711 341	[6723] 759 341	[7139] 806 341
[25] 95		[410] 46 404	[956] 108 404	[1460] 165 402	[1959] 221 401	[2454] 277 399	[2941] 332 398	[3419] 386 397	[3892] 439 394	[4356] 492 392	[4806] 543 391	[5251] 593 390	[5683] 642 390	[6117] 691 389	[6531] 737 390	[6939] 783 389
[30] 114		[171] 19 485	[700] 79 485	[1297] 146 485	[1735] 196 483	[2226] 251 481	[2718] 307 480	[3204] 362 478	[3689] 417 476	[4162] 470 474	[4623] 522 472	[5079] 573 472	[5519] 623 471	[5959] 673 471	[6377] 720 471	[6781] 766 471

Delta 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 252 cm³/r [15.4 in³/r]

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]	[259]	[276]
250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000

Flow LPM [GPM]	[2]	[485]	[1011]	[1520]	[2032]	[2564]	[3059]	[3569]	[4065]	[4561]	[5085]	[5589]	[6054]	[6536]	[6891]	[7388]	[7872]
	7.6	55	114	172	229	289	345	403	459	515	574	631	683	738	778	834	889
		28	27	26	26	25	24	23	23	22	23	23	22	22	19	19	20
	[4]	[504]	[1062]	[1609]	[2145]	[2684]	[3213]	[3744]	[4263]	[4780]	[5294]	[5804]	[6311]	[6811]	[7308]	[7787]	[8236]
	15	57	120	182	242	303	363	423	481	540	598	655	712	769	825	879	930
		59	57	56	56	55	55	54	54	53	53	53	51	51	49	49	47
	[6]	[478]	[1031]	[1585]	[2132]	[2670]	[3195]	[3717]	[4222]	[4726]	[5222]	[5721]	[6211]	[6700]	[7179]	[7658]	[8118]
	23	54	116	179	241	301	361	420	477	534	590	646	701	756	810	865	917
		89	88	86	85	85	84	84	84	84	84	83	82	82	80	78	78
	[8]	[453]	[1012]	[1571]	[2115]	[2664]	[3191]	[3717]	[4224]	[4725]	[5215]	[5706]	[6194]	[6678]	[7161]	[7628]	[8076]
	30	51	114	177	239	301	360	420	477	533	589	644	699	754	808	861	912
		120	118	117	115	114	113	113	112	113	113	113	112	111	110	109	108
	[10]	[398]	[957]	[1516]	[2063]	[2609]	[3137]	[3668]	[4181]	[4678]	[5157]	[5636]	[6116]	[6589]	[7059]	[7522]	[7974]
	38	45	108	171	233	295	354	414	472	528	582	636	690	744	797	849	900
		149	148	147	145	144	143	142	142	142	143	142	142	141	140	139	138
	[12]	[370]	[914]	[1468]	[2011]	[2557]	[3085]	[3614]	[4125]	[4622]	[5102]	[5577]	[6059]	[6538]	[7017]	[7497]	[7966]
	45	42	103	166	227	289	348	408	466	522	576	630	684	738	792	846	899
		180	179	178	176	174	173	172	172	172	172	172	172	171	171	170	169
	[14]	[290]	[842]	[1399]	[1948]	[2496]	[3024]	[3552]	[4065]	[4571]	[5056]	[5525]	[5987]	[6445]	[6905]	[7359]	[7813]
	53	33	95	158	220	282	341	401	459	516	571	624	676	728	780	831	882
		210	209	208	206	205	203	202	201	200	199	199	200	200	200	200	199
	[16]	[239]	[795]	[1346]	[1891]	[2434]	[2962]	[3494]	[4003]	[4511]	[4995]	[5461]	[5919]	[6382]	[6841]	[7292]	[7743]
	61	27	90	152	213	275	334	395	452	509	564	616	668	720	772	823	874
		240	240	238	237	235	233	232	231	229	228	229	230	230	230	230	230
	[18]	[157]	[716]	[1265]	[1810]	[2355]	[2881]	[3408]	[3921]	[4431]	[4924]	[5401]	[5860]	[6310]	[6749]	[7184]	[7627]
	68	18	81	143	204	266	325	385	443	500	556	610	662	712	762	811	861
		270	270	269	267	265	264	261	261	258	256	256	258	259	260	260	260
	[20]	[96]	[650]	[1203]	[1750]	[2294]	[2820]	[3345]	[3857]	[4366]	[4865]	[5340]	[5801]	[6242]	[6686]	[7122]	[7553]
	76	11	73	136	198	259	318	378	435	493	549	603	655	705	755	804	853
		300	300	299	297	295	293	292	289	287	286	286	287	289	290	291	290
	[22]	[26]	[569]	[1111]	[1656]	[2195]	[2725]	[3250]	[3763]	[4268]	[4769]	[5259]	[5733]	[6182]	[6609]	[7030]	[7459]
	83	3	64	125	187	248	308	367	425	482	538	594	647	698	746	794	842
		330	330	330	328	327	324	322	320	316	314	313	314	316	318	320	320
	[25]		[425]	[967]	[1508]	[2042]	[2574]	[3093]	[3605]	[4110]	[4602]	[5084]	[5561]	[6028]	[6482]	[6899]	[7316]
	95		48	109	170	231	291	349	407	464	520	574	628	681	732	779	826
			375	375	374	372	369	366	364	361	358	357	356	358	361	364	364
	[30]		[179]	[723]	[1266]	[1800]	[2330]	[2852]	[3364]	[3868]	[4368]	[4856]	[5338]	[5811]	[6269]	[6701]	[7096]
	114		20	82	143	203	263	322	380	437	493	548	603	656	708	757	801
			450	450	450	449	447	443	439	436	433	430	430	431	434	437	438

179 } Torque [lb-in]
20 } Nm
450 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

**Δ Pressure bar [PSI]
300 cm³/r [18.3 in³/r]**

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]	[259]	[276]
250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000

Flow LPM [GPM]	[2]	[608]	[1257]	[1919]	[2553]	[3196]	[3824]	[4475]	[5087]	[5707]	[6307]	[6901]	[7472]	[8015]	[8484]	[8962]	[9413]
	7.6	69	142	217	288	361	432	505	574	644	712	779	844	905	958	1012	1063
		24	23	23	22	21	21	21	20	19	18	17	16	15	13	11	11
	[4]	[612]	[1283]	[1940]	[2587]	[3227]	[3856]	[4483]	[5094]	[5693]	[6293]	[6881]	[7462]	[8024]	[8574]	[9113]	[9629]
	15	69	145	219	292	364	435	506	575	643	710	777	842	906	968	1029	1087
		50	48	47	46	45	44	44	44	43	42	41	40	40	39	38	37
	[6]	[570]	[1248]	[1906]	[2547]	[3178]	[3800]	[4420]	[5025]	[5619]	[6203]	[6773]	[7345]	[7899]	[8449]	[8992]	[9525]
	23	64	141	215	288	359	429	499	567	634	700	765	829	892	954	1015	1075
		76	74	73	71	70	69	68	68	69	68	68	67	66	65	64	63
	[8]	[540]	[1210]	[1871]	[2522]	[3152]	[3781]	[4404]	[5008]	[5607]	[6186]	[6749]	[7319]	[7879]	[8433]	[8977]	[9512]
	30	61	137	211	285	356	427	497	565	633	698	762	826	890	952	1013	1074
		101	100	98	96	94	93	92	92	92	93	93	93	93	92	91	91
	[10]	[496]	[1161]	[1825]	[2471]	[3110]	[3733]	[4362]	[4968]	[5574]	[6157]	[6721]	[7274]	[7811]	[8356]	[8887]	[9416]
	38	56	131	206	279	351	421	492	561	629	695	759	821	882	943	1003	1063
		126	126	124	122	120	118	115	113	113	113	114	116	118	118	117	117
	[12]	[443]	[1108]	[1768]	[2418]	[3059]	[3688]	[4307]	[4918]	[5526]	[6114]	[6681]	[7239]	[7786]	[8338]	[8876]	[9411]
	45	50	125	200	273	345	416	486	555	624	690	754	817	879	941	1002	1062
		151	151	150	148	145	143	141	140	139	139	140	142	144	144	144	144
	[14]	[387]	[1034]	[1701]	[2346]	[2985]	[3610]	[4227]	[4839]	[5452]	[6050]	[6622]	[7184]	[7723]	[8269]	[8816]	[9362]
	53	44	117	192	265	337	408	477	546	615	683	748	811	872	934	995	1057
		177	177	176	173	171	168	166	165	163	163	165	167	169	171	170	170
	[16]	[366]	[961]	[1620]	[2264]	[2903]	[3530]	[4147]	[4753]	[5366]	[5960]	[6540]	[7098]	[7642]	[8169]	[8685]	[9211]
	61	41	109	183	256	328	399	468	537	606	673	738	801	863	922	980	1040
		202	202	201	199	197	195	192	190	189	188	188	189	191	194	196	196
	[18]	[291]	[893]	[1546]	[2187]	[2829]	[3450]	[4067]	[4678]	[5283]	[5873]	[6451]	[7005]	[7537]	[8064]	[8580]	[9103]
	68	33	101	175	247	319	390	459	528	596	663	728	791	851	910	969	1028
		227	227	227	224	222	219	217	215	213	211	212	214	217	220	221	221
	[20]	[204]	[797]	[1444]	[2094]	[2736]	[3361]	[3974]	[4585]	[5184]	[5775]	[6353]	[6907]	[7448]	[7974]	[8489]	[8992]
	76	23	90	163	236	309	380	449	518	585	652	717	780	841	900	958	1015
		252	252	252	251	249	246	243	241	239	238	238	239	242	245	247	248
	[22]	[102]	[710]	[1366]	[2013]	[2651]	[3270]	[3885]	[4496]	[5096]	[5689]	[6271]	[6831]	[7362]	[7877]	[8375]	[8880]
	83	12	80	154	227	299	369	439	508	575	642	708	771	831	889	945	1003
		278	278	278	277	274	272	269	267	265	264	263	265	269	273	275	275
	[25]		[553]	[1208]	[1851]	[2489]	[3114]	[3726]	[4335]	[4930]	[5523]	[6108]	[6670]	[7220]	[7783]	[8298]	[8777]
	95		62	136	209	281	352	421	489	557	624	690	753	815	879	937	991
			316	316	316	313	310	307	303	301	299	298	298	301	306	310	312
	[30]		[233]	[941]	[1539]	[2179]	[2811]	[3430]	[4028]	[4625]	[5217]	[5802]	[6385]	[6957]	[7522]	[8060]	[8565]
	114		26	106	174	246	317	387	455	522	589	655	721	785	849	910	967
			379	379	379	377	374	371	367	365	363	362	361	364	368	374	376

Delta 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI]
347 cm³/r [21.2 in³/r]

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]	[259]	[276]
250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000

Flow LPM [GPM]	[2]	[687]	[1415]	[2128]	[2824]	[3532]	[4248]	[4947]	[5633]	[6298]	[6964]	[7575]	[8182]	[8743]	[9209]	[9624]	[10081]
	7.6	78	160	240	319	399	480	558	636	711	786	855	924	987	1040	1087	1138
		20	19	18	18	17	18	17	17	16	15	14	13	12	9	8	4
	[4]	[689]	[1443]	[2179]	[2891]	[3606]	[4302]	[4986]	[5653]	[6316]	[6965]	[7615]	[8260]	[8891]	[9515]	[10120]	[10698]
	15	78	163	246	326	407	486	563	638	713	786	860	933	1004	1074	1143	1208
		42	41	41	40	39	37	38	38	39	38	38	37	37	35	33	31
	[6]	[648]	[1406]	[2154]	[2866]	[3580]	[4276]	[4970]	[5641]	[6290]	[6921]	[7563]	[8190]	[8812]	[9427]	[10029]	[10630]
	23	73	159	243	324	404	483	561	637	710	781	854	925	995	1064	1132	1200
		64	64	63	61	60	58	57	57	59	60	60	59	58	57	56	55
	[8]	[606]	[1356]	[2105]	[2825]	[3545]	[4241]	[4943]	[5621]	[6274]	[6899]	[7522]	[8144]	[8768]	[9388]	[9998]	[10598]
	30	68	153	238	319	400	479	558	635	708	779	849	919	990	1060	1129	1196
		87	86	85	84	82	81	79	78	79	81	82	81	81	80	78	77
	[10]	[550]	[1295]	[2041]	[2765]	[3488]	[4188]	[4891]	[5585]	[6264]	[6899]	[7505]	[8091]	[8672]	[9283]	[9885]	[10488]
	38	62	146	230	312	394	473	552	631	707	779	847	913	979	1048	1116	1184
		109	108	107	106	104	103	100	98	97	98	100	103	103	103	102	101
	[12]	[478]	[1227]	[1976]	[2698]	[3411]	[4108]	[4802]	[5479]	[6146]	[6782]	[7396]	[7992]	[8585]	[9176]	[9767]	[10345]
	45	54	139	223	305	385	464	542	619	694	766	835	902	969	1036	1103	1168
		131	130	130	129	127	125	122	119	117	115	115	119	123	125	125	124
	[14]	[409]	[1151]	[1896]	[2624]	[3344]	[4048]	[4742]	[5418]	[6083]	[6722]	[7339]	[7939]	[8541]	[9142]	[9738]	[10318]
	53	46	130	214	296	378	457	535	612	687	759	829	896	964	1032	1099	1165
		153	153	152	152	149	147	145	142	140	139	139	143	147	148	147	147
	[16]	[339]	[1033]	[1774]	[2494]	[3209]	[3907]	[4605]	[5280]	[5956]	[6610]	[7243]	[7850]	[8438]	[9014]	[9592]	[10166]
	61	38	117	200	282	362	441	520	596	672	746	818	886	953	1018	1083	1148
		174	174	174	174	172	169	166	164	162	159	159	160	165	168	170	170
	[18]	[245]	[943]	[1676]	[2401]	[3113]	[3809]	[4500]	[5175]	[5837]	[6477]	[7107]	[7711]	[8308]	[8895]	[9466]	[10040]
	68	28	106	189	271	351	430	508	584	659	731	802	871	938	1004	1069	1133
		196	196	196	195	193	192	189	187	185	183	181	182	185	188	192	193
	[20]	[143]	[832]	[1571]	[2290]	[3003]	[3697]	[4386]	[5050]	[5715]	[6351]	[6968]	[7569]	[8147]	[8721]	[9297]	[9855]
	76	16	94	177	259	339	417	495	570	645	717	787	855	920	985	1050	1113
		218	218	218	218	216	214	212	209	207	205	203	203	205	210	214	215
	[22]	[34]	[715]	[1454]	[2175]	[2896]	[3594]	[4280]	[4950]	[5602]	[6236]	[6854]	[7449]	[8027]	[8590]	[9150]	[9705]
	83	4	81	164	246	327	406	483	559	632	704	774	841	906	970	1033	1096
		240	240	240	240	240	238	236	233	230	228	226	226	228	231	237	240
	[25]		[523]	[1251]	[1969]	[2693]	[3395]	[4081]	[4756]	[5414]	[6057]	[6687]	[7296]	[7882]	[8457]	[9011]	[9534]
	95		59	141	222	304	383	461	537	611	684	755	824	890	955	1017	1076
			272	272	272	272	272	269	266	263	261	259	259	261	265	270	272
	[30]		[152]	[1072]	[1749]	[2434]	[3123]	[3802]	[4468]	[5114]	[5763]	[6400]	[7018]	[7633]	[8232]	[8819]	[9397]
	114		17	121	197	275	353	429	504	577	651	723	792	862	929	996	1016
			327	327	327	327	327	323	319	315	314	313	315	319	323	327	327

152 } Torque [lb-in]
17 } Nm
327 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI]
395 cm³/r [24.1 in³/r]

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]	[224]	[241]
250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500

Flow LPM [GPM]	[2]	[782]	[1622]	[2436]	[3237]	[4034]	[4837]	[5650]	[6428]	[7213]	[7911]	[8607]	[9235]	[9798]	[10439]
	7.6	88	183	275	365	455	546	638	726	814	893	972	1043	1106	1179
		18	17	17	16	16	16	17	16	15	15	15	14	13	12
	[4]	[770]	[1643]	[2476]	[3287]	[4088]	[4860]	[5617]	[6357]	[7103]	[7838]	[8566]	[9285]	[9990]	[10684]
	15	87	186	280	371	462	549	634	718	802	885	967	1048	1128	1206
		38	37	36	35	33	33	35	36	36	35	35	34	34	33
	[6]	[746]	[1609]	[2460]	[3280]	[4083]	[4867]	[5644]	[6384]	[7103]	[7811]	[8520]	[9232]	[9930]	[10616]
	23	84	182	278	370	461	549	637	721	802	882	962	1042	1121	1199
		58	57	55	54	52	51	50	51	53	54	55	54	53	53
	[8]	[699]	[1561]	[2430]	[3249]	[4062]	[4852]	[5638]	[6398]	[7126]	[7820]	[8506]	[9198]	[9884]	[10565]
	30	79	176	274	367	459	548	637	722	805	883	960	1038	1116	1193
		77	76	75	74	72	70	68	67	69	72	74	74	74	73
	[10]	[630]	[1489]	[2345]	[3180]	[4008]	[4819]	[5622]	[6397]	[7142]	[7856]	[8525]	[9142]	[9776]	[10438]
	38	71	168	265	359	453	544	635	722	806	887	962	1032	1104	1178
		96	96	95	93	91	90	87	85	83	83	88	93	93	93
	[12]	[556]	[1412]	[2264]	[3090]	[3898]	[4689]	[5473]	[6225]	[6976]	[7710]	[8415]	[9081]	[9681]	[10304]
	45	63	159	256	349	440	529	618	703	788	870	950	1025	1093	1163
		115	115	115	113	111	109	107	105	102	100	100	105	110	113
	[14]	[469]	[1325]	[2178]	[2999]	[3819]	[4611]	[5391]	[6137]	[6867]	[7581]	[8270]	[8942]	[9598]	[10234]
	53	53	150	246	339	431	521	609	693	775	856	934	1010	1084	1155
		134	134	134	133	131	128	126	124	122	120	119	123	133	134
	[16]	[360]	[1220]	[2069]	[2894]	[3715]	[4506]	[5290]	[6048]	[6782]	[7495]	[8190]	[8873]	[9534]	[10181]
	61	41	138	234	327	419	509	597	683	766	846	925	1002	1076	1149
		153	153	153	153	151	148	145	143	140	138	138	139	145	151
	[18]	[334]	[1098]	[1951]	[2777]	[3591]	[4386]	[5172]	[5924]	[6665]	[7387]	[8087]	[8763]	[9418]	[10048]
	68	38	124	220	314	405	495	584	669	752	834	913	989	1063	1134
		173	173	173	173	171	169	166	162	161	159	157	158	162	169
	[20]	[221]	[993]	[1837]	[2660]	[3479]	[4259]	[5030]	[5780]	[6518]	[7238]	[7939]	[8613]	[9258]	[9892]
	76	25	112	207	300	393	481	568	653	736	817	896	972	1045	1117
		192	192	192	192	191	189	186	183	181	179	177	178	182	188
	[22]	[115]	[862]	[1698]	[2521]	[3337]	[4135]	[4895]	[5641]	[6366]	[7067]	[7752]	[8414]	[9062]	[9702]
	83	13	97	192	285	377	467	553	637	719	798	875	950	1023	1095
		211	211	211	211	211	209	206	203	201	200	199	200	204	209
	[25]		[637]	[1473]	[2296]	[3117]	[3909]	[4687]	[5434]	[6163]	[6861]	[7536]	[8192]	[8829]	[9475]
	95		72	166	259	352	441	529	613	696	775	851	925	997	1070
			240	240	240	240	238	235	232	229	227	227	228	233	240
	[30]		[211]	[1079]	[1903]	[2725]	[3526]	[4311]	[5079]	[5824]	[6547]	[7240]	[7921]	[8577]	[9228]
	114		24	122	215	308	398	487	573	658	739	817	894	968	1042
			288	288	288	288	286	283	280	277	274	273	275	280	287

Delta 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

Δ Pressure bar [PSI]
470 cm³/r [28.7 in³/r]

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]	[190]	[207]
250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000

Flow LPM [GPM]	[2]	[925]	[1885]	[2820]	[3727]	[4639]	[5526]	[6404]	[7270]	[8129]	[8978]	[9794]	[10551]
	7.6	104	213	318	421	524	624	723	821	918	1014	1106	1191
		14	14	13	12	12	12	11	10	9	9	8	7
	[4]	[942]	[1942]	[2917]	[3849]	[4776]	[5692]	[6594]	[7488]	[8352]	[9199]	[10014]	[10824]
	15	106	219	329	435	539	643	744	845	943	1039	1131	1222
		31	30	29	29	28	27	27	26	25	24	23	23
	[6]	[906]	[1921]	[2892]	[3833]	[4772]	[5676]	[6572]	[7440]	[8309]	[9152]	[9974]	[10786]
	23	102	217	327	433	539	641	742	840	938	1033	1126	1218
		47	46	45	45	44	43	43	42	42	41	41	40
	[8]	[856]	[1866]	[2853]	[3795]	[4730]	[5634]	[6520]	[7379]	[8230]	[9075]	[9895]	[10693]
	30	97	211	322	428	534	636	736	833	929	1025	1117	1207
		63	62	62	61	60	58	57	57	58	58	57	56
	[10]	[780]	[1799]	[2800]	[3745]	[4685]	[5594]	[6479]	[7337]	[8177]	[9009]	[9843]	[10638]
	38	88	203	316	423	529	632	731	828	923	1017	1111	1201
		79	79	78	77	76	75	74	72	72	74	74	74
	[12]	[699]	[1709]	[2711]	[3661]	[4597]	[5508]	[6403]	[7258]	[8101]	[8916]	[9719]	[10506]
	45	79	193	306	413	519	622	723	819	915	1007	1097	1186
		96	95	94	93	92	91	90	89	89	90	90	91
	[14]	[596]	[1612]	[2609]	[3561]	[4490]	[5390]	[6268]	[7112]	[7941]	[8743]	[9519]	[10282]
	53	67	182	295	402	507	608	708	803	897	987	1075	1161
		112	111	111	110	109	107	106	104	103	101	102	104
	[16]	[467]	[1486]	[2480]	[3440]	[4371]	[5268]	[6152]	[6992]	[7810]	[8601]	[9370]	[10118]
	61	53	168	280	388	493	595	695	789	882	971	1058	1142
		129	128	127	126	125	123	122	120	119	117	116	116
	[18]	[332]	[1353]	[2357]	[3317]	[4256]	[5157]	[6043]	[6892]	[7713]	[8501]	[9270]	[10026]
	68	37	153	266	375	481	582	682	778	871	960	1047	1132
		145	145	144	143	142	140	138	136	135	134	132	133
	[20]	[304]	[1226]	[2218]	[3172]	[4102]	[4994]	[5873]	[6731]	[7557]	[8365]	[9147]	[9922]
	76	34	138	250	358	463	564	663	760	853	944	1033	1120
		161	161	160	159	158	157	155	153	152	150	149	150
	[22]	[137]	[1059]	[2048]	[3004]	[3945]	[4840]	[5727]	[6576]	[7399]	[8198]	[8967]	[9715]
	83	15	120	231	339	445	546	647	742	835	926	1012	1097
		177	177	177	176	175	174	172	170	169	167	166	166
	[25]		[833]	[1816]	[2765]	[3680]	[4575]	[5455]	[6313]	[7133]	[7928]	[8691]	[9436]
	95		94	205	312	415	517	616	713	805	895	981	1065
			201	201	201	200	198	196	194	193	191	191	192
	[30]		[491]	[1318]	[2295]	[3232]	[4142]	[5022]	[5881]	[6721]	[7522]	[8300]	[9320]
	114		55	149	259	365	468	567	664	759	849	937	1052
			241	241	241	241	240	237	236	236	233	232	227

491 } Torque [lb-in]
55 } Nm
241 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
542 cm³/r [33.1 in³/r]**

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]	[172]
250	500	750	1000	1250	1500	1750	2000	2250	2500

Flow LPM [GPM]	[2]	[1131]	[2304]	[3433]	[4558]	[5668]	[6725]	[7732]	[8683]	[9645]	[10457]
	76	128	260	388	515	640	759	873	980	1089	1181
		13	12	11	11	11	11	10	8	8	7
	[4]	[1139]	[2352]	[3515]	[4638]	[5735]	[6781]	[7819]	[8809]	[9752]	[10644]
	15	129	266	397	524	648	766	883	994	1101	1202
		27	26	25	25	25	25	24	23	23	22
	[6]	[1063]	[2267]	[3433]	[4549]	[5645]	[6694]	[7697]	[8675]	[9630]	[10557]
	23	120	256	388	514	637	756	869	979	1087	1192
		41	40	39	38	38	38	39	38	37	36
	[8]	[992]	[2186]	[3354]	[4475]	[5578]	[6646]	[7665]	[8608]	[9535]	[10449]
	30	112	247	379	505	630	750	865	972	1076	1180
		56	55	54	53	52	52	51	52	52	51
	[10]	[897]	[2090]	[3259]	[4378]	[5482]	[6555]	[7602]	[8578]	[9482]	[10343]
	38	101	236	368	494	619	740	858	968	1071	1168
		70	69	68	67	67	65	64	64	64	65
	[12]	[807]	[1980]	[3138]	[4256]	[5365]	[6440]	[7494]	[8481]	[9403]	[10275]
	45	91	224	354	481	606	727	846	957	1062	1160
		84	83	83	81	80	79	78	77	76	77
	[14]	[693]	[1873]	[3028]	[4138]	[5218]	[6268]	[7318]	[8304]	[9235]	[10105]
	53	78	211	342	467	589	708	826	937	1043	1141
		98	98	97	96	95	93	91	90	91	92
	[16]	[554]	[1732]	[2882]	[3993]	[5083]	[6107]	[7118]	[8089]	[9032]	[9928]
	61	63	196	325	451	574	689	804	913	1020	1121
		112	112	111	110	109	108	106	104	104	106
	[18]	[409]	[1582]	[2738]	[3844]	[4924]	[5952]	[6956]	[7928]	[8874]	[9772]
	68	46	179	309	434	556	672	785	895	1002	1103
		126	126	126	125	124	123	121	119	119	121
	[20]	[355]	[1428]	[2587]	[3696]	[4767]	[5804]	[6813]	[7786]	[8732]	[9624]
	76	40	161	292	417	538	655	769	879	986	1087
		140	140	140	139	138	137	136	134	134	135
	[22]	[310]	[1259]	[2412]	[3518]	[4595]	[5619]	[6618]	[7589]	[8536]	[9438]
	83	35	142	272	397	519	634	747	857	964	1065
		154	154	154	154	152	151	150	148	148	149
	[25]		[958]	[2107]	[3215]	[4281]	[5310]	[6305]	[7264]	[8204]	[9110]
	95		108	238	363	483	599	712	820	926	1029
			174	174	174	174	173	171	170	168	169
	[30]		[521]	[1599]	[2696]	[3769]	[4804]	[5809]	[6776]	[7705]	[8617]
	114		59	181	304	425	542	656	765	870	973
			209	209	209	209	208	207	207	205	205

Delta 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 649 cm³/r [39.6 in³/r]

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]	[155]
250	500	750	1000	1250	1500	1750	2000	2250

Flow LPM [GPM]	[2]	[1365]	[2787]	[4156]	[5488]	[6775]	[7949]	[9102]	[10174]	[11100]
	7.6	154	315	469	620	765	897	1028	1149	1253
		10	10	10	9	9	8	7	6	3
	[4]	[1326]	[2770]	[4113]	[5400]	[6632]	[7819]	[8973]	[10030]	[11015]
	15	150	313	464	610	749	883	1013	1132	1244
		22	22	21	20	21	20	19	19	18
	[6]	[1258]	[2663]	[3998]	[5270]	[6521]	[7692]	[8774]	[9808]	[10809]
	23	142	301	451	595	736	868	991	1107	1220
		35	34	33	32	32	32	32	32	31
	[8]	[1154]	[2558]	[3902]	[5195]	[6455]	[7659]	[8775]	[9770]	[10708]
	30	130	289	441	587	729	865	991	1103	1209
		47	46	45	44	42	42	42	43	43
	[10]	[1045]	[2442]	[3787]	[5076]	[6331]	[7541]	[8691]	[9685]	[10573]
	38	118	276	428	573	715	851	981	1093	1194
		58	58	57	56	55	53	53	54	55
	[12]	[928]	[2321]	[3662]	[4939]	[6193]	[7385]	[8536]	[9577]	[10469]
	45	105	262	413	558	699	834	964	1081	1182
		70	70	70	68	67	66	65	65	66
	[14]	[740]	[2127]	[3469]	[4746]	[5989]	[7188]	[8352]	[9433]	[10439]
	53	84	240	392	536	676	812	943	1065	1179
		82	82	82	81	80	79	77	76	76
	[16]	[614]	[1990]	[3318]	[4588]	[5795]	[6942]	[8081]	[9154]	[10141]
	61	69	225	375	518	654	784	912	1033	1145
		93	93	93	93	92	91	90	89	90
	[18]	[448]	[1830]	[3158]	[4414]	[5619]	[6754]	[7853]	[8890]	[9873]
	68	51	207	356	498	634	763	887	1004	1115
		105	105	105	105	104	103	102	102	104
	[20]	[281]	[1618]	[2944]	[4198]	[5410]	[6551]	[7653]	[8689]	[9676]
	76	32	183	332	474	611	740	864	981	1092
		117	117	117	117	117	116	114	114	115
	[22]	[276]	[1518]	[2842]	[4099]	[5313]	[6453]	[7554]	[8596]	[9576]
	83	31	171	321	463	600	728	853	970	1081
		128	128	128	128	128	128	126	125	126
	[25]		[1079]	[2393]	[3646]	[4834]	[5969]	[7071]	[8112]	[9105]
	95		122	270	412	546	674	798	916	1028
			146	146	146	146	146	145	144	144
	[30]		[436]	[1747]	[3013]	[4225]	[5356]	[6454]	[7489]	[8479]
	114		49	197	340	477	605	729	845	957
			175	175	175	175	175	174	174	175

8479 } Torque [lb-in]
957 } Nm
175 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
754cm³/r [46.0 in³/r]**

[17]	[34]	[52]	[69]	[86]	[103]	[121]	[138]
250	500	750	1000	1250	1500	1750	2000

Flow LPM [GPM]

[2]	[1561]	[3128]	[4605]	[6014]	[7422]	[8721]	[9978]	[10910]
7.6	176	353	520	679	838	985	1127	1232
	9	8	8	8	7	7	6	5
[4]	[1548]	[3142]	[4650]	[6029]	[7350]	[8605]	[9785]	[10892]
15	175	355	525	681	830	971	1105	1230
	19	18	18	18	18	18	17	17
[6]	[1470]	[3084]	[4608]	[6022]	[7346]	[8555]	[9722]	[10850]
23	166	348	520	680	829	966	1098	1225
	30	29	28	27	27	27	27	27
[8]	[1359]	[2975]	[4504]	[5925]	[7263]	[8488]	[9638]	[10694]
30	153	336	509	669	820	958	1088	1207
	40	39	38	38	37	36	37	38
[10]	[1240]	[2844]	[4364]	[5815]	[7185]	[8458]	[9603]	[10584]
38	140	321	493	656	811	955	1084	1195
	50	50	49	48	47	46	46	47
[12]	[1079]	[2686]	[4207]	[5641]	[7008]	[8248]	[9390]	[10400]
45	122	303	475	637	791	931	1060	1174
	60	60	60	59	58	57	57	57
[14]	[932]	[2512]	[4038]	[5477]	[6850]	[8124]	[9274]	[10286]
53	105	284	456	618	773	917	1047	1161
	70	70	70	70	69	68	67	67
[16]	[753]	[2328]	[3834]	[5246]	[6577]	[7831]	[8999]	[10040]
61	85	263	433	592	742	884	1016	1133
	80	80	80	80	80	79	78	78
[18]	[547]	[2119]	[3632]	[5024]	[6320]	[7551]	[8706]	[9721]
68	62	239	410	567	714	852	983	1097
	90	90	90	90	90	90	90	90
[20]	[310]	[1919]	[3430]	[4826]	[6126]	[7339]	[8466]	[9430]
76	35	217	387	545	692	829	956	1065
	100	100	100	100	100	100	100	100
[22]	[248]	[1666]	[3172]	[4571]	[5878]	[7102]	[8254]	[9269]
83	28	188	358	516	664	802	932	1046
	110	110	110	110	110	110	110	110
[25]		[1261]	[2784]	[4191]	[5504]	[6727]	[7873]	[8911]
95		142	314	473	621	759	889	1006
		126	126	126	126	126	126	126
[30]		[545]	[2055]	[3474]	[4800]	[6036]	[7175]	[8231]
114		62	232	392	542	681	810	929
		151	151	151	151	151	151	151

C-3

Delta Series

Dimensions

Wheel mount

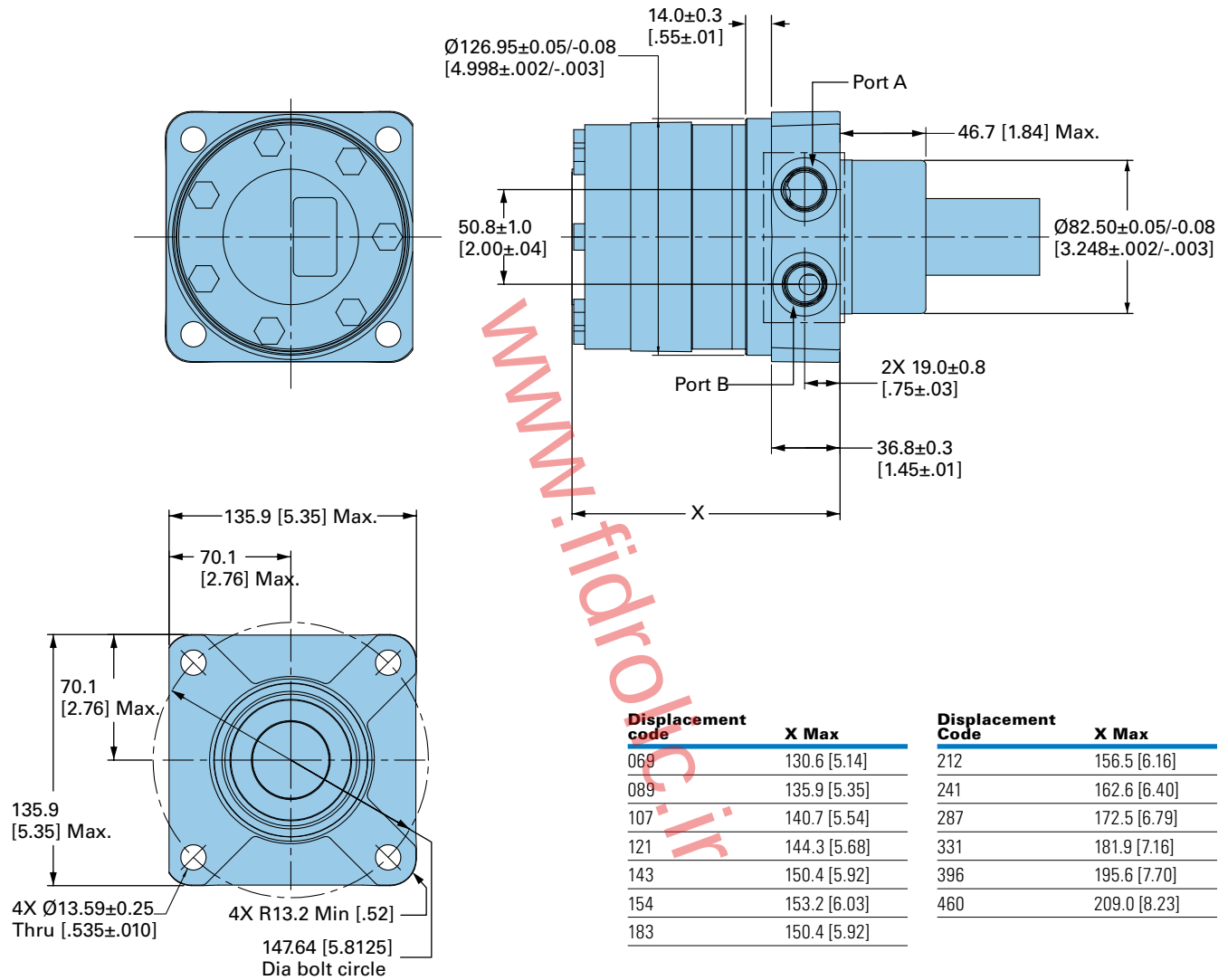
Ports

7/8 -14 UNF-2B SAE O-ring ports
G 1/2 (BSP) ports

Standard rotation viewed from shaft end

Port A pressurized — CCW
Port B pressurized — CW

C-3



Standard mount

Ports

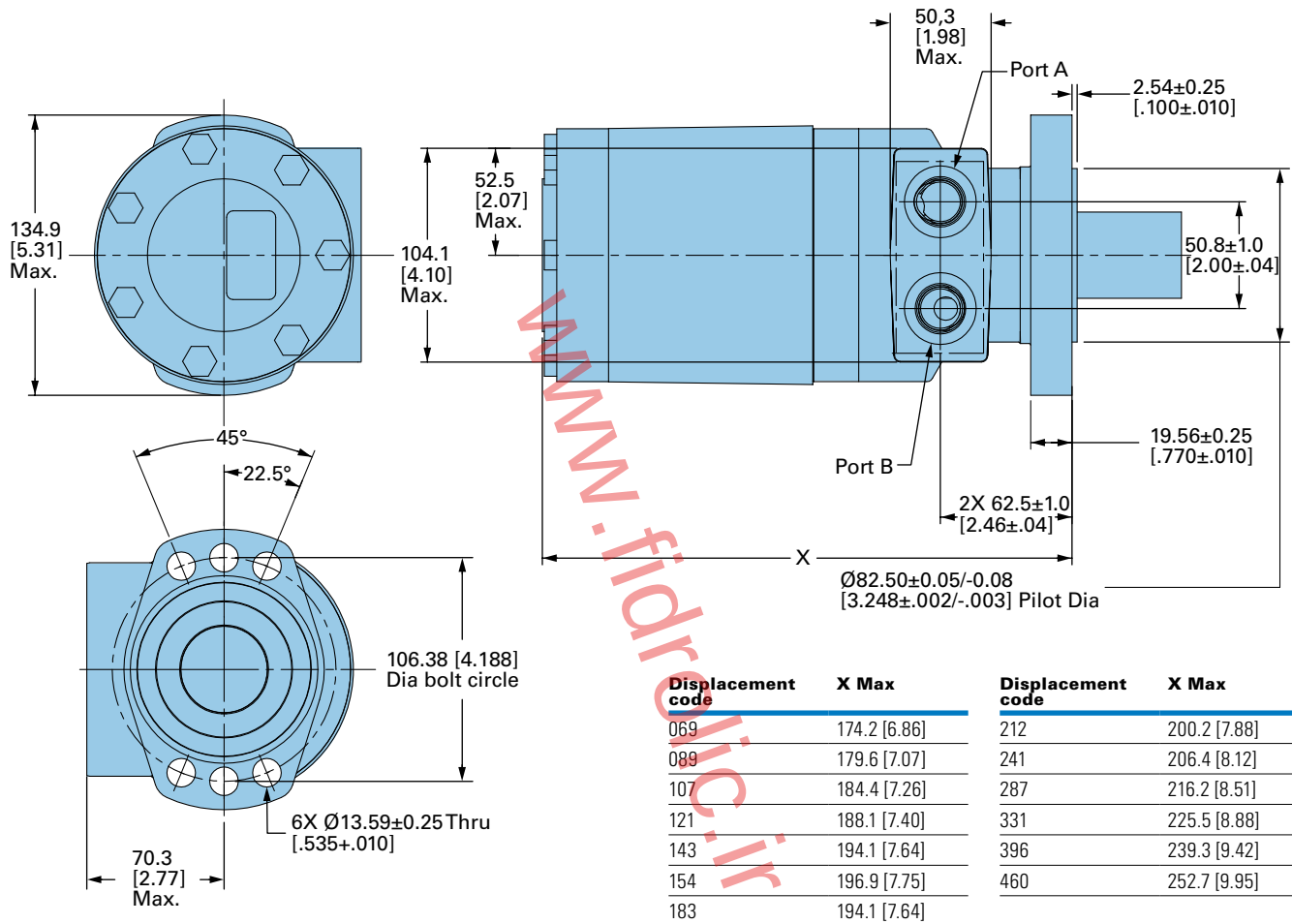
Code: AA 7/8-14 UNF-2B SAE O-ring ports

Code: AC G 1/2 (BSP) ports

Standard rotation viewed from shaft end

Port A pressurized — CCW

Port B pressurized — CW



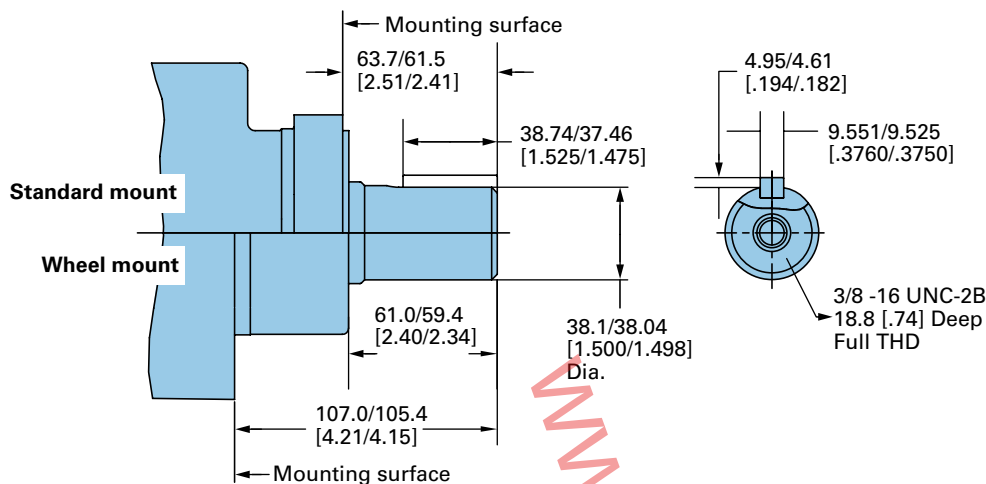
C-3

Delta Series

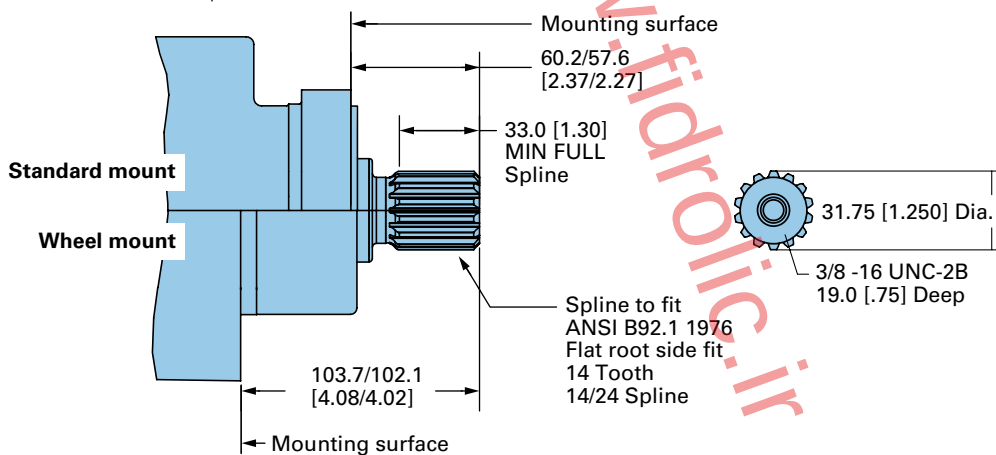
Dimensions

Shafts

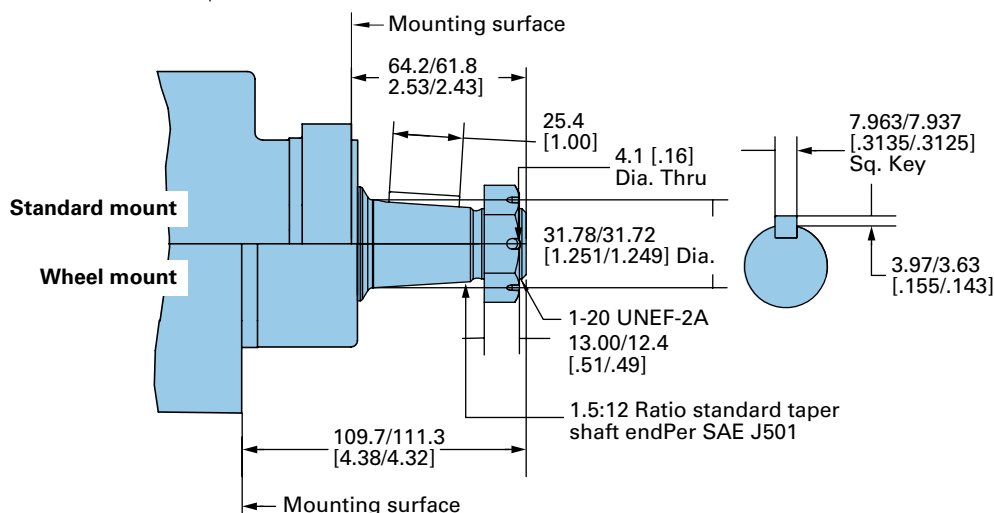
Code: 01 1 ½ Inch straight
972[8600] Max. Torque Nm [lb-in]



Code: 04 1 ¼ Inch 14 Tooth splined
768[6800] Max. Torque Nm [lb-in]



Code: 02 1 ¼ Inch tapered
768[6800] Max. Torque Nm [lb-in]

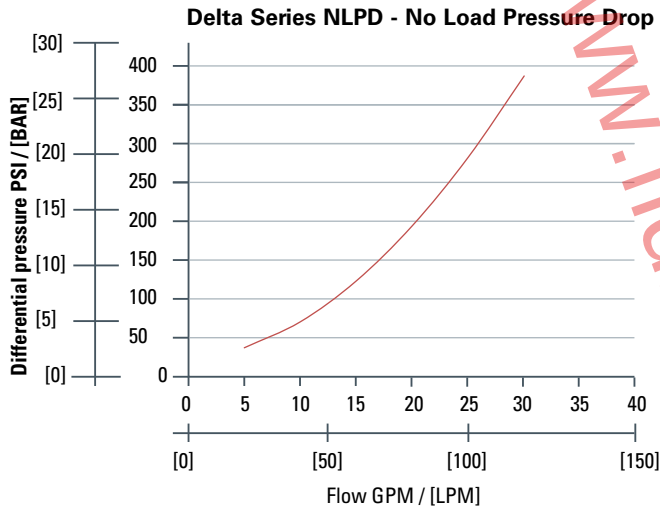


These curves indicate the radial load capacity on the motor shaft(s) at various locations.

Each curve is based on B10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

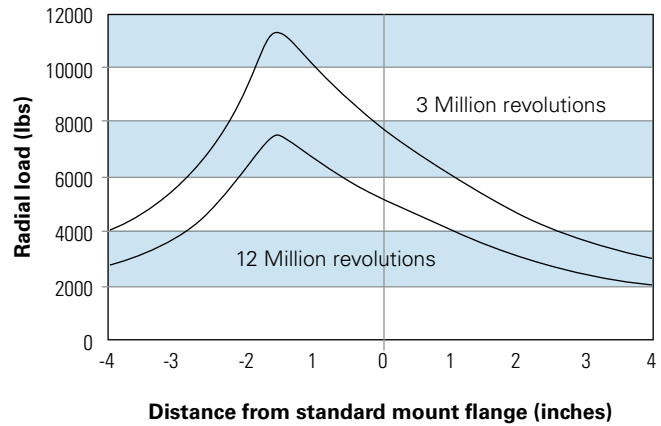
To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

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



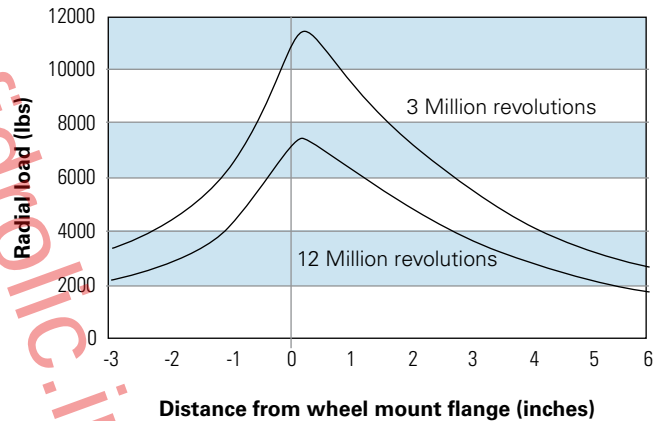
Side load chart for standard mount

Allowable radial load, Delta Motor
L₁₀ Bearing life per ISO 281



Side load chart for wheel mount

Allowable radial load, delta motor
L₁₀ Bearing Life per ISO 281



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Delta Series

Product numbers

Note: For Delta Series Motors with a configuration **not shown** in the charts below contact your Eaton representative.

Mounting	Shaft	Port size	Time	Displacement cm³/r [in³/r] / Product number			
Wheel motor				113 [6.9]	146 [8.9]	198 [12.1]	234 [14.3]
	1-1/4 Inch Tapered	7/8" O-ring	Standard -CCW	184-0005-002	184-0006-002	184-0002-002	184-0001-002
			Standard -CW	184-0025-002	184-0026-002	184-0027-002	184-0028-002
	1-1/2 Inch 17 T Splined	7/8" O-ring	Standard -CCW	184-0013-002	184-0014-002	184-0015-002	184-0016-002
			Standard -CW	184-0037-002	184-0038-002	184-0039-002	184-0040-002
				252 [15.4]	300 [18.3]	347 [21.2]	395 [24.1]
	1-1/4 Inch Tapered	7/8" O-ring	Standard -CCW	184-0003-002	184-0004-002	184-0007-002	184-0008-002
			Standard -CW	184-0029-002	184-0030-002	184-0031-002	184-0032-002
	1-1/2 Inch 17 T Splined	7/8" O-ring	Standard -CCW	184-0017-002	184-0018-002	184-0019-002	184-0020-002
			Standard -CW	184-0041-002	184-0042-002	184-0043-002	184-0044-002
				470 [28.7]	542 [33.1]	649 [39.6]	649 [46.0]
	1-1/4 Inch Tapered	7/8" O-ring	Standard -CCW	184-0009-002	184-0010-002	184-0011-002	184-0012-002
			Standard -CW	184-0033-002	184-0034-002	184-0035-002	184-0036-002
	1-1/2 Inch 17 T Splined	7/8" O-ring	Standard -CCW	184-0021-002	184-0022-002	184-0023-002	184-0024-002
Standard -CW			184-0045-002	184-0046-002	184-0047-002	184-0048-002	

C-3

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.

M	D L	***	**	**	**	0	*	*	**	0 0	**	**	0 0	B
1	2 3	4 5 6	7 8	9 10	11 12	13	14	15	16 17	18 19	20 21	22 23	24 25	26

1	Product M Motor	11 12	Ports AA .875-14 UNF-2B SAE O-Ring AC G 1/2 BSP Straight Thread
2 3	Series DL Delta Series	13	Pressure/flow option 0 None
4 5 6	Displacement cm³/r [in³/r] 069 113 [6.9] 089 146 [8.9] 107 176 [10.7] 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]	14	Geroler option 0 Standard B Tight fitting Geroler C Reduced Noise* *Option C required on all displacements higher than 20 CID
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	15	Seal option 0 Standard 1 Viton 4 Seal guard 5 Viton with seal guard A Extreme duty seal guard
9 10	Output shaft 01 38.10 [1.500] Dia. Straight with .375-16 UNC-2B Thread, and 9.52 [.375] Sq x 38.10 [1.500] 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 1.000-20 UNEF-2A thread in end, 7.938 [.3125] Sq x 31.75 [1.250] Key	16 17	Accessories 00 None 01 Spring applied pressure release brake
		18 19	Special features (hardware) 00 None
		20 21	Special features (assembly) 00 Standard rotation - CCW 01 Reverse rotation - CW
		22 23	Paint/packaging AA No paint, individual box AB Low gloss black primer, individual box AS Epoxy coated black, individual box AE No paint, bulk box AF Low gloss black primer, bulk box
		24 25	Customer identification 00 None
		26	Design code B Two

See Eatonpowersource.com/ for more options and configurations.

Delta Series with Parking Brake

Highlights

Description

Eaton's offering in LSHT motor technology is the Delta series motor with parking brake. It utilizes brake pads that rotate at 6 times the speed of the output shaft, thereby giving the brake a 6-to-1 mechanical advantage. It has the same Geroler, and disc valve technologies as the standard Char-Lynn motors. In addition to providing dependable load-holding capability, Delta series motor with parking brake provides the same smooth, reliable operation, with similar performance, as the Delta series motor.

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.

Features:

- Integrated, Compact, Patented Design
- Rear-mounted intergrated brake with 6:1 torque advantage
- Access port for manual brake release (for over-riding brake in the event of loss of release pressure)
- Available on all Delta series displacements

Benefits:

- Cost-effective packaged solution simplifies ordering and inventory requirements
- Reduces assembly labor
- Design flexibility
- Wet brake is enviornmentally protected and provides long life

Specifications

Geroler elements	12 Displacements
Brake torque*	Min. to hold intermittent torque of motor
Release Pressure-bar[psi]	Min. 10 [150] Max. 69 [1000]

*Max brake torque is higher than motor intermittent torque rating / shaft torque rating. Make sure unit is not loaded beyond shaft torque rating.

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Wheel Mount

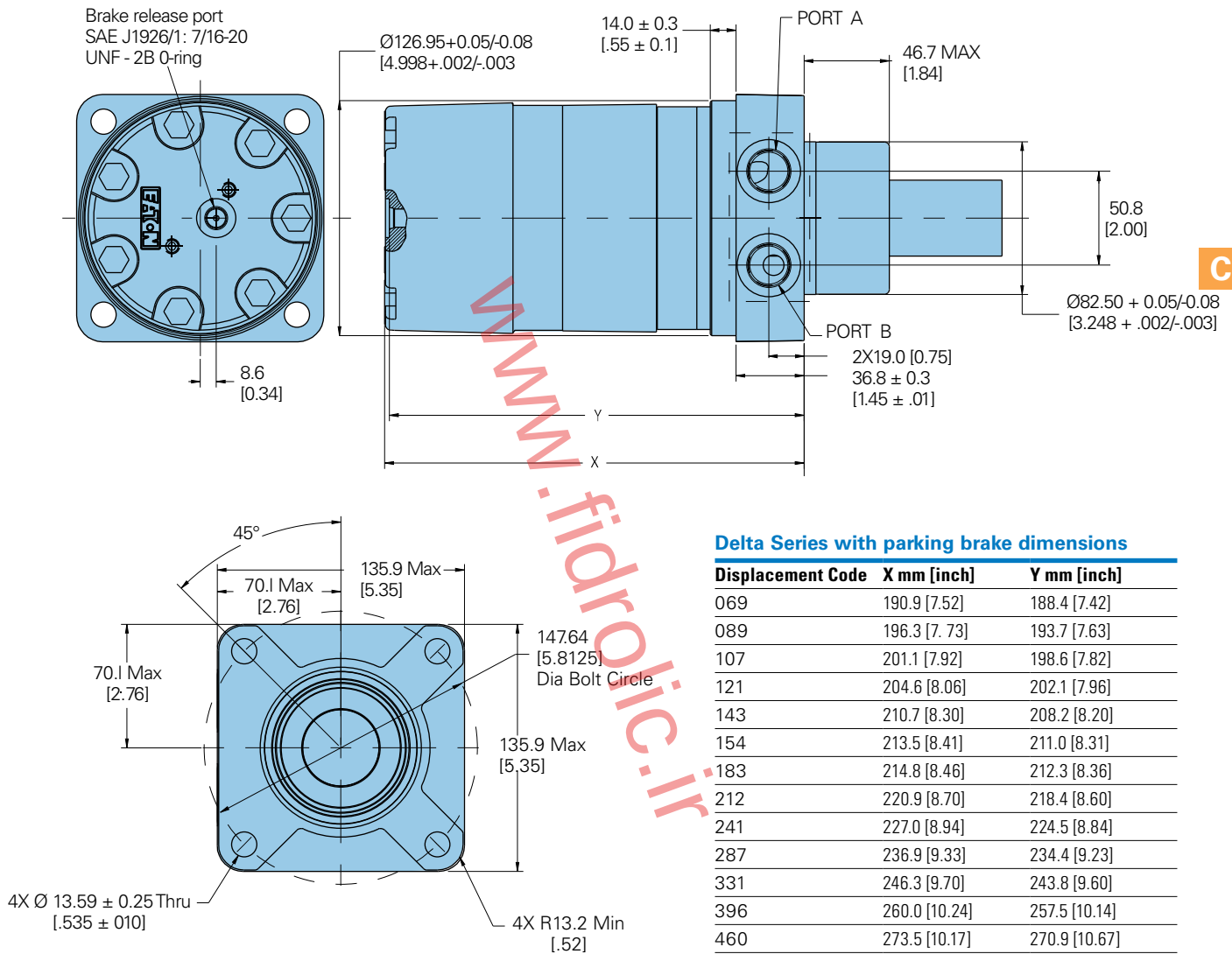
Ports

Code: AA 7/8-14 UNF-2B SAE O-ring ports**Code: AC** G 1/2 (BSP) ports

Standard Rotation Viewed from Shaft End

Port A Pressurized - CCW

Port B Pressurized - CW



C-3

Description:

The 4000 Series share the same architecture of the industry leading 2000 Series motor, but has a larger frame size for higher torques and flows. The 4000 Series offers up to 8600 in-lb of torque and 25 gpm (continuous ratings).

**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

C-4

4000 Series motors

Geroler element	10 Displacements
Flow l/min [GPM]	95 [25] Continuous** 151 [40] Intermittent*
Speed RPM	722 Cont.** 868 Inter.*
Pressure bar [PSI]	207 [3000] Cont.** 310 [4500] Inter.*
Torque Nm [lb-in]	972 [8600] Cont.** 1181 [10450] Inter.*

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

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



Mower



Snow removal



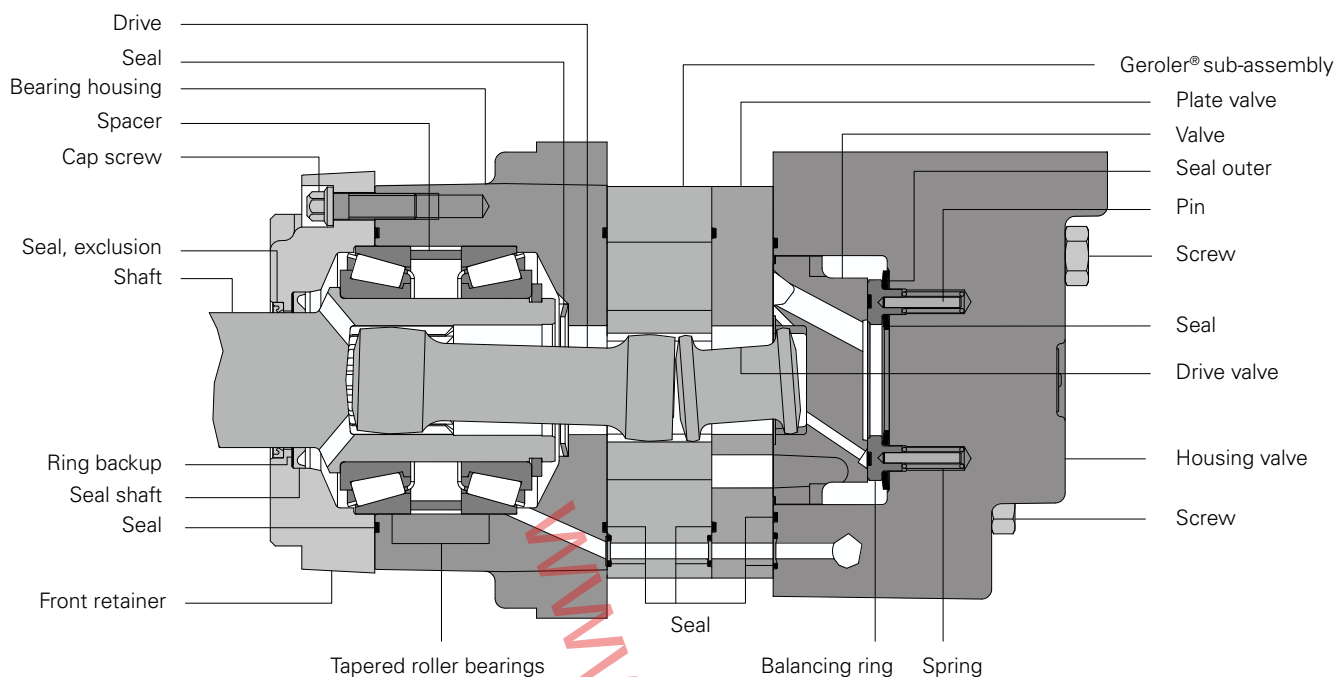
Paving equipment



Trencher

4000 Series

Specifications



C-4

4000 series motors

Displ. cm³/r [in³/rev]		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) @ Flow	Continuous	626	722	582	459	383	336	303	239	191	151
	Intermittent	697	862	693	546	532	468	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	322 [2850]	376 [3330]	485 [4290]	599 [5300]	705 [6240]	753 [6666]	851 [7530]	931 [8240]	946 [8375]	972 [8605]
	Intermittent	470 [4160]	558 [4940]	705 [6240]	802 [7100]	844 [7470]	957 [8471]	1064 [9420]	1183 [10470]	1169 [10350]	1181 [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]	310 [4500]	260 [3750]	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]	14.1 [31.0]	14.3 [31.5]	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 in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

Maximum inlet pressure:

310 bars (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 13 cSt [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: 20/18/13

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (expect when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

**Δ Pressure bar [PSI]
110 cm³/r [6.7 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	[0.5]	[150]	[390]	[850]	[1290]														
	2	15	45	95	145														
		14	10	5	2														
	[2]	[170]	[440]	[900]	[1380]	[1860]	[2270]	[2680]	[3110]										
	8	20	50	100	155	210	255	305	350										
		34	33	31	28	25	22	18	11										
	[4]	[180]	[450]	[910]	[1390]	[1860]	[2280]	[2700]	[3120]	[3450]									
	15	20	50	105	155	210	260	305	355	390									
		68	67	62	56	50	44	36	28	18									
	[6]	[190]	[460]	[940]	[1400]	[1870]	[2310]	[2730]	[3140]	[3560]	[3880]								
	23	20	50	105	160	210	260	310	355	400	440								
		138	136	123	110	97	84	70	56	42	28								
	[8]	[200]	[470]	[960]	[1420]	[1880]	[2320]	[2760]	[3200]	[3640]	[3950]								
	30	25	55	110	160	210	260	310	360	410	445								
		207	204	200	193	184	174	163	150	136	121								
	[10]	[190]	[460]	[950]	[1420]	[1880]	[2340]	[2790]	[3230]	[3670]	[4010]								
	38	20	50	105	160	210	265	315	365	415	445								
		277	274	270	262	253	241	228	213	196	179								
	[12]	[180]	[460]	[950]	[1420]	[1890]	[2350]	[2820]	[3260]	[3700]	[4070]								
	45	20	50	105	160	215	265	320	370	420	460								
		347	344	340	331	322	308	292	274	255	236								
	[14]	[160]	[450]	[940]	[1420]	[1880]	[2350]	[2820]	[3260]	[3710]	[4080]								
	53	20	50	105	160	210	265	320	370	420	460								
		417	414	410	400	390	374	355	335	313	292								
	[16]	[140]	[440]	[930]	[1420]	[1880]	[2350]	[2830]	[3280]	[3730]	[4110]								
	61	15	50	105	160	210	265	320	370	420	465								
		487	484	480	469	458	440	419	416	410	348								
	[18]	[130]	[440]	[920]	[1410]	[1870]	[2350]	[2840]	[3300]	[3750]	[4120]								
	68	15	50	105	160	210	265	320	375	425	465								
		556	553	549	537	525	505	482	455	428	404								
	[20]	[100]	[440]	[910]	[1400]	[1870]	[2350]	[2840]	[3300]	[3770]	[4140]								
	76	10	50	105	160	210	265	320	375	425	465								
		626	622	618	606	593	570	545	516	485	460								
	[25]	[80]	[430]	[900]	[1370]	[1860]	[2350]	[2850]	[3320]	[3790]	[4160]								
	95	10	50	100	155	210	265	320	375	430	470								
		697	694	690	677	664	638	611	579	545	518								

[430]
50 } Torque [lb-in]
Nm
694 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
130 cm³/r [7.9 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	[0.5]	[310]	[510]	[1060]	[1590]													
	2	35	60	120	180													
		12	9	5	2													
	[1]	[290]	[530]	[1080]	[1600]	[2110]	[2640]	[3060]	[3450]									
	4	35	60	120	180	240	300	345	390									
		30	28	25	19	14	13	12	4									
	[2]	[280]	[530]	[1100]	[1620]	[2140]	[2660]	[3180]	[3600]	[4020]	[4080]							
	8	30	60	125	185	240	300	360	405	455	460							
		57	56	53	47	42	40	38	29	20	12							
	[4]	[260]	[520]	[1100]	[1650]	[2200]	[2700]	[3210]	[3660]	[4100]	[4560]							
	15	30	60	125	185	250	305	365	415	465	515							
		116	114	111	105	100	95	90	70	50	37							
	[6]	[240]	[510]	[1100]	[1650]	[2200]	[2720]	[3240]	[3710]	[4180]	[4660]							
	23	25	60	125	185	250	305	365	420	470	525							
		173	170	167	161	156	149	142	123	104	91							
	[8]	[230]	[510]	[1080]	[1640]	[2210]	[2740]	[3270]	[3770]	[4270]	[4750]							
	30	25	60	120	185	250	310	370	425	480	535							
		228	225	222	216	210	202	194	176	158	145							
	[10]	[210]	[510]	[1080]	[1640]	[2210]	[2750]	[3300]	[3820]	[4350]	[4840]							
	38	25	60	120	185	250	310	375	430	490	545							
		283	285	278	272	266	256	246	229	212	189							
	[12]	[200]	[500]	[1070]	[1640]	[2220]	[2750]	[3300]	[3840]	[4370]	[4870]							
	45	25	55	120	185	250	310	375	435	495	550							
		341	338	335	329	323	312	300	282	263	237							
	[14]	[180]	[490]	[1060]	[1640]	[2220]	[2750]	[3310]	[3860]	[4390]	[4890]							
	53	20	55	120	185	250	310	375	435	495	550							
		400	396	392	386	380	368	355	335	311	286							
	[16]	[160]	[490]	[1050]	[1630]	[2220]	[2760]	[3310]	[3860]	[4400]	[4920]							
	61	20	55	120	185	250	310	375	435	495	555							
		457	453	449	443	437	424	410	388	366	335							
	[18]	[130]	[480]	[1050]	[1630]	[2220]	[2760]	[3320]	[3870]	[4420]	[4940]							
	68	15	55	120	185	250	310	375	435	500	560							
		516	511	506	500	494	480	465	442	418	384							
	[20]	[110]	[470]	[1040]	[1620]	[2210]	[2760]	[3330]	[3890]	[4440]								
	76	10	55	120	185	250	310	375	440	500								
		574	569	564	559	551	536	520	495	470								
	[22]	[70]	[450]	[1020]	[1610]	[2190]	[2750]	[3320]	[3880]	[4440]								
	83	10	50	115	180	245	310	375	440	500								
		633	628	624	615	606	590	573	547	520								
	[25]	[50]	[430]	[1000]	[1580]	[2160]	[2720]	[3300]	[3860]	[4430]								
	95	5	50	115	180	245	305	375	435	500								
		722	718	714	702	690	672	653	625	595								
	[30]		[400]	[940]	[1500]	[2080]	[2670]	[3200]	[3740]									
	114		45	105	170	235	300	360	425									
			862	855	842	827	806	783	749									

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

**Δ Pressure bar [PSI]
160 cm³/r [9.9 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

[0.5]	[300]	[680]	[1320]	[2050]	[2750]					
2	35	75	150	230	310					
	8	7	5	3	1					
[1]	[320]	[700]	[1350]	[2070]	[2780]	[3300]	[3940]	[4410]	[4950]	
4	35	80	155	235	315	375	445	500	560	
	23	22	20	19	18	16	15	8	2	
[2]	[330]	[700]	[1360]	[2080]	[2790]	[3340]	[3970]	[4530]	[5090]	[5590]
8	35	80	155	235	315	375	450	510	575	630
	46	45	41	40	37	32	29	27	25	13
[4]	[320]	[710]	[1400]	[2100]	[2820]	[3420]	[4020]	[4620]	[5220]	[5730]
15	35	80	160	240	320	385	455	520	590	645
	93	92	90	88	84	76	73	62	51	35
[6]	[300]	[710]	[1420]	[2140]	[2850]	[3510]	[4180]	[4760]	[5340]	[5870]
23	35	80	160	240	320	395	470	540	605	665
	137	135	134	131	126	120	114	90	75	57
[8]	[280]	[720]	[1450]	[2180]	[2900]	[3560]	[4230]	[4850]	[5470]	[6010]
30	30	80	165	245	330	400	480	550	620	680
	184	182	180	176	171	163	154	138	122	100
[10]	[260]	[720]	[1480]	[2220]	[2950]	[3610]	[4290]	[4920]	[5560]	[6160]
38	30	80	165	250	335	410	485	555	630	695
	232	229	226	221	216	206	194	182	169	142
[12]	[240]	[700]	[1450]	[2190]	[2920]	[3590]	[4280]	[4920]	[5570]	[6180]
45	25	80	165	245	330	405	485	555	630	700
	277	274	272	266	260	250	238	224	209	182
[14]	[220]	[680]	[1420]	[2160]	[2890]	[3570]	[4270]	[4920]	[5580]	[6200]
53	25	75	160	245	325	405	480	555	630	700
	321	319	318	311	304	294	282	266	249	222
[16]	[200]	[670]	[1400]	[2130]	[2860]	[3550]	[4260]	[4920]	[5590]	[6220]
61	25	75	160	240	325	400	480	555	630	705
	366	364	362	356	348	338	326	308	289	262
[18]	[180]	[650]	[1360]	[2100]	[2830]	[3530]	[4250]	[4910]	[5600]	[6240]
68	20	75	155	235	320	400	480	555	635	705
	410	409	407	401	392	382	370	350	329	302
[20]	[150]	[630]	[1340]	[2070]	[2800]	[3510]	[4240]	[4910]	[5610]	
76	15	70	150	235	315	395	480	555	635	
	460	458	456	448	440	429	417	396	373	
[22]	[120]	[620]	[1330]	[2060]	[2790]	[3500]	[4220]	[4910]	[5600]	
83	15	70	150	235	315	395	475	555	635	
	509	506	502	494	484	473	461	438	413	
[25]	[70]	[600]	[1320]	[2050]	[2780]	[3480]	[4210]	[4900]	[5590]	
95	10	70	150	230	315	395	475	555	630	
	582	578	573	563	552	540	526	501	474	
[30]		[560]	[1280]	[1990]	[2700]	[3430]	[3970]	[4640]		
114		65	145	225	305	390	450	525		
		693	687	675	661	647	630	600		

[1990] } Torque [lb-in]
225 } Nm
675 } Speed RPM

C-4

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
205 cm³/r [12.5 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	[0.5]	[400]	[810]	[1500]														
	2	45	90	170														
		8	5	1														
	[1]	[410]	[830]	[1590]	[2220]	[2860]	[3860]	[4560]	[5390]	[5510]								
	4	45	95	180	250	325	435	515	610	625								
		17	17	16	15	14	12	11	9	3								
	[2]	[420]	[850]	[1680]	[2410]	[3140]	[4060]	[4800]	[5420]	[6000]	[6210]							
	8	45	95	190	270	355	460	540	610	680	700							
		36	35	34	32	29	27	25	22	16	8							
	[4]	[430]	[870]	[1770]	[2590]	[3140]	[4260]	[5040]	[5730]	[6340]	[6740]							
	15	50	100	200	295	355	480	570	645	715	760							
		73	73	71	70	68	61	57	45	35	23							
	[6]	[430]	[880]	[1800]	[2620]	[3530]	[4370]	[5170]	[5900]	[6590]	[7100]							
	23	50	100	205	295	400	495	585	665	745	800							
		107	106	105	103	101	98	90	81	74	65							
	[8]	[410]	[870]	[1820]	[2660]	[3560]	[4410]	[5240]	[6020]	[6770]								
	30	45	100	205	300	400	500	590	680	765								
		144	143	142	138	136	132	125	116	109								
	[10]	[390]	[860]	[1820]	[2700]	[3580]	[4460]	[5300]	[6110]	[6890]								
	38	45	95	205	305	405	505	600	690	780								
		182	180	179	174	170	166	160	152	143								
	[12]	[350]	[850]	[1810]	[2690]	[3570]	[4440]	[5300]	[6120]									
	45	40	95	205	305	405	500	600	690									
		217	216	215	211	202	200	194	185									
	[14]	[330]	[840]	[1790]	[2670]	[3560]	[4430]	[5290]	[6120]									
	53	35	95	200	300	400	500	600	690									
		256	254	252	248	243	237	229	219									
	[16]	[290]	[820]	[1770]	[2650]	[3540]	[4410]	[5280]	[6120]									
	61	35	95	200	300	400	500	595	690									
		291	290	289	284	280	272	264	253									
	[18]	[270]	[810]	[1750]	[2640]	[3520]	[4400]	[5270]	[6120]									
	68	30	90	200	300	400	495	595	690									
		329	327	325	321	316	308	298	287									
	[20]	[230]	[800]	[1730]	[2620]	[3510]	[4380]	[5270]	[6120]									
	76	25	90	195	295	395	495	595	690									
		366	364	362	358	353	345	334	321									
	[22]	[190]	[780]	[1690]	[2600]	[3500]	[4370]	[5260]										
	83	20	90	190	295	395	495	595										
		402	400	398	394	389	380	368										
	[25]	[150]	[750]	[1640]	[2560]	[3480]	[4360]	[5240]										
	95	15	85	185	290	395	495	590										
		459	456	453	448	442	434	421										
	[30]		[710]	[1540]	[2510]	[3350]	[4190]	[5030]										
	114		80	175	285	380	475	570										
			546	542	537	529	520	504										

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 245 cm³/r [15.0 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]
17	34	52	69	86	103	121	138	155	172	190	207	224	241	259

C-4

Flow LPM [GPM]

[0.5]	[460]	[980]													
2	50	110													
	5	2													
[1]	[480]	[990]	[1490]	[1990]	[2480]	[2970]	[3400]	[3830]	[4250]	[4680]	[5020]				
4	55	110	170	225	280	335	385	435	480	530	565				
	14	14	14	13	13	12	12	11	11	10	4				
[2]	[500]	[1000]	[1520]	[2040]	[2540]	[3050]	[3420]	[3930]	[4440]	[4900]	[5320]	[5740]	[6160]	[6640]	[7150]
8	55	115	170	230	285	345	385	445	500	555	600	650	695	750	810
	30	30	29	29	28	27	26	24	23	22	20	18	16	14	11
[4]	[510]	[1030]	[1560]	[2080]	[2600]	[3130]	[3630]	[4130]	[4630]	[5120]	[5570]	[6030]	[6480]	[6870]	[7340]
15	60	115	175	235	295	355	410	465	525	580	630	680	730	775	830
	61	61	60	60	59	59	58	56	53	49	47	44	42	39	36
[6]	[510]	[1040]	[1570]	[2100]	[2620]	[3160]	[3660]	[4200]	[4710]	[5220]	[5690]	[6140]	[6620]	[7050]	[7430]
23	60	120	175	235	295	355	415	475	530	590	645	695	750	795	840
	91	90	90	89	88	88	86	83	80	75	72	70	67	63	59
[8]	[500]	[1020]	[1560]	[2110]	[2630]	[3150]	[3680]	[4210]	[4740]	[5250]	[5720]	[6200]	[6670]	[7090]	[7470]
30	55	115	176	240	295	355	415	475	535	595	645	700	755	800	845
	121	121	120	119	118	117	115	113	111	106	103	99	96	91	87
[10]	[470]	[1000]	[1540]	[2100]	[2620]	[3150]	[3690]	[4230]	[4770]	[5290]	[5670]	[6240]	[6710]	[7140]	
38	55	115	175	235	295	355	415	480	540	600	640	705	760	805	
	152	151	150	148	148	147	145	143	141	137	133	129	125	120	
[12]	[450]	[980]	[1530]	[2080]	[2610]	[3140]	[3680]	[4220]	[4760]	[5280]	[5750]	[6230]	[6700]		
45	50	110	175	235	295	355	415	475	540	595	650	705	755		
	183	182	180	179	178	178	176	173	170	166	161	157	152		
[14]	[420]	[960]	[1520]	[2060]	[2600]	[3130]	[3670]	[4200]	[4740]	[5260]	[5740]	[6220]			
53	45	110	170	235	295	355	415	475	535	595	650	705			
	213	212	211	210	209	208	206	203	200	195	190	185			
[16]	[400]	[950]	[1500]	[2040]	[2580]	[3120]	[3660]	[4190]	[4730]	[5250]	[5730]	[6210]			
61	45	105	170	230	290	355	415	475	535	595	645	700			
	244	243	242	241	240	239	236	232	229	225	219	213			
[18]	[380]	[930]	[1480]	[2020]	[2560]	[3110]	[3650]	[4180]	[4710]	[5230]	[5720]	[6200]			
68	45	105	165	230	290	350	410	470	530	590	645	700			
	275	274	273	272	270	269	266	262	259	254	248	241			
[20]	[350]	[910]	[1460]	[2000]	[2550]	[3100]	[3640]	[4170]	[4700]	[5220]	[5710]				
76	40	105	165	225	290	350	410	470	530	590	645				
	305	305	304	303	302	300	296	292	288	283	276				
[22]	[310]	[870]	[1420]	[1970]	[2500]	[3050]	[3590]	[4140]	[4680]	[5200]	[5680]				
83	35	100	160	225	280	345	405	470	530	590	640				
	337	336	335	334	332	330	326	323	319	313	306				
[25]	[260]	[820]	[1380]	[1930]	[2460]	[2980]	[3540]	[4090]	[4640]	[5180]					
95	30	95	155	220	280	335	400	460	525	585					
	383	382	381	380	378	376	372	369	365	357					
[30]		[680]	[1250]	[1860]	[2390]	[2900]	[3430]	[3960]	[4460]	[4950]					
114		75	140	210	270	330	390	445	505	560					
		457	456	455	453	450	445	442	437	427					
[35]			[1110]	[1740]	[2270]	[2790]	[3340]	[3910]	[4400]						
132			125	195	255	315	375	440	495						
			532	531	528	525	519	515	509						

[3440] } Torque [lb-in]
375 } Nm
519 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

**Δ Pressure bar [PSI]
280 cm³/r [17.1 in³/r]**

	[250] 17	[500] 34	[750] 52	[1000] 69	[1250] 86	[1500] 103	[1750] 121	[2000] 138	[2250] 155	[2500] 172	[2750] 190	[3000] 207	[3250] 224	[3500] 241	[3750] 259
[0.5] 2	[533] 60 4	[1074] 121 2													
[1] 4	[553] 62 12	[1136] 128 12	[1714] 194 12	[2287] 258 11	[2841] 321 11	[3394] 384 11	[3868] 437 10	[4389] 496 10	[4895] 553 10	[5380] 608 8	[5870] 663 6	[6368] 720 6	[6811] 770 6	[7239] 818 5	[7654] 865 4
[2] 8	[568] 64 26	[1146] 130 26	[1740] 197 25	[2328] 263 25	[2902] 328 24	[3461] 391 24	[3955] 447 23	[4524] 511 22	[4922] 556 21	[5630] 636 20	[6146] 694 19	[6666] 753 17	[7191] 813 17	[7749] 876 15	[8323] 940 13
[4] 15	[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] 23	[583] 66 79	[1177] 133 79	[1781] 201 78	[2395] 271 78	[2987] 338 77	[3601] 407 77	[4193] 474 76	[4793] 542 74	[5376] 607 72	[5959] 673 69	[6521] 737 67	[7082] 800 66	[7607] 859 65	[8097] 915 64	
[8] 30	[573] 65 106	[1167] 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] 38	[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] 45	[527] 60 161	[1126] 127 160	[1745] 197 166	[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] 53	[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] 61	[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] 68	[437] 49 241	[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] 76	[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] 83	[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] 95	[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] 114		[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] 132			[1348] 152 468	[2057] 232 466	[2623] 296 464	[3183] 360 463	[3883] 439 457	[4354] 492 449							

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 310 cm³/r [19.0 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]
17	34	52	69	86	103	121	138	155	172	190	207	224	241	259

Flow LPM [GPM]	[0.5]	[600]	[1150]																
	2	70 4	130 2																
	[1]	[620]	[1270]	[1920]	[2560]	[3170]	[3780]	[4290]	[4900]	[5490]	[6080]	[6670]	[7270]	[7880]	[8490]	[9080]			
	4	70 11	145 11	215 11	290 10	360 10	425 10	485 9	555 9	620 9	685 8	755 8	820 7	890 7	960 6	1025 5			
	[2]	[630]	[1280]	[1940]	[2590]	[3230]	[3830]	[4450]	[5070]	[5680]	[6300]	[6910]	[7530]	[8160]	[8790]	[9420]			
	8	70 23	145 23	220 22	295 22	365 21	435 21	505 20	575 20	640 19	710 18	780 18	850 17	920 17	995 16	1065 15			
	[4]	[640]	[1290]	[1960]	[2640]	[3290]	[3940]	[4600]	[5240]	[5880]	[6510]	[7150]	[7790]	[8450]	[9100]				
	15	70 47	145 47	220 46	300 46	370 45	445 45	520 44	590 44	665 43	735 42	810 42	880 41	955 41	1030 40				
	[6]	[650]	[1300]	[1970]	[2660]	[3320]	[4000]	[4680]	[5330]	[5980]	[6630]	[7280]	[7940]						
	23	75 71	145 71	225 70	300 70	375 69	450 69	530 68	600 67	675 66	750 64	825 64	895 63						
	[8]	[640]	[1300]	[1980]	[2670]	[3350]	[4030]	[4710]	[5360]	[6020]	[6670]	[7320]							
	30	70 96	145 96	225 95	300 95	380 94	455 94	530 93	605 92	680 91	755 89	825 88							
	[10]	[620]	[1280]	[1970]	[2660]	[3340]	[4070]	[4740]	[5390]	[6050]	[6710]	[7370]							
	38	70 121	145 120	225 120	300 119	375 119	460 118	535 117	610 116	685 115	760 112	835 109							
	[12]	[600]	[1260]	[1940]	[2630]	[3340]	[4040]	[4730]	[5390]	[6060]	[6720]								
	45	70 145	140 144	220 144	295 143	375 142	455 142	535 141	610 140	685 139	760 135								
	[14]	[570]	[1240]	[1920]	[2600]	[3310]	[4000]	[4710]	[5380]	[6060]	[6730]								
	53	65 169	140 169	215 168	295 168	375 167	450 167	530 165	610 164	685 163	760 159								
	[16]	[540]	[1230]	[1900]	[2580]	[3280]	[3970]	[4700]	[5380]	[6050]									
	61	60 193	140 193	215 192	290 192	370 190	450 189	530 188	610 187	685 185									
	[18]	[490]	[1210]	[1880]	[2550]	[3240]	[3930]	[4680]	[5370]	[6040]									
	68	55 217	135 217	210 216	290 216	365 214	445 213	530 211	605 209	680 207									
	[20]	[450]	[1190]	[1860]	[2520]	[3210]	[3900]	[4670]	[5360]	[6030]									
	76	50 242	135 242	210 242	285 241	365 240	440 238	530 236	605 234	680 232									
	[22]	[420]	[1130]	[1820]	[2520]	[3180]	[3870]	[4640]	[5320]										
	83	45 267	130 266	205 266	285 265	360 264	435 262	525 260	600 258										
	[25]	[340]	[1050]	[1780]	[2510]	[3160]	[3820]	[4590]	[5280]										
	95	40 303	120 303	200 302	285 301	355 300	430 299	520 296	595 293										
	[30]		[1010]	[1700]	[2420]	[3100]	[3720]	[4500]	[5140]										
	114		115 363	190 362	275 360	350 359	420 358	510 354	580 351										
	[35]			[1580]	[2360]	[2950]	[3540]	[4390]											
	132			180 422	265 420	335 419	400 418	495 413											

[4390] } Torque [lb-in]
495 } Nm
413 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

**Δ Pressure bar [PSI]
395 cm³/r [24.0 in³/r]**

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]
17	34	52	69	86	103	121	138	155	172	190	207	224	241

Flow LPM [GPM]	[0.5]	[700]	[1340]																
	2	80	150																
		4	2																
	[1]	[750]	[1430]	[2110]	[2770]	[3460]	[4170]	[4890]	[5610]	[6310]	[7010]	[7700]							
	4	85	160	240	315	390	470	550	635	715	790	870							
		9	9	8	8	8	7	7	7	5	4	2							
	[2]	[800]	[1550]	[2290]	[3030]	[3850]	[4620]	[5310]	[6000]	[6750]	[7010]	[7700]							
	8	90	175	260	340	435	520	600	680	765	790	870							
		18	18	17	16	15	15	14	13	13	4	2							
	[4]	[860]	[1630]	[2470]	[3310]	[4120]	[4900]	[5640]	[6390]	[7190]	[7490]	[8240]	[8990]	[9730]	[10470]				
	15	95	185	280	375	465	555	635	720	810	845	930	1015	1100	1185				
		38	38	37	36	36	35	35	34	34	13	12	11	10	8				
	[6]	[860]	[1690]	[2540]	[3410]	[4180]	[4980]	[5780]	[6580]	[7400]	[7890]	[8780]							
	23	95	190	285	385	470	565	655	745	835	890	990							
		57	57	56	55	54	53	52	50	49	33	32							
	[8]	[840]	[1680]	[2550]	[3400]	[4260]	[5090]	[5870]	[6650]	[7480]	[8220]								
	30	95	190	290	385	480	575	665	750	845	930								
		76	76	75	74	73	72	70	68	66	47								
	[10]	[800]	[1680]	[2550]	[3400]	[4260]	[5100]	[5920]	[6730]	[7560]									
	38	90	190	290	385	480	575	670	760	855									
		95	95	94	93	92	91	89	86	84									
	[12]	[760]	[1660]	[2520]	[3380]	[4270]	[5110]	[5900]	[6690]										
	45	85	190	285	380	480	575	665	755										
		114	114	113	112	111	110	108	105										
	[14]	[740]	[1640]	[2490]	[3370]	[4260]	[5100]	[5880]	[6650]										
	53	85	185	280	380	480	575	665	750										
		133	133	132	131	130	129	127	124										
	[16]	[710]	[1620]	[2460]	[3350]	[4240]	[5080]	[5840]											
	61	80	185	280	380	480	575	660											
		153	153	152	151	149	147	145											
	[18]	[680]	[1600]	[2430]	[3340]	[4220]	[5060]	[5810]											
	68	75	180	275	375	475	570	655											
		172	172	171	170	168	166	164											
	[20]	[610]	[1580]	[2400]	[3320]	[4210]	[5040]	[5780]											
	76	70	180	270	375	475	570	655											
		192	191	190	189	187	185	183											
	[22]	[570]	[1490]	[2340]	[3220]	[4160]	[5010]	[5740]											
	83	65	170	265	365	470	565	650											
		211	210	209	208	206	204	201											
	[25]	[490]	[1350]	[2250]	[3080]	[4070]	[4960]	[5700]											
	95	55	155	255	350	460	560	645											
		239	238	237	236	235	233	230											
	[30]		[1080]	[1650]	[2270]	[3020]	[3850]												
	114		120	185	255	340	435												
			285	284	282	281	279												
	[35]			[1520]	[2120]	[2870]	[3760]												
	132			170	240	325	425												
				331	330	328	325												
	[40]				[2050]	[2790]	[3620]												
	151				230	315	410												
					376	374	371												

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 495 cm³/r [30 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]
17	34	52	69	86	103	121	138	155	172

C-4

Flow LPM [GPM]

[0.5]	[800]	[1750]	[1750]							
2	90	200	200							
	3	1	1							
[1]	[880]	[1875]	[2875]	[3825]	[4775]	[5720]	[6670]	[7600]		
4	100	210	325	430	540	645	755	860		
	7	6	6	5	4	3	2	1		
[2]	[905]	[1940]	[2975]	[3990]	[5010]	[6010]	[7010]	[8000]	[8980]	
8	100	220	335	450	565	680	790	905	1015	
	18	17	17	16	15	12	11	10	8	
[4]	[935]	[2005]	[3075]	[4160]	[5245]	[6300]	[7355]	[8375]	[9400]	[10350]
15	105	225	345	470	595	710	830	945	1060	1170
	30	29	28	27	26	23	21	19	17	14
[6]	[920]	[2010]	[3100]	[4185]	[5265]	[6345]	[7420]	[8445]	[9465]	
23	105	225	350	475	595	715	840	955	1070	
	45	44	43	42	40	37	35	32	30	
[8]	[905]	[2015]	[3125]	[4205]	[5290]	[6385]	[7485]	[8510]		
30	100	230	355	475	600	720	845	960		
	61	60	59	57	55	52	49	46		
[10]	[880]	[1995]	[3095]	[4205]	[5295]	[6390]	[7480]	[8525]		
38	100	225	350	475	600	720	845	960		
	76	75	74	72	70	66	63	59		
[12]	[860]	[1975]	[3095]	[4200]	[5305]	[6390]	[7475]			
45	95	225	350	475	600	720	845			
	91	90	89	87	85	81	77			
[14]	[830]	[1945]	[3055]	[4165]	[5275]	[6360]	[7445]			
53	95	220	345	470	595	720	840			
	106	105	104	102	100	96	92			
[16]	[805]	[1910]	[3020]	[4130]	[5245]	[6330]	[7420]			
61	90	215	340	465	595	715	840			
	122	120	119	117	115	111	107			
[18]	[740]	[1860]	[2980]	[4105]	[5235]	[6305]	[7380]			
68	85	210	335	465	590	715	835			
	137	136	134	132	130	125	121			
[20]	[680]	[1810]	[2940]	[4085]	[5225]	[6285]				
76	75	205	330	460	590	710				
	153	152	150	147	145	140				
[25]	[570]	[1665]	[2800]	[4005]	[5210]	[6135]				
95	65	190	315	455	590	695				
	191	189	187	184	182	177				
[30]		[1520]	[2645]	[3765]	[4885]	[5985]				
114		170	300	425	550	675				
		228	226	223	220	215				
[35]			[2400]	[3510]						
132			270	395						
			265	263						
[40]			[2155]	[3260]						
151			245	370						
			305	303						

{
 245 } Torque [lb-in]
 245 } Nm
 305 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
625 cm³/r [38 in³/r]**

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1600]	[1700]	[1800]	[2000]
17	34	52	69	86	103	110	117	124	138

Flow LPM [GPM]	[0.5]	[1000]								
	2	115								
		2								
	[1]	[1080]	[2340]	[3600]	[4850]	[6100]	[7350]	[8290]	[8760]	
	4	120	265	405	550	690	830	885	935	990
		5	5	5	4	4	3	3	2	2
	[2]	[1085]	[2380]	[3675]	[5010]	[6350]	[7625]	[8115]	[8605]	[9095]
	8	125	270	415	565	715	860	915	970	1030
		14	14	14	13	12	11	10	9	8
	[4]	[1090]	[2420]	[3750]	[5175]	[6600]	[7900]	[8410]	[9000]	[9590]
	15	125	275	425	585	745	895	950	1015	1085
		23	23	23	22	21	19	18	17	16
	[6]	[1095]	[2460]	[3825]	[5220]	[6620]	[7950]	[8430]	[8910]	[9490]
	23	125	280	430	590	750	900	950	1005	1070
		35	35	35	34	33	31	30	29	28
	[8]	[1100]	[2500]	[3900]	[5270]	[6640]	[7990]	[8460]	[8925]	
	30	125	280	440	595	750	905	955	1010	
		48	48	47	46	45	43	43	42	
	[10]	[1130]	[2550]	[3975]	[5320]	[6670]	[8045]	[8595]	[9150]	
	38	130	290	450	600	755	910	970	1035	
		60	60	59	58	57	54	53	52	
	[12]	[1160]	[2600]	[4050]	[5375]	[6700]	[8100]	[8660]		
	45	130	295	460	605	755	915	980		
		72	72	71	70	69	65	64		
	[14]	[1105]	[2535]	[3965]	[5325]	[6685]	[8065]	[8620]		
	53	125	285	450	600	755	910	975		
		84	84	83	82	81	77	76		
	[16]	[1050]	[2465]	[3880]	[5275]	[6670]	[8035]	[8580]		
	61	120	280	440	595	755	910	970		
		96	95	95	94	93	89	88		
	[18]	[990]	[2405]	[3825]	[5240]	[6655]	[7345]			
	68	110	270	430	590	750	830			
		108	107	107	105	104	100			
	[20]	[930]	[2350]	[3770]	[5205]	[6640]				
	76	105	265	425	590	750				
		121	120	120	118	116				
	[25]	[750]	[2175]	[3600]	[5000]	[6400]				
	95	85	245	405	565	725				
		151	150	149	147	146				
	[30]	[550]	[1975]	[3400]	[4800]	[6200]				
	114	60	225	385	542	700				
		181	180	179	177	176				
	[35]			[3125]	[4545]					
	132			355	515					
				210	208					
	[40]			[2850]	[4295]					
	151			320	485					
				241	239					

4000 Series

Dimensions

Standard 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)
- 4 Bolt 3/4 inch split flange ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- G 3/4 (BSP) Staggered ports (2)
- G 1/4 (BSP) Case drain port (1)

Standard rotation viewed from shaft end

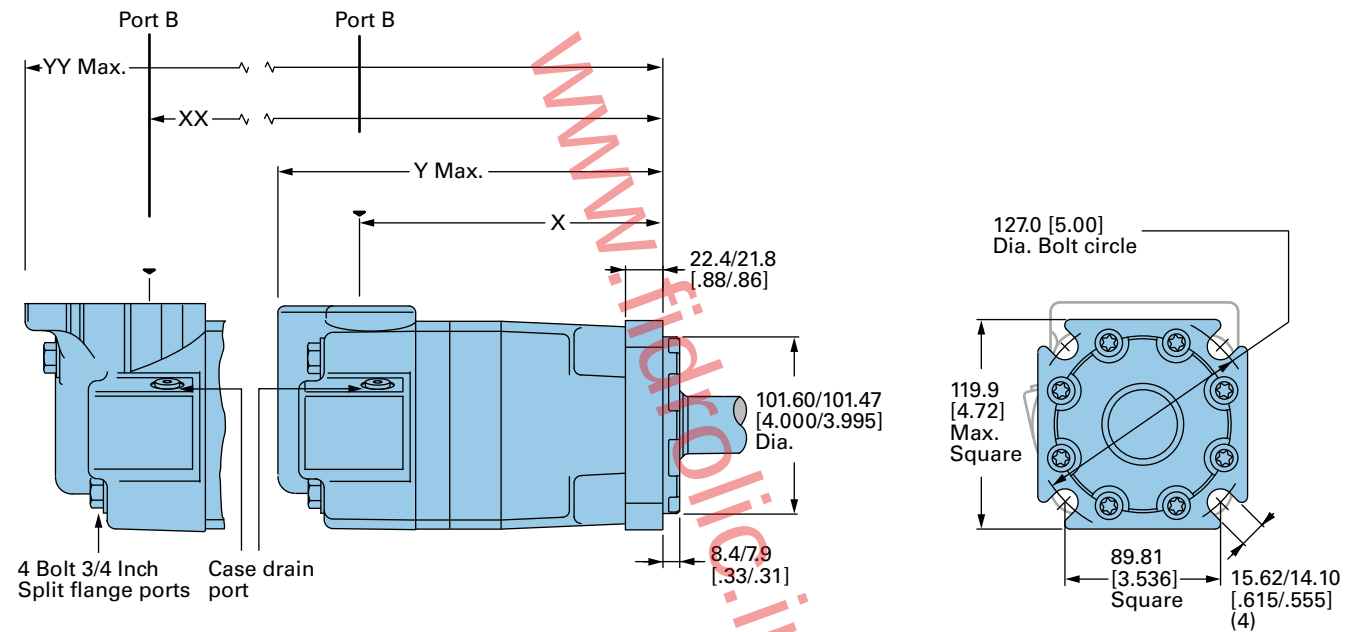
- Port A pressurized — CW
- Port B pressurized — CCW

Standard mount motor dimensions

Displacement cm ³ /r [in ³ /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]	171.5 [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]

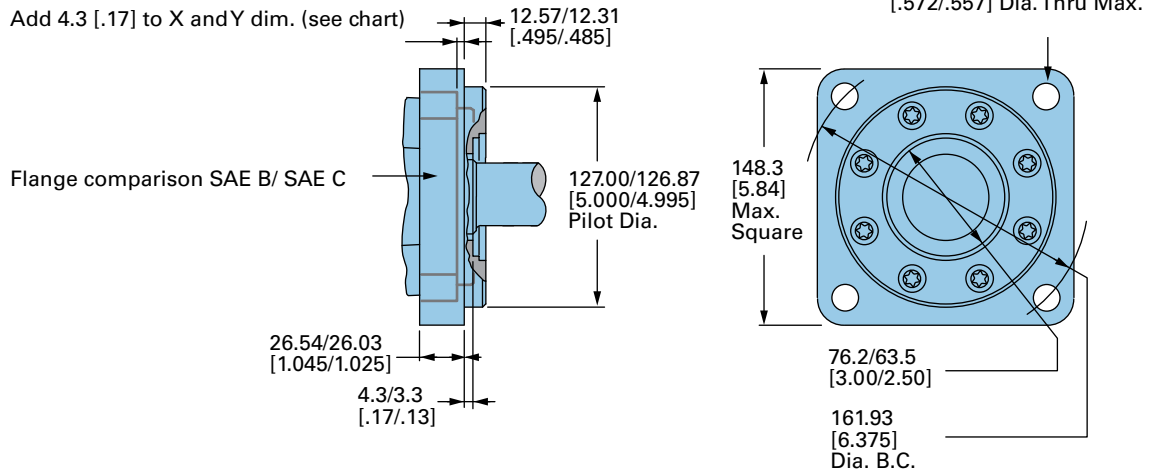
Standard mount

C-4



SAE C Flange

Add 4.3 [.17] to X and Y dim. (see chart)



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)

4 Bolt 3/4 inch split flange ports (2)
7/16 -20 UNF-2B SAE O-ring case drain port (1)

G 3/4 (BSP) staggered ports (2)

G 1/4 (BSP) case drain port (1)

Standard rotation viewed from shaft end

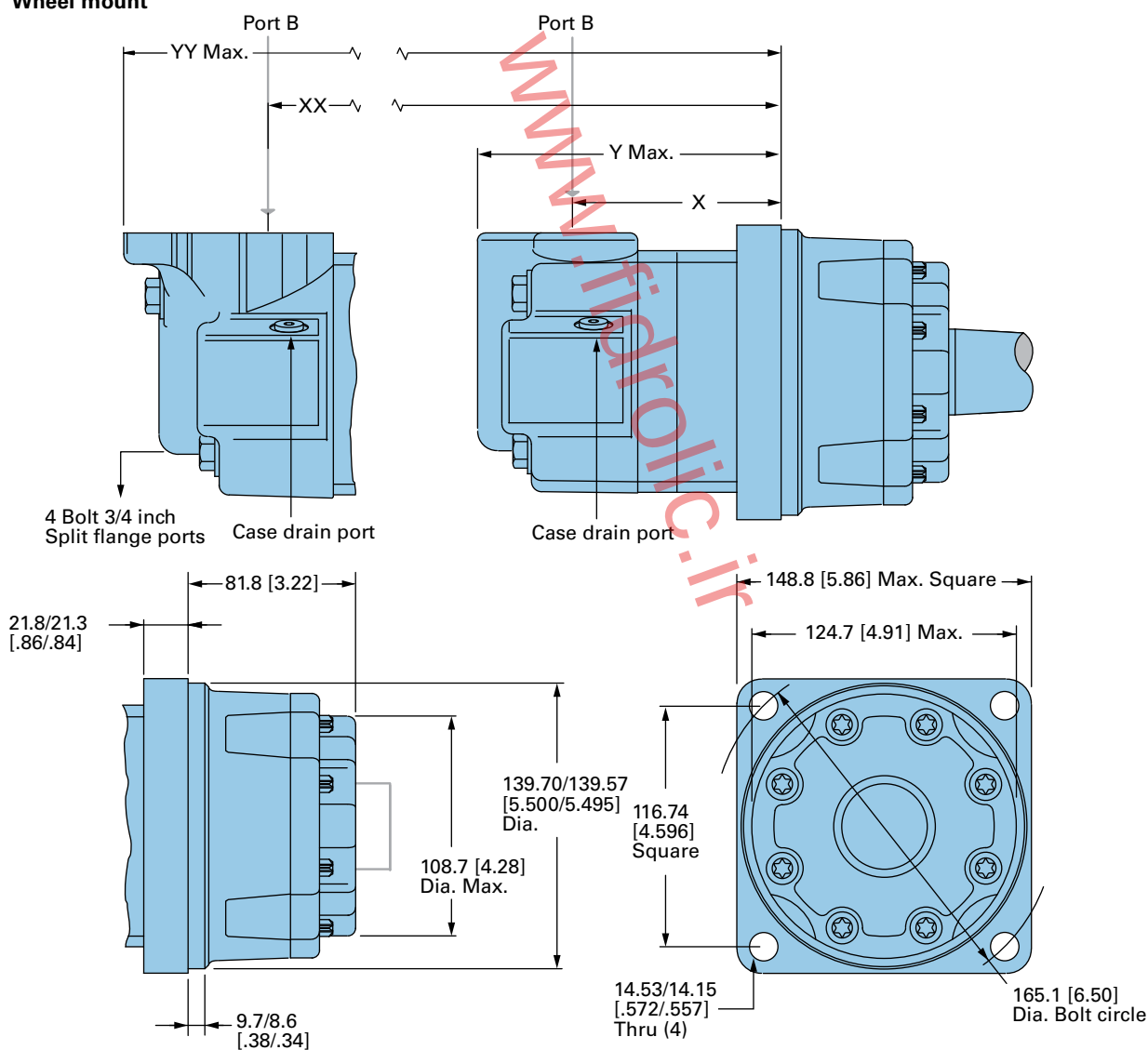
Port A pressurized — CW

Port B pressurized — CCW

Wheel mount motor dimensions

Displacement cm ³ /r [in ³ /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]	115.6 [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]	115.6 [4.55]	194.3 [7.65]
395 [24.0]	117.1 [4.61]	172.8 [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]	147.1 [5.79]	202.9 [7.99]	156.0 [6.14]	235.0 [9.25]

Wheel mount



C-4

4000 Series

Dimensions

Bearlingless

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)
- 4 Bolt 3/4 inch split flange ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- G 3/4 (BSP) staggered ports (2)
- G 1/4 (BSP) case drain port (1)

Standard rotation viewed from drive end

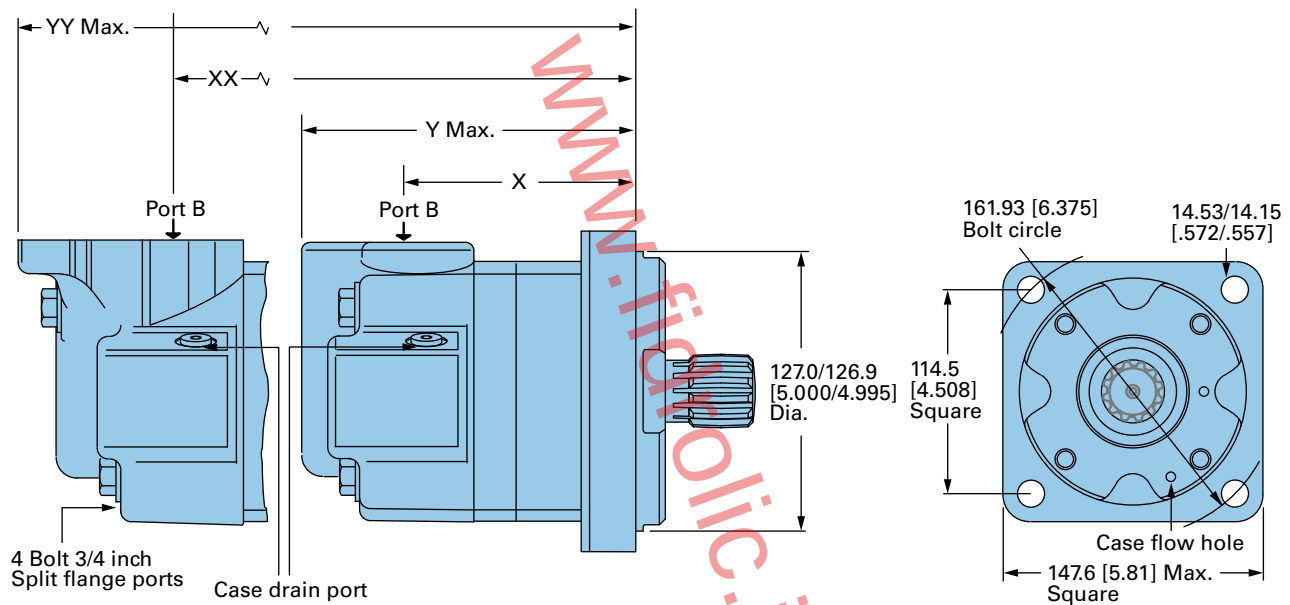
- Port A pressurized — CW
- Port B pressurized — CCW

Wheel mount motor dimensions

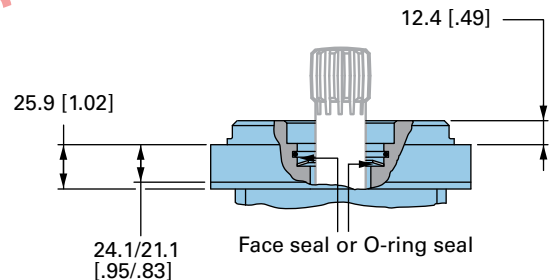
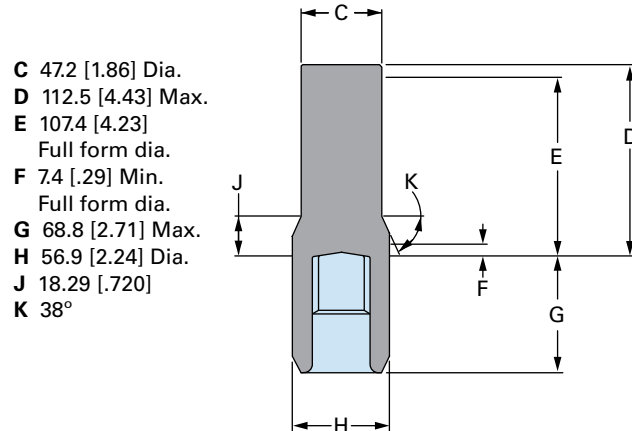
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
110 [6.7]	91.0 [3.58]	146.8 [5.78]	100.1 [3.94]	178.8 [7.04]
130 [7.9]	95.0 [3.74]	150.8 [5.94]	104.1 [4.10]	182.9 [7.20]
160 [9.9]	101.6 [4.00]	157.1 [6.19]	110.5 [4.35]	189.2 [7.45]
205 [12.5]	109.9 [4.33]	165.7 [6.52]	118.9 [4.68]	197.6 [7.78]
245 [15.0]	101.6 [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]

Bearingless

C-4

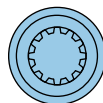


Shaft blank dimensions



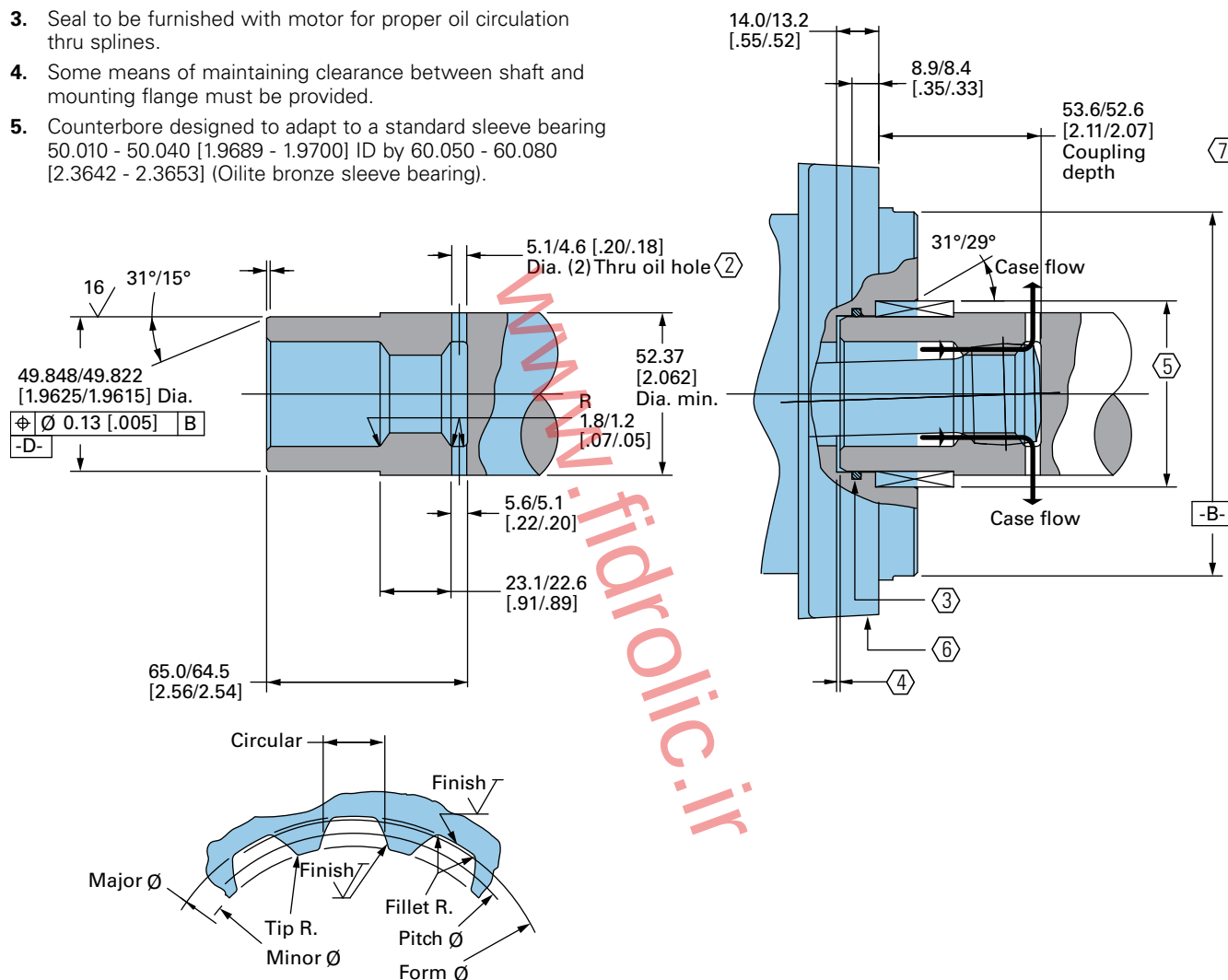
For 4000 Series bearingless motor application information contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

Mating coupling blank
Eaton Part no. 12745-003



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]
Base diameter	Ref. 26.396455 [1.0392305] $\sqrt{0.21 [0.008] [D]}$
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]

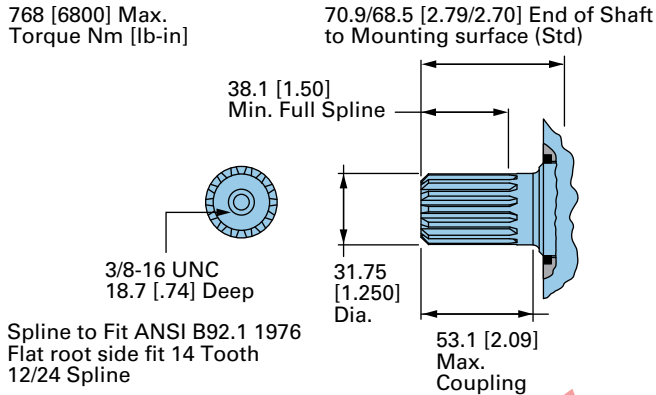
Finish	1.6 (63)
Involute profile variation	+0.000 -0.025 [+0.0000 -0.0010]
Total index variation	0.038 [.0015]
Lead variation	0.013 [.0005]
Circular space width:	
Maximum actual	5.045 [1.986]
Minimum effective	4.995 [1.951]
Maximum effective	Ref. 5.009 [1.972]
Minimum actual	Ref. 4.986 [1.963]
Dimension 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

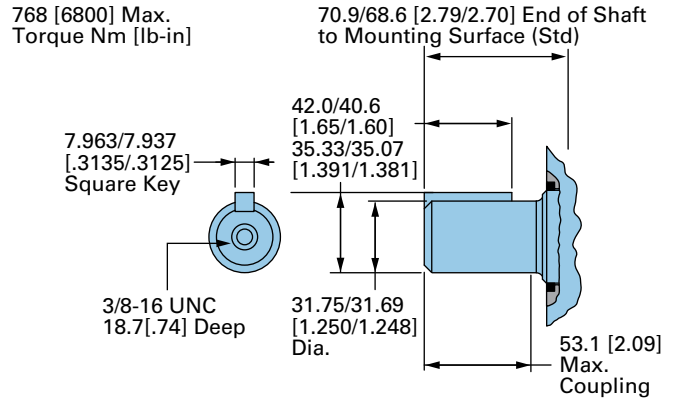
Dimensions

Shafts

Code: 03 1 1/4 -14 Tooth splined

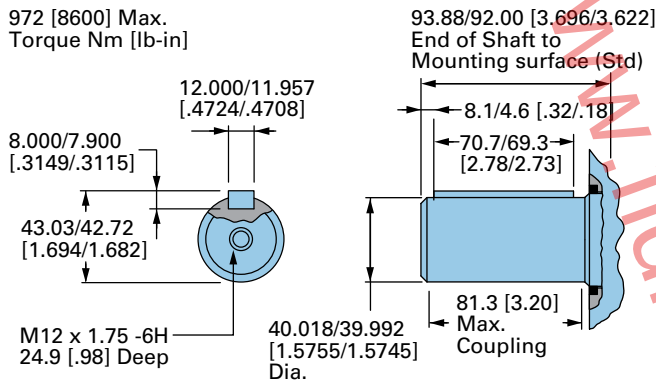


Code: 01 1 1/4 Inch straight

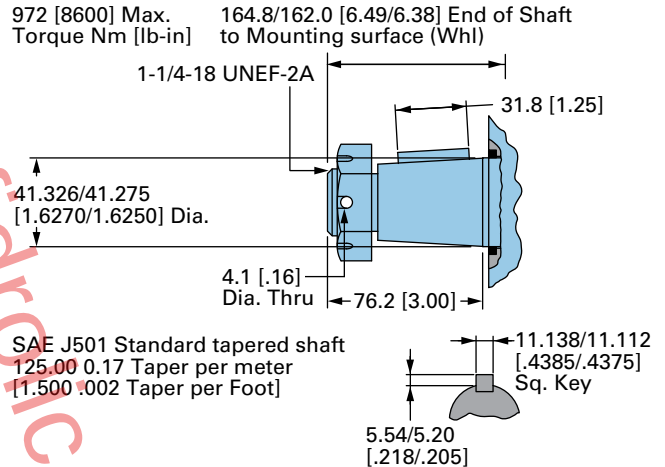


C-4

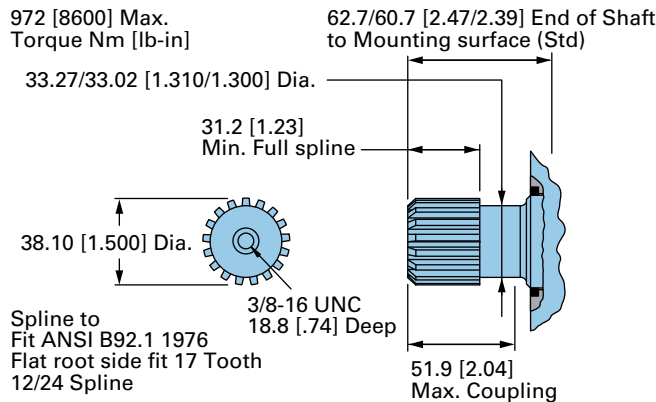
Code: 11 40 mm Straight



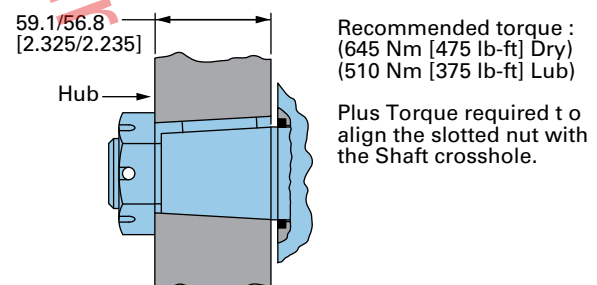
Code: 02 1 5/8 Tapered



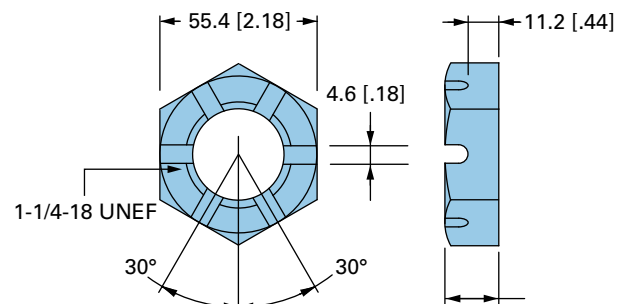
Code: 10 1 1/2 Inch 17-Tooth splined



Tapered shaft hub data



Slotted hexagon nut

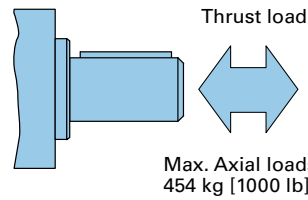


These curves indicate the radial load capacity on the motor shaft(s) at various locations with an allowable external thrust load of 454 kg [1000 lb].

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 [208lb/100 PSI].

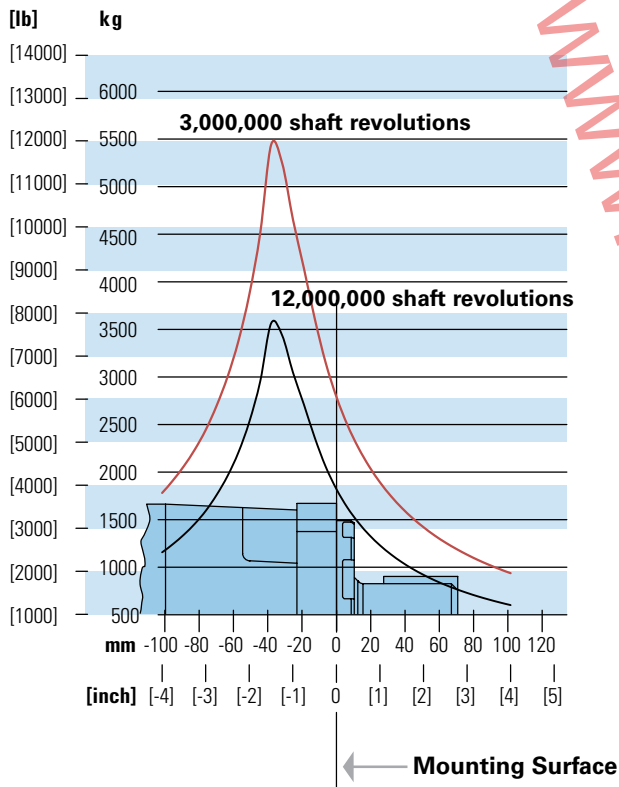
Each curve is based on B10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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.

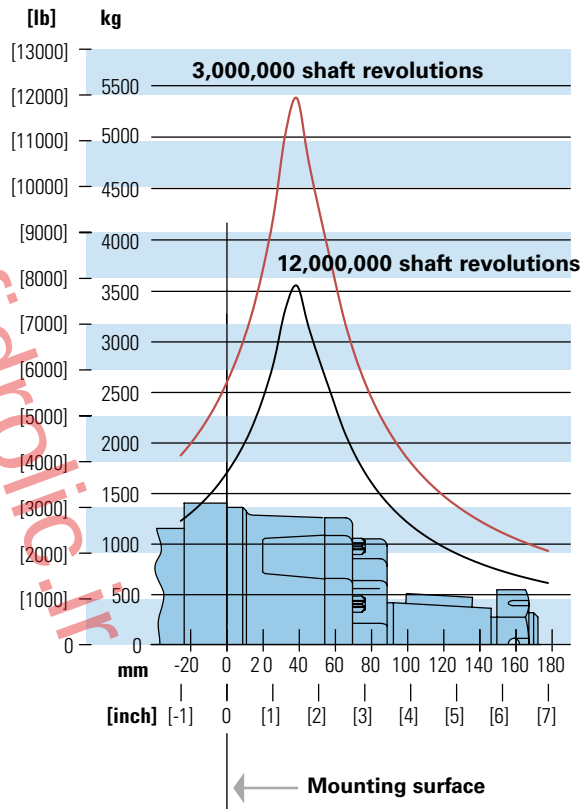


RPM	Multiplication factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

Standard Motor Straight and Splined Shafts



Wheel motor tapered shaft



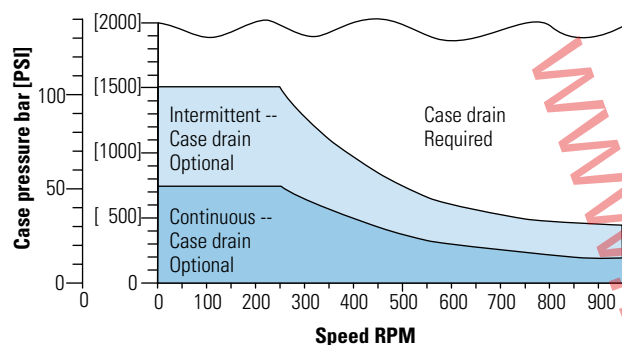
4000 Series

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.

Standard shaft seal

Case pressure seal limitation



Case porting advantage

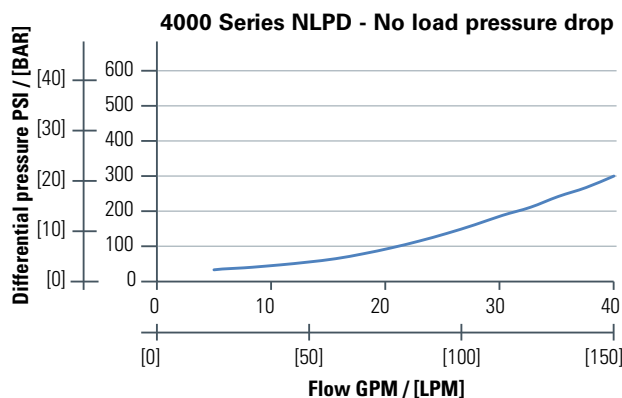
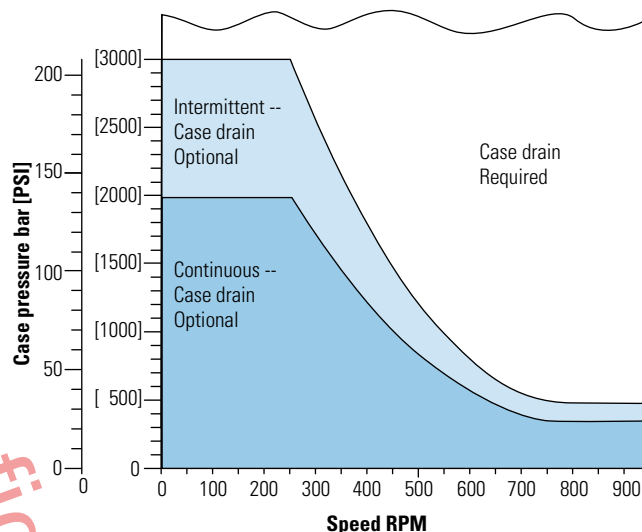
Contamination control — flushing the motor case.

Cooler motor — exiting oil draws motor heat away.

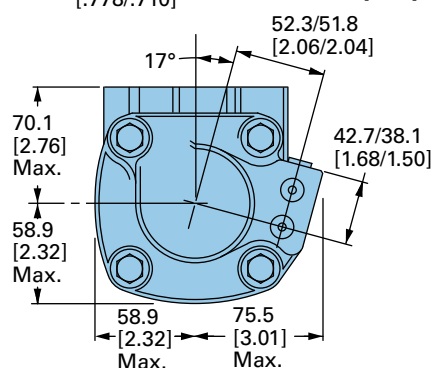
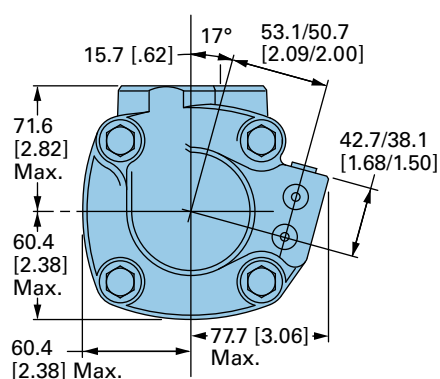
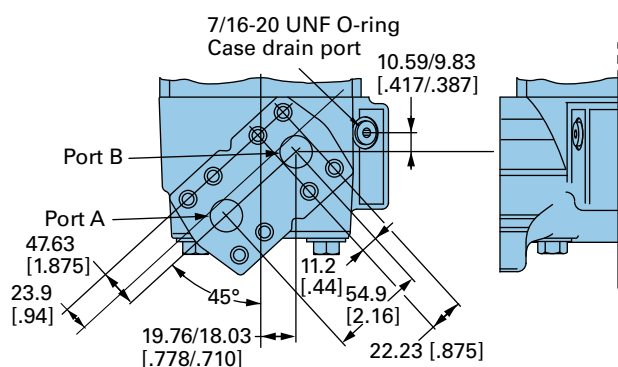
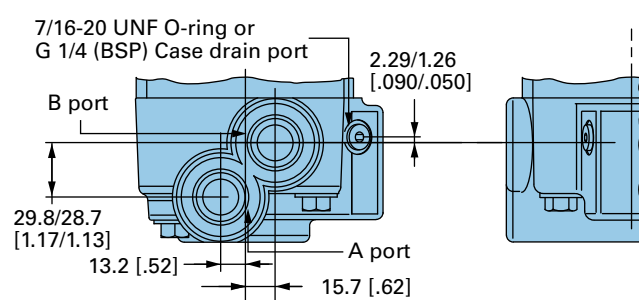
Extend motor seal life — maintain low case pressure with a preset restriction in the case drain line.

High pressure shaft seal

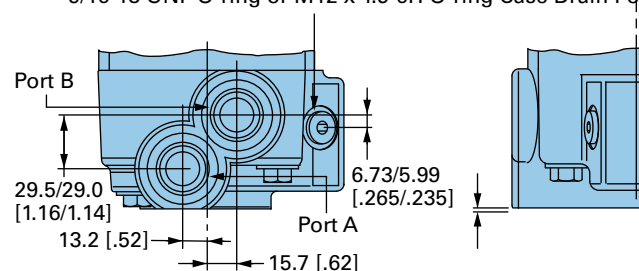
Case pressure seal limitation



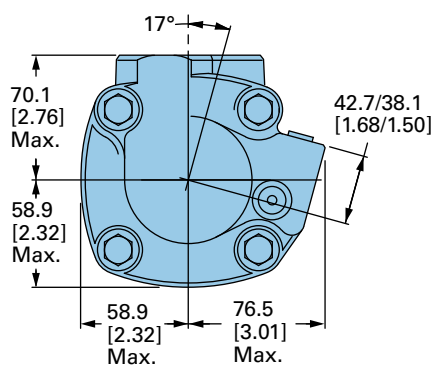
Ports

Code: AB 1-1/16-12 O-ring ports**Code: AC** G 3/4 (BSP) ports**Code: AD** Four Bolt 3/4 inch split flange SAE J518c (code 61)**Code: AA** 7/8-14 O-ring ports**Code: AE** M22 x 1.5-6H ports

9/16-18 UNF O-ring or M12 x 1.5-6H O-ring Case Drain Port



6.9 [2.7] Material Removed from this Housing for 7/8-14 O-ring Ports and M22 x 1.5-6H Ports



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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 size	Port size displ. cm³/r [in³/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	-1103	-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	—	—	-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	—	—	—
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	—	—	-1002	—	—	—	—	—	—	—
	40 mm Straight	G 3/4 (BSP)	—	-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	—	—	—	—	-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		—	—	—	—	—	—	—	—	—	—	
Bearingless		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	—	—

111-1057

C-4

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.

M	04		***			**		**		**		**		*	00		0	*	**		**		00		**		00		F
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

1		Product		9 10		Output shaft	
M		Motor				00 None (Bearingless)	
2 3		Series				01 31.75 [1.250] Dia. Straight With .375-16UNC- 2B Thread, 53.1 [2.09] Max Coupling Length, 7.938 [3.125] Sq x 41.27 [1.625] Straight Key	
04		4000 Series				02 41.28 [1.625] Dia. Tapered with 11.112 [1.4375] Sq x 31.75 [1.250] Straight Key, 1.250-18UNEF-2A Thread with Slotted Hex Nut	
4 5 6		Displacement cm³/r [in³/r]				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	
067		109.8 cm³/r [6.70 in³/r]				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	
080		130.3 cm³/r [7.95 in³/r]				11 40.00 [1.575] Dia. Straight with M12 x 1.75-6H Thread, 7.955 [3.132] x 11.979 [4.716] Wide X 69.98 [2.755] straight key	
099		162.2 cm³/r [9.90 in³/r]					
125		205.5 cm³/r [12.54 in³/r]					
150		246.3 cm³/r [15.03 in³/r]					
171		280.1 cm³/r [17.09 in³/r]					
190		311.8 cm³/r [19.03 in³/r]					
225		369.0 cm³/r [22.52 in³/r]					
240		393.9 cm³/r [24.04 in³/r]					
301		492.6 cm³/r [30.06 in³/r]					
342		560.2 cm³/r [34.18 in³/r]					
381		623.9 cm³/r [38.07 in³/r]					
7 8		Mounting type		11 12		Ports	
AA		Bearingless, 4 Bolt: 127.00 [5.000] Pilot Dia. 14.27 [.562] Dia. Holes on 161.92 [6.375] Dia. Bolt circle				AA .875-14 UNF-2B SAE O-Ring ports - staggered ports	
AB		Standard, 4 Bolt: 101.60 [4.000] Pilot Dia. 14.7 [.58] Slots on 127.00 [5.000] Dia. Bolt Circle. (SAE B)				AB 1.0625-12 UN-2B SAE O-Ring ports - staggered ports	
AC		Wheel, 4 Bolt: 139.70 [5.500] Pilot Dia. 14.27 [.562] Dia. Holes on 165.10 [6.500] Dia. Bolt circle.				AC G 3/4 Ports - Staggered ports	
AD		Wheel, 4 Bolt: 127.00 [5.000] Pilot Dia. .500-13 UNC-2B Threaded Holes on 147.62 [5.812] Dia. Bolt circle.				AD 19.05 [.750] 4 bolt split flange staggered ports standard pressure series (Code 61)	
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					
				13 14		Case flow options	
						00 None	
						01 .5625-18 UNF-2B SAE O-Ring port with shuttle	
						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	
				15		Low pressure relief	
						0 None	
						A Set at 4.5 Bar [65 lbf/in²]	
						B Set at 15.2 Bar [220 lbf/in²]	
				16 17		Pressure/Flow option	
						00 None	
				18		Geroler option	
						0 Standard	

Model code

19	Seal option		24 25	Special features (assembly)
0	Standard		00	None
1	Viton			
3	Viton Shaft Seal		26 27	Paint/packaging
7	Extreme Duty Seal guard		00	No paint, individual box
B	High pressure Shaft Seal		AA	Low gloss black primer, individual box
			AB	Epoxy coated (frost gray), individual box
20 21	Accessories		28 29	Customer Identification
00	None		00	None
AC	M12 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)		30	Design code
AD	M12 Threaded connector, digital speed and direction pickup (one 72 pulse per rev speed signal and one directional signal (pin 1=power, pin 2=direction, pin 2=common, pin 4=speed))		F	Sixth
22 23	Special features (hardware)			
00	None			
17	Low noise valve plate			

See Eatonpowersource.com/ for more options and configurations.

Description:

With torque up to 1685 Nm [15,000 in-lbs] and 150 lpm [40 gpm] continuous, this motor is packed with power operates very smoothly.

**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
- Sprayer, trencher
- Wood products

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.

C-5



Skid steer loader



Vertical drills



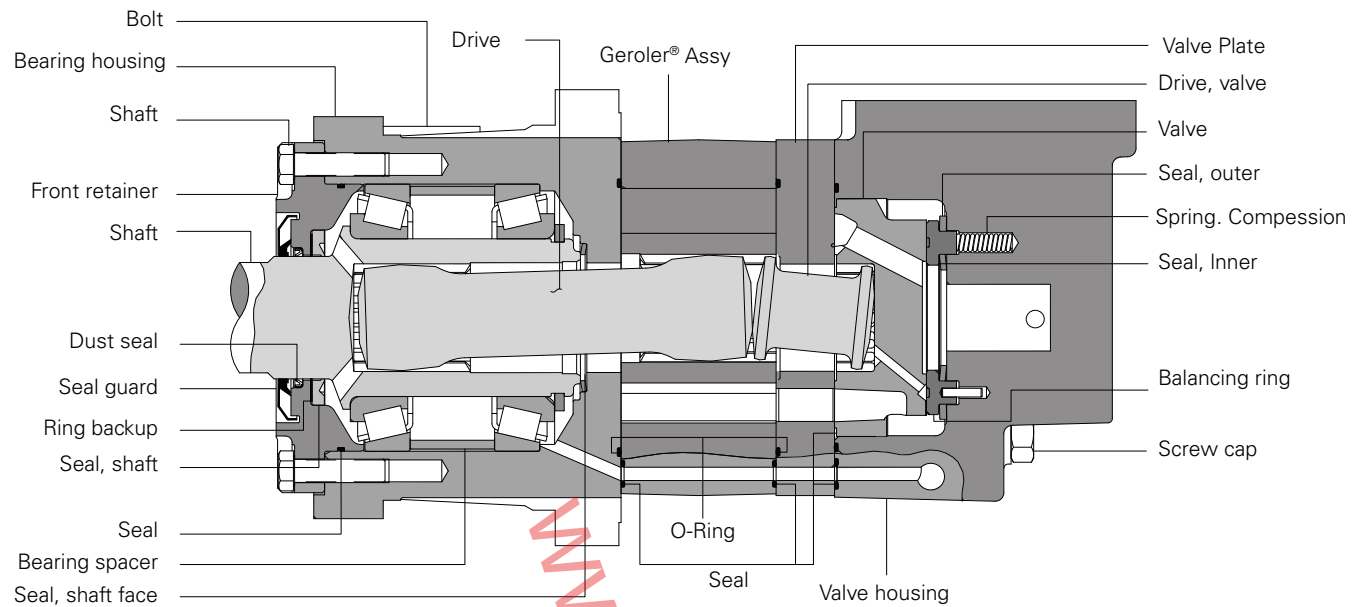
Paving equipment



Trencher

6000 Series

Specifications



6000 series motors

Displ. cm³/r [in³/rev]	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) @ Flow	Continuous	775	615	485	387	307	241	203	187
	Intermittent	866	834	698	570	454	353	303	280
Flow l/min [GPM]	Continuous	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]
Torque* Nm [lb - in]	Continuous	575 [5100]	735 [6510]	930 [8230]	1155 [10230]	1445 [12800]	1480 [13100]	1378 [12192]	1582 [14004]
	Intermittent	860 [7620]	1100 [9740]	1355 [11990]	1635 [14490]	1885 [16670]	1898 [16800]	1699 [15040]	1850 [16377]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	170 [2500]	140 [2000]	140 [2000]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	310 [4500]	275 [4000]	221 [3200]	170 [2500]	140 [2000]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	240 [3500]	205 [3000]	170 [2500]
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]
	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]	23.8 [52.5]	24.3 [53.5]

Maximum case pressure: See case pressure seal limitation graph.

*See shaft torque ratings for limitations.

Note: To assure best motor life, run motor in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

Maximum inlet pressure:

310 bars (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 13 cSt [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: 20/18/13

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (expect when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
195 cm³/r [11.9 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	[0.5]	[280]	[650]	[1450]	[2290]														
	2	30	75	165	260														
		9	7	5	2														
	[2]	[290]	[680]	[1500]	[2340]	[3100]	[3880]	[4140]											
	8	35	75	170	265	350	440	470											
		38	37	35	34	30	26	18											
	[4]	[300]	[710]	[1500]	[2390]	[3200]	[4030]	[4600]	[5200]	[5790]									
	15	35	80	170	270	360	455	520	590	655									
		77	76	74	72	66	62	46	32	18									
	[8]	[310]	[740]	[1590]	[2450]	[3280]	[4120]	[4810]	[5530]	[6250]	[6900]								
	30	35	85	180	275	370	465	545	625	705	780								
		154	153	148	144	131	119	116	99	83	65								
	[14]	[320]	[750]	[1610]	[2480]	[3330]	[4190]	[4990]	[5810]	[6630]	[7320]								
	53	35	85	180	280	375	475	565	655	750	825								
		232	230	225	221	212	203	186	167	148	118								
	[16]	[300]	[730]	[1600]	[2470]	[3340]	[4210]	[5090]	[5900]	[6710]	[7470]								
	61	35	80	180	280	375	475	575	665	760	845								
		309	307	303	300	291	283	258	236	214	181								
	[20]	[270]	[720]	[1590]	[2460]	[3350]	[4240]	[5100]	[5950]	[6800]	[7620]								
	76	30	80	180	280	380	480	575	670	770	860								
		387	384	379	374	365	356	332	306	280	247								
	[24]	[240]	[700]	[1570]	[2440]	[3330]	[4220]	[5080]	[5940]	[6810]									
	91	25	80	175	275	375	475	575	670	770									
		465	462	456	450	440	429	413	388	363									
	[28]	[190]	[660]	[1530]	[2400]	[3300]	[4200]	[5060]	[5940]	[6810]									
	106	20	75	175	270	375	475	570	670	770									
		542	539	532	526	514	502	476	448	421									
	[32]	[160]	[630]	[1500]	[2370]	[3270]	[4160]	[5040]	[5920]	[6790]									
	121	20	70	170	270	370	470	570	670	765									
		620	617	609	602	589	576	542	511	480									
	[36]	[120]	[620]	[1480]	[2350]	[3240]	[4130]	[5000]	[5880]	[6760]									
	136	15	70	165	265	365	465	565	665	765									
		697	692	683	674	659	645	601	564	527									
	[40]	[80]	[610]	[1450]	[2320]	[3210]	[4100]	[4960]	[5840]										
	151	10	70	165	260	365	465	560	660										
		775	770	759	749	733	718	666	624										
	[45]		[590]	[1410]	[2280]	[3170]	[4060]	[4920]	[5790]										
	170		65	160	260	360	460	555	655										
			866	854	843	825	808	749	702										

[5790] } Torque [lb-in]
655 } Nm
702 } 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

Δ Pressure bar [PSI] 245 cm³/r [15.0 in³/r]

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	[0.5]	[430]	[860]	[1890]															
	2	50	95	215															
		7	4	1															
	[2]	[440]	[900]	[1940]	[2990]	[3960]	[4920]	[5425]	[5930]										
	8	50	100	220	340	445	555	615	670										
		30	29	26	24	21	17	11	6										
	[4]	[460]	[940]	[2000]	[3060]	[4080]	[5090]	[5680]	[6630]	[7570]	[8520]								
	15	50	105	225	345	460	575	640	750	855	965								
		61	60	56	54	48	42	39	30	12	6								
	[8]	[470]	[960]	[2060]	[3150]	[4210]	[5260]	[6180]	[7100]	[8020]	[9020]								
	30	55	110	235	355	475	595	700	800	905	1020								
		122	120	116	113	104	95	81	67	53	37								
	[14]	[480]	[970]	[2080]	[3180]	[4270]	[5360]	[6390]	[7420]	[8450]	[9510]								
	53	55	110	235	360	480	605	720	840	955	1075								
		183	182	178	174	165	157	141	125	109	92								
	[16]	[450]	[960]	[2070]	[3180]	[4290]	[5420]	[6480]	[7490]	[8480]	[9540]								
	61	50	110	235	360	485	610	730	845	960	1080								
		245	244	240	236	228	221	202	184	165	145								
	[20]	[420]	[940]	[2050]	[3160]	[4290]	[5440]	[6510]	[7580]	[8660]	[9740]								
	76	45	105	230	355	485	615	735	855	980	1100								
		307	306	301	297	287	277	257	238	218	197								
	[24]	[380]	[920]	[2020]	[3120]	[4260]	[5400]	[6490]	[7590]	[8680]									
	91	45	105	230	355	480	610	735	860	980									
		368	365	361	358	348	338	316	294	271									
	[28]	[330]	[870]	[1980]	[3100]	[4240]	[5380]	[6480]	[7580]	[8670]									
	106	35	100	225	350	480	610	730	855	980									
		430	426	421	416	404	376	358	340	322									
	[32]	[290]	[800]	[1920]	[3050]	[4170]	[5290]	[6410]	[7520]	[8640]									
	121	35	90	215	345	470	600	725	850	975									
		491	489	481	475	461	448	423	398	373									
	[36]	[250]	[730]	[1850]	[2980]	[4060]	[5150]	[6300]	[7440]										
	136	30	80	210	335	460	580	710	840										
		556	549	543	537	524	509	482	456										
	[40]	[200]	[690]	[1790]	[2940]	[4010]	[5130]	[6190]	[7100]										
	151	25	80	200	330	455	580	700	800										
		615	612	606	599	585	570	540	510										
	[45]		[570]	[1760]	[2860]	[3960]	[5070]	[6080]	[6690]										
	170		65	200	325	445	575	685	755										
			688	682	674	658	641	608	574										
	[50]			[1720]	[2800]	[3890]	[4920]	[5940]											
	189			195	315	440	555	670											
				758	749	731	712	676											
	[55]			[1670]	[2740]	[3820]	[4890]	[5880]											
	208			190	310	430	550	665											
				834	824	804	783	744											

C-5

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous
Intermittent

Peak
No operation

**Δ Pressure bar [PSI]
310 cm³/r [19.0 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	[0.5]	[530]	[1120]	[2440]															
	2	60	125	275															
		6	4	1															
	[2]	[540]	[1150]	[2460]	[3620]	[4780]	[5690]	[6670]	[7780]										
	8	60	130	280	410	540	645	755	880										
		24	23	22	20	17	14	10	4										
	[4]	[550]	[1180]	[2560]	[3800]	[5030]	[6050]	[7070]	[8260]	[9070]	[9530]								
	15	60	135	290	430	570	685	800	935	1025	1075								
		48	47	45	42	38	32	24	17	10	3								
	[8]	[560]	[1250]	[2650]	[3970]	[5280]	[6480]	[7710]	[8740]	[9770]	[10990]								
	30	65	140	300	450	595	730	870	985	1105	1240								
		96	95	91	87	81	73	64	55	46	35								
	[14]	[570]	[1260]	[2690]	[4050]	[5420]	[6730]	[8040]	[9260]	[10490]	[11800]								
	53	65	140	305	460	610	760	910	1045	1185	1335								
		144	143	140	135	129	121	111	99	88	76								
	[16]	[540]	[1230]	[2660]	[4060]	[5450]	[6800]	[8150]	[9400]	[10660]	[11990]								
	61	60	140	300	460	615	770	920	1060	1205	1355								
		193	192	188	184	178	167	156	141	126	109								
	[20]	[510]	[1200]	[2630]	[4040]	[5450]	[6820]	[8190]	[9520]	[10840]									
	76	60	135	295	455	615	770	925	1075	1225									
		242	241	236	232	226	216	201	184	167									
	[24]	[480]	[1160]	[2600]	[4020]	[5440]	[6840]	[8230]	[9560]	[10900]									
	91	55	130	295	455	615	775	930	1080	1230									
		290	289	282	279	273	260	248	232	215									
	[28]	[420]	[1130]	[2570]	[3990]	[5420]	[6820]	[8220]	[9520]	[10840]									
	106	45	130	290	450	610	770	930	1075	1225									
		339	336	333	328	320	308	295	276	257									
	[32]	[360]	[1100]	[2510]	[3920]	[5330]	[6750]	[8170]	[9440]										
	121	40	125	285	445	600	765	925	1065										
		388	384	381	375	368	354	341	320										
	[36]	[300]	[1060]	[2440]	[3830]	[5220]	[6660]	[8100]	[9330]										
	136	35	120	275	435	590	750	915	1055										
		436	430	421	416	410	396	383	360										
	[40]	[270]	[1020]	[2400]	[3780]	[5150]	[6580]	[8020]	[9220]										
	151	30	115	270	425	580	745	905	1040										
		485	478	466	461	456	441	427	403										
	[50]		[982]	[2180]	[3420]	[4660]	[6050]	[7440]											
	189		110	245	385	525	685	840											
			597	582	576	570	551	534											
	[60]			[1960]	[3250]	[4540]	[5750]	[7080]											
	227			220	365	515	650	800											
				698	691	684	661	641											

[5750] } Torque [lb-in]
650 } Nm
661 } 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

Δ Pressure bar [PSI] 390 cm³/r [23.9 in³/r]

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
17	34	69	103	138	172	207	241	276	310

Flow LPM [GPM]	[1]	[760]	[1570]	[3230]														
	4	85	175	365														
		4	2	1														
	[2]	[780]	[1610]	[3270]	[4910]	[6440]	[7760]	[9080]	[10590]									
	8	90	180	370	555	730	875	1025	1195									
		19	18	17	16	14	12	9	4									
	[4]	[800]	[1640]	[3300]	[4970]	[6570]	[8160]	[9570]	[11270]	[12880]	[14490]							
	15	90	185	375	560	740	920	1080	1275	1455	1635							
		38	38	37	35	33	29	22	14	5	1							
	[8]	[810]	[1650]	[3370]	[5080]	[6740]	[8430]	[10050]	[11620]	[12880]	[14480]							
	30	90	185	380	575	760	950	1135	1315	1455	1635							
		77	76	74	72	68	65	55	45	33	21							
	[14]	[800]	[1620]	[3390]	[5130]	[6810]	[8520]	[10190]	[11860]	[13640]								
	53	90	185	385	580	770	965	1150	1340	1540								
		115	115	112	109	105	100	91	81	79								
	[16]	[750]	[1600]	[3380]	[5120]	[6820]	[8560]	[10230]	[11920]									
	61	85	180	380	580	770	965	1155	1345									
		154	154	151	147	143	132	126	116									
	[20]	[680]	[1580]	[3360]	[5120]	[6840]	[8590]	[10280]	[11980]									
	76	75	180	380	580	775	970	1160	1355									
		193	193	189	187	182	175	162	152									
	[24]	[620]	[1520]	[3280]	[5060]	[6780]	[8530]	[10240]										
	91	70	170	370	570	765	965	1155										
		232	230	229	225	220	212	204										
	[28]	[570]	[1460]	[3210]	[5000]	[6730]	[8480]	[10200]										
	106	65	165	365	565	760	960	1150										
		270	268	266	261	256	248	236										
	[32]	[530]	[1420]	[3140]	[4930]	[6640]	[8380]	[10120]										
	121	60	160	355	555	750	945	1145										
		309	306	304	299	292	282	269										
	[36]	[450]	[1370]	[3010]	[4840]	[6500]	[8250]	[10000]										
	136	50	155	340	545	735	930	1130										
		348	346	340	336	329	317	301										
	[40]	[380]	[1320]	[2880]	[4740]	[6460]	[8120]											
	151	45	150	325	535	730	915											
		387	386	380	375	368	359											
	[50]		[1140]	[2650]	[4540]	[6440]	[8050]											
	189		130	300	515	730	910											
			482	475	469	460	449											
	[60]			[2460]	[4430]	[6360]	[7860]											
	227			280	500	720	890											
				570	562	552	538											

C-5

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous
Intermittent

Peak
No operation

Δ Pressure bar [PSI] 490 cm³/r [30.0 in³/r]

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]
17	34	69	103	138	172	207	241	276

Flow LPM [GPM]	[1]	[1010]	[2200]	[4260]	[6140]					
	4	115	235	480	695					
		7	7	5	3					
	[2]	[1020]	[2110]	[4270]	[6280]	[8350]	[10420]	[12140]		
	8	115	240	480	710	945	1175	1370		
		15	14	13	12	11	8	3		
	[4]	[1030]	[2100]	[4280]	[6410]	[8500]	[10590]	[12500]	[14580]	[16670]
	15	115	235	485	725	960	1195	1410	1645	1885
		30	30	29	28	27	25	21	17	12
	[8]	[1020]	[2090]	[4290]	[6490]	[8620]	[10740]	[12800]	[14930]	
	30	115	235	485	735	975	1215	1445	1685	
		60	60	59	57	54	51	45	38	
	[14]	[1000]	[2080]	[4290]	[6500]	[8650]	[10800]	[12890]		
	53	115	235	485	735	975	1220	1455		
		91	91	89	87	84	79	71		
	[16]	[1100]	[2060]	[4260]	[6480]	[8650]	[10820]	[12900]		
	61	124	235	480	730	975	1220	1460		
		122	122	121	118	114	109	100		
	[20]	[900]	[1980]	[4180]	[6420]	[8620]	[10820]			
	76	100	225	470	725	975	1220			
		153	152	150	147	144	139			
	[24]	[850]	[1930]	[4150]	[6390]	[8580]	[10770]			
	91	95	220	470	720	970	1215			
		184	184	181	180	176	171			
	[28]	[740]	[1840]	[4070]	[6290]	[8500]	[10720]			
	106	85	210	460	710	960	1210			
		215	214	211	208	204	198			
	[32]	[690]	[1710]	[3970]	[6190]	[8420]	[10660]			
	121	80	195	450	700	950	1205			
		245	244	241	237	232	226			
	[36]	[670]	[1560]	[3860]	[6080]	[8340]	[10420]			
	136	75	175	435	685	940	1175			
		276	275	272	265	260	255			
	[40]	[570]	[1400]	[3750]	[5970]	[8140]	[10180]			
	151	65	160	425	675	920	1150			
		307	306	303	295	290	284			
	[50]		[1140]	[3240]	[5220]	[7620]				
	189		130	365	590	860				
			382	379	369	362				
	[60]			[2860]	[4860]	[7140]				
	227			325	550	805				
				454	442	435				

[2860] } Torque [lb-in]
325 } Nm
454 } 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

**Δ Pressure bar [PSI]
625 cm³/r [38.0 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3200]
17	34	69	103	138	172	207	221

Flow LPM [GPM]	[1]	[1060]	[2205]	[4515]	[6690]				
	4	120	250	510	755				
		5	5	4	2				
	[2]	[1090]	[2300]	[4720]	[7025]	[9360]			
	8	125	260	535	795	1060			
		12	12	12	10	6			
	[4]	[1145]	[2450]	[5052]	[7520]	[10090]	[12700]		
	15	130	275	570	850	1140	1434		
		24	24	24	21	16	13		
	[8]	[1195]	[2600]	[5350]	[8195]	[11220]	[13100]	[15800]	[16800]
	30	135	295	605	925	1270	1480	1785	1898
		45	45	44	42	37	35	32	30
	[14]	[1200]	[2600]	[5390]	[8145]	[10570]	[13000]	[15700]	
	53	135	295	610	920	1195	1469	1774	
		72	72	71	68	64	60	56	
	[16]	[1120]	[2530]	[5340]	[8105]	[10530]	[13000]		
	61	125	285	605	915	1190	1469		
		94	94	92	89	85	83		
	[20]	[1050]	[2465]	[5285]	[8080]	[11725]			
	76	120	280	595	915	1325			
		120	119	117	115	110			
	[24]	[950]	[2365]	[5180]	[7990]	[11705]			
	91	105	265	585	905	1320			
		144	143	140	138	132			
	[28]	[855]	[2255]	[5080]	[7915]	[11640]			
	106	95	255	575	895	1315			
		169	168	165	162	156			
	[32]	[730]	[2140]	[4960]	[7775]	[11505]			
	121	80	240	560	880	1300			
		193	192	188	185	179			
	[36]	[555]	[1965]	[4780]	[7585]				
	136	65	220	540	855				
		217	216	213	210				
	[40]	[380]	[1790]	[4600]	[7395]				
	151	45	200	520	835				
		241	240	238	236				
	[50]			[4180]	[6985]				
	189			470	790				
				296	290				
	[60]			[3800]	[6600]				
	227			430	745				
				353	345				

C-5

Flow LPM [GPM]

Hydraulic

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Intermittent

Peak

No operation

**Δ Pressure bar [PSI]
735 cm³/r [45.0 in³/r]**

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]
17	34	52	69	86	103	121	138	155	172

Flow LPM [GPM]	[1]	[1311]	[2775]	[4200]	[5480]	[7000]										
	4	148	314	475	619	791										
		4	4	3	3	2										
	[2]	[1340]	[2856]	[4535]	[6020]	[7551]	[8685]	[10182]	[11121]							
	8	151	323	512	680	853	981	1150	1257							
		10	10	10	10	9	7	6	5							
	[4]	[1253]	[2854]	[4363]	[5813]	[7272]	[8714]	[10135]	[11537]	[12970]	[15040]					
	15	142	322	493	657	822	985	1145	1303	1465	1699					
		20	20	19	18	17	16	14	13	11	11					
	[8]	[1290]	[2889]	[4540]	[6130]	[7703]	[9202]	[10666]	[12192]	[13713]						
	30	146	326	513	693	870	1040	1205	1378	1549						
		40	39	38	38	37	37	35	33	32						
	[14]	[1277]	[2821]	[4528]	[6180]	[7795]	[9338]	[10877]	[12419]							
	53	144	319	512	698	881	1055	1229	1403							
		61	60	59	58	57	56	54	52							
	[16]	[1196]	[2753]	[4478]	[6148]	[7768]	[9376]	[10984]								
	61	135	311	506	695	878	1059	1241								
		82	80	79	78	77	76	74								
	[20]	[1092]	[2794]	[4320]	[6021]	[7697]	[9311]	[10907]								
	76	123	316	488	680	870	1052	1232								
		102	101	101	99	97	96	93								
	[24]	[1206]	[2556]	[4162]	[5871]	[7564]	[9289]									
	91	136	289	470	663	855	1049									
		123	122	120	119	118	116									
	[28]	[1083]	[2338]	[4040]	[5666]	[7365]	[9022]									
	106	122	264	456	640	832	1019									
		145	142	141	139	137	135									
	[32]	[950]	[2110]	[3795]	[5457]	[7122]	[8828]									
	121	107	238	429	617	805	997									
		163	162	162	159	159	156									
	[36]	[726]	[1845]	[3517]	[5223]	[6853]										
	136	82	208	397	590	774										
		184	183	182	181	179										
	[40]	[515]	[2227]	[3270]	[4965]	[6672]										
	151	58	252	369	561	754										
		203	202	202	201	199										
	[50]			[3869]	[4870]	[5850]										
	189			437	550	661										
				254	252	250										
	[60]				[4856]	[6604]										
	227				549	746										
					303	301										

[6604] } Torque [lb-in]
746 } Nm
301 } 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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Peak

Intermittent

No operation

Δ Pressure bar [PSI] 805 cm³/r [49.0 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]
17	34	52	69	86	103	121	138	155	172

Flow LPM [GPM]	[1]	[1455]	[3100]	[4680]	[6031]	[7799]					
	4	164	350	529	681	881					
		4	4	2	2	1					
	[2]	[1483]	[3173]	[5121]	[6432]	[8510]	[9633]	[11319]	[12127]		
	8	168	359	579	727	961	1088	1279	1370		
		9	9	9	8	7	6	5	5		
	[4]	[1547]	[3331]	[5292]	[7000]	[8714]	[10075]	[11352]	[12965]	[14564]	[16377]
	15	175	376	598	790	984	1138	1283	1465	1645	1850
		19	19	18	17	16	15	14	12	11	10
	[8]	[1599]	[3473]	[5415]	[7170]	[8934]	[10629]	[12300]	[14004]	[15441]	
	30	181	392	612	810	1009	1201	1390	1582	1745	
		35	35	34	33	32	31	29	29	28	
	[14]	[1599]	[3469]	[5415]	[7093]	[9024]	[10658]	[12283]	[13726]		
	53	181	392	612	801	1020	1204	1388	1551		
		56	56	55	53	53	52	50	50		
	[16]	[1543]	[3395]	[5357]	[7032]	[8983]	[10640]	[12010]			
	61	174	384	605	794	1015	1202	1357			
		73	73	72	70	69	68	67			
	[20]	[1457]	[3312]	[5292]	[6968]	[8943]	[10583]	[12146]			
	76	165	374	598	787	1010	1196	1372			
		93	92	91	89	88	87	86			
	[24]	[1352]	[3183]	[5088]	[6811]	[8812]	[10411]				
	91	153	360	575	769	996	1176				
		112	112	111	110	108	106				
	[28]	[1213]	[3055]	[5047]	[6713]	[8681]	[10411]				
	106	137	345	570	758	981	1176				
		131	131	131	129	128	127				
	[32]	[1075]	[2907]	[4884]	[6546]	[8395]	[10060]				
	121	121	328	552	740	949	1137				
		150	149	149	146	145	144				
	[36]	[823]	[2692]	[4663]	[6320]	[8118]					
	136	93	304	527	714	917					
		168	168	168	167	165					
	[40]	[592]	[2477]	[4426]	[6085]	[7832]					
	151	67	280	500	688	885					
		187	186	186	185	184					
	[50]		[2730]	[4214]	[5849]	[7603]					
	189		308	476	661	859					
			234	233	231	230					
	[60]			[3806]	[5459]	[7407]					
	227			430	617	837					
				280	277	275					

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous
Intermittent

Peak
No operation

Δ Pressure bar [PSI] 985 cm³/r [60.0 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]
17	34	52	69	86	103	121	138

Flow LPM [GPM]	[1]	[1890]	[4110]	[5730]	[7640]	[9550]			
	4	215	465	645	865	1080			
		3	3	2	2	1			
	[2]	[1910]	[4140]	[6270]	[8300]	[10420]	[12500]	[13860]	[14920]
	8	215	470	710	940	1175	1410	1565	1685
		8	8	7	7	6	5	4	3
	[4]	[1980]	[4290]	[6480]	[8540]	[10670]	[12800]	[13900]	[15850]
	15	225	485	730	965	1205	1445	1570	1790
		15	15	15	14	14	13	13	12
	[8]	[2030]	[4400]	[6630]	[8790]	[10940]	[13090]	[14500]	[16580]
	30	230	495	750	995	1235	1480	1640	1875
		30	30	30	29	28	27	26	25
	[14]	[2020]	[4390]	[6630]	[8860]	[11050]	[13240]	[15040]	
	53	230	495	750	1000	1250	1495	1700	
		45	45	45	44	43	42	41	
	[16]	[2010]	[4320]	[6560]	[8790]	[11000]	[13260]		
	61	225	490	740	995	1245	1500		
		61	61	61	60	59	58		
	[20]	[1910]	[4220]	[6480]	[8720]	[10950]	[13160]		
	76	215	475	730	985	1235	1485		
		77	77	76	76	75	74		
	[24]	[1810]	[4060]	[6230]	[8500]	[10790]	[12990]		
	91	205	460	705	960	1220	1470		
		92	92	92	91	90	89		
	[28]	[1620]	[3920]	[6180]	[8420]	[10630]	[12820]		
	106	185	445	700	950	1200	1450		
		107	107	107	106	105	103		
	[32]	[1480]	[3740]	[5980]	[8200]	[10280]			
	121	165	425	675	925	1160			
		123	123	122	121	120			
	[36]	[1140]	[3490]	[5710]	[7930]	[9940]			
	136	130	395	645	895	1125			
		138	138	138	137	135			
	[40]	[850]	[3240]	[5420]	[7640]	[9590]			
	151	95	365	610	865	1085			
		153	153	152	151	150			
	[50]		[2960]	[5160]	[7350]	[9310]			
	189		325	585	830	1050			
			191	190	189	188			
	[60]			[4660]	[7160]	[9070]			
	227			525	810	1025			
				230	229	226			

[7160] } Torque [lb-in]
810 } Nm
229 } Speed RPM

6000 Series

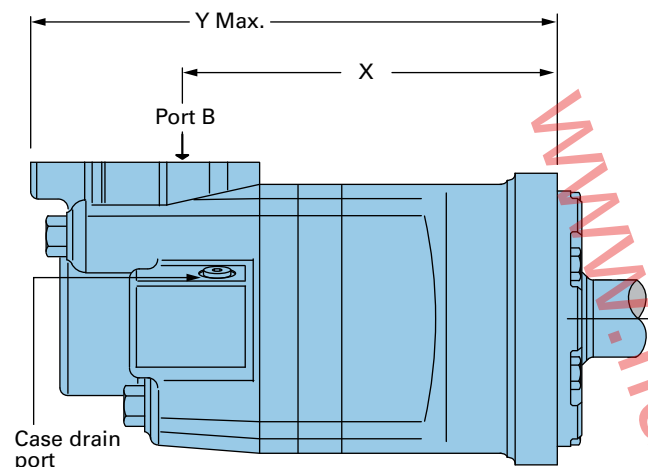
Dimensions

Standard mount

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)
- 4 Bolt 3/4 inch Split flange ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- G 1 (BSP) Staggered ports (2)
- G 1/4 (BSP) Case drain port (1)
- 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 mount



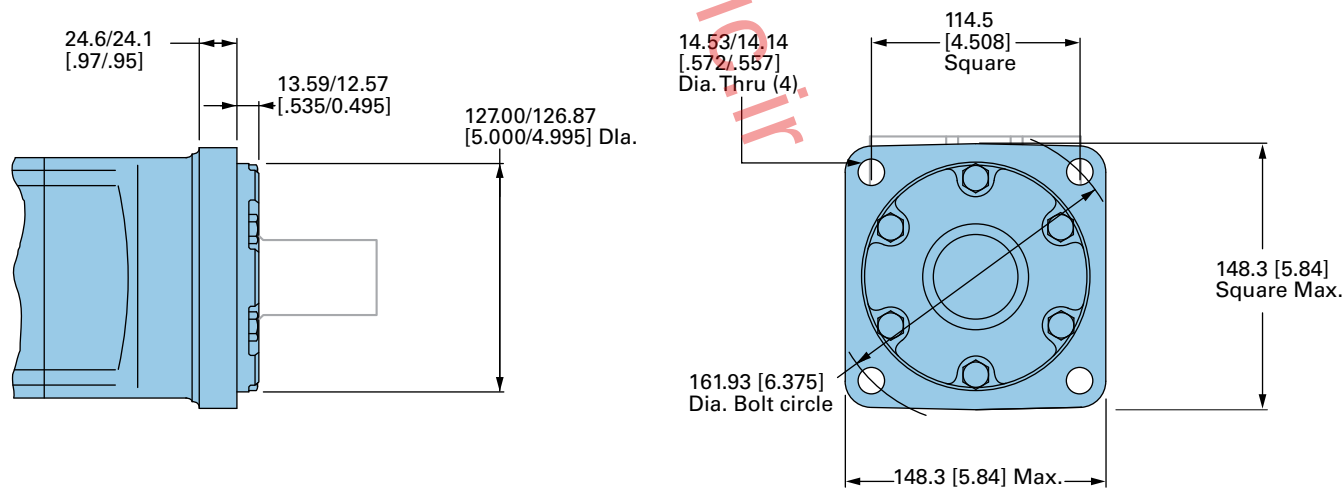
Standard rotation viewed from shaft end

- Port A pressurized — CW
- Port B pressurized — CCW

Standard motor mount dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
195 [11.9]	187.7 [7.39]	270.4 [10.65]
245 [15.0]	193.3 [7.61]	276.0 [10.87]
310 [19.0]	200.7 [7.9]	283.3 [11.15]
390 [23.9]	209.3 [8.24]	292.1 [11.50]
490 [30.0]	220.5 [8.68]	303.2 [11.94]
625 [38.0]	235.0 [9.25]	317.9 [12.52]
735 [45.0]	247.5 [9.74]	330.5 [13.01]
805 [49]	254.89 [10.035]	337.8 [13.30]
985 [60.0]	274.9 [10.82]	357.6 [14.08]

Standard SAE CC Flange



Wheel mount

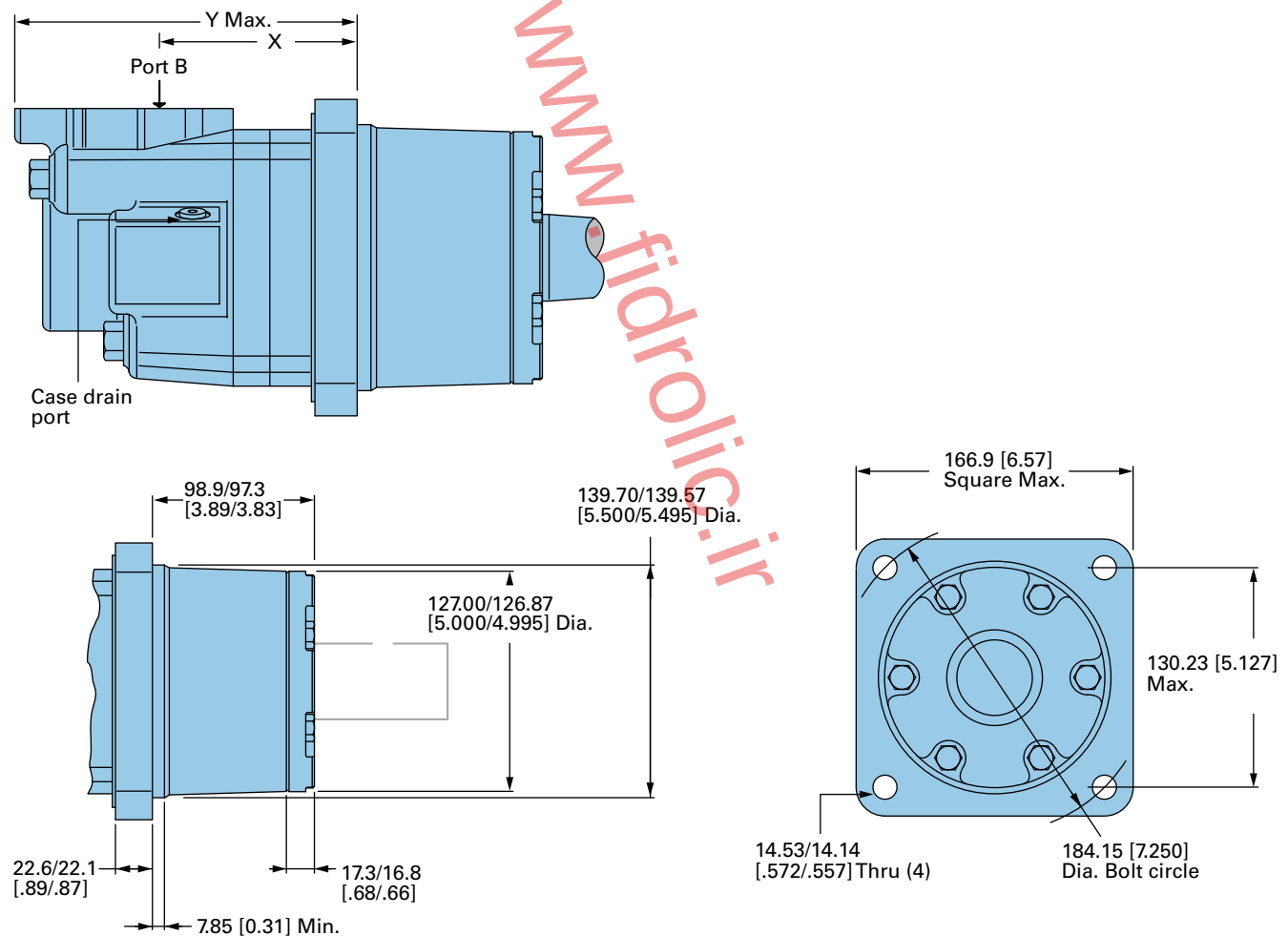
Ports

- 1 5/16 -12 UN-2B SAE O-ring staggered ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- 4 Bolt 3/4 inch split flange ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case drain port (1)
- G 1 (BSP) Staggered ports (2)
- G 1/4 (BSP) Case drain port (1)
- 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



C-5

6000 Series

Dimensions

Global mount (ISO)

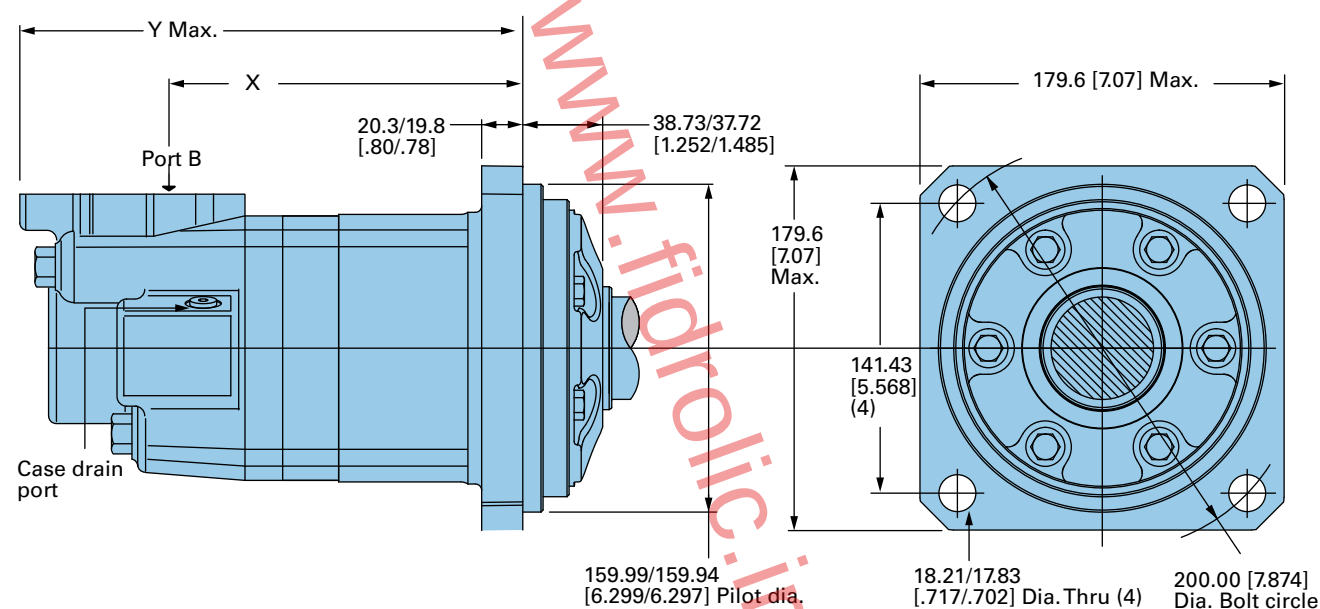
Ports

- 1 5/16 -12 UN-2B SAE O-ring staggered ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- 4 Bolt 3/4 inch Split flange ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- G 1 (BSP) Staggered ports (2)
- G 1/4 (BSP) Case drain port (1)
- 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)

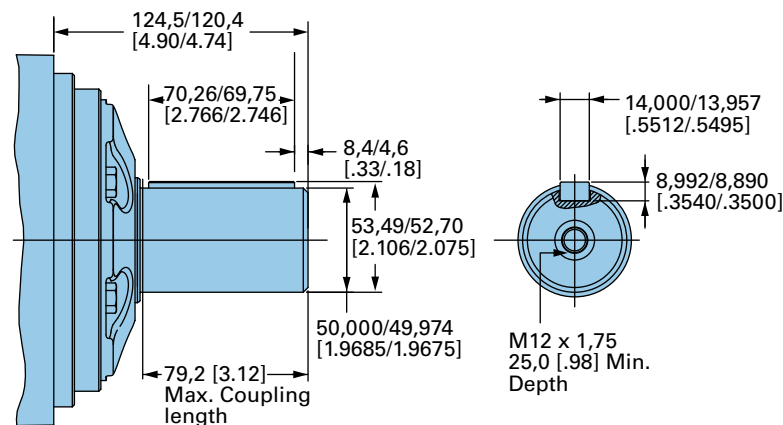
Standard rotation viewed from shaft end

- Port A pressurized — CW
- Port B pressurized — CCW

Global mount (ISO)



50 mm Dia. Straight shaft



Bearingless

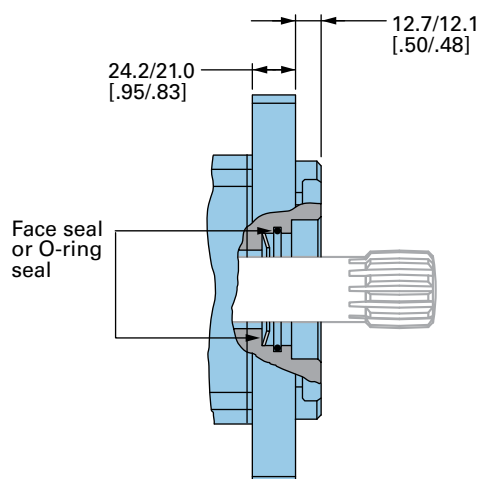
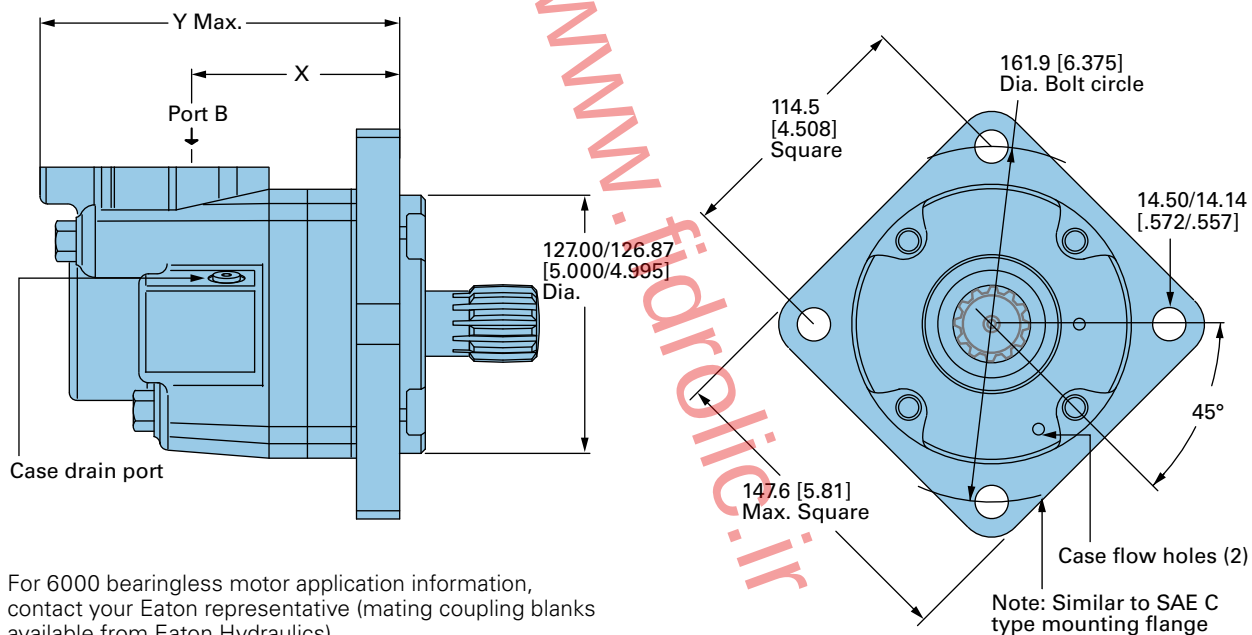
Ports

- 1 5/16 -12 UN-2B SAE O-ring staggered ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- 4 Bolt 3/4 inch split flange ports (2)
- 7/16 -20 UNF-2B SAE O-ring case drain port (1)
- G 1 (BSP) staggered ports (2)
- G 1/4 (BSP) case drain port (1)
- 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 drive end

- Port A pressurized — CW
- Port B pressurized — CCW

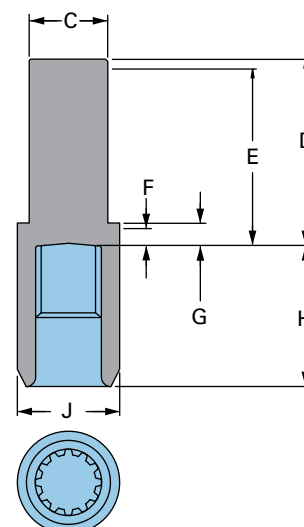
Bearingless



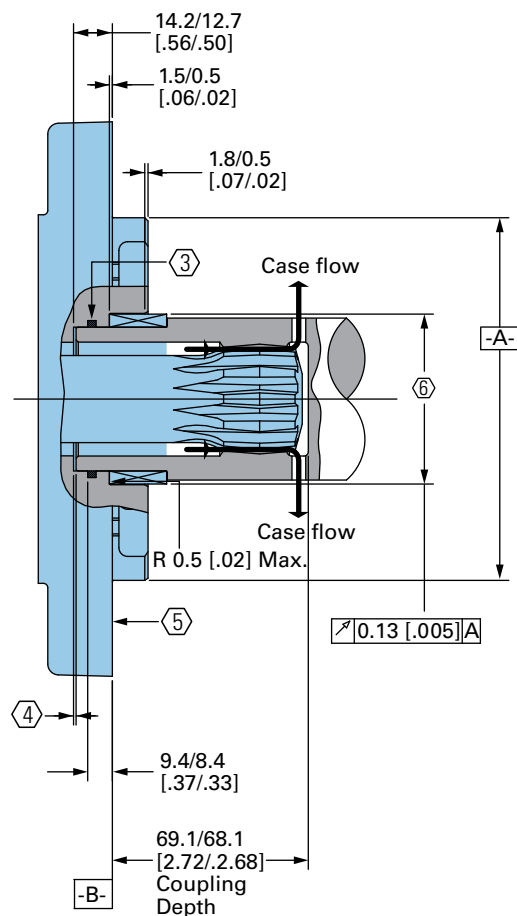
Bearingless blank dimensions

- C 47.2 [1.86] Dia.
- D 112.5 [4.39] Max.
- E 106.4 [4.19]
Full form dia.
- F 6.9 [.27] Min.
Full form dia.
- G 10.2 [.40] Max.
- H 86.1 [3.39] Max.
- J 66.5 [2.62] Dia.

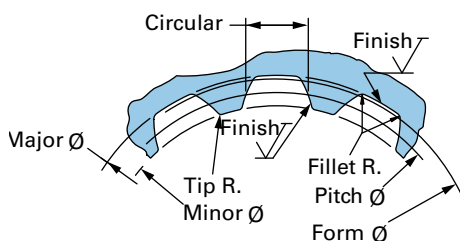
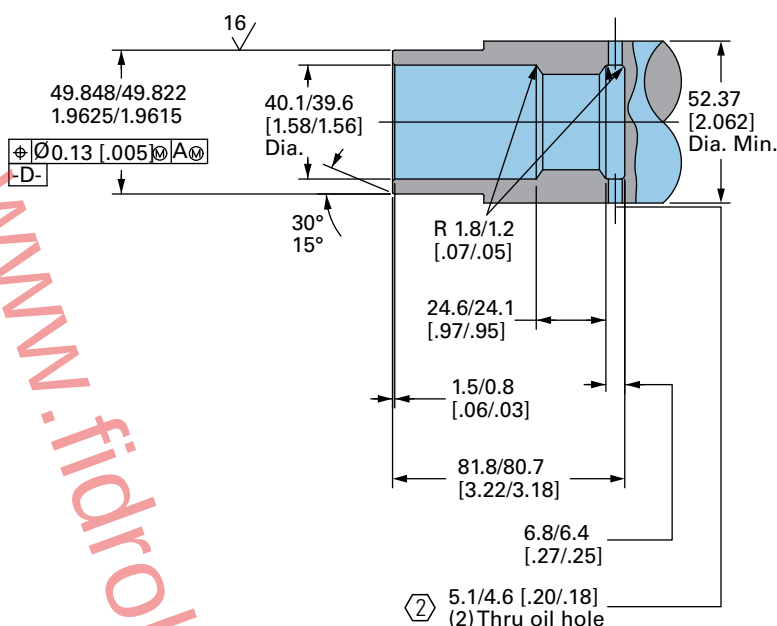
Mating coupling blank Eaton Part no. 12778-002



Bearingless



C-5



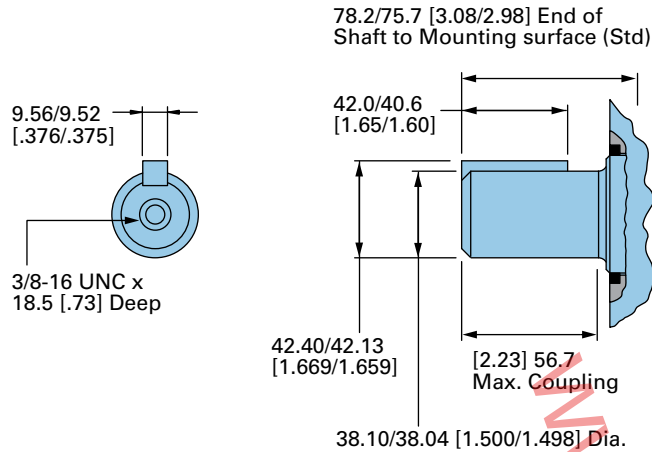
- Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0.076 - 1.02 [.030 - .040] (dimensions apply after heat treat).
- Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- Seal to be furnished with motor for proper oil circulation thru splines.
- Some means of maintaining clearance between shaft and mounting flange must be provided.
- Similar to SAE "C" Four Bolt Flange.
- 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]
Base diameter	Ref. 31.054652 [1.2226241] 0.21 [.008] D
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	0.038 [.0015]
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	

Shafts splined

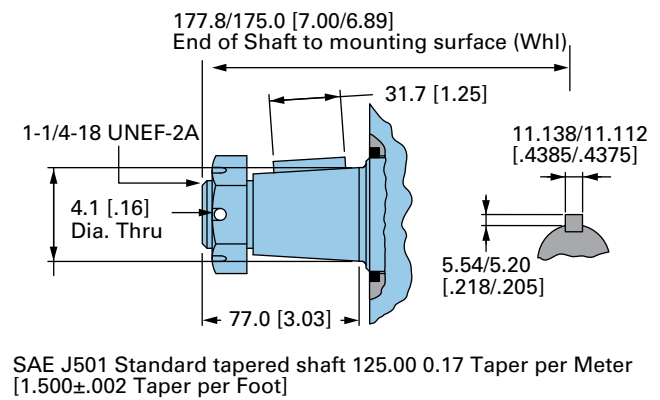
Code: 01 1 1/2 Inch Straight

1328 [11750] Max. Torque Nm [lb-in]



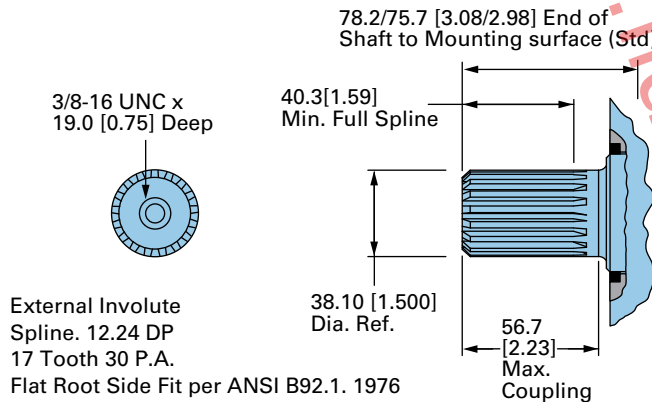
Code: 02 1 3/4 Inch tapered

2107 [18650] Max. Torque Nm [lb-in]

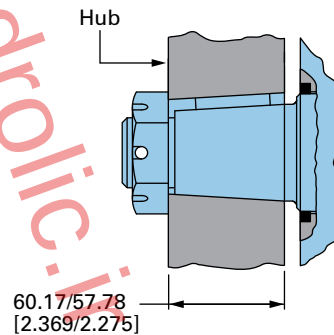


Code: 03 1 1/2 Inch 17 Tooth splined

1328 [11750] Max. Torque Nm [lb-in]



Tapered shaft hub data

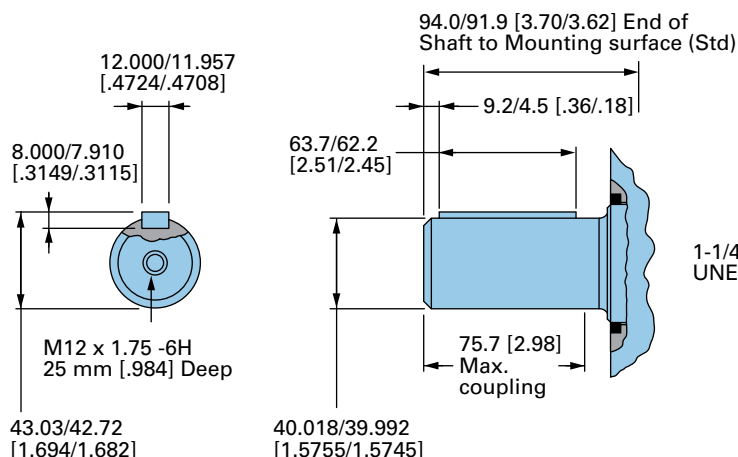


Recommended Torque:
(645 Nm [475 lb-ft] Dry)
(510 Nm [375 lb-ft] Lub)

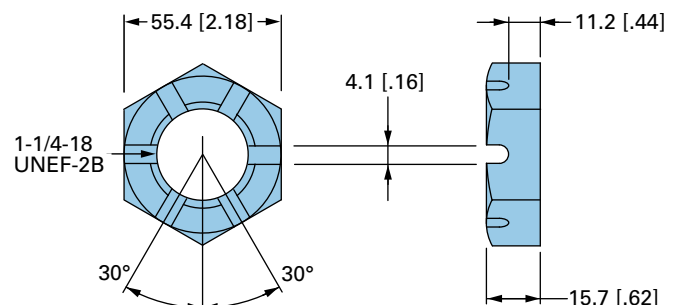
Plus Torque required to
align the slotted nut with
the Shaft Crosshole.

Code: 04 40 mm Straight

1328 [11750] Max. Torque Nm [lb-in]



Slotted hexagon nut



6000 Series

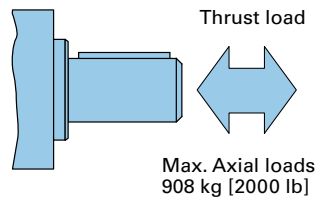
Shaft side load capacity

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].

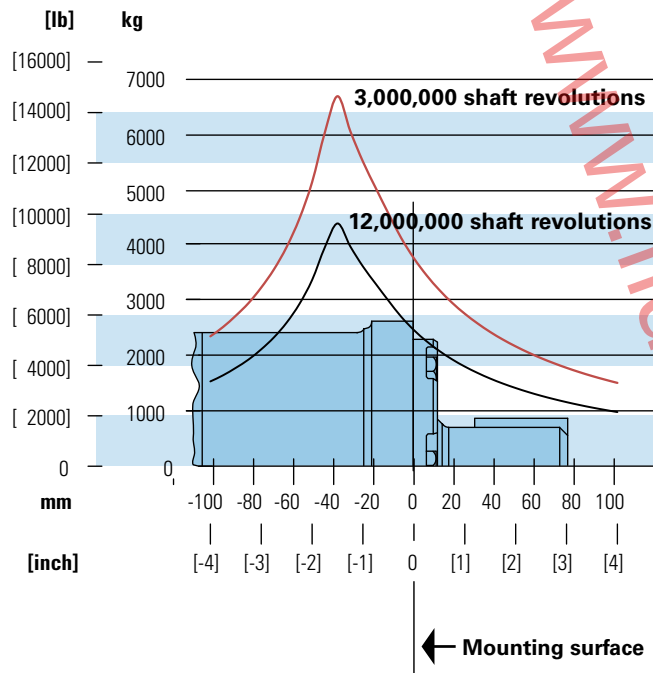
Each curve is based on B10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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.

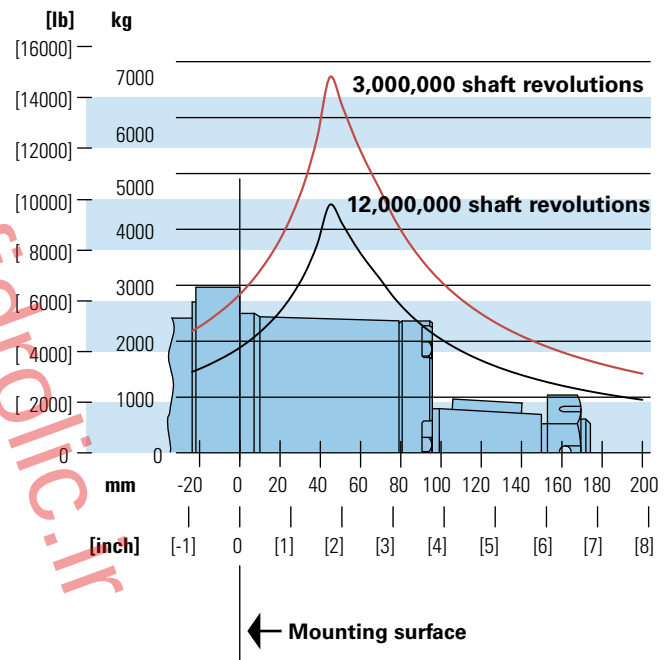


RPM	Multiplication factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

Standard motor straight and splined shafts



Wheel motor tapered shaft



C-5

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.

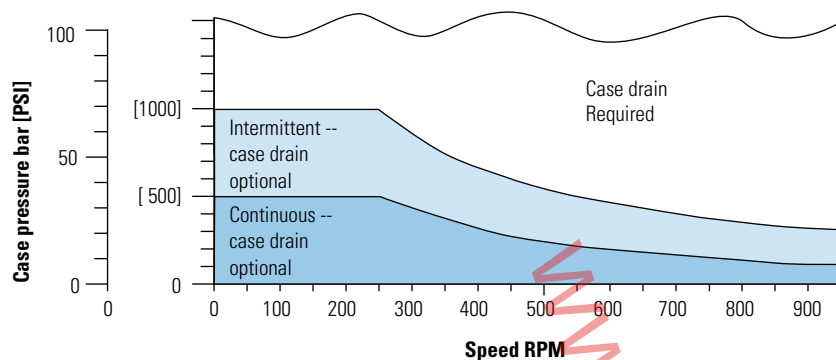
Case porting advantage

Contamination control — flushing the motor case.

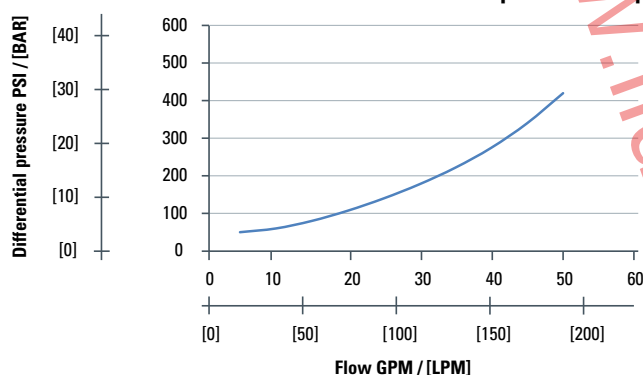
Cooler motor — exiting oil draws motor heat away.

Extend motor seal life — maintain low case pressure with a preset restriction in the case drain line.

Case pressure seal limitation



6000 Series NLPD - No load pressure drop



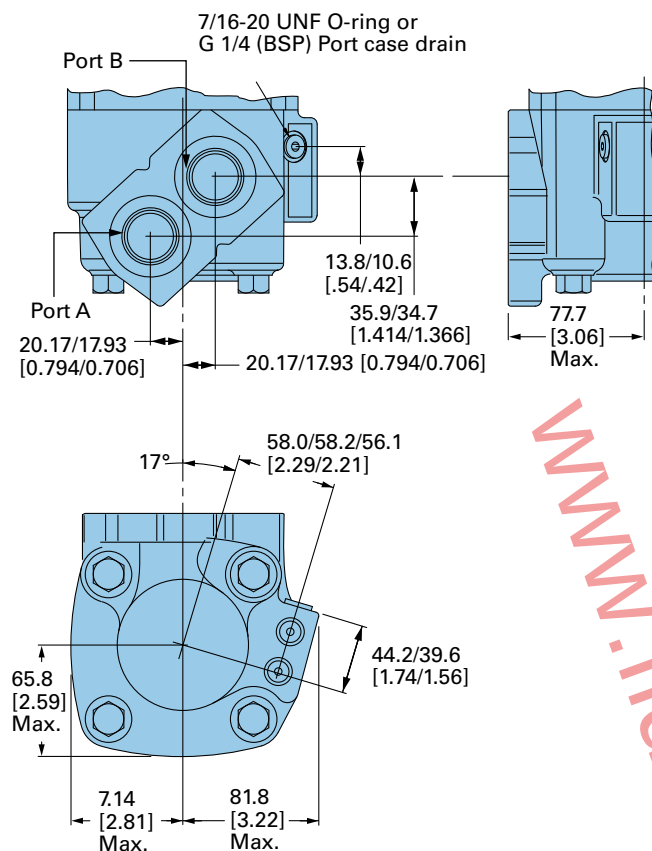
6000 Series

Dimensions

Ports

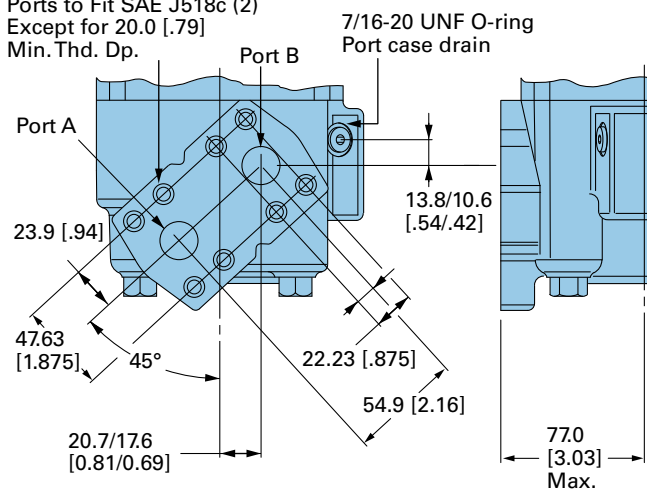
Code: AA 1-5/16-12 O-ring ports

Code: AC G 1 (BSP) ports

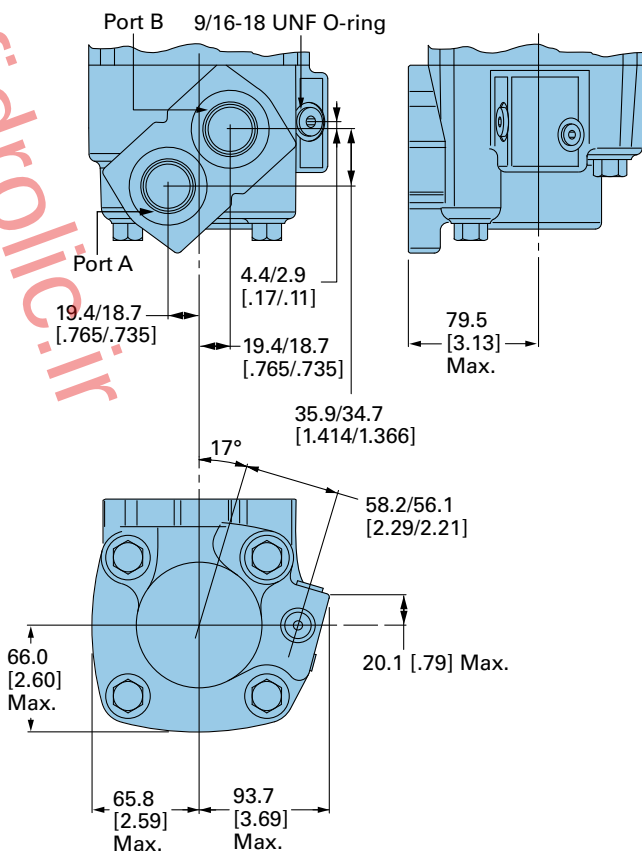


Code: AB 4 Bolt 3/4 Inch split flange

Ports to Fit SAE J518c (2)
Except for 20.0 [.79]
Min. Thd. Dp.



Code: AA 1 5/16 -12 O-ring ports (2) with shuttle



C-5

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 ³ /r [in ³ /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	1 5/16 O-ring	112-1058	-1059	-1060	-1061	-1062	-1109	-1163	—	-1063
	17 T Splined	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 AH), 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 12)

Ports - G1 (BSP) staggered G 1/4 case drain Code: (AC & 03)

Paint - Low gloss black (code AA)

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.

C-5

Mounting	Shaft	Port size	Displ. cm³/r [in³/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 30-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 30-digits of the code must be present when ordering.

M	0 6		* * *			* *		* *		* *		* *		*	0 0		*	*	0 0		0 0		* *		* *		0 0		F
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

1		Product		11 12		Ports description	
		M Motor				AA 1.3125-12 UNF-2B SAE O-Ring ports--staggered ports	
2 3		Series				AB SAE 19.05 [.750] Dia. 4-Bolt split flange - staggered ports	
		06 6000 Series				AC G 1 Staggered Ports	
4 5 6		Displacement cm³/r [in³/r]				AG .750-16 UNF-2B SAE O-ring ports - staggered	
		120 195.8 [11.95]		13 14		Case flow	
		150 246.5 [15.04]				00 None	
		190 312.0 [19.04]				02 .4375-20 UNF-2B SAE O-Ring port with check valve	
		239 391.7 [23.90]				03 G 1/4 BSP straight thread port with check valve	
		300 491.4 [29.99]				06 .5625-18 UNF-2B SAE O-Ring port with shuttle valve	
		381 624.2 [38.09]		15		Low pressure relief	
		450 737.4 [45.00]				0 None	
		490 803.4 [49.03]				A Set at 4.5 [65 lbf/in ²]	
		600 982.7 [59.97]				B Set at 15.2 [220 lbf/in ²]	
7 8		Mounting type		16 17		Pressure/flow option	
		AA Bearingless, 4 Bolt: 127,0 [5.00] Pilot Dia. and 14,35 [.565] Dia. Holes 162,0 [6.38] Dia. Bolt circle				00 None	
		AB Standard, 4 bolt (SAE CC): 127,0 [5.00] pilot Dia. and 14,35 [.565] Dia. Holes on 162,0 [6.38] Dia. B.C.		18		Geroler option	
		AC Wheel, 4 Bolt 139,7 [5.50] Pilot Dia. and 14,35 [.565] Dia. Holes on 184,2 [7.25] Dia. Bolt circle				0 Standard	
		AH Standard, 4 Bolt: 160.0 [6.30] pilot Dia. 18,01 [.709] Dia. Holes on 200.0 [7.87] Dia. Bolt circle.				2 Tight fitting	
		AL Wheel, 4 Bolt: 160.0 [6.30] Pilot Dia. with 5.8 [.23] pilot length and 18.00 [.709] Dia. Holes on 200.0 [7.874] Bolt circle (ISO compatible)		19		Seal option	
9 10		Output shaft description				0 Standard	
		00 None (Bearingless)				1 Viton	
		01 38,10 [1.50] Dia. Straight shaft with .375-16 UNC-2B Thread in End, 9,52 [.375] Sq x 41,28 [1.625] straight key		20 21		Accessories	
		02 44,45 [1.75] Dia. .125:1 tapered shaft per SAE J501 with 1.25-18 UNEF-2A threaded shaft end, 11,11 [.4375] Sq. x 31,8 [1.25] straight key				00 None	
		03 38,10 [1.50] Dia. Flat root side fit, 17 tooth, 12/24 DP 30 DEG. Involute spline with .375-16 UNC-2B thread in end 40.4 [1.59] minimum full spline length		22 23		Special features (hardware)	
		04 40,00 [1.575] Dia. Straight shaft with M12 x 1.75-6H thread in end, 12W x 8H x 63L [.472W x .313H x 2.480L] Key				00 None	
		12 49,99 [1.968] Dia. Straight shaft with M12 x 1.75-6H thread in End, 14W x 9H x 70L [.550W x .354H x 2.756L] Key		24 25		Special features (assembly)	
						00 None	
						AA Reverse rotation	

M	06		***			**		**		**		**		*	00		*	*	00		00		**		**		00		F
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

26 27

Paint/Packaging

- 00 No Paint, Individual box
- AA Low gloss black primer
- AD No Paint, Bulk box option
- AE Low gloss black primer, Bulk box option
- AK Epoxy coated black

28 29

Customer ID

- 00 None

30

Design code

- F Sixth

See Eatonpowersource.com/ for more options and configurations.

10,000 Series

Highlights

Description:

This is the biggest disc valve motor of our line with up to 170 lpm [45 gpm] and 2700 Nm [23,910 in-lbs] in-lb of torque in continuous mode, this motor is powerful and yet provides exceptional efficiency and side-load capability.



Features:

- High torque and flow
- Speed sensing capability
- Low pressure loss even in higher flows

Benefits:

- High power density for demanding mobile and industrial applications
- Large front bearing pack

Applications:

- Boring
- Industrial
- Metal forming
- Port equipment
- Saw mill

Specifications

Geroler element	4 Displacements
Flow l/min [GPM]	170 [45] Continuous** 265 [70] Intermittent*
Speed RPM	501 Cont.** 784 Inter.*
Pressure bar [PSI]	205 [3000] Cont.** 275 [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.

C-6



Boring



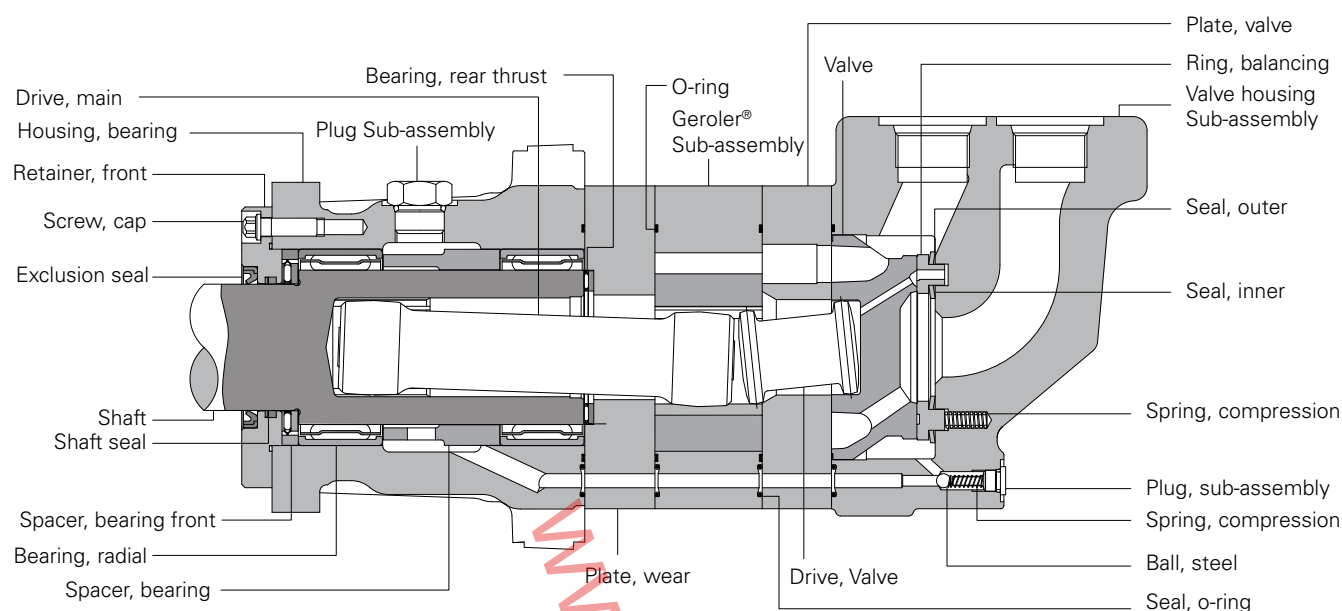
Metal forming



Port equipment



Vertical drilling

**10,000 series motors**

Displ. cm³/r [in³/rev]		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 in low speed high torque mode at approximately 30% of continuous pressure and 50% of continuous flow for 30 minutes in each direction before application of full load. Ensure that motor is filled with fluid prior to operation.

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 13 cSt [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: 20/18/13

Thermal shock warning:

Do not operate the motor with fluid that is 70F or more above the motor temperature.

Minimum delta pressure warning:

Motors must not run with equal inlet and outlet pressure 50 PSID minimum delta pressure between motor ports is required at all times (except when switching direction of rotation)

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 345 cm³/r [21.0 in³/r]

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]
17	34	69	103	138	172	207	241	276

Flow LPM [GPM]	[1]	[600]	[1310]							
	4	70	150							
		3	1							
	[2]	[740]	[1510]	[3050]	[4600]	[6140]	[7680]			
	8	85	170	345	520	695	870			
		21	19	15	11	8	4			
	[4]	[730]	[1500]	[3040]	[4590]	[6140]	[7680]	[9220]	[10770]	[12310]
	15	80	170	345	520	695	870	1040	1215	1390
		43	41	37	33	30	26	22	18	14
	[8]	[720]	[1490]	[3030]	[4580]	[6120]	[7670]	[9210]	[10750]	[12300]
	30	80	170	340	515	690	865	1040	1215	1390
		87	86	82	78	74	70	66	62	58
	[12]	[700]	[1470]	[3020]	[4560]	[6100]	[7650]	[9190]	[10740]	[12280]
	45	80	165	340	515	690	865	1040	1215	1385
		131	130	127	123	118	114	110	106	102
	[16]	[680]	[1450]	[3000]	[4540]	[6080]	[7630]	[9170]	[10720]	[12260]
	61	75	165	340	515	685	860	1035	1210	1385
		176	175	172	167	163	158	154	149	145
	[20]	[660]	[1430]	[2970]	[4520]	[6060]	[7600]	[9150]	[10690]	[12230]
	76	75	160	335	510	685	860	1035	1210	1380
		221	220	217	212	207	202	198	193	189
	[24]	[630]	[1400]	[2950]	[4490]	[6030]	[7580]	[9120]	[10660]	[12210]
	91	70	160	335	505	680	855	1030	1205	1380
		266	265	261	256	252	246	242	237	232
	[28]	[600]	[1370]	[2920]	[4460]	[6000]	[7550]	[9090]	[10640]	[12180]
	106	70	155	330	505	680	855	1025	1200	1375
		310	309	306	301	296	291	286	280	275
	[32]	[570]	[1340]	[2890]	[4430]	[5970]	[7520]	[9060]	[10610]	[12150]
	121	65	150	325	500	675	850	1025	1200	1375
		356	355	351	346	340	335	329	324	319
	[36]	[540]	[1310]	[2850]	[4400]	[5940]	[7480]	[9030]	[10570]	[12120]
	136	60	150	320	495	670	845	1020	1195	1370
		400	399	396	390	384	379	373	368	362
	[40]	[500]	[1270]	[2820]	[4360]	[5910]	[7450]	[8990]	[10540]	
	151	55	145	320	495	670	840	1015	1190	
		445	444	441	435	429	423	417	412	
	[45]	[460]	[1220]	[2760]	[4300]	[5840]	[7380]	[8910]	[10450]	
	170	50	140	310	485	660	835	1005	1180	
		501	500	498	492	486	480	473	467	
	[60]		[1080]	[2620]	[4160]	[5710]	[7250]	[8800]		
	227		120	295	470	645	820	995		
			668	665	658	651	644	637		
	[70]		[960]	[2510]	[4050]	[5590]	[7140]	[8680]		
	265		110	285	460	630	805	980		
			784	777	769	761	754	746		

[2510]
 285 } Torque [lb-in]
 777 } Nm
 Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Intermittent

Peak

No operation

**Δ Pressure bar [PSI]
480 cm³/r [29.3 in³/r]**

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]
17	34	69	103	138	172	207	241	276

Flow LPM [GPM]	[1]	[760]	[1540]	[3120]	[4640]								
	4	85	175	355	525								
		6	5	4	2								
	[2]	[1040]	[2140]	[4320]	[6500]	[8690]	[10870]						
	8	120	240	490	735	980	1230						
		15	13	11	8	5	2						
	[4]	[1040]	[2130]	[4310]	[6490]	[8680]	[10860]	[13050]	[15230]	[17410]			
	15	120	240	485	735	980	1225	1475	1720	1965			
		31	29	27	24	21	18	16	13	10			
	[8]	[1020]	[2110]	[4290]	[6480]	[8660]	[10840]	[13030]	[15210]	[17390]			
	30	115	240	485	730	980	1225	1470	1720	1965			
		62	61	58	55	53	50	47	44	42			
	[12]	[990]	[2080]	[4270]	[6450]	[8630]	[10820]	[13000]	[15180]	[17370]			
	45	110	235	480	730	975	1220	1470	1715	1965			
		94	93	90	87	84	81	78	75	73			
	[16]	[960]	[2060]	[4240]	[6420]	[8600]	[10790]	[12970]	[15150]	[17340]			
	61	110	235	480	725	970	1220	1465	1710	1960			
		125	124	122	119	116	113	110	107	104			
	[20]	[930]	[2020]	[4200]	[6390]	[8570]	[10750]	[12940]	[15120]	[17300]			
	76	105	230	475	720	970	1215	1460	1710	1955			
		157	156	154	150	147	144	141	138	135			
	[24]	[890]	[1980]	[4170]	[6350]	[8530]	[10720]	[12900]	[15080]				
	91	100	225	470	715	965	1210	1460	1705				
		189	188	185	182	179	175	172	169				
	[28]	[850]	[1940]	[4130]	[6310]	[8490]	[10680]	[12860]	[15040]				
	106	95	220	465	715	960	1205	1455	1700				
		221	220	217	214	210	207	203	200				
	[32]	[810]	[1900]	[4080]	[6270]	[8450]	[10630]	[12820]	[15000]				
	121	90	215	460	710	955	1200	1450	1695				
		252	251	249	245	242	238	235	231				
	[36]	[760]	[1850]	[4040]	[6220]	[8400]	[10590]	[12770]					
	136	85	210	455	705	950	1195	1445					
		282	281	280	277	273	270	266					
	[40]	[710]	[1800]	[3990]	[6170]	[8350]	[10540]	[12720]					
	151	80	205	450	695	945	1190	1435					
		318	316	312	308	305	301	297					
	[45]	[647]	[1740]	[3920]	[6110]	[8290]	[10470]	[12660]					
	170	75	195	445	690	935	1185	1430					
		354	353	351	348	344	340	336					
	[60]	[430]	[1520]	[3710]	[5890]	[8070]	[10260]	[12440]					
	227	50	170	420	665	910	1160	1405					
		474	473	471	467	462	458	454					
	[70]		[1360]	[3540]	[5730]	[7910]	[10100]	[12280]					
	265		155	400	645	895	1140	1385					
			552	550	546	541	536	532					

C-6

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No operation

Δ Pressure bar [PSI] 665 cm³/r [40.6 in³/r]

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]	[3750]
17	34	52	69	86	103	121	138	155	172	190	207	224	241	259

Flow LPM [GPM]	[1]	[1470] 165 4	[3010] 340 3	[4550] 515 3	[6100] 690 2	[7630] 860 1											
	4																
	[2]	[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					
	8																
	[4]	[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	
	15																
	[8]	[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 32	[23050] 2605 31	
	30																
	[12]	[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	[19930] 2250 55	[21470] 2425 54	[23020] 2600 53	
	45																
	[16]	[1360] 155 89	[2910] 330 88	[4450] 505 87	[5990] 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	[19890] 2245 77	[21400] 2420 76		
	61																
	[20]	[1310] 150 112	[2860] 375 111	[4400] 495 110	[5940] 670 109	[7490] 845 108	[9030] 1020 107	[10580] 1195 106	[12120] 1370 104	[13660] 1545 103	[15210] 1720 102	[16750] 1890 101	[18300] 2070 100	[19840] 2240 99			
	76																
	[24]	[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				
	91																
	[28]	[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					
	106																
	[32]	[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					
	121																
[36]	[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						
136																	
[40]	[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						
151																	
[45]	[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							
170																	
[60]	[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								
227																	
[70]	[380] 45 396	[1930] 220 393	[3470] 390 391	[5010] 565 390	[6560] 740 388	[8100] 915 387	[9640] 1090 385	[11190] 1265 384									
265																	

[3470] } Torque [lb-in]
390 } Nm
391 } Speed RPM

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 25 cSt [120 SUS]. Actual data may vary slightly from unit to unit in production.

Continuous

Intermittent

Peak

No operation

**Δ Pressure bar [PSI]
940 cm³/r [57.4 in³/r]**

[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]	[3250]	[3500]
17	34	52	69	86	103	121	138	155	172	190	207	224	241

Flow LPM [GPM]	[1]	[2080]	[4260]	[6440]												
	4	235	480	730												
		3	2	1												
	[2]	[2090]	[4270]	[6450]	[8640]	[10820]	[13000]	[15190]	[17370]							
	8	235	480	730	975	1220	1470	1715	1965							
		7	6	5	5	4	3	2	1							
	[4]	[2080]	[4260]	[6440]	[8620]	[10810]	[12990]	[15170]	[17360]	[19540]	[21720]	[23910]	[26090]	[28270]	[30460]	
	15	235	480	730	975	1220	1470	1715	1960	2210	2455	2700	2950	3195	3440	
		15	14	13	13	12	11	10	9	8	7	7	6	5	4	
	[8]	[2040]	[4220]	[6400]	[8590]	[10770]	[12950]	[15140]	[17320]	[19500]	[21690]	[23870]				
	30	230	475	725	970	1215	1465	1710	1955	2205	2450	2695				
		31	30	29	28	28	27	26	25	24	23	22				
	[12]	[1990]	[4170]	[6350]	[8540]	[10720]	[12900]	[15090]	[17270]	[19450]	[21640]					
	45	225	470	715	965	1210	1460	1705	1950	2200	2445					
		47	46	45	44	43	43	42	41	40	39					
	[16]	[1930]	[4110]	[6290]	[8480]	[10660]	[12840]	[15030]	[17210]	[19390]						
	61	220	465	710	960	1205	1450	1700	1945	2190						
		63	62	61	60	59	58	58	57	56						
	[20]	[1860]	[4040]	[6220]	[8410]	[10590]	[12770]	[14960]	[17140]	[19320]						
	76	210	455	705	950	1195	1445	1690	1935	2185						
		79	78	77	76	75	74	73	72	72						
	[24]	[1780]	[3970]	[6150]	[8330]	[10520]	[12700]	[14880]	[17080]							
	91	200	450	695	940	1190	1435	1680	1930							
		95	94	93	92	91	90	89	88							
	[28]	[1700]	[3890]	[6070]	[8250]	[10440]	[12620]	[14800]	[16990]							
	106	190	440	685	930	1180	1425	1675	1920							
		111	110	109	108	107	106	105	104							
	[32]	[1620]	[3800]	[5980]	[8160]	[10350]	[12530]	[14720]								
	121	185	430	675	920	1170	1415	1665								
		127	126	125	124	123	122	121								
	[36]	[1520]	[3710]	[5890]	[8070]	[10260]	[12440]	[14620]								
	136	170	420	665	910	1160	1405	1650								
		143	142	141	140	139	138	137								
	[40]	[1420]	[3610]	[5790]	[7970]	[10160]	[12340]	[14520]								
	151	160	410	655	900	1150	1395	1640								
		159	158	157	156	155	154	153								
	[45]	[1290]	[3480]	[5660]	[7840]	[10020]	[12210]	[14400]								
	170	145	395	640	885	1130	1380	1625								
		179	178	177	176	174	174	173								
	[60]	[860]	[3040]	[5230]	[7410]	[9600]	[11780]									
	227	95	345	590	835	1085	1330									
		239	238	236	235	234	233									
	[70]	[540]	[2720]	[4910]	[7090]	[9270]	[11460]									
	265	60	305	555	800	1045	1295									
		279	278	276	275	274	273									

C-6

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)
- 4 Bolt 11/4 inch split flange ports (2)
- 9/16 -18 UNF-2B SAE O-ring case drain port (1)

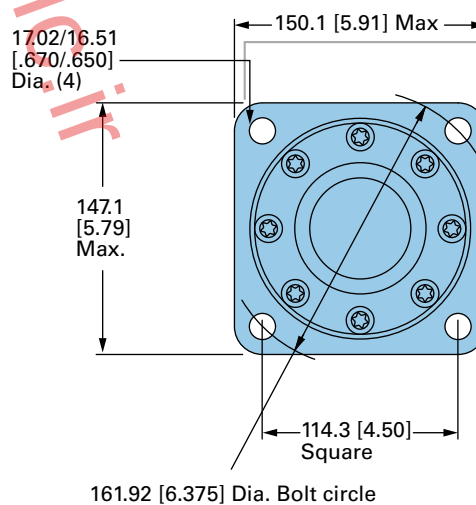
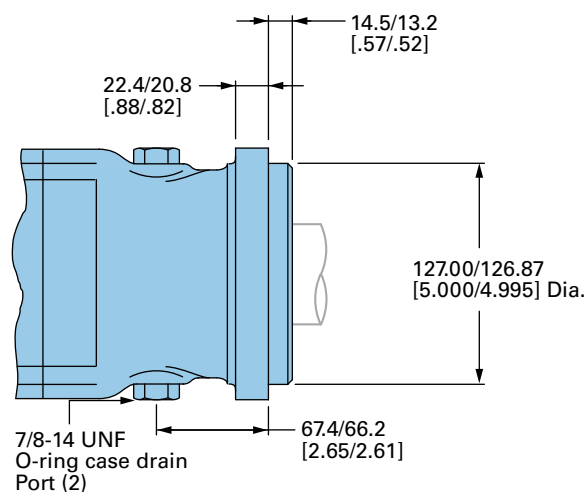
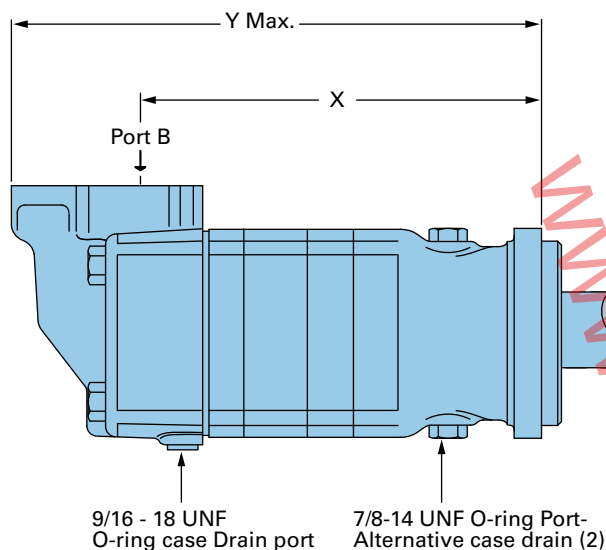
Standard rotation viewed from shaft end

- Port A pressurized — CW
- Port B pressurized — CCW

Standard mount motor dimensions

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
345 [21.0]	282.4 [11.12]	380.9 [15]
480 [29.2]	295.1 [11.62]	393.6 [15.50]
585 [35.6]	304.9 [11.99]	403.3 [15.88]
665 [40.6]	295.1 [11.62]	393.6 [15.50]
940 [57.4]	313.4 [12.34]	412.1 [16.22]

Standard mount



C-6

Ports

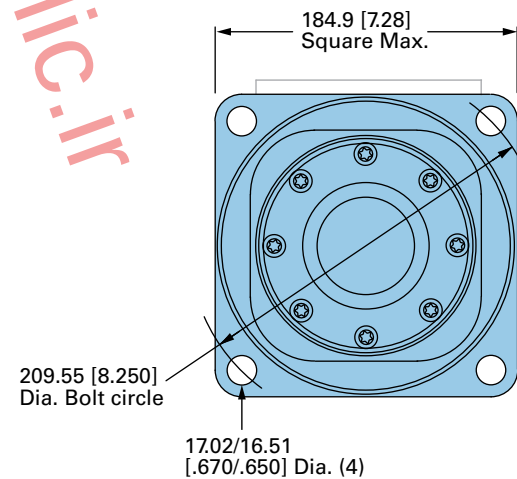
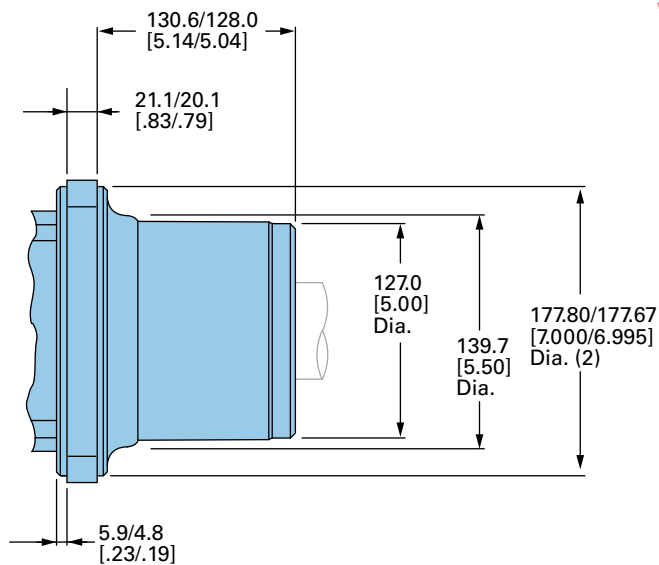
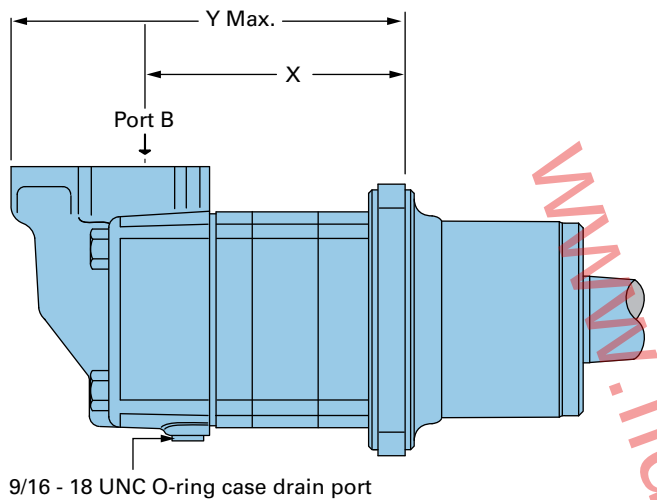
- 1 5/16 -12 UN-2B SAE O-ring staggered ports (2)
- 9/16 -18 UNF-2B SAE O-ring case drain port (1)
- 4 Bolt 11/4 inch split flange ports (2)
- 9/16 -18 UNF-2B SAE O-ring case drain port (1)

Standard rotation viewed from shaft end

Port A pressurized — CW
 Port B pressurized — CCW

Wheel mount motor dimensions

Displacement cm ³ /r [in ³ /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]
585 [35.6]	179.3 [7.06]	288.4 [35.6]
665 [40.6]	179.6 [7.07]	278.6 [10.97]
940 [57.4]	197.8 [7.79]	297.2 [11.70]

Wheel mount

C-6

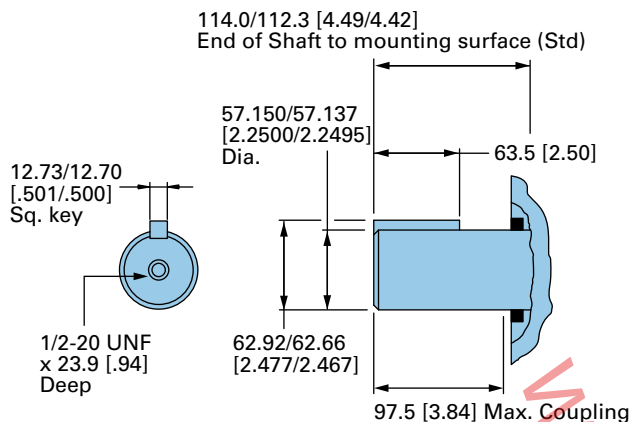
10,000 Series

Dimensions

Shafts

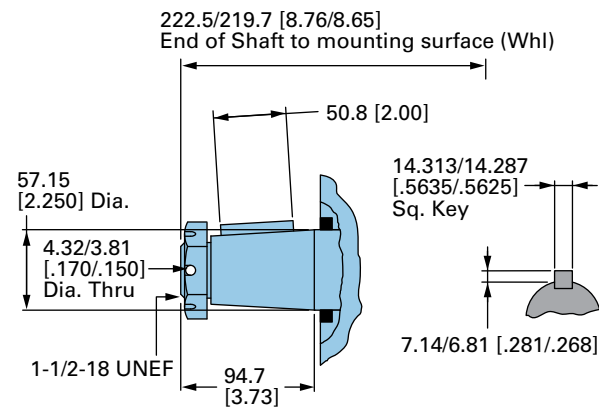
Code: 01 2 1/4 Inch straight

2712 [24000] Max. Torque Nm [lb-in]



Code: 02 2 1/4 Inch tapered

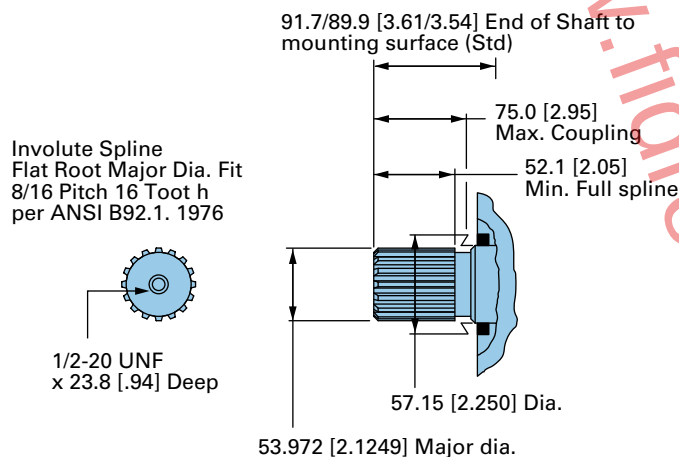
2712 [24000] Max. Torque Nm [lb-in]



SAE J501 Standard tapered shaft 125.00 0.17 Taper per Meter
[1.500±.002 Taper per Foot]

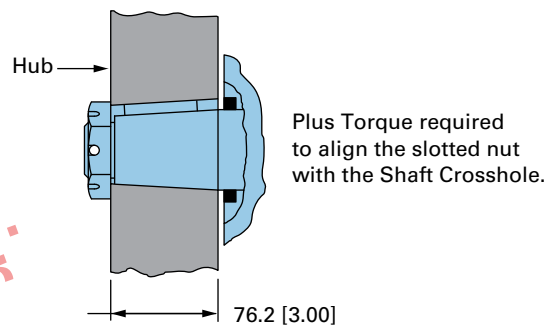
Code: 03 2 1/8 Inch 16 Tooth splined

2712 [24000] Max. Torque Nm [lb-in]

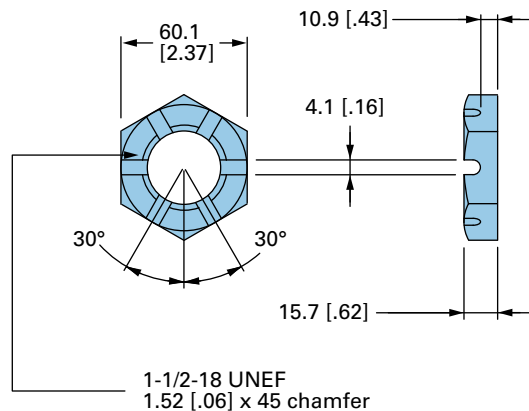


Tapered shaft hub data

Recommended torque:
(1150 Nm [850 lb-ft] Dry)
(880 Nm [650 lb-ft] Lub)



Slotted hexagon nut



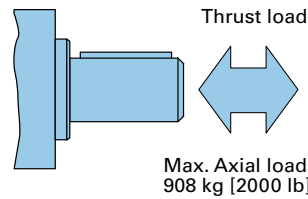
C-6

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].

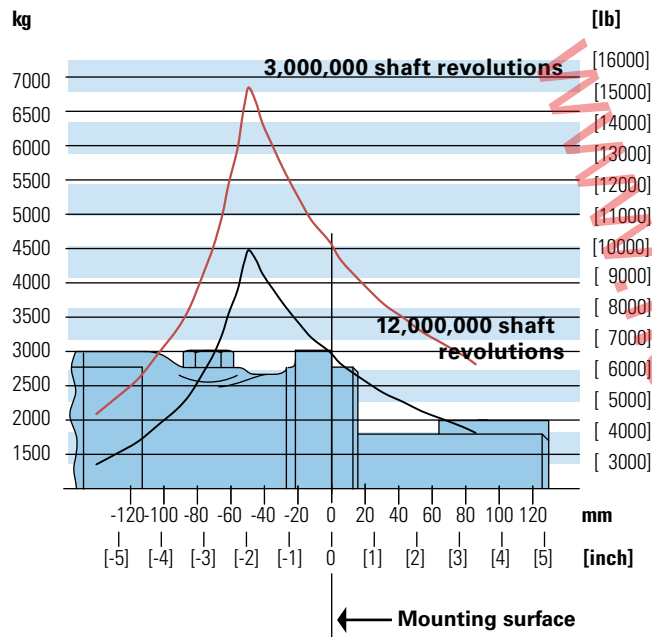
Each curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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.

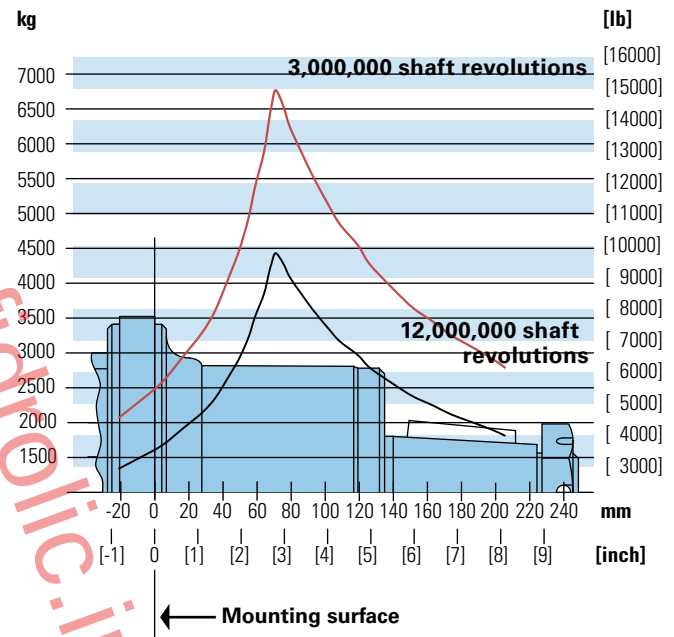


RPM	Multiplication factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

Standard motor straight and splined shaft



Wheel motor tapered shaft



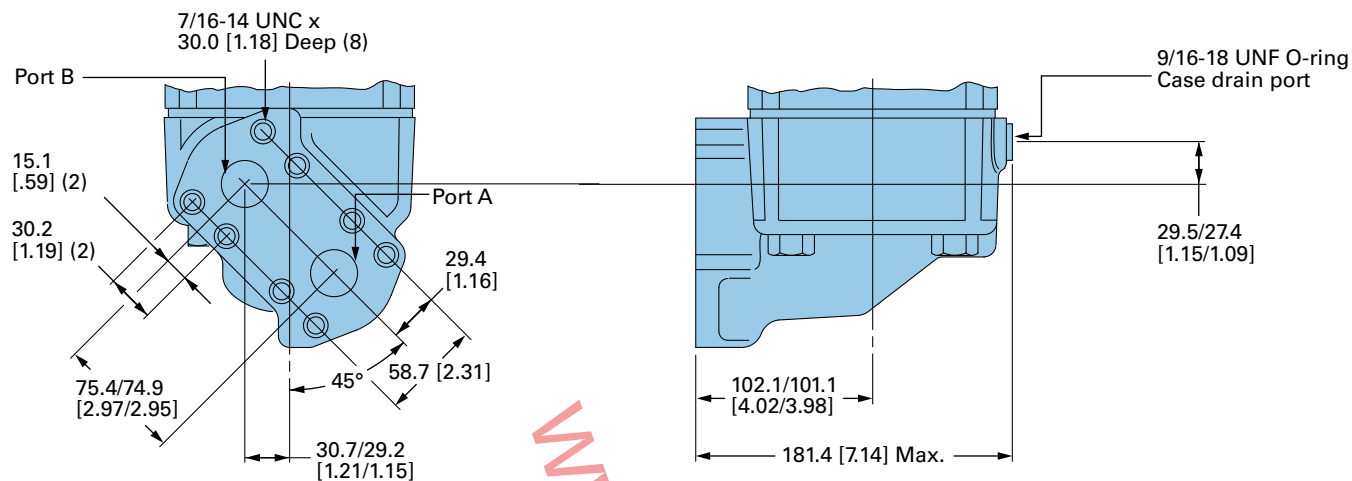
C-6

10,000 Series

Dimensions

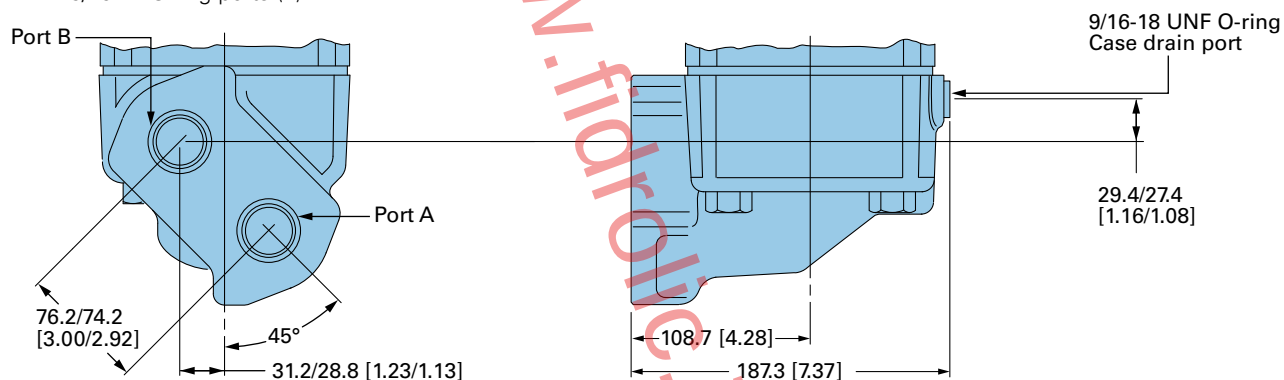
Ports

Code: AB 1 1/4 inch split flange ports (2)

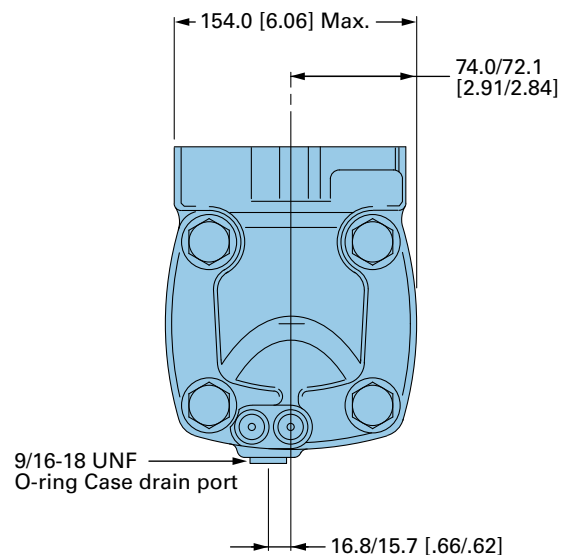


C-6

Code: AA 1 5/16-12 O-ring ports (2)



End View common dimensions



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- or 120- plus four digit number from charts for complete product number— Example 120-1014

Orders will not be accepted without three digit prefix.

Mounting	Shaft	Port size	Displ. cm ³ /r [in ³ /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	-1045	-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	—	-1006	-1007	-1008
		1 1/4 inch Split flange	—	—	—	-1020
	2 1/8 Inch 16 T Splined	1 5/16 O-ring	—	—	-1011	-1012
		1 1/4 inch Split flange	—	—	—	—
	2 1/4 Inch Tapered	1 5/16 O-ring	120-1013	-1014	-1015	-1016
		1 1/4 inch Split flange	—	-1029	-1027	-1028

10,000 Series

Model code

The following 30-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 30-digits of the code must be present when ordering.

M	1	0		*	*	*		*	*		0	1		0		0	0		0	*		0	0		0	0		*	*		0	0		C
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				

1	Product		15	Low pressure relief	
M	Motor		0	None	
2 3	Series		16 17	Pressure/flow option	
10	10,000 Series		00	None	
4 5 6	Displacement cm³/r [in³/r]		18	Geroler option	
210	343.8 [20.98]		0	Standard	
293	479.5 [29.26]		19	Seal option	
406	665.3 [40.60]		0	Standard	
574	940.8 [57.41]		4	Seal guard	
7 8	Mounting description		20 21	Accessories	
AA	Standard, 4 Bolt: 127,0 [5.00] Pilot Dia. 16,76 [.660] Dia. Holes on 161,92 [6.375] Dia. Bolt circle		00	None	
AB	Wheel, 4 Bolt: 16,76 [.660] Dia. Holes on 209,55 [8.250] Dia. Bolt circle		22 23	Special features (hardware)	
			00	None	
9 10	Output shaft description		24 25	Special features (assembly)	
01	57,15 [2.250] Dia. Straight with .500-20 UNF-2B thread in end, 12,7 [.50] square x 63,5 [2.50] straight end		00	None	
02	57,15 [2.250] Dia. .125:1 tapered shaft per SAE J512 with 1.500-18 UNEF-2A threaded shaft end and slotted hex nut, 14,288 [.5625] square x 50,8 [2.00] straight key		AA	Reverse rotation	
03	53,98 [2.125] Dia. flat root, major dia. Fit, 16 tooth, 8/16 DP, 30 degree involute spline with .500-20 UNF-20 thread in End. 52,07 [2.050] minimum full spline length		26 27	Paint/packaging	
			00	None	
			AA	Low gloss black primer	
11 12	Ports		28 29	Customer identification	
AA	1.3125 -12 UNF-2B O-Ring staggered ports		00	None	
AB	31,75 [1.250] Dia. 4 Bolt split flange staggered ports with .4375-15 UNC-2B Tapped mounting holes		30	Design code	
			C	Third	
13 14	Case flow options				
01	.5625-18 UNF-2B Case Drain SAE O-Ring Port				

See Eatonpowersource.com/ for more options and configurations.

Char-Lynn Specialty Motors

Orbit motor



With over 45 years of manufacturing in Kameoka, Japan, Eaton's global suite of low speed high torque motors are customers first choice for swing and track drive applications. With industry leading control and efficiency, these motors are

tuned for use at very low flows and speeds. Their compact integrated design, allows for substantial space savings and integrated propel valves and brake packages simplify systems and offer valuable solutions.

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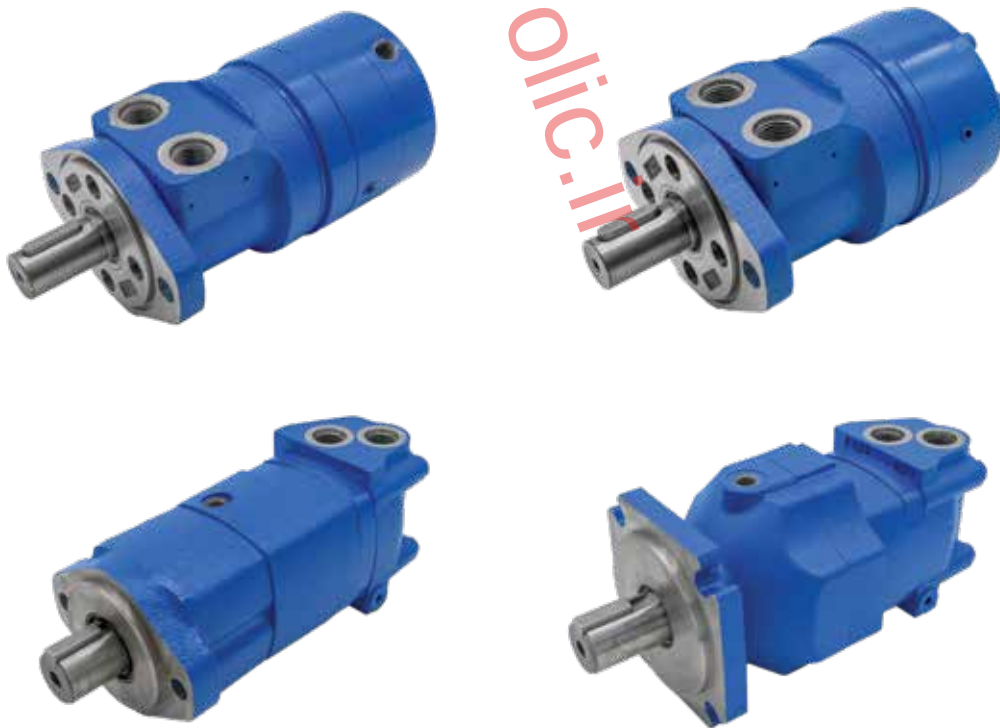
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Orbit Motor, Optional products line.....

Char-Lynn Low speed high torque orbit motor for brake application

**S Series with pin brake, S Series with mechanical brake
and 2000 Series with mechanical brake**



D-1

Characteristics & Advantages

The S series Motor with a pin brake offers an easy parking brake option within the Spool Motor category. The simple design provides a reliable and cost effective solution.

These motors can be chosen with an external or internal pilot system.



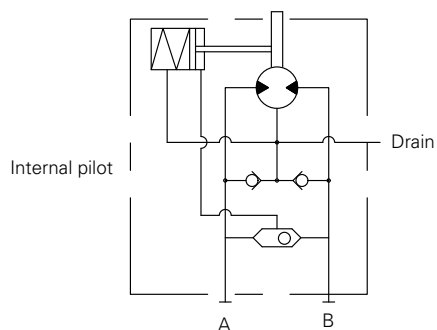
Specifications

Series	Brake torque	Brake release pressure	Brake release system
SBP	5.9 Nm [52.22 lb-in]	5 bar [73 psi]	Internal Pilot
SBR	5.9 Nm [52.22 lb-in]	5 bar [73 psi]	External Pilot

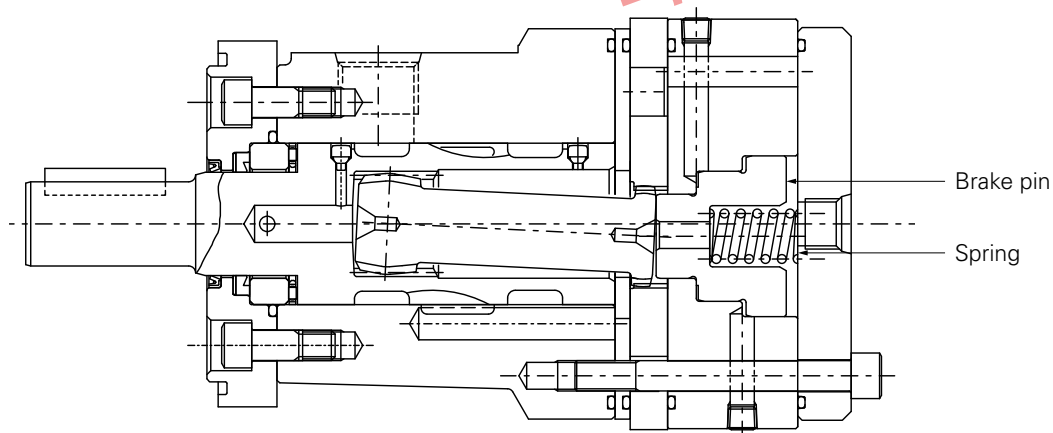
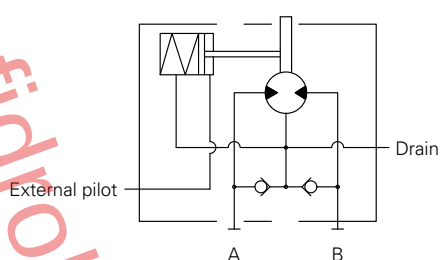
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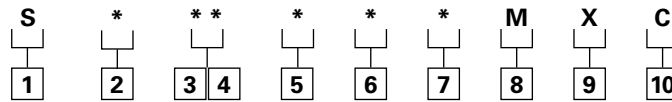
1. Must use an external drain line
2. Do not operate the pin brake in dynamic conditions
3. Output shaft is locked at a position of 60°

SBP Series



SBR Series





1	Series	S S Series motor with pin brake
2	Brake specifications	
	P Internal Pilot, 5.9Nm [52.22 lb-in]	
	R External Pilot, 5.9Nm [52.22 lb-in]	
3	4	Displacement
		05 58cm ³ /r [3.5 in ³ /r]
		07 76cm ³ /r [4.6 in ³ /r]
		10 93cm ³ /r [5.7 in ³ /r]
		12 120cm ³ /r [7.3 in ³ /r]
		14 144cm ³ /r [8.8 in ³ /r]
5	Port	
	A G1/2 O-ring port	
	B Manifold mount	
	C 1/2NPTF port	
	D Rc1/2 port	
	E 7/8UNF O-ring port	
6	Shaft	
	B Ø1" SAE 6B Splined shaft	
	C Ø1" Straight with Woodruff key	
	D Ø25 Straight with Parallel key, 8mm	
7	Flange mounting	
	2 2 Bolt	
	4 4 Bolt	
8	Special features (none of standard motor)	
	B Special seal for phosphate ester fluid	
	M Metric mounting holes	
9	Drain port	
	X Standard, with Drain port	
10	Design code	

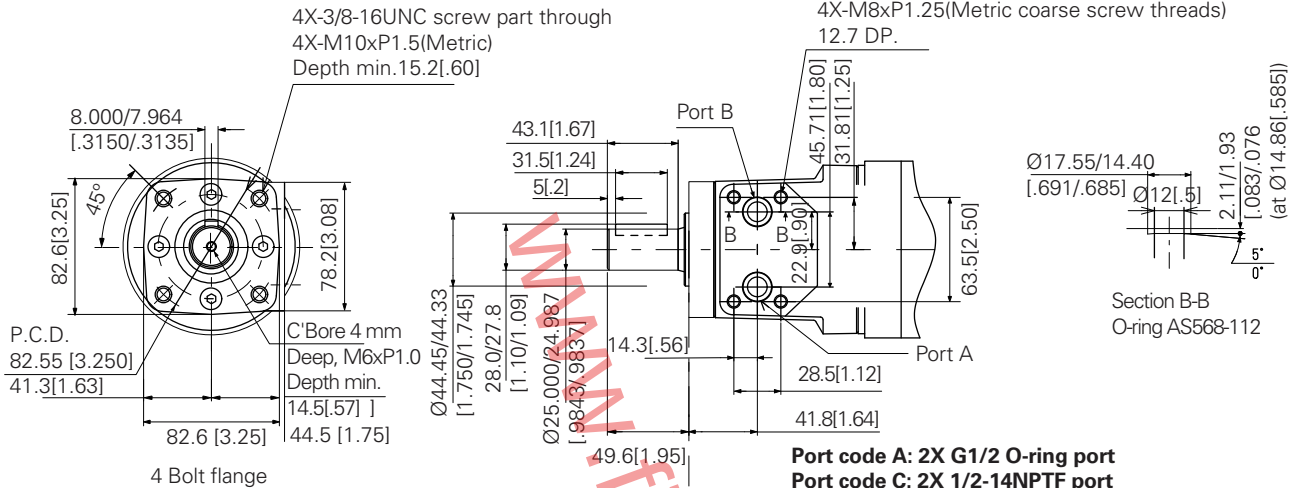
D-1

Dimension and mounting data

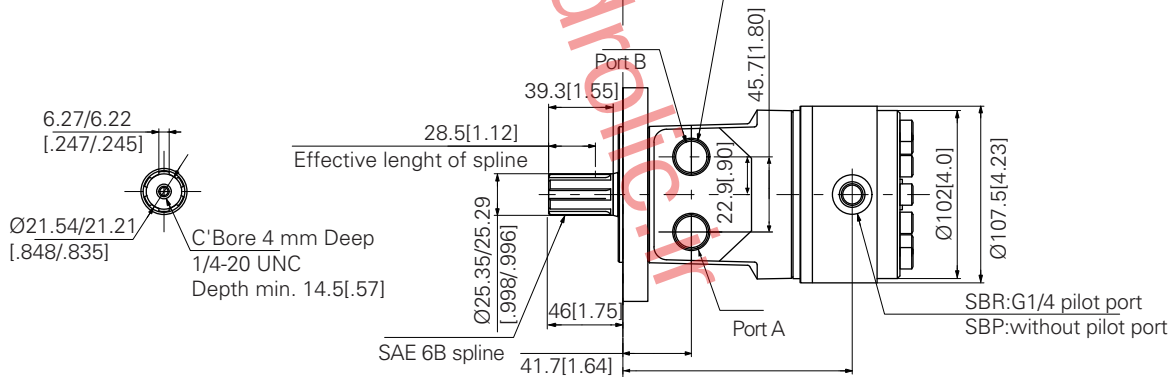
- Rotation: Viewed from shaft end
- CW: Port A pressurized
- CCW: Port B pressurized

Model	X: Length mm [inch]	Y: Length mm [inch]
SB-05	5.30[134.7]	6.76[171.7]
SB-07	5.39[137.0]	6.85[174.0]
SB-10	5.48[139.2]	6.94[176.2]
SB-12	5.62[142.7]	7.07[179.7]
SB-14	5.74[145.8]	7.20[182.8]

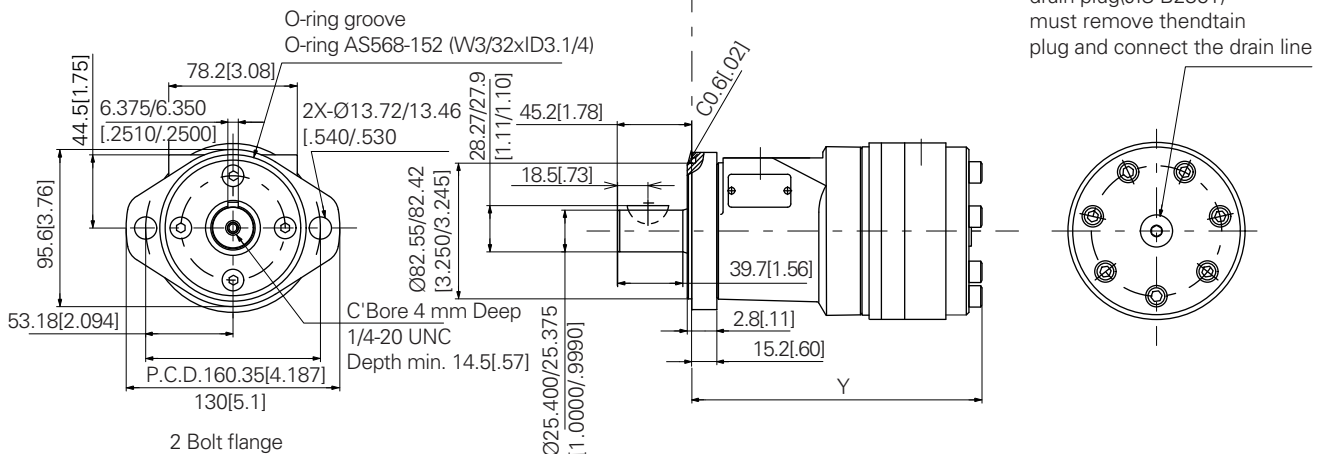
**Shaft code: D Ø25 Straight shaft
with Parallel key, 8 mm
Max. Torque: 350 N-m [3098 lb-in]**



Shaft code: B Ø25 SAE 6B Splined shaft



**Shaft code: C Ø25 Straight shaft with Woodruff key
Max. Torque: 350 N-m [3098 lb-in]**



Characteristics & Advantages

The S series Motor with mechanical brake utilizes a compact parking brake integrated into the motor. This motor has many uses in construction, winches, marine, and industrial vehicles.

Braking is applied when the pilot pressure is not supplied. The mechanical release of the brake is possible for the SBD and SBE series.



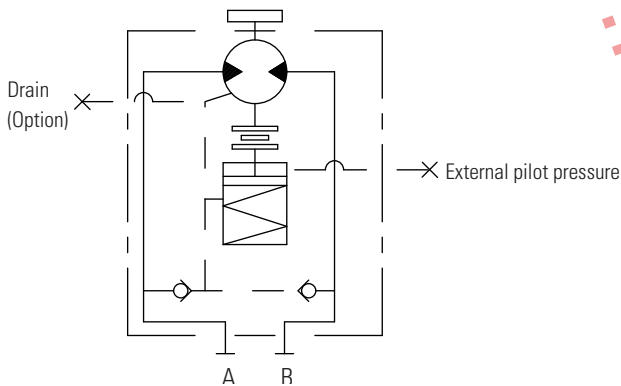
Specifications

Series	Brake torque	Brake release pressure	Brake release system
SBA	98Nm [868 lb-in]	10 bar [145 psi]	External Pilot
SBD	98Nm [868 lb-in]	10 bar [145 psi]	External Pilot + Mechanical System
SBE	157Nm [1,390 lb-in]	16 bar [232 psi]	External Pilot + Mechanical System
SBF	157Nm [1,390 lb-in]	16 bar [232 psi]	External Pilot

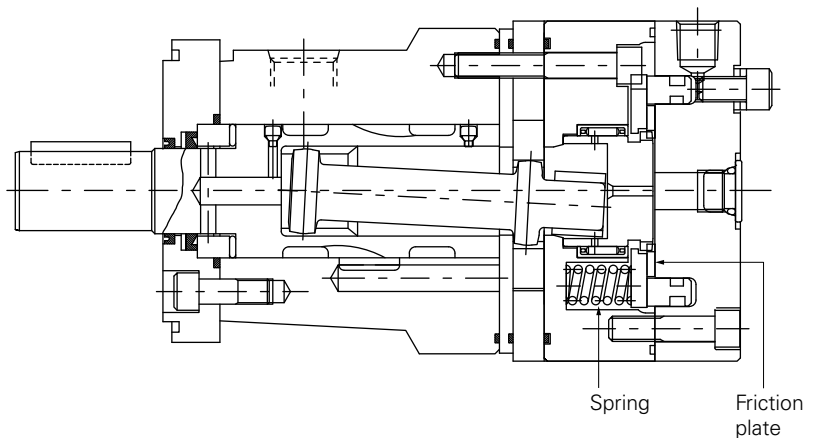
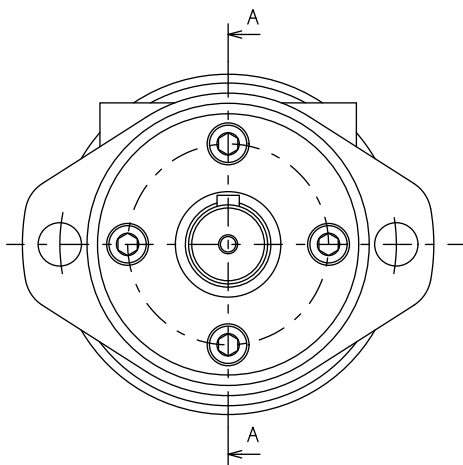
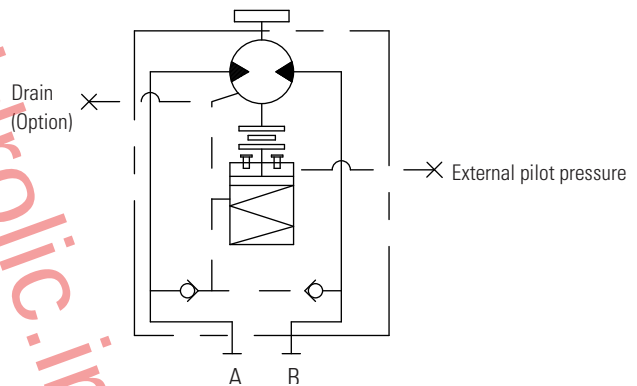
Note:

1. Other specifications are same as Standard S Series motor.
2. Fire resistant fluid need special specification motor. Please contact your Eaton representative.
3. This Brake can be used as a Parking Brake only. In case of dynamic brake application, Please contact your Eaton representative.
4. This is not a full capacity brake, but is a limited capacity brake, designed to hold loads from moving when no pressure is applied to the circuit.

SBA,SBF Series



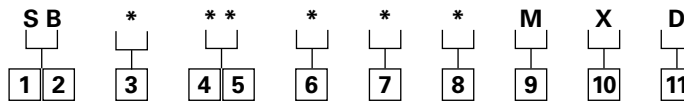
SBD,SBE Series



S Series Motor with Mechanical Brake

Model code

D-2



1 2	Series	6	Port
SB	S Series motor with mechanical brake	A	G1/2 O-ring port
3	Brake specifications	B	Manifold mount
A	External pilot, 98Nm [868 lb-in]	C	1/2-14NPTF port
D	External pilot + Mechanical release system, 98Nm [868 lb-in]	D	Rc1/2 port
E	External pilot + Mechanical release system, 157Nm [1,390 lb-in]	E	7/8-14 UNF O-ring port
F	External Pilot, 157Nm [1,390 lb-in]	7	Shaft
4 5	Displacement	B	Ø1" SAE 6B Splined shaft
05	58cm ³ /r [3.5 in ³ /r]	C	Ø1" Straight with Woodruff key
07	76cm ³ /r [4.6 in ³ /r]	D	Ø25 Straight with Parallel key, 8mm
10	93cm ³ /r [5.7 in ³ /r]	8	Flange mounting
12	120cm ³ /r [7.3 in ³ /r]	2	2 Bolt
14	144cm ³ /r [8.8 in ³ /r]	4	4 Bolt
16	165cm ³ /r [10.1 in ³ /r]	9	Special features (none of standard motor)
19	186cm ³ /r [11.3 in ³ /r]	M	Metric mounting holes
22	224cm ³ /r [13.6 in ³ /r]	10	Drain port
30	299cm ³ /r [18.2 in ³ /r]	X	Standard, with Drain port
38	371cm ³ /r [22.6 in ³ /r]	11	Design code

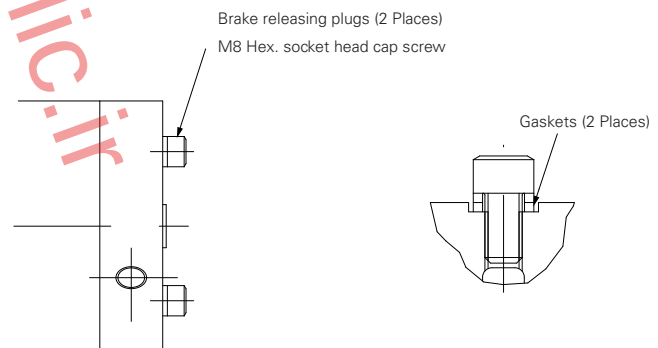
How to release the brake mechanically

The SBD and SBE Series are provided with a mechanical type brake releasing mechanism.

Remove the (2) gaskets and alternately tighten two brake releasing plugs. The brake will be released mechanically.

To restore braking, insert the gaskets and tighten the brake releasing plugs at a torque of 25.5~31.4N·m [225.69~277.91 lb-in] (At this time, clean the surface of sealing).

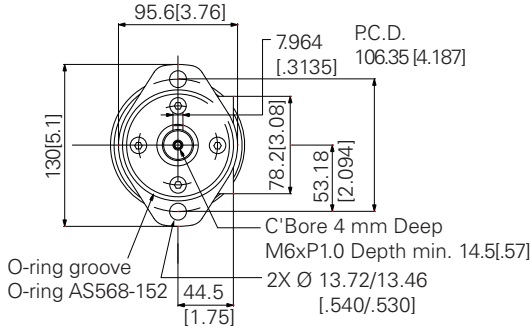
More specific features (Displacements, etc) are available on request, please contact with sales.



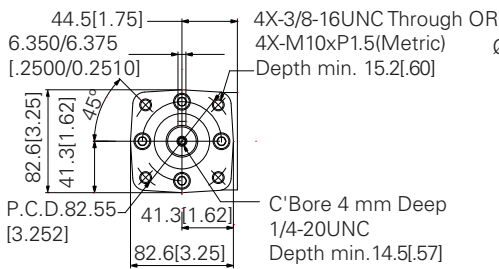
Dimension and mounting data

- Rotation: Viewed from shaft end
 - CW: Port A pressurized
 - CCW: Port B pressurized
- Need to select the port code B with metric 4-M8 thread
- A change coupler of Rc3/8 is available (AH0039A)

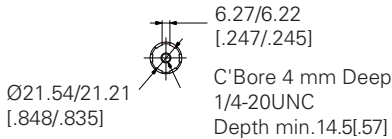
Shaft code: D Ø25 Straight shaft with Parallel key, 8 mm
Max. Torque: 350 N-m [3098 lb-in]



Shaft code: C Ø25 Straight shaft with Woodruff key
Max. Torque: 350 N-m [3098 lb-in]

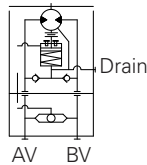


Shaft code: B Ø25 SAE 6B Splined shaft



Internal pilot with shuttle valve (VSDD4A+PIPE KET)

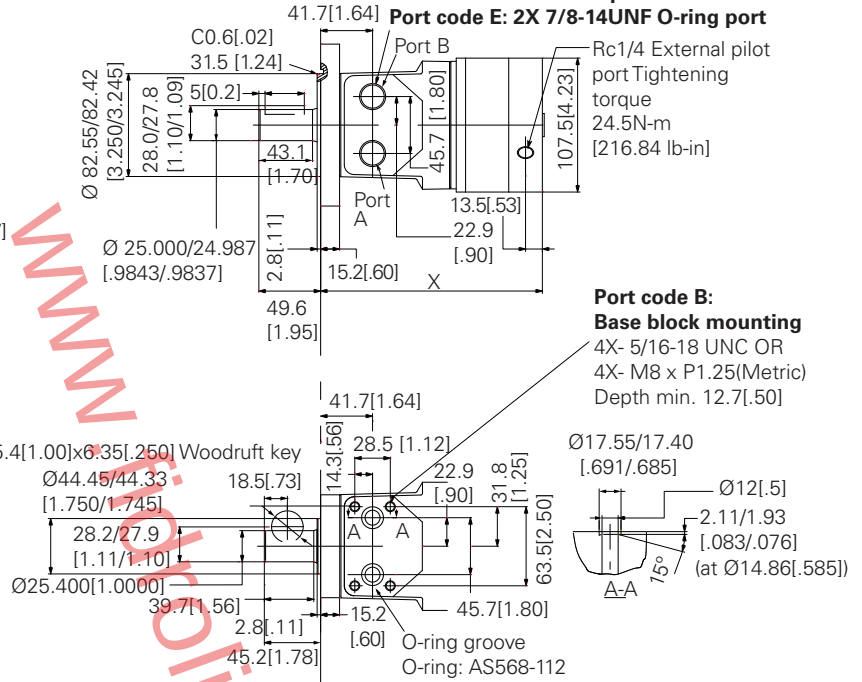
Motor with brake



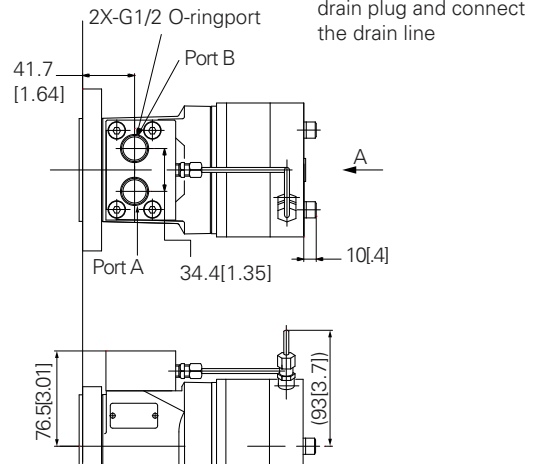
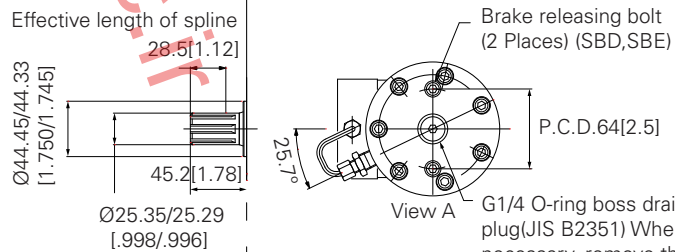
Shuttle valve

Model	X: Length mm [inch]	Model	X: Length mm [inch]
SB-05	177.0 [6.97]	SB-16	190.7 [7.51]
SB-07	179.3 [7.06]	SB-19	193.4 [7.61]
SB-10	181.5 [7.14]	SB-22	198.3 [7.81]
SB-12	184.9 [7.28]	SB-30	208.0 [8.19]
SB-14	188.1 [7.41]	SB-38	217.3 [8.56]

Port code A: 2X G1/2 O-ring port
Port code C: 2X 1/2-14NPTF port
Port code D: 2X Rc1/2 port
Port code E: 2X 7/8-14UNF O-ring port



Port code B: Base block mounting
 4X- 5/16-18 UNC OR
 4X- M8 x P1.25 (Metric)
 Depth min. 12.7 [0.50]



2000 Series Motor with Mechanical Brake (Brake Torque 98-196N-m [867-1,735 lb-in])

Characteristics & Advantages

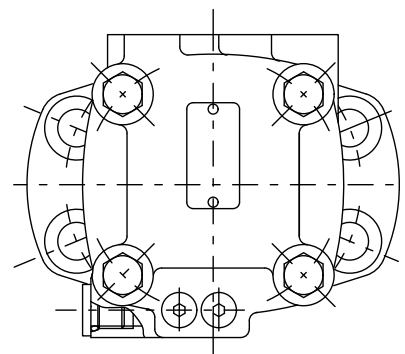
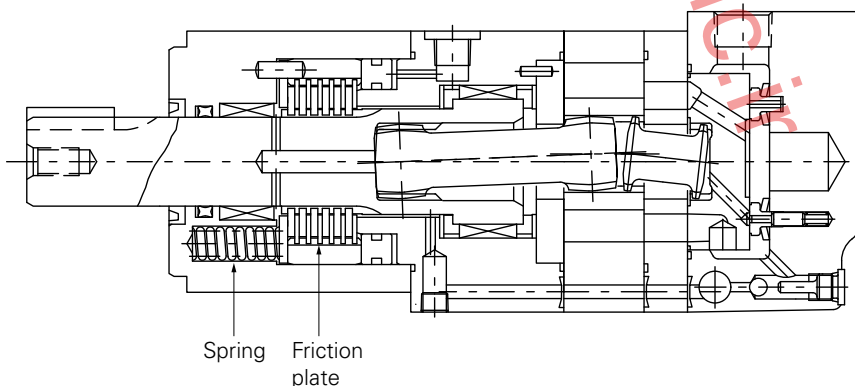
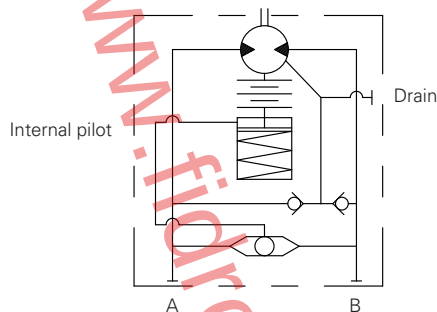
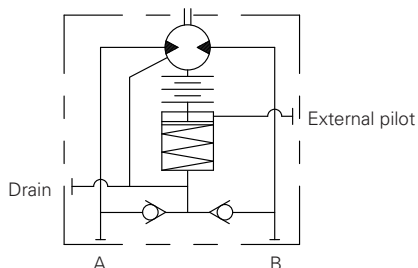
The 2K series motor with mechanical brake utilizes a pressure-release mechanical brake built into the motor. This parking brake can be used in applications such as winches, fishing equipment, industrial vehicles, industrial machinery, and much more.

Note: This is not a full capacity brake, but is a limited capacity brake, designed to hold loads from moving when no pressure is applied to the circuit.



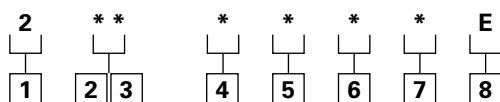
Specifications

Model Code	Brake Torque	Brake Release Pressure	Brake Release System
2-□□□K□□	98N-m [867lb-in]	9.8bar [142psi]	External Pilot
2-□□□L□□	196N-m [1735lb-in]	19.6bar [284psi]	External Pilot
2-□□□M□□	98N-m [867lb-in]	9.8bar [142psi]	Internal Pilot
2-□□□N□□	196N-m [1735lb-in]	19.6bar [284psi]	Internal Pilot



2000 Series Motor with Mechanical Brake (Brake Torque 98-196N-m [867-1,735 lb-in])

Model code



1	Series	
	2	2000 series
2 3	Displacement	
	08	78cm ³ /r [4.8in ³ /r]
	10	97cm ³ /r [5.9in ³ /r]
	12	123cm ³ /r [7.5in ³ /r]
	16	158cm ³ /r [9.6in ³ /r]
	20	195cm ³ /r [11.9in ³ /r]
	25	244cm ³ /r [14.9in ³ /r]
	29	288cm ³ /r [17.6in ³ /r]
	31	306cm ³ /r [18.7in ³ /r]
	39	393cm ³ /r [24.0in ³ /r]
4	Brake specifications [in-lb] Brake Torque	
	K	98N-m[867lb-in], External pilot
	M	196N-m[1,735 lb-in], External pilot
	L	98N-m[867lb-in], Internal pilot
	N	196N-m[1,735 lb-in], Internal pilot

5	Shaft	
	A	Ø32 Straight with 10x8x31.5 Key
	B	Ø1-1/4" Splined
	D	Ø1-1/4" Straight with 5/16" Square key
	F	Ø1" Straight with 1/4" Key
6	Flange Mounting	
	2	2 Bolt
	4	4 Bolt (unequally spaced)
7	Port Connection	
	None	G1/2 O-ring port
	A	7/8UNF O-ring port (External pilot only)
	C	Rc1/2 port
	U	7/8UNF O-ring port (pitch 50.8mm)
8	Design Code	

More specific features (Displacements, etc) are available on request, please contact with sales.

D-3

2000 Series Motor with Mechanical Brake (Brake Torque 98-196N-m [867-1,735 lb-in])

Dimension and mounting data

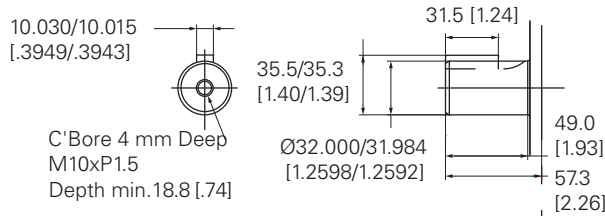
External pilot

Rotation: Viewed from shaft end

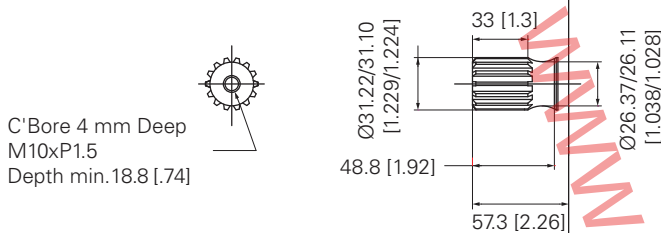
- CW: Port A pressurized
- CCW: Port B pressurized

D-3

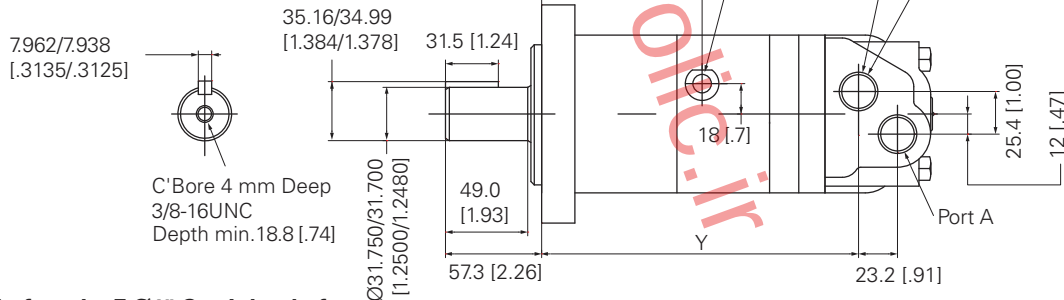
Shaft code: A Ø32 Straight shaft



Shaft code: B Ø1-1/4" Involute splined shaft

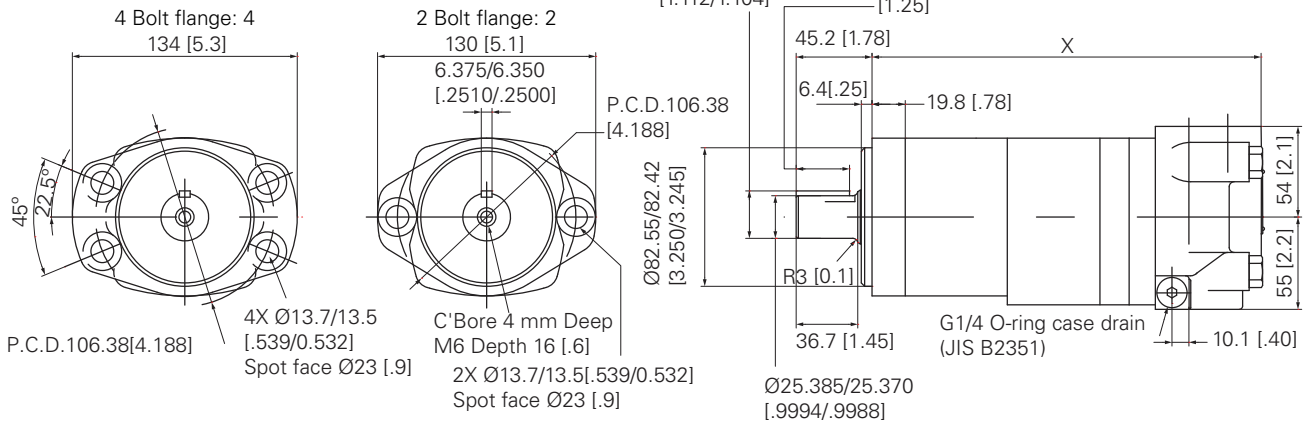


Shaft code: D Ø1-1/4" Straight shaft



Shaft code: F Ø1" Straight shaft

Max. Torque: 395 N-m [3496]



Model	X mm [inch]	Y mm [inch]	1-1/4" SAE Involute Spline (External)	
2-080	229 [9.0]	186 [7.3]	D.P	12/24
2-100	232 [9.1]	189 [7.4]	Number of teeth	14
2-125	237 [9.3]	194 [7.6]	Pitch Dia.	29.634[1.1667]
2-160	243 [9.6]	200 [7.9]	Base Dia.	25.664[1.0104]
2-200	250 [9.8]	207 [8.1]	Pressure angle	30°
2-250	259 [10.2]	216 [8.5]	Type of fit	Side fit
2-290	267 [10.5]	224 [8.8]	Class of fit	II
2-315	271 [10.7]	228 [9.0]	Major Dia.	31.22/31.10[1.229/1.224]
2-390	286 [11.3]	243 [9.6]	Minor Dia.	26.99/26.66[1.063/1.050]
			Form Dia.	Max. 27.488[1.0822]
			Fillet radius	Max. 0.39[0.015]
			Dimension over two pins	35.797/35.750 [1.4093/1.4075]
			Pin Dia.	4.064[1.600]

Port code None: 2X G1/2 O-ring port
Port code C: 2X Rc1/2 port
Port code A: 2X 7/8UNF O-ring port

2000 Series Motor with Mechanical Brake (Brake Torque 98-196N-m [867-1,735 lb-in])

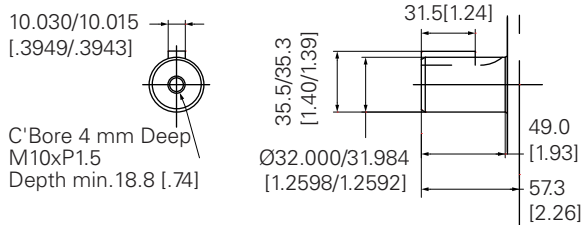
Dimension and mounting data

Internal pilot

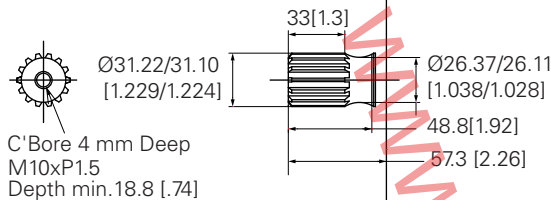
Rotation: Viewed from shaft end

- CW: Port A pressurized
- CCW: Port B pressurized

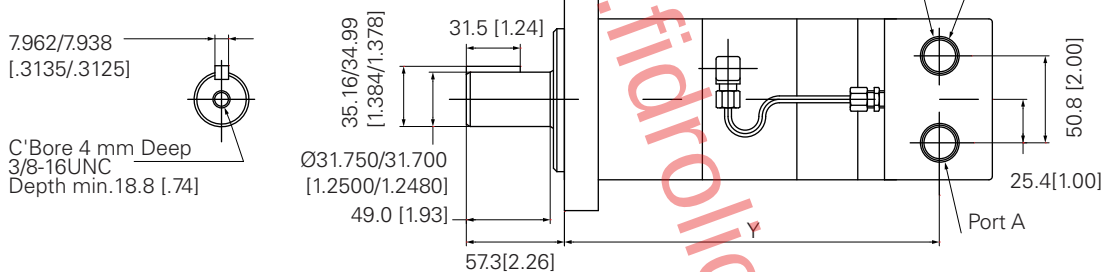
Shaft code: A Ø32 Straight shaft



Shaft code: B Ø1-1/4" Involute splined shaft



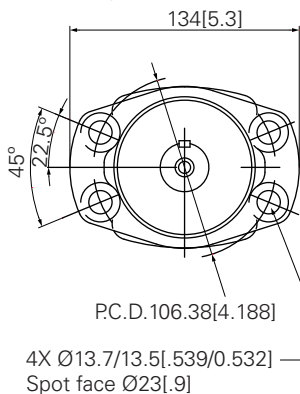
Shaft code: D Ø1-1/4" Straight shaft



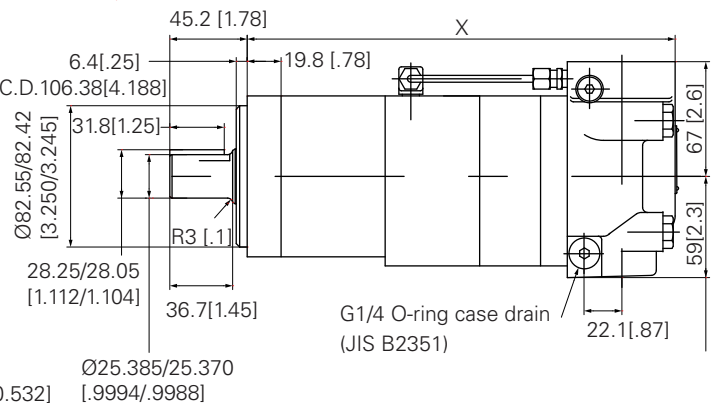
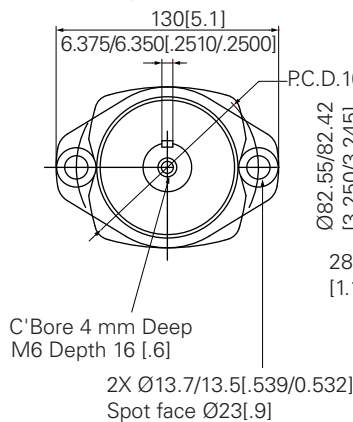
Shaft code: F Ø1" Straight shaft

Max. Torque: 395 N-m [3496]

4 Bolt flange



2 Bolt flange



Model	X mm [inch]	Y mm [inch]	1-1/4" SAE Involute Spline (External)	
2-080	229[9.0]	186[7.3]	D.P	12/24
2-100	232[9.1]	189[7.4]	Number of teeth	14
2-125	237[9.3]	194[7.6]	Pitch Dia.	29.634[1.1667]
2-160	243[9.6]	200[7.9]	Base Dia.	25.664[1.0104]
2-200	250[9.8]	207[8.1]	Pressure angle	30°
2-250	259[10.2]	216[8.5]	Type of fit	Side fit
2-290	267[10.5]	224[8.8]	Class of fit	II
2-315	271[10.7]	228[9.0]	Major Dia.	31.22/31.10[1.229/1.224]
2-390	286[11.3]	243[9.6]	Minor Dia.	26.99/26.66[1.063/1.050]
			Form Dia.	Max. 27.488[1.0822]
			Fillet radius	Max. 0.39[0.015]
			Dimension over two pins	35.797/35.750 [1.4093/1.4075]
			Pin Dia.	4.064[0.1600]

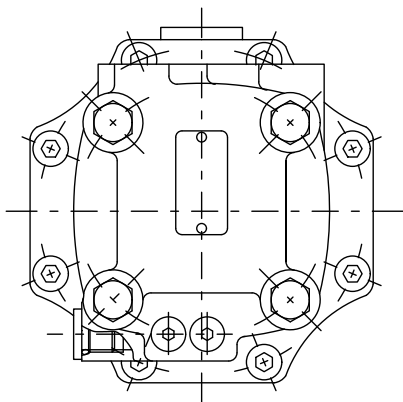
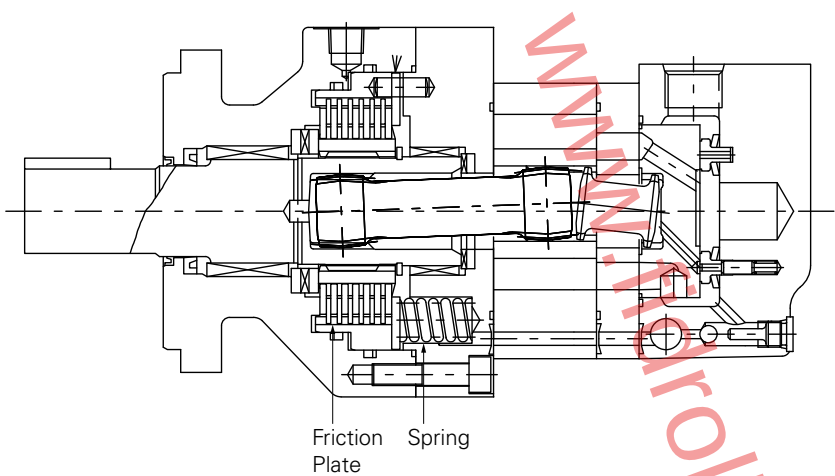
Port code None: 2X G1/2 O-ring port
Port code C: 2X Rc1/2 port
Port code U: 2X 7/8UNF O-ring port

2000 Series Motor with Mechanical Brake (Brake Torque 294-392N-m [2,602-3,470 lb-in])

Specifications

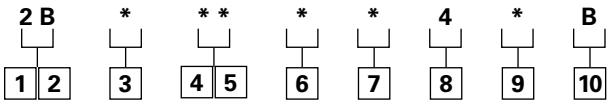
Model code	Brake torque	Brake release pressure	Brake release system
2BE□□A□4-B	294N-m[2602lb-in]	20bar[290psi]	External Pilot
2BF□□A□4-B	392N-m[3470lb-in]	25bar[363psi]	External Pilot

Note: 1. This Brake can be used as a Parking Brake only. In case of dynamic brake application, please contact Eaton.



2000 Series Motor with Mechanical Brake (Brake Torque 294-392N-m [2,602-3,470 lb-in])

Model code



1 2	Series
2B	2000 Series with mechanical brake
3	Brake Torque
E	294N-m, External pilot
F	392N-m, External pilot
4 5	Displacement
08	78cm ³ /r [4.8in ³ /r]
10	97cm ³ /r [5.9in ³ /r]
12	123cm ³ /r [7.5in ³ /r]
16	158cm ³ /r [9.6in ³ /r]
20	195cm ³ /r [11.9in ³ /r]
25	244cm ³ /r [14.9in ³ /r]
29	288cm ³ /r [17.6in ³ /r]
31	306cm ³ /r [18.7in ³ /r]
39	393cm ³ /r [24.0in ³ /r]
6	Motor type
A	Standard

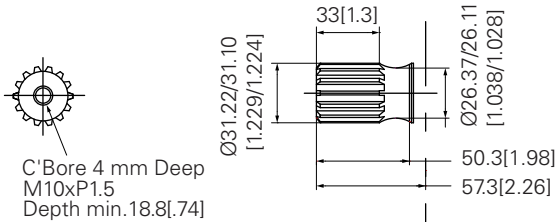
7	Shaft
A	Ø32 Straight with 10x8x31.5 Key
B	Ø1-1/4" Splined
C	Ø1-1/4" Tapered
D	Ø1-1/4" Straight with 5/16" Square key
8	Flange mounting
4	4 Bolt (P.C.D. 127)
9	Port connections
-	G1/2 O-ring port
A	7/8UNF O-ring port
C	Rc1/2 port
10	Design code

More specific features (Displacements, etc) are available on request, please contact with sales.

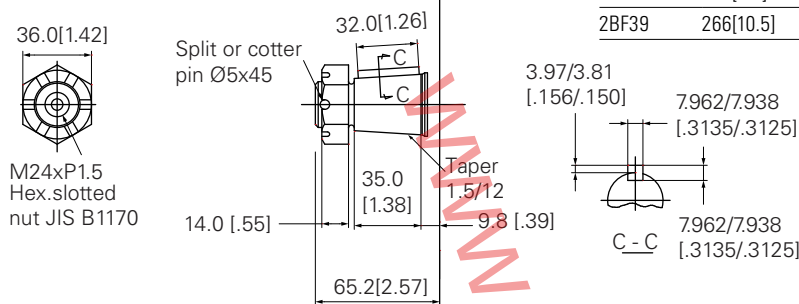
D-4

Dimension and mounting data

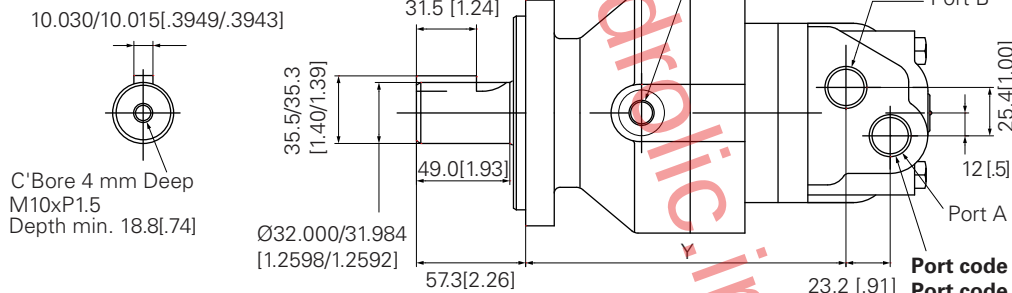
Shaft code: B Ø1-1/4" Involute splined shaft



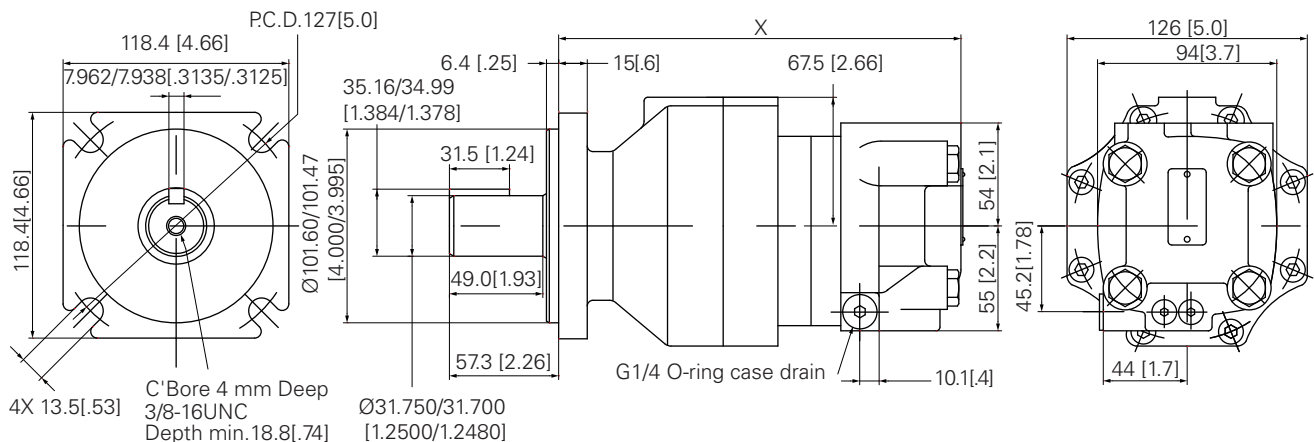
Shaft code: C Ø1-1/4" Tapered shaft



Shaft code: A Ø32 Straight shaft



Shaft code: D Ø1-1/4" Straight shaft



Rotation: Viewed from
shaft end

- CW: Port A pressurized
- CCW: Port B pressurized

Model	X mm [inch]	Y mm [inch]
2BF08	208[8.2]	165[6.5]
2BF10	211[8.3]	168[6.6]
2BF12	216[8.5]	173[6.8]
2BF16	223[8.8]	180[7.1]
2BF20	229[9.0]	186[7.3]
2BF25	238[9.4]	195[7.7]
2BF29	246[9.7]	203[8.0]
2BF31	250[9.8]	207[8.1]
2BF39	266[10.5]	223[8.8]

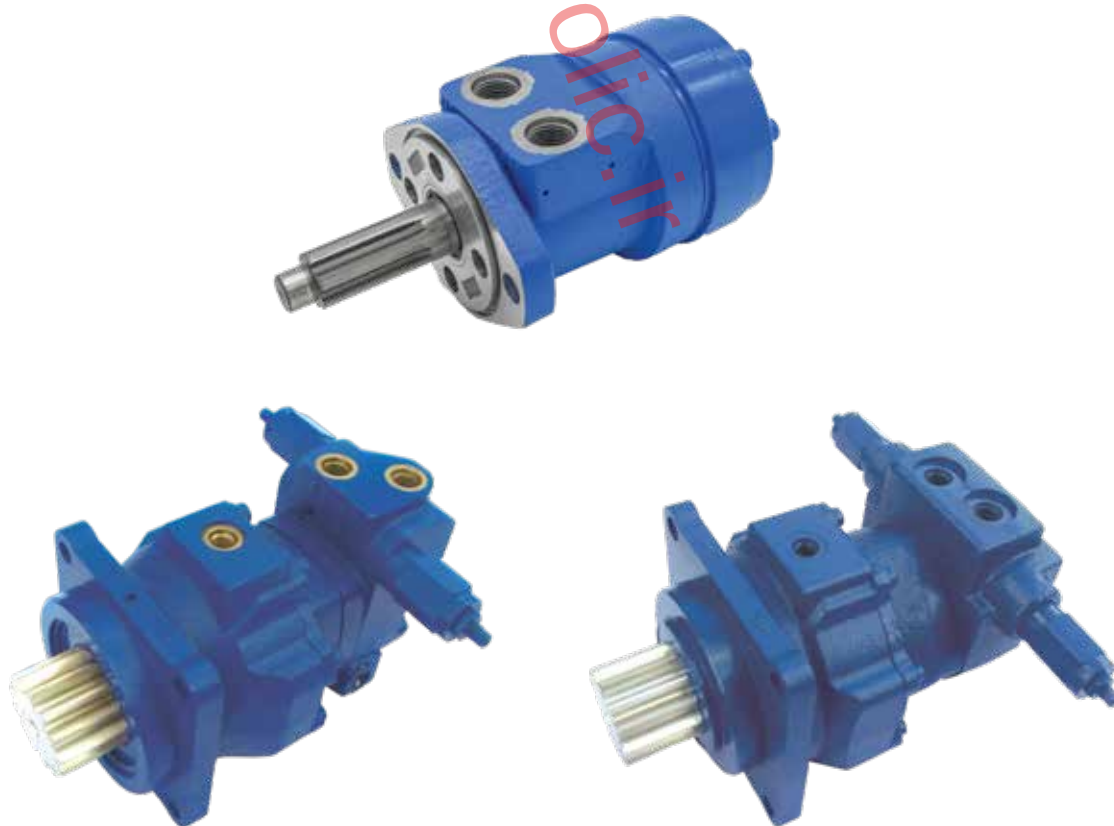
1-1/4" SAE involute spline (External)

D.P	12/24
Number of teeth	14
Pitch Dia.	29.634[1.1667]
Base Dia.	25.664[1.0104]
Pressure angle	30°
Type of fit	Side fit
Class of fit	II
Major Dia.	31.22/31.10 [1.229/1.224]
Minor Dia.	26.99/26.66 [1.063/1.050]
Form Dia.	Max. 27.488 [1.0822]
Fillet radius	Max. 0.39 [.015]
Dimension over two pins	35.797/35.750 [1.4093/1.4075]
Pin Dia.	4.064 [.1600]

Port code None: 2X G1/2 O-ring port
Port code C: 2X Rc1/2 port
Port code A: 2X 7/8UNF O-ring port

Char-Lynn Low speed high torque orbit motors for swing drive

S series, 2K series, 2.5K series, 4K series, 4.5K series swing motors



Features

- Low speed high torque Char-Lynn motor for Swing
- Direct drive (no reduction gear)
- Displacement from 165cm³/rev[10.1in³/rev] to 393 cm³/rev [24.0 in³/rev], maximum pressure up to 196bar[2843psi]
- Optionally integrate mechanical parking brake, time delay valve and shock less relief valve

D-5

Benefits

- Maintenance cost saving cause no reduction gear oil required
- Cost competitive due to simple structure design
- Reduced energy consuming attributed to higher mechanical and volumetric efficiency
- Less mechanical shocks by smooth and precise control
- Proven performance by 30+ years experience

Typical application

- Mini excavator
- Excavator attachment
- General swing application

Typical mini excavator weight (ton)

0.5	0.7	1.0	1.5	2.0	2.5	3.0	3.5	Model
								S-160
								S-190
								S-220
								S-300
								2P*16
								2P*20
								2P*25
								25P*16
								25P*20
								25P*25
								4P*25
								4P*31
								4P*39
								45P*31
								45P*33
								45P*39

Recommendation fluids: ISO VG32, 46, 56, 68 mineral oil

Recommended system operation temperature: -30°C to 80°C
[-22°F to 176°F]

Recommended oil viscosity: 24 to 50 cSt[120 to 233 SUS]

Recommended cleanliness: ISO 18/13



Characteristics & Advantages

S series motor is special designed spool valve Char-Lynn motor which can work on radial load.

Compact dimension and cost competitive are the key benefits for S series motor.

S series motor specifically fit for Swing drive of mini-excavators which tonnage less than 1 ton.

Pinion gear and valve can be easily assembled on the S series motor directly.



D-5

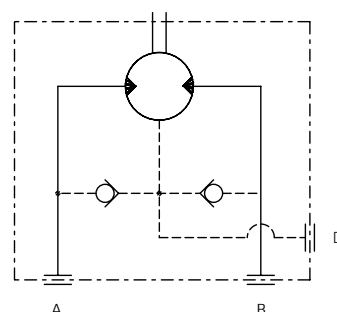
Specification

Model		S-160	S-190	S-220	S-300
Motor displacement	cm ³ /r [in ³ /r]	165 [10.1]	186 [11.4]	224 [13.7]	299 [18.3]
Max output Torque	N-m [lb-in]	180 [1593]	203 [1797]	242 [2141.9]	323 [2858.8]
Max pressure	bar [psi]	68 [986.3]	68 [986.3]	68 [986.3]	68 [986.3]
Max speed	rpm	80	80	80	80
Mass	kg[lb]	7.4[16.3]	7.6[16.8]	7.9[17.4]	8.4[18.5]

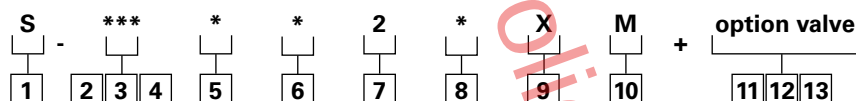
Note:

1. Drain line recommended
2. Back pressure should be max 20bar[290.1psi]

Circuit diagram



Model Code



1	Series S S Series swing motor
2 3 4	Displacement 160 165cm ³ /r [10.1in ³ /r] 190 186cm ³ /r [11.4in ³ /r] 220 224cm ³ /r [13.7in ³ /r] 300 299cm ³ /r [18.3in ³ /r]
5	Port A G1/2 O-ring port E 7/8UNF O-ring port G G1/4 O-ring port
6	Output shaft K 1 inch 6B spline M Ø25 straight shaft long type S 1 inch 6B spline with bearing support
7	Flange 2 2 bolt flange

8	Special requirement H Geroler load holding N Low noise V Low leakage
9	X: With drain port (plugged)
10	Design code
11 12 13	Option valve VSE Relief valve VSW Counter balance valve with relief Keep blank for no optional valve required

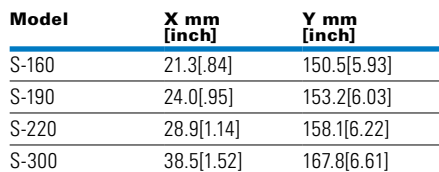
Model code and relief setting pressure are required in order sheet.

*More displacement/Port are optional based on customer request

*For any special requirement please contact with sales.

For all the relief valve setting pressure and other special requirements besides above model code listed, please submit additional order sheet to clarify. (see end cover)

D-5



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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.

RPM Allowable shaft side load — Kg [lb]

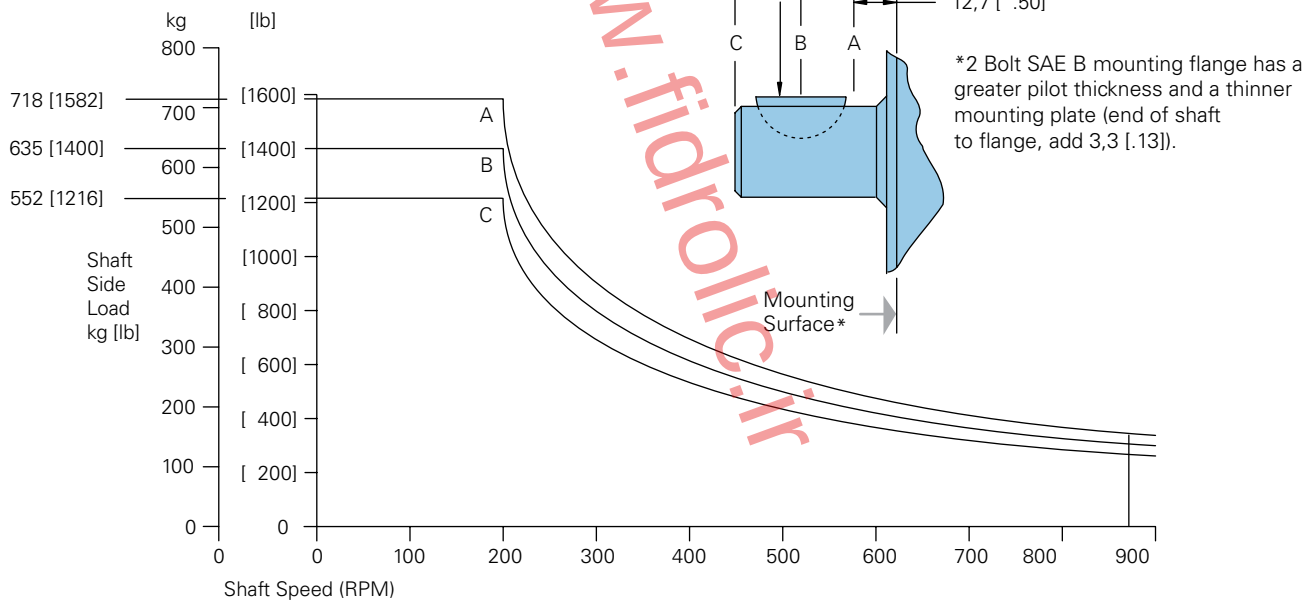
	A	B	C
900	154 [339]	136 [300]	118 [261]
625	205 [452]	181 [400]	158 [348]
500	256 [565]	227 [500]	197 [435]
400	307 [678]	272 [600]	237 [522]
300	410 [904]	363 [800]	316 [696]
200	718 [1582]	635 [1400]	552 [1216]

D-5

$$\text{Sideload } P \text{ kg} = \frac{900}{N} \left(\frac{16800}{L + 96,3} \right) \text{ for 200-900 RPM}$$

$$\text{Sideload } P \text{ [lb]} = \frac{900}{N} \left(\frac{1460}{L + [3.79]} \right) \text{ for 200-900 RPM}$$

Where N = Shaft Speed (RPM)
L = Distance from Mounting Surface



2K Series

Swing motor

Characteristics & Advantages

2K series motor is disc valve Char-Lynn® motor which can work with low leakage under high pressure.

The integrated pinion gear and big capacity bearing ensured the 2K series motor high reliability even under high radial load.

Specifically fitting for Swing drive on mini-excavators which tonnage less than 1.5 ton.

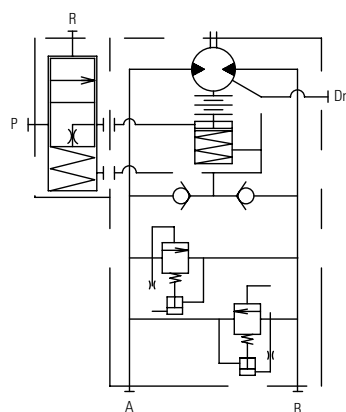
Integrated relief valve (or other required valves) can be easily assembled on the 2K series motor directly.



D-6

Circuit diagram

This hydraulic circuit includes time delay valve and schockless relief valve (option)



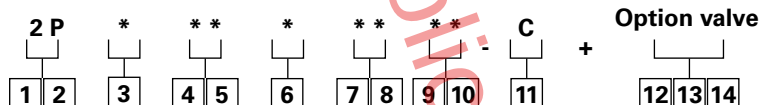
Specification

Model		2P*16	2P*20	2P*25
Motor displacement	cm³/rev [in³/rev]	158 [9.6]	195 [11.9]	244 [14.9]
Max output torque	N-m [lb-in]	308 [2726.0]	411 [3637.6]	420 [3717.3]
Max pressure	bar [psi]	123 [1784]	132 [1915]	108 [1566]
Max speed	rpm	80	80	80
Mechanical brake torque	N-m [lb-in]	441[3903.2] (Min. release pressure: 20bar[290psi], Max release pressure: 49bar[711psi])		
Mass	kg[lb]	21.0[46.3]	21.5[47.4]	22.0[48.5]

Note:

1. Max pressure is relief valve setting pressure
2. Need drain line (Back pressure should be max 20bar [290psi]).

Model Code



1 2	Series
2P	2K Series swing motor
3	Brake specification
N	Without mechanical brake
C	With mechanical brake
4 5	Displacement
16	158cm³/r[9.6in³/r]
20	195cm³/r[11.9in³/r]
25	244cm³/r[14.9in³/r]
6	Load holding spec.
A	Geroler Load holding (Middle)
B	Geroler Load holding (Light)
7 8	Port
11	G3/8 O-ring port with shockless relief valve
31	G3/8 O-ring port with relief valve

9 10	Output pinion shaft
15	m4 z11
34	m4 z13
11	Design code
12 13 14	Option valve
VNS	Shockless relief valve
V2T	Time delay valve
VSW	Counter balance valve with relief
	Keep blank for no optional valve required

Model code and relief setting pressure are required in order sheet.

*More displacement/Port are optional based on customer request

For all the relief valve setting pressure and other special requirements besides above model code listed, please submit additional order sheet to clarify. (see end cover)

Without mechanical brake

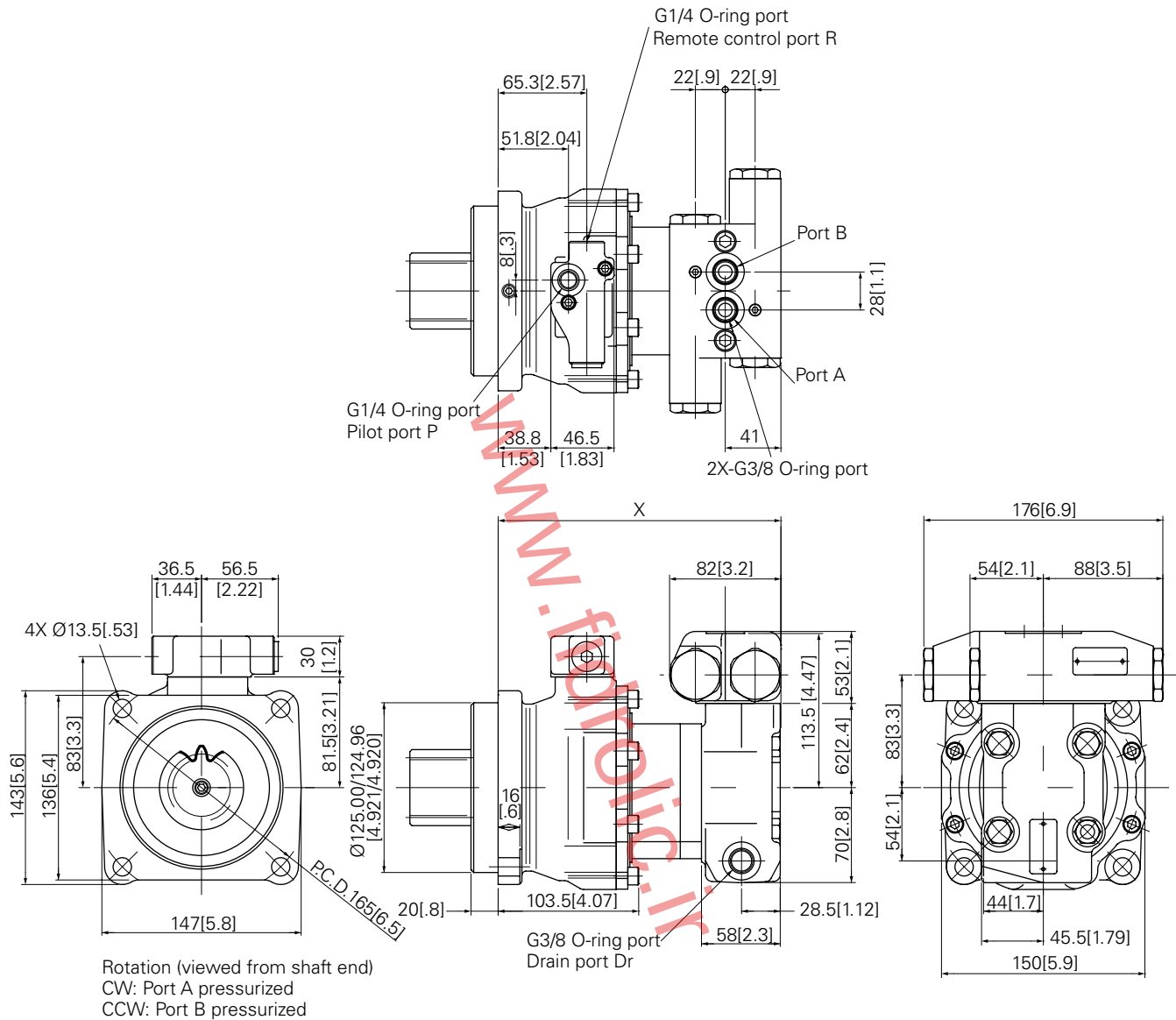


Module	4	4	4.5	4.5
Number of teeth	11	13	11	12
Pressure angle	20	20	20	20
Pitch diameter mm [inch]	44[1.7]	52[2.1]	49.5[1.95]	54[2.1]
Add modification coefficient	0.55	0.6	0.5	0.4

Model	X mm [inch]	Y mm [inch]
2PN16	193[7.6]	150[5.9]
2PN20	200[7.9]	157[6.2]
2PN25	209[8.2]	166[6.5]

Note: as per JIS standard Output torque is limited depending on pinion dimension In case of small pinion, output torque is limited less than spec..

With Shockless relief valve and time delay valve option.
With mechanical brake



Model	X mm [inch]
2PC16	206[8.1]
2PC20	213[8.4]
2PC25	222[8.7]

2.5K Series

Swing motor

Characteristics & Advantages

2.5K series motor is disc valve Char-Lynn® motor which can work with low leakage under high pressure.

The integrated pinion gear and big capacity bearing ensured the 2.5K series motor high reliability even under high radial load.

Specifically fitting for Swing drive on mini-excavators which tonnage less than 2 ton.

Integrated relief valve (or other required valves) can be easily assembled on the 2.5K series motor directly/

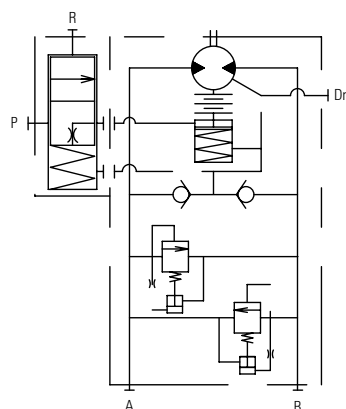
2.5K series is a motor used with heavier duty specifications than 2K series.



D-7

Circuit diagram

This hydraulic circuit includes time delay valve and shockless relief valve (option)



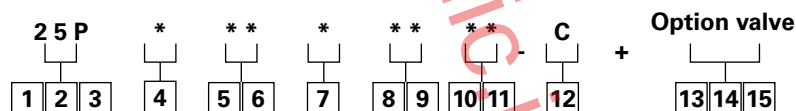
Specification

Model		25P*16	25P*20	25P*25
Motor displacement	cm ³ /rev [in ³ /rev]	158 [9.6]	195 [11.9]	244 [14.9]
Max output torque	N-m [lb-in]	369 [3265.9]	472 [4177.6]	515 [4558.1]
Max pressure	bar [psi]	147 [2132]	152 [2205]	132 [1915]
Max speed	rpm	80	80	80
Mechanical brake torque	N-m [lb-in]	441[3903.2] (Min. release pressure: 20bar[290psi], Max release pressure: 49bar[711psi])		
Mass	kg[lb]	21.0[46.3]	21.5[47.4]	22.0[48.5]

Note:

1. Max pressure is relief valve setting pressure
2. Need drain line (Back pressure should be max 20bar [290psi]).

Model Code



1 2 3 Series
25P 2.5K Series swing motor

4 Brake specification
N Without mechanical brake
C With mechanical brake

5 6 Displacement
16 158cm³/r[9.6in³/r]
20 195cm³/r[11.9in³/r]
25 244cm³/r[14.9in³/r]

7 Load holding spec.
A Geroler Load holding (Middle)
B Geroler Load holding (Light)

8 9 Port
11 G3/8 O-ring port with shockless relief valve
31 G3/8 O-ring port with relief valve

10 11 Output pinion shaft
15 m4 z11
34 m4 z13

12 Design code

13 14 15 Option valve
VNS Shockless relief valve
V2T Time delay valve
VSW Counter balance valve with relief
Keep blank for no optional valve required

Model code and relief setting pressure are required in order sheet.

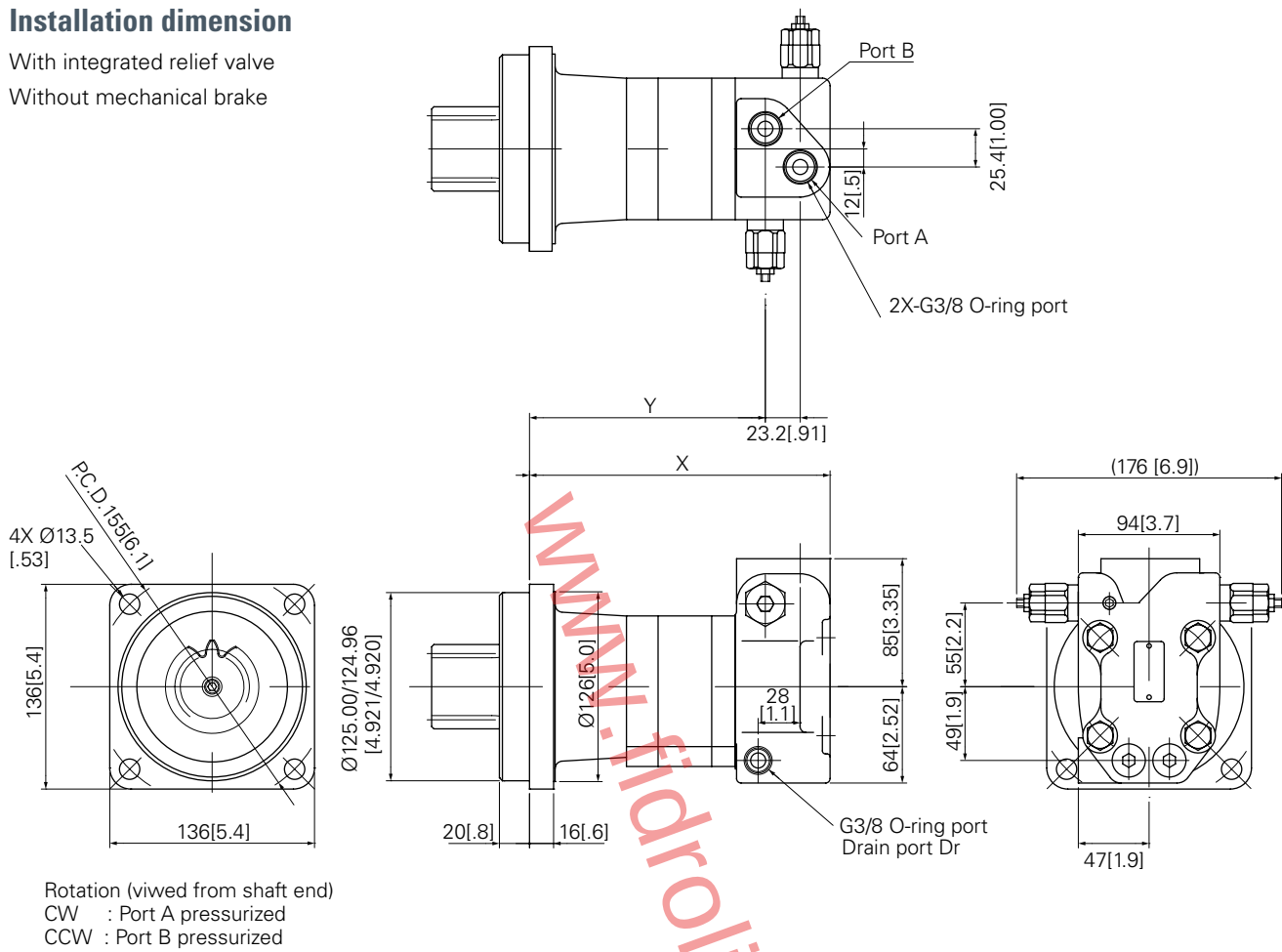
*More displacement/Port are optional based on customer request

For all the relief valve setting pressure and other special requirements besides above model code listed, please submit additional order sheet to clarify. (see end cover)

Installation dimension

With integrated relief valve

Without mechanical brake



Pinion Gear Dimension (Reference)

Module	4	4	4.5	4.5
Number of teeth	11	13	11	12
Pressure angle	20	20	20	20
Pitch diameter mm [inch]	44[1.7]	52[2.1]	49.5[1.95]	54[2.1]
Add modification coefficient	0.55	0.6	0.5	0.4

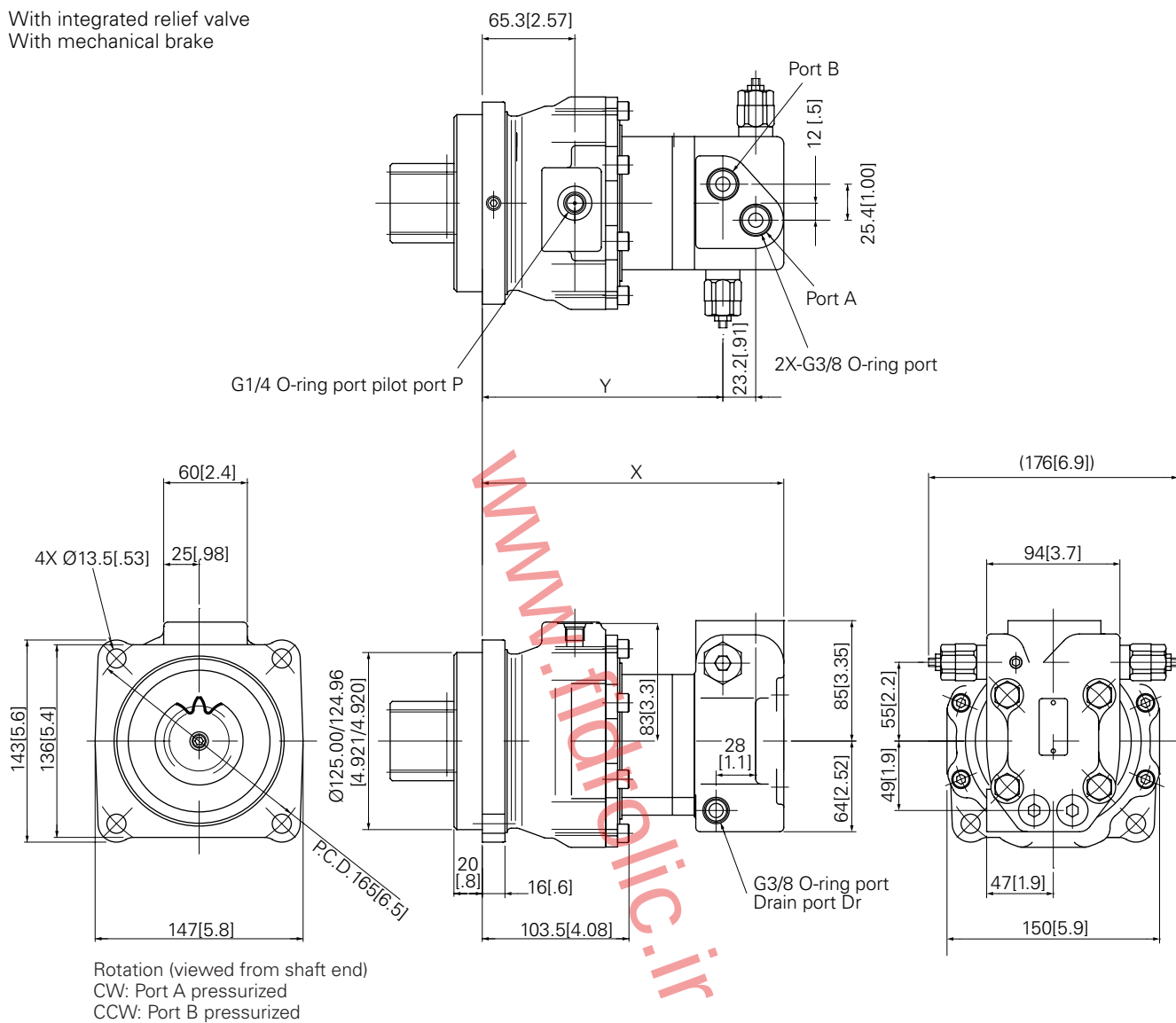
Note: as per JIS standard Output torque is limited depending on pinion dimension In case of small pinion, output torque is limited less than spec..

Model	X mm [inch]	Y mm [inch]
25PN16	193[7.6]	150[5.9]
25PN20	200[7.9]	157[6.2]
25PN25	209[8.2]	166[6.5]

Swing Motor

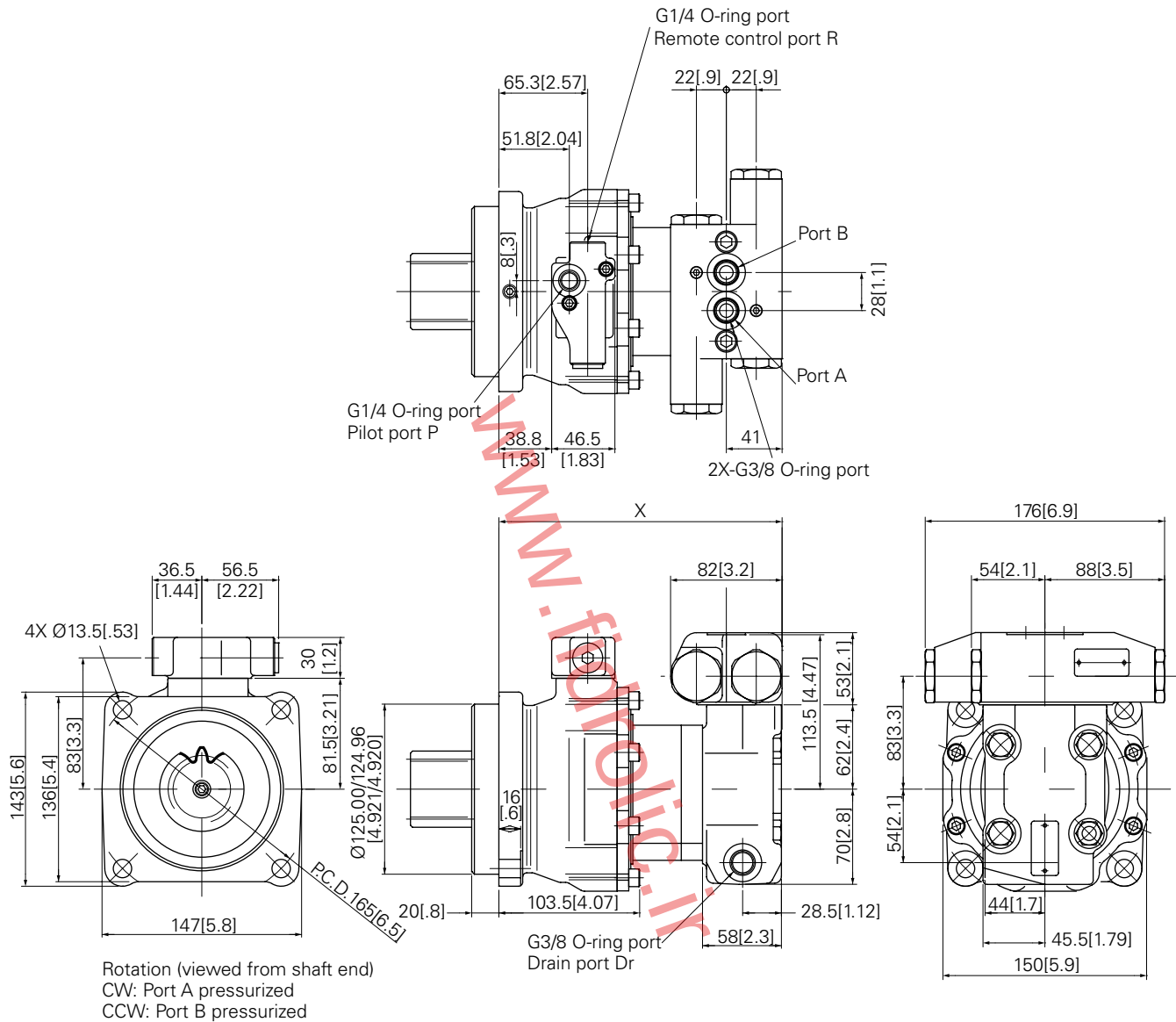
With integrated relief valve
With mechanical brake

D-7



Model	X mm [inch]	Y mm [inch]
25PC16	206[8.1]	163[6.4]
25PC20	213[8.4]	170[6.7]
25PC25	222[8.7]	179[7.0]

With Shockless relief valve and time delay valve option.
With mechanical brake



D-7

Model	X mm [inch]
25PC16	206[8.1]
25PC20	213[8.4]
25PC25	222[8.7]

4K series

Swing motor

Characteristics & Advantages

4K series motor is disc valve Char-Lynn® motor which can work with low leakage under high pressure.

The integrated pinion gear and big capacity bearing ensured the 4K series motor high reliability even under high radial load.

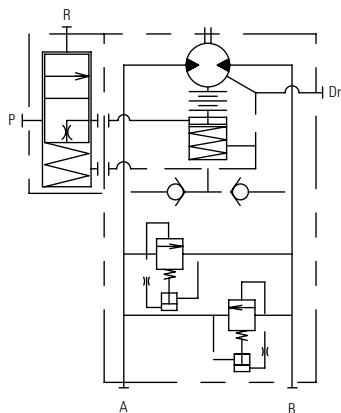
Specifically fitting for Swing drive on mini-excavators which tonnage less than 2.5 ton.

Integrated relief valve (or other required valves) can be easily assembled on the 4K series motor directly.



Circuit diagram

This hydraulic circuit includes time delay valve.



Specification

Model		4P*25	4P*31	4P*39
Motor displacement	cm³/rev [in³/rev]	246 [15.0]	311 [19.0]	393 [24.0]
Max output torque	N-m [lb-in]	691 [6115.8]	850 [7523.1]	859 [7602.8]
Max pressure	bar[psi]	177 [2567]	172 [2495]	137 [1987]
Max speed	rpm	80	80	80
Mechanical brake	N-m [lb-in]	785[6947.8] (Minimum release pressure: 20bar[290psi], Max release pressure: 39bar[566psi])		
Mass	kg[lb]	28.5[62.8]	29.0[63.9]	30.0[66.1]

Note:

1. Max pressure is relief valve setting pressure.
2. Need drain line (Back pressure should be max 20bar[290psi]).

Model Code

4 P * ** * ** 0 1 - D + Option valve
 1 2 3 4 5 6 7 8 9 10 11 12 13 14

1 2

Series

4P 4K Series swing motor

3

Brake specification

M Without mechanical brake
H With mechanical brake

4 5

Displacement

25 246cm³/r [15.0in³/r]
31 311cm³/r [19.0in³/r]
39 393cm³/r [24.0in³/r]

6

Load holding spec.

C Geroler Load holding (Light)
F Geroler Load holding (Middle)

7 8

Port

23 G3/8 O-ring port with shockless relief valve
24 Manifold (valve mount type)

9 10

Output pinion shaft

01 Module 4 (Module 4 is standard option, other available shaft in Page 12)

11

Design code

12 13 14

Option valve

V2T Time delay valve
Keep blank for no optional valve required

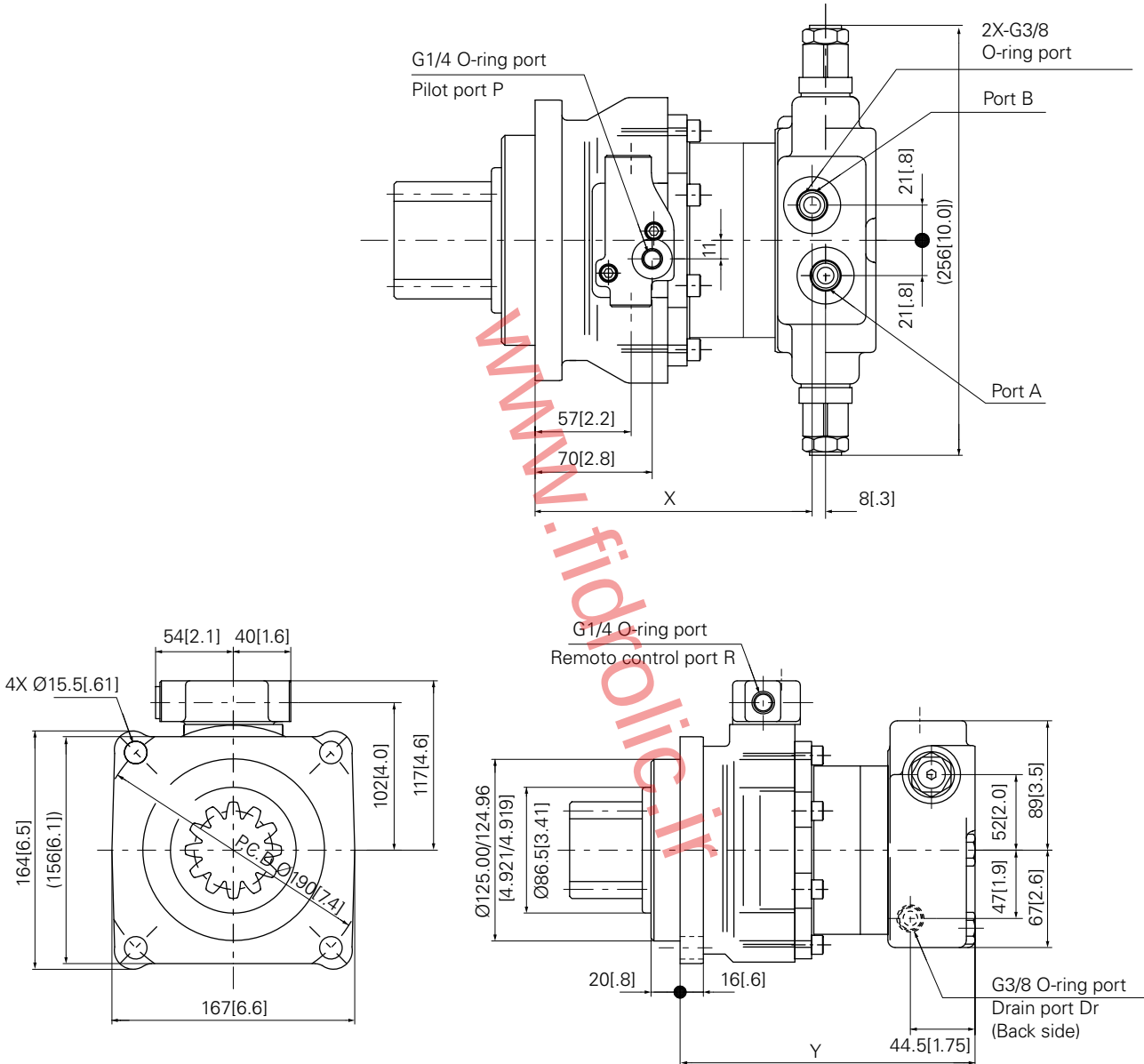
*More displacement/Port are optional based on customer request

For all the relief valve setting pressure and other special requirements besides above model code listed, please submit additional order sheet to clarify.(see end cover)

Installation Dimension

With integrated shockless relief valve and time delay valve (option)

With mechanical brake



Rotation (viewed from shaft end)

CW: Port A pressurized

CCW: Port B pressurized

Pinion gear dimension (reference)

Module	4	4.5	5	6
Number of teeth	13	11	12	11
Pressure angle	20	20	20	20
Pitch diameter mm [inch]	52[2.05]	49.5[1.95]	60[2.4]	66[2.6]
Add modification coefficient	0.45	0.55	0.5	0.55

Note: as per JIS standard output torque is limited depending on pinion dimension

Model	X mm [inch]	Y mm [inch]
4PH25	165 [6.5]	203 [8.0]
4PH31	173.5 [6.83]	211.5 [8.33]
4PH39	184 [7.2]	222 [8.7]

4.5K series

Swing motor

Characteristics & Advantages

4.5K series motor is disc valve Char-Lynn® motor which can work with low leakage under high pressure.

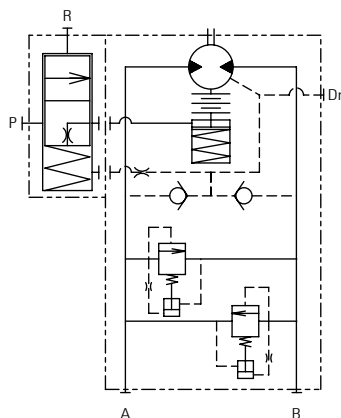
The integrated pinion gear and big capacity bearing ensured the 4.5K series motor high reliability even under high radial load. Specifically fitting for Swing drive on mini-excavators which tonnage less than 3.5 ton.

Integrated relief valve (or other required valves) can be easily assembled on the 4.5K series motor directly.



Circuit diagram

This hydraulic circuit includes time delay valve.



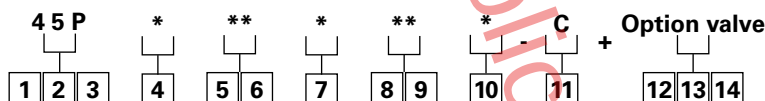
Specification

Model		45P*31	45P*33	45P*39
Motor displacement	cm³/rev [in³/rev]	311 [19.0]	333 [20.3]	393 [24.0]
Max output torque	N-m [lb-in]	898 [7948.0]	996 [8815.3]	951 [8417.1]
Max pressure	bar[psi]	181 [2625]	177 [2567]	152 [2205]
Max speed	rpm	80	80	80
Mass	kg[lb]	32.0[70.6]	32.5[71.6]	33.0[72.8]

Note:

1. Max pressure is relief valve setting pressure.
2. Need drain line (Back pressure should be max 20bar [290psi]).

Model code



1 2 3	Series 45P 4.5K Series swing motor
4	Brake specification M Without mechanical brake C With mechanical brake
5 6	Displacement 31 311cm³/r[19.0in³/r] 33 333cm³/r[20.3in³/r] 39 393cm³/r[24.0in³/r]
7	Load holding spec. A Geroler Load holding (Light) H Geroler Load holding (Middle)
8 9	Port 23 G3/8 O-ring port with shockless relief valve 24 Manifold (valve mount type)

10	Output pinion shaft Please check with our sales
11	Design code
12 13 14	Option valve V2T Time delay valve Keep blank for no optional valve required

*More displacement/Port are optional based on customer request

For all the relief valve setting pressure and other special requirements besides above model code listed, please submit additional order sheet to clarify.(see end cover)

Note: Pre-Production

With mechanical brake



Please contact us

Char-Lynn Low speed high torque orbit motor for traction drive

K-D, and TRB traction motors



Features

- Low speed high torque Char-Lynn® motor for Traction
- Direct drive (no reduction gear)
- Displacement from 180cm³/rev [11.0in³/rev] to 490cm³/rev[29.9in³/rev], maximum pressure up to 206bar[2988psi]
- Integrated counter balance valve

Benefits

- Reduced energy consuming attributed to higher mechanical and volumetric efficiency
- Less mechanical shocks by smooth and precise control
- Cost competitive due to simple structure design
- Proven performance by 20+ years experience
- No reduction gear oil to change/maintain

Typical application

- Mini excavator
- Belt conveyor
- General traction application
- Harvester
- Winch
- Paver

Typical mini excavator weight (ton)

0.5	0.8	1.0	1.5	1.7	Model
					K-D18
					TRBF20
					TRBF31
					TRBV31
					TRBV35
					TRBV39
					TRBV44
					TRBV49

Recommendation fluids: ISO VG32, 46, 56, 68 mineral oil

Recommended system operation temperature: -30°C to 80°C
[-22°F to 176°F]

Recommended oil viscosity: 24 to 50 cSt[120 to 233 SUS]

Recommended cleanliness: ISO 18/13

D-10



K-D series

Traction Motor

Characteristics & Advantages

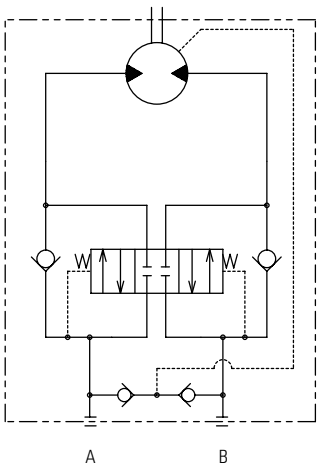
K-D series motor designed based on 2000 series Char-Lynn motor. The disc valve in the K-D series motor is more compact and efficient. This allows a shorter package and better performance at low speeds.



Specification

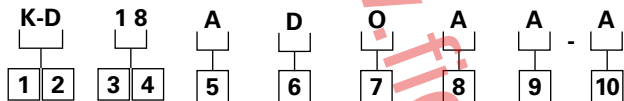
Model		K-D18
Motor displacement	cm ³ /rev [in ³ /rev]	180 [11.0]
Max output torque	N-m [lb-in]	470 [4159.8]
Max pressure	bar [psi]	167 [2422]
Max flow	l/min [GPM]	10 [2.6]
Max case pressure	bar [psi]	20 [290]
Mass weight	kg[lb]	13.5[29.8]

Circuit diagram



D-10

Model code

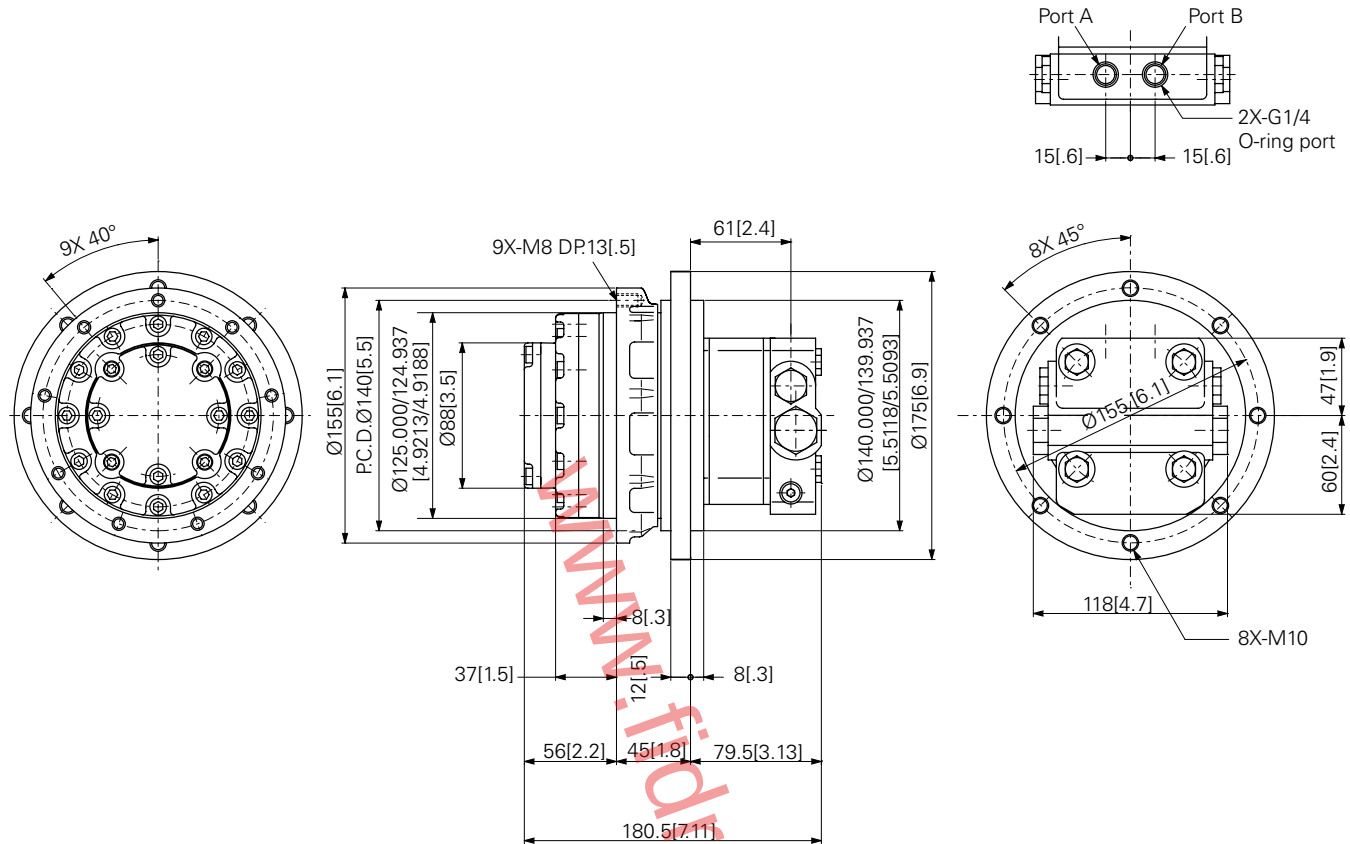


1 2	Series K-D K-D Series Traction motor
3 4	Displacement 18 180cm ³ /r [11.0in ³ /r]
5	End-Cover spec. A G1/4 O-ring port, integrated counter balance valve
6	Wheel type D Pilot dia. Ø125, Bolt P.C.D. 140, 9-M8

7	Flange type O Pilot dia. Ø140, Bolt P.C.D. 155, 8-M8
8	Load holding spec. A Tight fitting, Low leakage
9	Special feature A None
10	Design Code

More specific features (Displacements, etc) are available on request, please contact with sales.

Installation Dimension



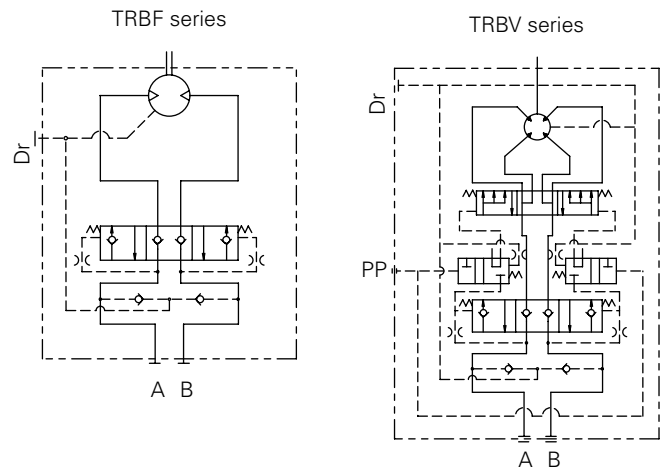
D-10

TRB Series

Traction motor

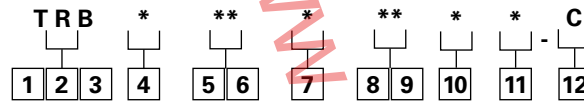
Characteristics & Advantages

TRB series motor designed based on 6000 series Char-Lynn motor. By using Eaton's special disc valve design, the TRB motor is very compact and very efficient at high pressures. This allows superior performance at low speeds. Also to increase machine performance two speed options are available.



D-11

Model Code



1 2 3 Series
TRB TRB Series traction motor

4 Two speed spec.
F Fixed displacement
V Variable displacement (2 speed motor)
S Auto 2 speed

5 6 Displacement
31 310cm³/r [18.9in³/r]
35 350cm³/r [21.4in³/r]
39 390cm³/r [23.8in³/r]
44 440cm³/r [26.9in³/r]
49 490cm³/r [29.9in³/r]

7 Load holding spec.
A Tight fitting (Medium)
C Tight fitting (Light)

8 9 End-cover spec
11 Fixed displacement, G1/4 O-ring port, integrated counter balance valve
12 Variable displacement, G1/4 O-ring port, integrated counter balance valve
21 Fixed displacement, G3/8 O-ring port, integrated counter balance valve
22 Variable displacement, G3/8 O-ring port, integrated counter balance valve

10 Special feature
0 Standard
3 High temperature/ High pressure

11 Wheel and Flange spec.
1 Wheel Pilot dia. Ø140, Bolt P.C.D. 157, 8-M10
Flange Pilot dia. Ø140, Bolt P.C.D. 157, 8-M10
4 Wheel Pilot dia. Ø160, Bolt P.C.D. 180, 9-M10
Flange Pilot dia. Ø155, Bolt P.C.D. 175, 8-M10
8 Wheel Pilot dia. Ø140, Bolt P.C.D. 155, 9-M10
Flange Pilot dia. Ø140, Bolt P.C.D. 155, 8-M10

12 Design Code

More specific features (Displacements, etc) are available on request, please contact with sales.

*High temperature/high pressure

Intermittent oil temperature is 100°C[212°F]

Intermittent pressure is 235[3408] bar[psi]

Specification

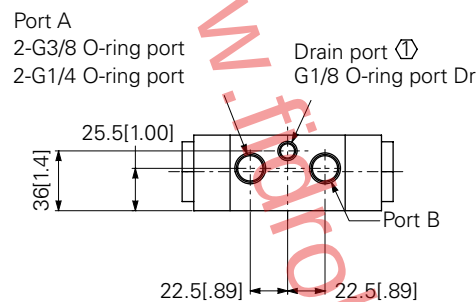
Model		TRB20	TRB31	TRB35	TRB39	TRB44	TRB49
Motor displacement Fixed(Variable)	cm ³ /rev [in ³ /rev]	195[11.9] 97.5[5.95]	310[18.9] (155[9.5])	350[21.4] (175[10.7])	390[23.8] (195[11.9])	440[26.9] (220[13.4])	490[29.9] (245[15.0])
Max output torque	N-m [lb-in]	518 [4584.7]	1020 [9027.7]	1148 [10160.6]	1279 [11320.0]	1443 [12771.6]	1607 [14223.1]
Max pressure	bar [psi]	167 [2422]	206 [2988]	206 [2988]	206 [2988]	206 [2988]	206 [2988]
Max flow	l/min[GPM]	20 [5.1]	20 [5.1]	20 [5.1]	20 [5.1]	20 [5.1]	20 [5.1]
Max case pressure	bar[psi]	TRBV: 5[73] TRBF: 20[290]	TRBV: 5[73] TRBF: 20[290]	TRBV: 5[73] TRBF: 20[290]	TRBV: 5[73] TRBF: 20[290]	TRBV: 5[73] TRBF: 20[290]	TRBV: 5[73] TRBF: 20[290]
2 speed pilot pressure	bar[psi]	14 [203]	14 [203]	14 [203]	14 [203]	14 [203]	14 [203]
Mass weight	kg[lb]	20[44.1]	22.0[48.5]	22.5[49.6]	23.0[50.7]	23.5[51.8]	24.0[52.9]

Installation dimension

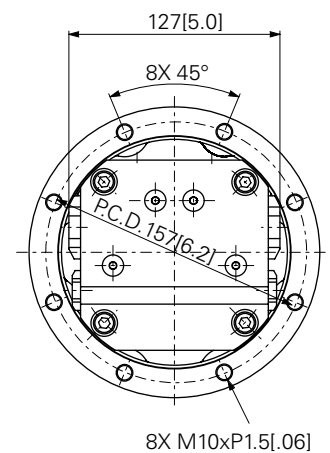
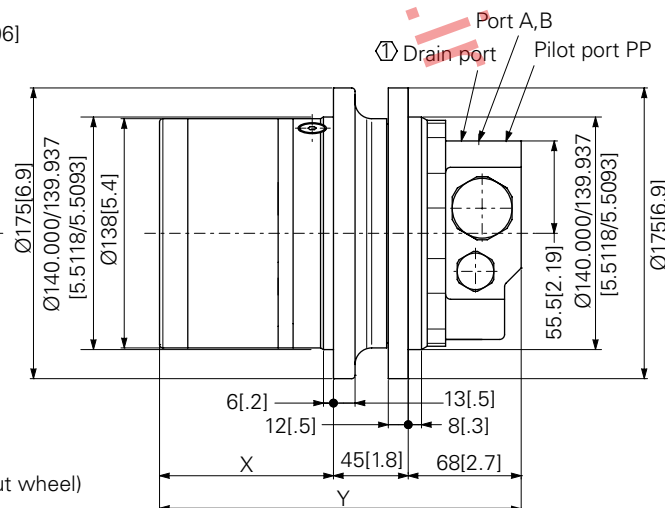
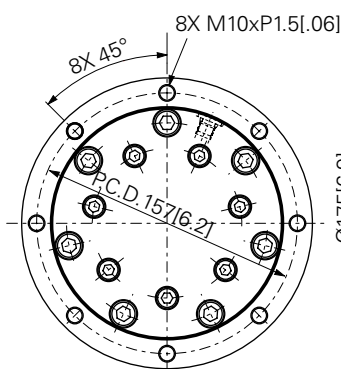
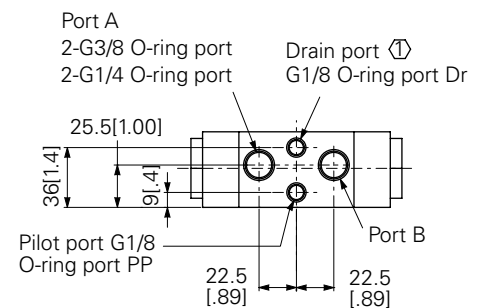
Wheel and Flange 1 type

Model	X mm [inch]	Y mm [inch]
TRB20	72.1 [2.84]	185.1 [7.29]
TRB31	85.0 [3.35]	198.0 [7.80]
TRB35	89.4 [3.52]	202.4 [7.97]
TRB39	93.7 [3.69]	206.7 [8.14]
TRB44	99.1 [3.90]	212.1 [8.35]
TRB49	104.7 [4.12]	217.7 [8.57]

TRBF;Fixed Displacement



TRBV; Variable displacement



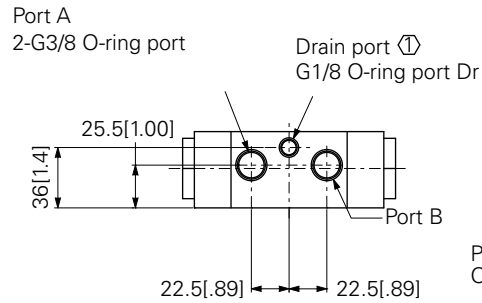
Note

- ① Connect to drain port
2. Direction (Viewed from output wheel)
Port A Pressurized : CCW
Port B Pressurized : CW

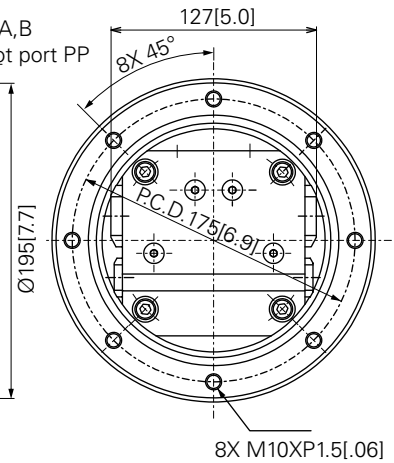
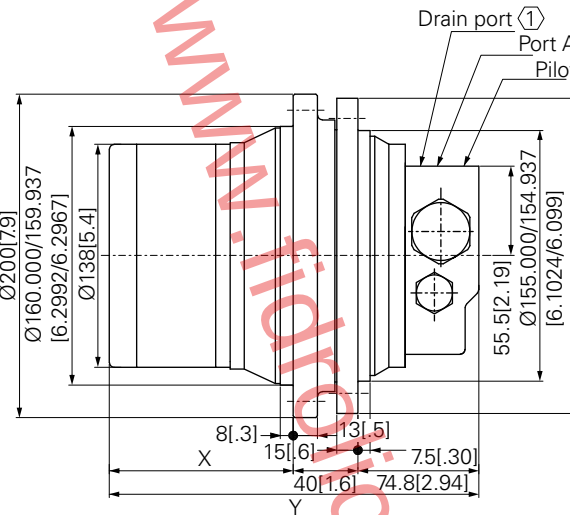
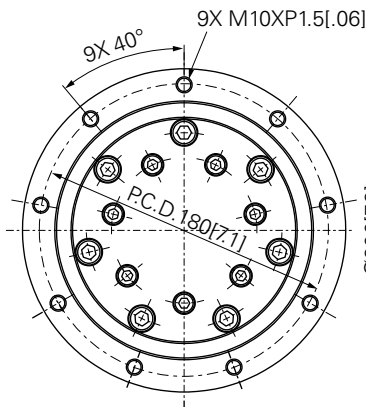
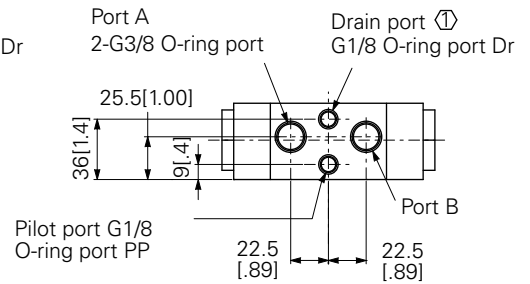
Wheel and Flange 4 type

Model	X mm [inch]	Y mm [inch]
TRB39	108.3 [4.26]	223.1 [8.78]
TRB44	113.8 [4.48]	228.6 [9.00]
TRB49	119.3 [4.70]	234.1 [9.22]

TRBF; Fixed Displacement



TRBV; Variable displacement



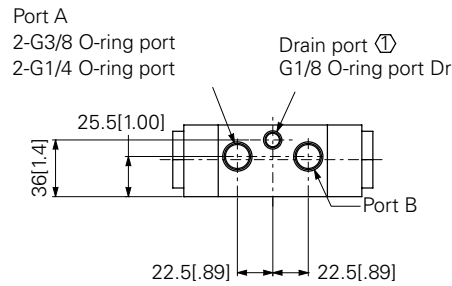
Note

- ① Connect to drain port
2. Direction (Viewed from output wheel)
 - Port A Pressurized : CCW
 - Port B Pressurized : CW

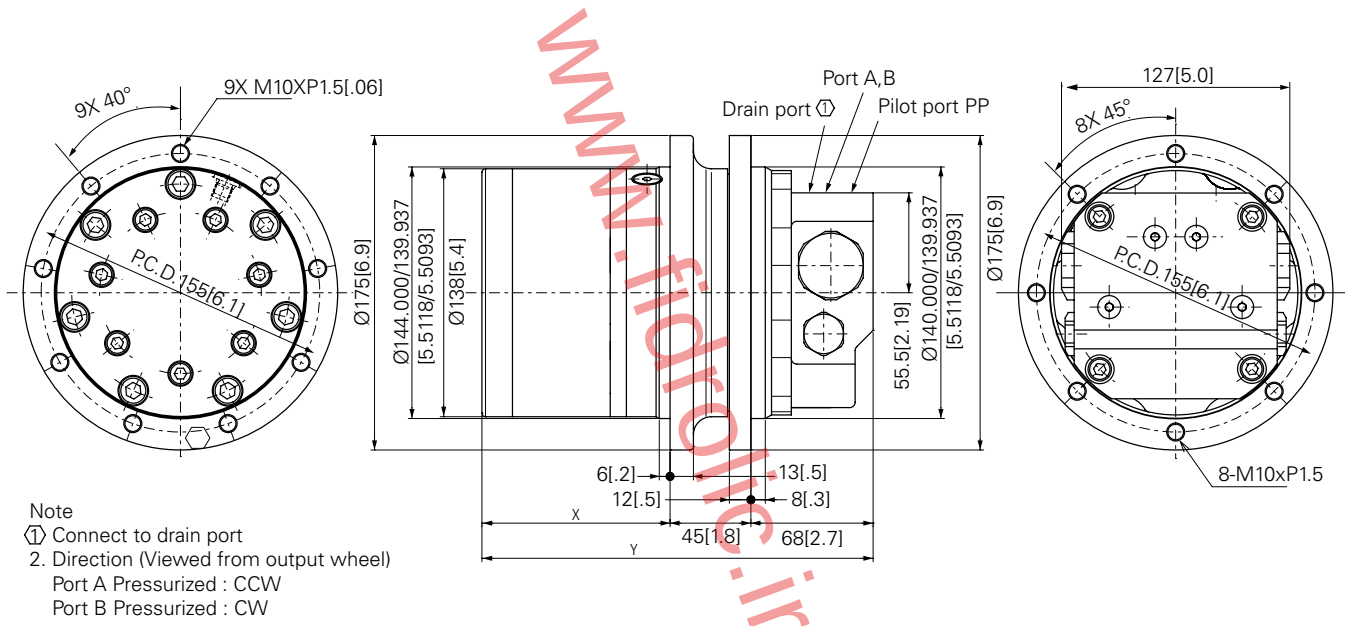
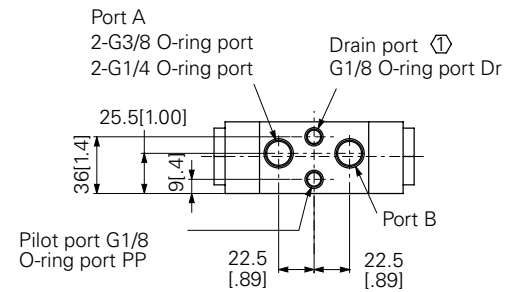
Wheel and Flange 8 type

Model	X mm [inch]	Y mm [inch]
TRB20	72.1 [2.84]	185.1 [7.29]
TRB31	85.0 [3.35]	198.0 [7.80]
TRB35	89.4 [3.52]	202.4 [7.97]
TRB39	93.7 [3.69]	206.7 [8.14]
TRB44	99.1 [3.90]	212.1 [8.35]
TRB49	104.7 [4.12]	217.7 [8.57]

TRBF; Fixed Displacement



TRBV; Variable displacement



D-11

S Series motor with rotation detecting shaft

- This series of motors are suited in combination with a tachometer or encoder. Motor comes with a rear output shaft that spins at motor shaft speed for use in applications with precise speed control.
- Applications: Plastic Injection Machine, Industrial Machine and Mobile



2000 Series motor with rotation detecting shaft

- By the rotation detecting shaft, these motors are especially adapted to combination with tachometers. This series of motors are suited in combination with a tachometer or encoder. Motor comes with a rear output shaft that spins at motor speed. In particular, Injection molding machines needing rpm detection will find the most convenient.
- Applications: Plastic Injection Machine, Industrial Machine and Mobile



Orbit motor with GJ type planetary-gear reducer

- The motors of this series are combinations of H, S, 2000 Series Motor and planetary-gear reducer. The reducer shaft, not frame, is the driving member.
- Applications: Industrial Machines, Fishing Machines



Orbit motor with GW type planetary-gear reducer

- The motors of this series are intended for use driving travelling mechanism and winches, each being a combination of 2000 Series Motor and planetary-gear reducer. The reducer frame is the driving member.
- Applications: Construction Machines, Agricultural and Forestry Machines, Fishing Machines

Please reach out to your Eaton representative for more information on these products.

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