

Low Speed, High Torque Motors

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



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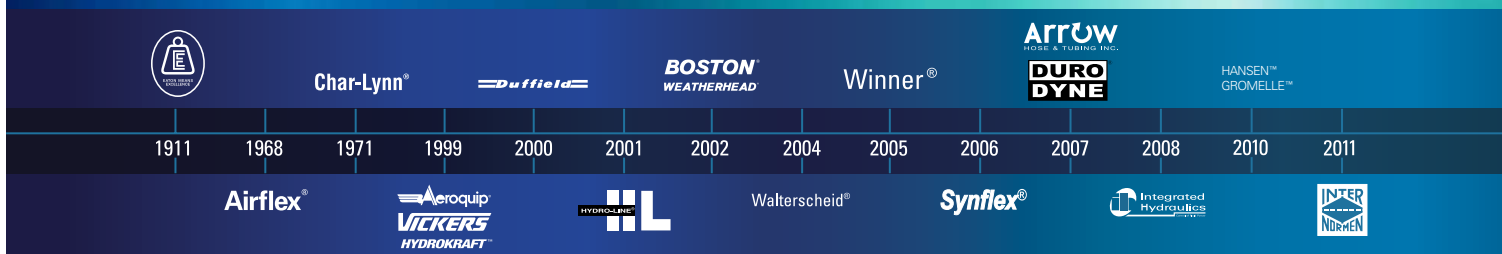


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The Power of One Eaton

Celebrating
100 YEARS
Ideals that Endure



EATON
Powering Business Worldwide

There's a certain energy at Eaton. It's the power of integrating the competencies of some of the world's most respected names to build a brand you can trust to meet every power management need. The energy created supports our commitment to powering business worldwide.

As the world's demand for high-efficiency hydraulic systems for mobile and stationary applications increase, Eaton is helping to solve these challenges more reliably, efficiently, and sustainably. Our goal is simple; to provide unique solutions across a wide range of markets that keep businesses on the leading edge of change. Visit Eaton.com/hydraulics/fusion.

That's the power of One Eaton.

Serving eight key segments - sharing one focus



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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.



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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.



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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.



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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

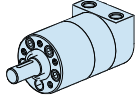
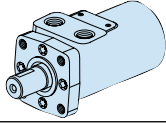
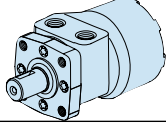
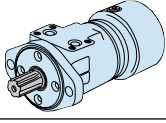
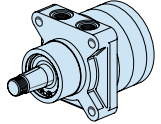
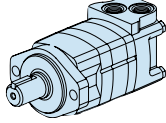
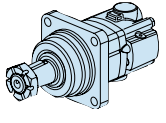
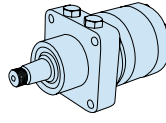
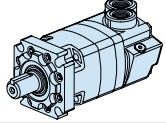
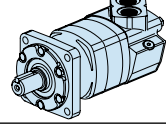
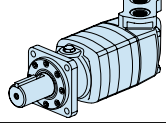
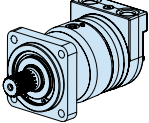
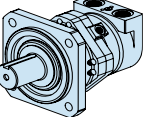
Knowing what's important to our customers and integrating that knowledge into the fabric of our business

- ...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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Introduction

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

Motor options include:

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

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

output speed.

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

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

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

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

MOTOR QUICK-GUIDE (BASED ON MAXIMUM CONTINUOUS RATINGS)

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

Circuits

Circuit Design Considerations

Hydraulic Circuit

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

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

Open Loop Circuit

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

Typical applications using open loop circuits include:

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

Closed Loop Circuit

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

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

Typical applications using closed loop circuits include:

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

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.

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

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.

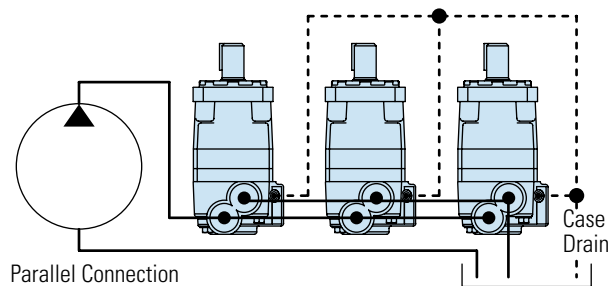
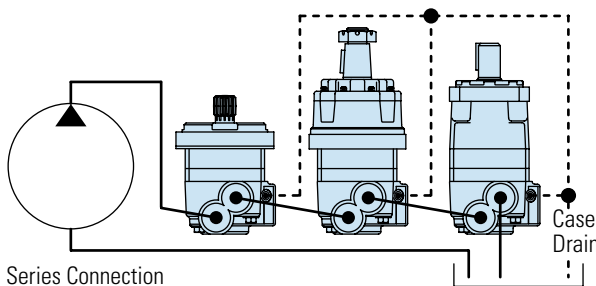
High Efficiencies

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.

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

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

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



Motor Application Information

Vehicle Drive Calculations

Step One – Calculate Motor Speed (RPM)

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

where KPH = vehicle speed (kilometers per hour)

where MPH = vehicle speed (miles per hour)

R_m = rolling radius of tires (meter)

R_i = rolling radius of tires (inch)

G = gear reduction ratio (if any) between motors and wheels. If no gear box or other gear reduction devices are used $G = 1$.

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

Step Two – Determine Rolling Resistance

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

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

where GVW = gross (loaded) vehicle weight lb/Kg

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.

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

TABLE 2

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

Step Four – Determine Acceleration Force (FA)

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

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

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

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

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

Step Five – Determine Drawbar Pull

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

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

Motor Application Information

Vehicle Drive Calculations

Step Six — Total Tractive Effort

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

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

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

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

Step Seven — Calculate Hydraulic Motor Torque (T)

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

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

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

Step Eight—Wheel Slip

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

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

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

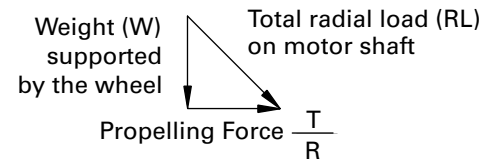
Where: f = coefficient of friction
W = loaded vehicle weight over drive wheel

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

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

Step Nine — Motor Radial Load Carrying Capacity

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



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

Refer to radial load rating of each motor series.

Shaft Torque (T)

$$T = \frac{q \times DP}{2 \times p}$$

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

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

Shaft Speed (N)

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

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

Power (into motor)

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

Power (out of motor)

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

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

Optional Features

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

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

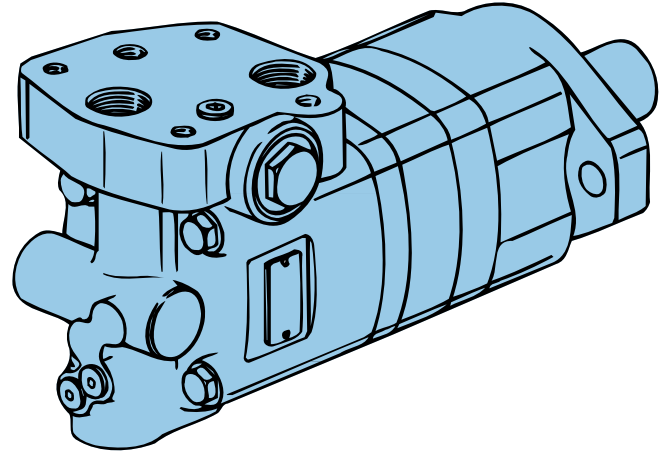
Optional Features

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

0 Optional
 S Standard
 — Not applicable

Two Speed Motors

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



Features:

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

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

Benefits:

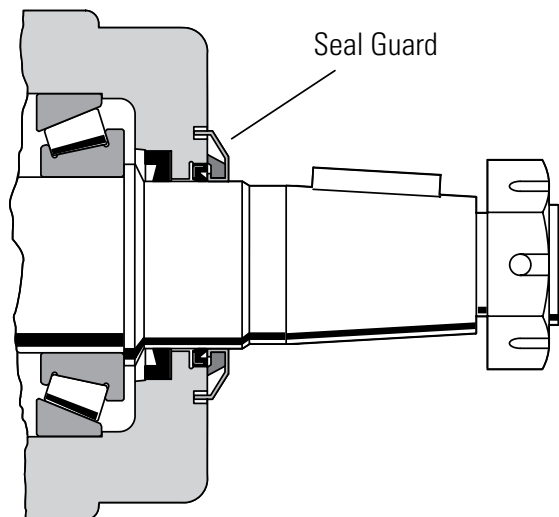
- Two operating speeds and torque levels with one motor
- Two selectable performance ranges in one motor package

Application:

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

Seal Guard

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



Features:

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

Benefits:

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

Applications:

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

Viton Seals

This option is available on all Char-Lynn motors.

Features:

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

Benefits:

- Longer seal life in chemically aggressive environment
- 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 and 2000 series motors.

Features:

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

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

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

Benefits:

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

Part Numbers:

H Series – Kit No. 60572-000

S Series – Kit No. 60578-000

T Series – Kit No. 60579-000

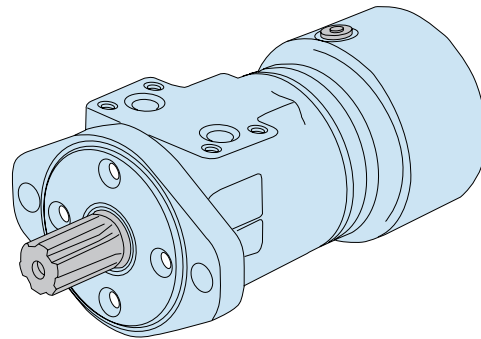
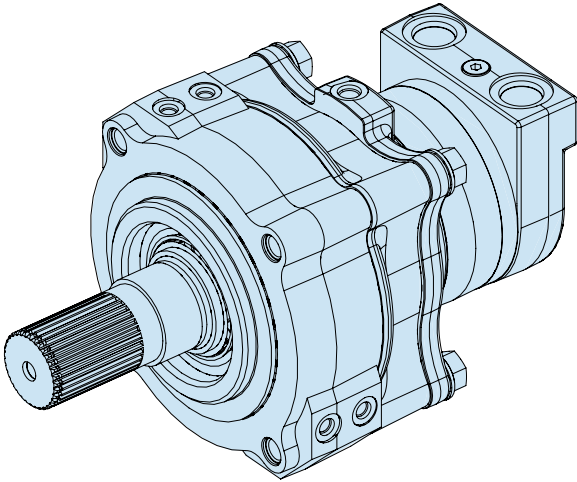
Shaft Seal – Part No. 14778-001

2000 Series – Kit No. 61329-000.

Shaft Seal – No. 14857-001

Brake Solutions

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



Features:

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

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

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

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

Benefits:

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

Applications:

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

Free Running Geroler Sets/Gerotor Sets

This feature is available in all Char-Lynn motors.

Features:

The free running option is accomplished using a specially precision-machined gerotor/geroler assembly. This feature increases the clearance between the star and mating ring, allowing the motor to turn more freely with less mechanical drag. The increased clearance also improves lubrication across the wear surfaces of the gerotor star and ring and provides a

greater pressure-relieving flow path reducing pressure spikes. Flow is by-passed internally across the star tips, reducing shock loads to the main drive components. This feature provides an effective method for reducing shock loads to the main drive components.

Benefits:

- Suited for applications with rapid stop/start or rapid reversals.

- Reduces starting pressure and increases starting torque efficiency.
- Reduces pressure spikes through the orbit gear set.

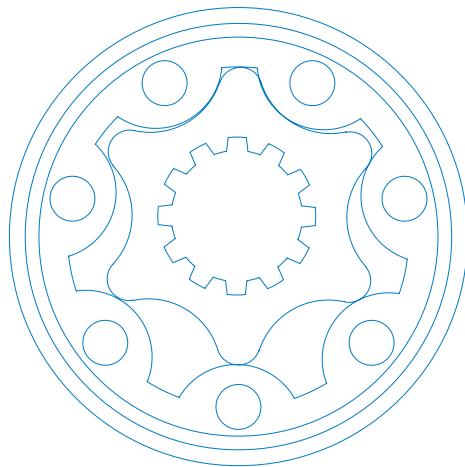
Applications:

- Harvesters
- Stump Grinders
- Skid Steer Loader Attachments
- Machine Tools
- Especially suited for continuous high speed/high flow applications.

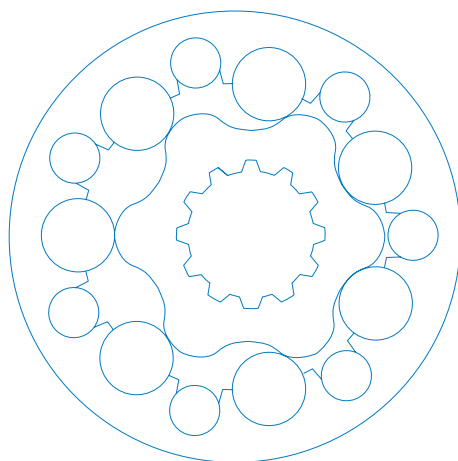
- Also suited for applications with high-pressure spikes from rapid reversals.

Special Notes:

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



Gerotor



Geroler

Gerotor or Geroler?

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

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

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

RPM = speed of output shaft in revolutions per minute

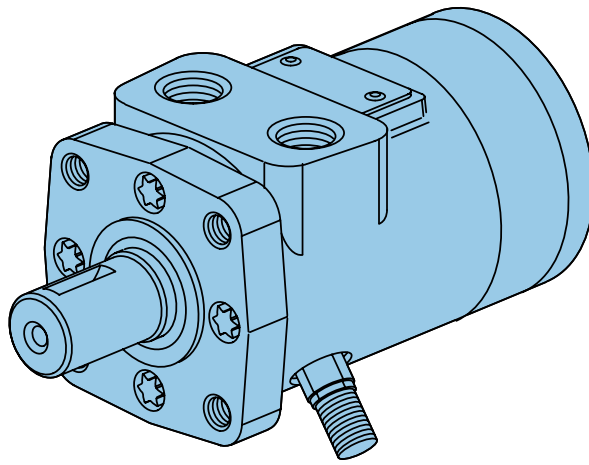
SUS = minimum viscosity measured in SUS.

The recommended viscosity limits are as follows:

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

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

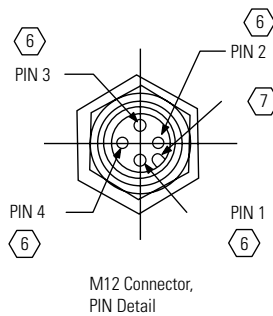
Speed Sensors



Note:

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

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



Features:

Eaton has developed speed sensors specifically designed for LSHT motors.

The single output speed sensor:

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

The dual output speed sensor:

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

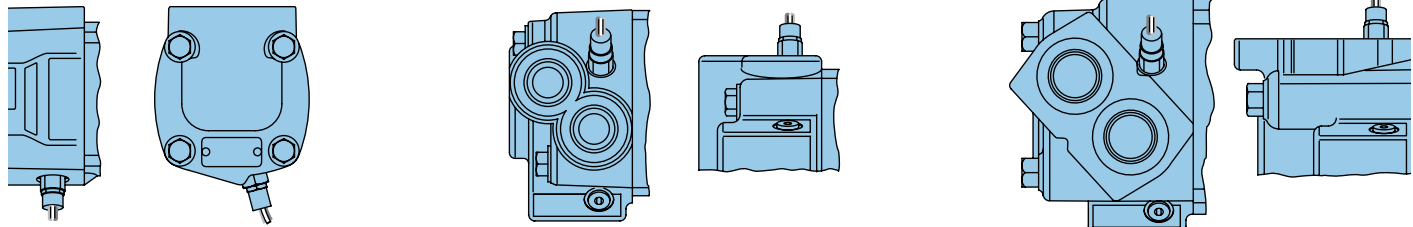
- The first version speed sensor has two output signals 90° out of phase. Each output provides one pulse per target.
- The second version has a speed signal that is twice the output pulses per revolution and it also has a direction signal. (Direction not available on spool motors)

Benefits:

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

Applications:

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



TECHNICAL INFORMATION

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

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

Shuttle Valve

Lubricating Shuttle

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

Features

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

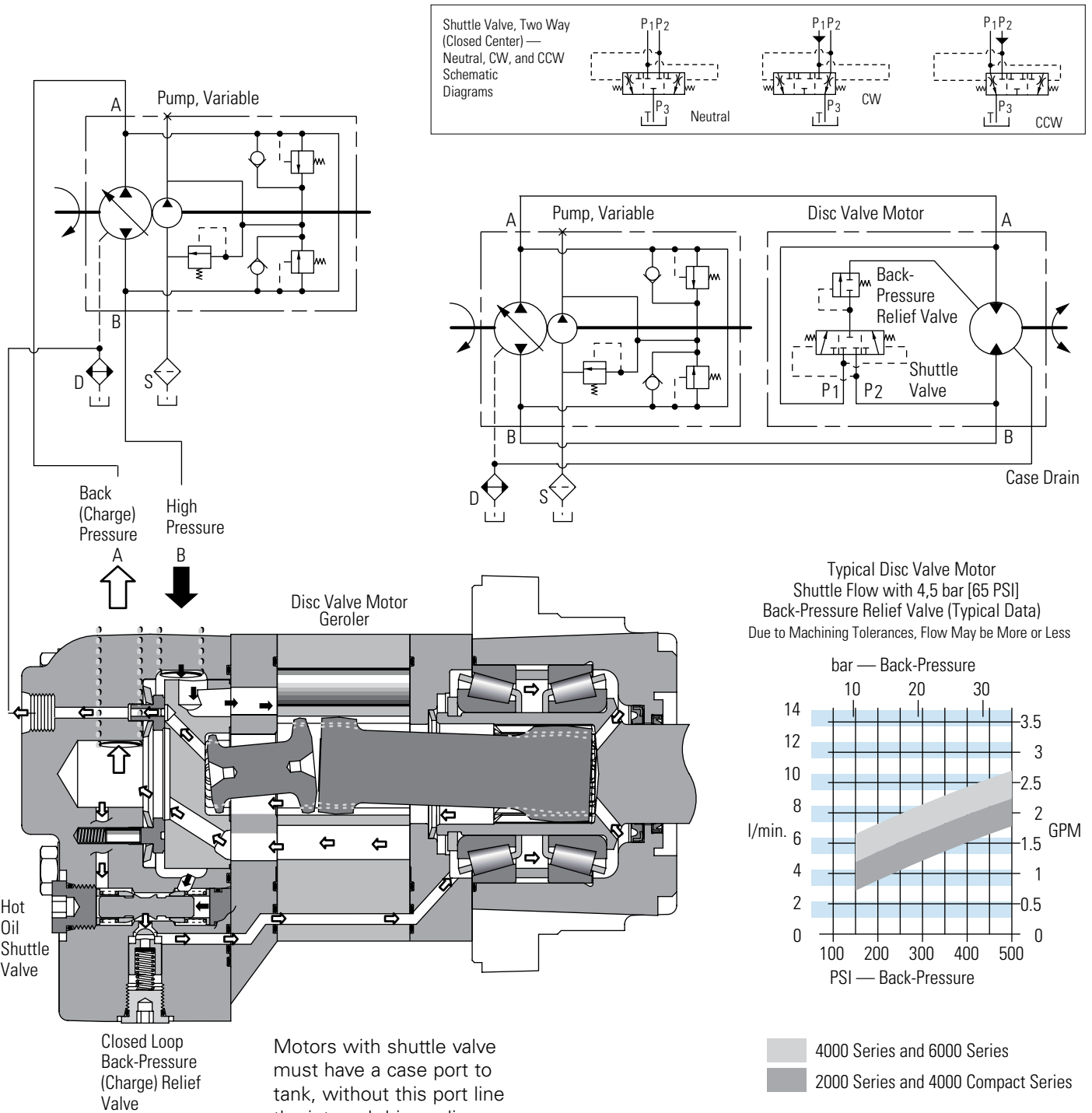
Benefits

- Flushing
- Cooling
- Longer system life

Applications

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

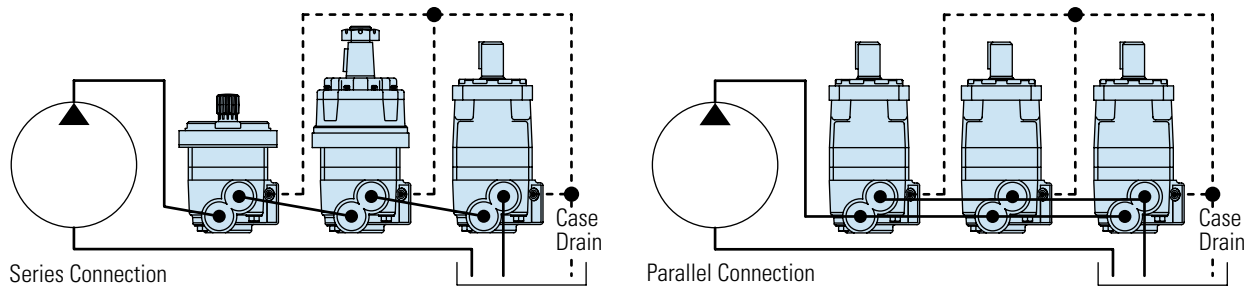
Closed Loop Circuit



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

Case Porting

This option is available on all Char-Lynn Motors.



Features:

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

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

Benefits:

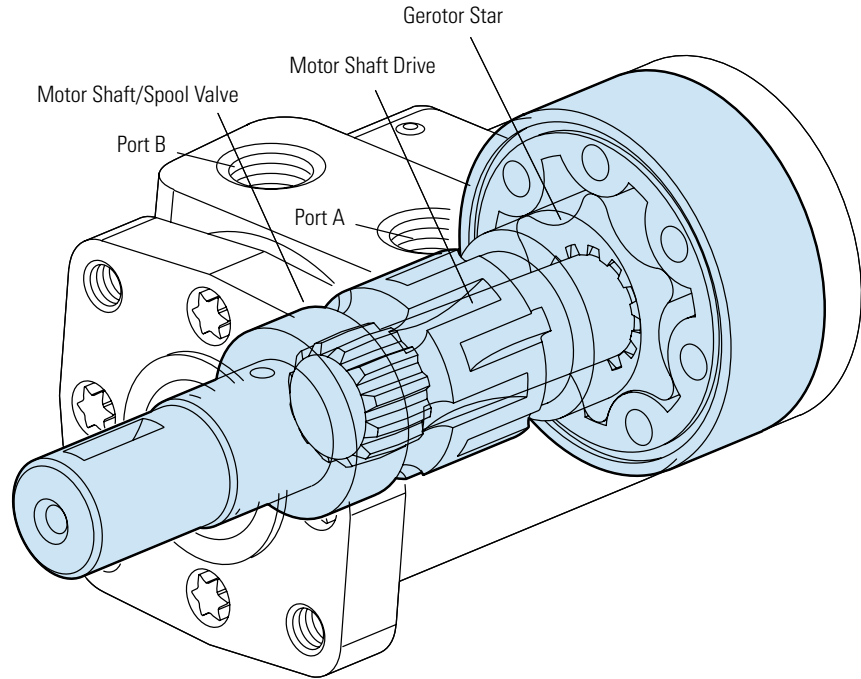
- Extends shaft seal life
- Extends thrust bearing life
- Reduces shaft seal leakage problems
- Improves flushing of the circuit to reduce system contaminates and cooling the system.

Applications:

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

Low Speed Valving

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



Features:

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

Benefits:

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

Applications:

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

Notes:

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

Nickel Plating Options

Full Body Nickel Plating

This option is available on H, S, T, 2K, 4K, 6K motors.

Features:

Eaton is offering full body nickel plating for Char Lynn Motors for protection against wash down environments (Note: this does not offer protection against salt water environments and the recommended option for that is epoxy paint). In order to meet the different requirements, Eaton is now offering two different nickel plating options shown below:

Benefits:

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

Applications:

- Food Processing: Industrial Conveyors

Choosing the options in the model code:

- H, S, T Motors - Choose Option Y in Paint / Packaging Options
- 2000, 4000, 6000 Series - Choose Option

OPTION	DESCRIPTION	APPLICATIONS
Electroless Nickel Plating (AMS 2404D specification)	Premium process offering extremely high quality corrosion resistance	Where water contact is extremely high ⁺
Electrolytic Nickel Plating (AMS-QQ-N-290 specification)	Good quality process offering standard corrosion resistance	Where water contact is minimal ⁺

+ Washdown applications only – does not include salt water applications

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 primarily in wash down environments.

Benefits:

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

Applications:

- Car Washes
- Fishing Winches / Marine applications

Environmental Protection

(epoxy paint)
(plated shafts)

This option is available on all Char-Lynn motors.

Features:

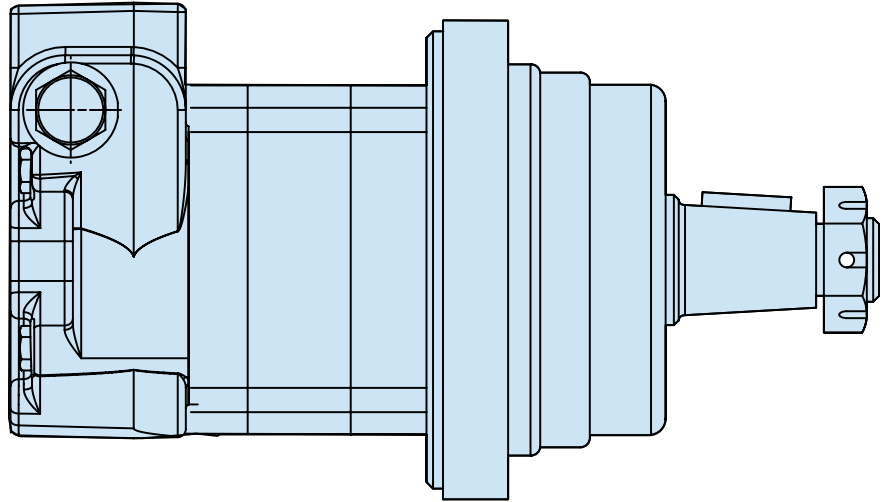
All motors are available with a corrosion resistant coating for use in hostile environments. The Char-Lynn line is also available with the output shaft plated, or with plated shaft and entire motor exterior coating.

Benefits:

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

Applications:

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



Features:

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

Benefits:

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

Applications:

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

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

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

REPLACEMENT CARTRIDGES

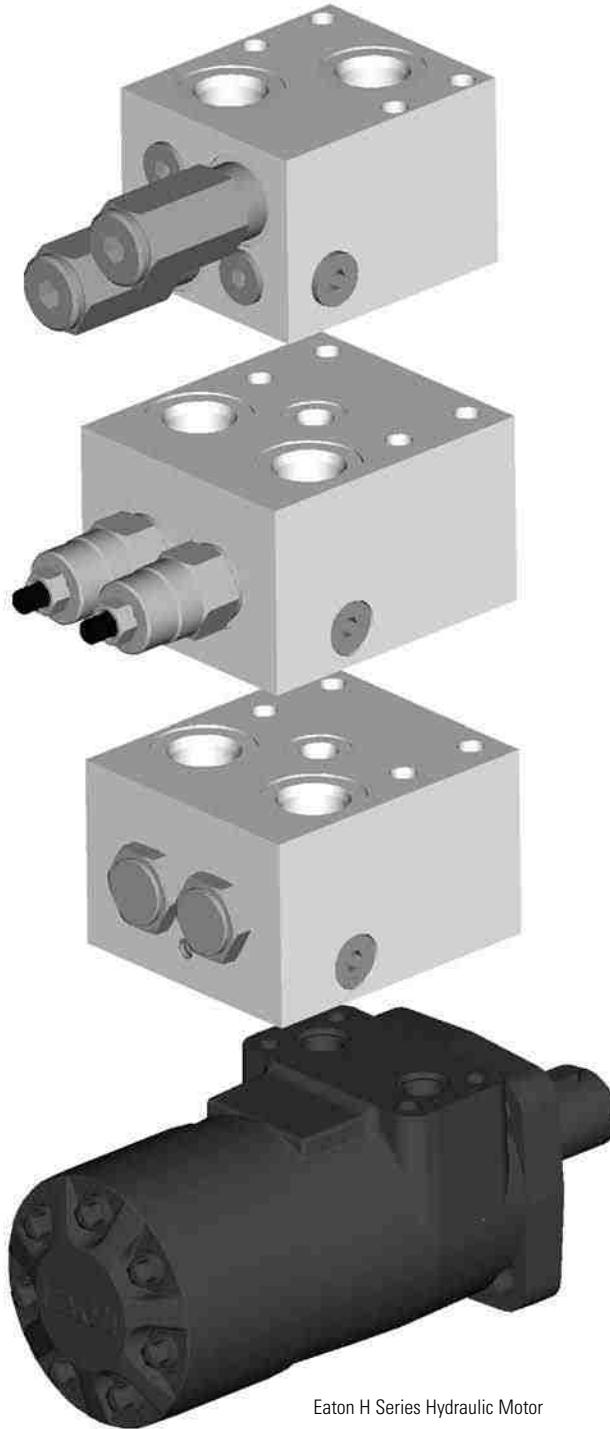
Item part #	Item desc.	Relief valve setting
02-199291	RV5A-10-F-0-35/15	1500 PSI
02-199292	RV5A-10-F-0-35/17.5	1750 PSI
02-199293	RV5A-10-F-0-35/20	2000 PSI
02-199295	RV5A-10-F-0-35/22.5	2250 PSI
02-198563	RV5A-10-F-0-35/25	2500 PSI
02-199294	RV5A-10-F-0-35/27.5	2750 PSI
02-199296	RV5A-10-F-0-35/30	3000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

Special Housings Bolt on Solutions

Cartridge Valves & Manifolds for Spool & Disk Valve Motors

We Manufacture Solutions

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



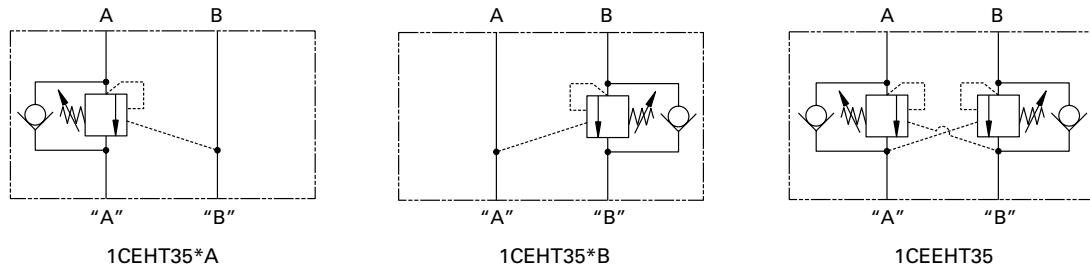
Eaton H Series Hydraulic Motor

Features

- Compatible with Eaton H & T series spool valve motors, and most 2000 series disk valve motors
- Aluminum Manifolds Anodized Black
- Pre-set cartridges to your specifications
- 100% production tested assembly
- Wide range of settings available
- Intelligent model code
- Manifolds are available with out cartridge valves, or pre-assembled and tested to your specifications
- Manifolds and motors can be supplied as a pre-assembled package
- Dual counterbalance valve (with integral shuttle valve), dual pilot operated check valve and dual cross port relief valve packages are available

ICEHT35/ICEEHT35 - Motor Mounted Valves

H & T Mounting Pattern Single and Dual Overcenter Valves



Description

Overcenter valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcenter valve will stop runaway in the event of hose burst and if open center directional control valves are used, will allow thermal expansion relief of the hydraulic fluid. The overcenter cartridge is ideal for mounting directly into a cavity machined in the body of the cylinder, motor or rotary actuator.

The cartridge can also be mounted directly to the ports via a specifically machined body as part of a Hydraulic Integrated Circuit or single unit, or contained within one of our standard line bodies.

Single overcenter valves are normally used when the load is unidirectional, for example an aerial platform or crane and dual overcenter valves are used for controlling loads in both directions for motor applications or for cylinders going over center.

Operation

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimization of load control and energy usage, a choice of pilot ratios is available.

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{(\text{Relief Setting}) - (\text{Load Pressure})}{\text{Pilot Ratio}}$$

Pilot Ratios

- 2.5:1 Best suited for extremely unstable applications such as long booms or flexible frameworks.
- 5:1 Best suited for applications where load varies (Standard) and machine structure can induce instability
- 10:1 Best suited for applications where the load remains relatively constant.

Performance Data

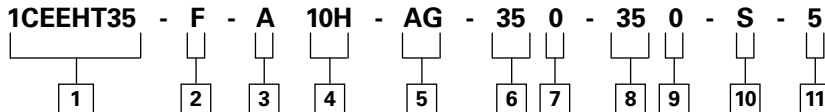
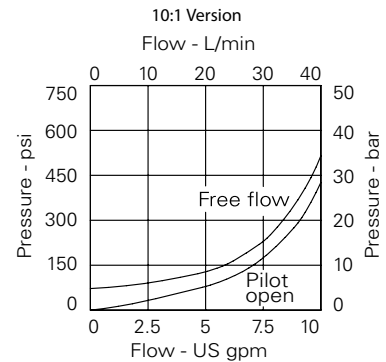
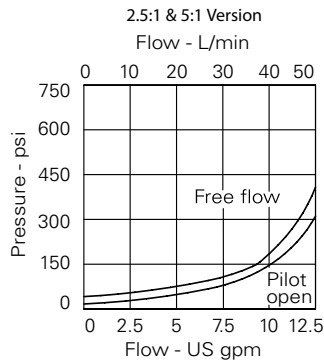
Ratings and Specifications

Figures based on: Oil Temp = 40°C Viscosity = 32 cSt (150 SUS)

Rated flow	30 L/min (8 USgpm)		
Max setting	Max load induced		
	Pressure:	270 bar (4000 psi)	
	Relief setting:	350 bar (5000 psi)	
Cartridge material	Working parts hardened & ground steel External surface zinc plated		
Body material	Standard aluminium (up to 210 bar*) Steel (up to 350 bar)		
Mounting position	Unrestricted		
Cavity Number	A6610 (See section M)		
Torque cartridge into cavity	45 Nm (33 lbs ft)		
Weight (inc cartridges)	1CEOMP35	1.6 kg (3.52 lbs)	
	1CEEOMP35	1.66 kg (3.65 lbs)	
Seal kit number	1CEHT35	9900834-000 (Buna-N)	9900835-000 (Viton)
	1CEEHT35	9900836-000 (Buna-N)	9900837-000 (Viton)
Recommended filtration level	BS5540/4 Class 18/13 (25 micron nominal)		
Operating Temp	-30°C to +90°C (-22° to 194°F)		
Leakage	0.3 milliL/min nominal (5 dpm)		
Nominal viscosity range	5 to 500 cSt		
Installation Kit (includes cap screws, washers, and o-rings)	9900828-000 (Buna-N) 9900829-000 (Viton)		

ICEHT35/ICEHT35 - Motor Mounted Valves

H & T Mounting Pattern Single and Dual Overcenter Valves



1 Basic Code

1CEEHT35 - Double Cartridge and Body
 1CEEHT35*A - Single overcenter in line A-"A"
 1CEEHT35*B - Single overcenter in line B-"B"

2 Adjustment Means

F - Screw Adjustment

3 Housing Material

A - Aluminum
 S - Steel

4

Code	Port Size "A" & "B"	Dual Housing Number	
		Aluminum	Steel
4W	1/2" BSP	6024221-001	6024221-003
10H	SAE 10	6024221-002	
10T	SAE 10		6024221-04

5 Port Acted Upon

A - A Port
 B - B Port
 AB - A & B Ports (dual)

6 Pressure Range (Cart A)

Note: Code Based on pressure in bar.

20 - (2.5:1 and 5:1): 70-210 bar. Std setting 100 bar.
 (10:1): 100-210 bar. Std setting 100 bar.

35 - (2.5:1 and 5:1): 100-350 bar. Std setting 210 bar.
 (10:1): 120-350 bar. Std setting 210 bar.

7 Pressure Setting (Cart A)

0 - Std factory setting
 1500 - 1500 psi

8 Pressure Range (Cart B)

Note: Code Based on pressure in bar.

20 - (2.5:1 and 5:1): 70-210 bar. Std setting 100 bar.
 (10:1): 100-210 bar. Std setting 100 bar.

35 - (2.5:1 and 5:1): 100-350 bar. Std setting 210 bar.
 (10:1): 120-350 bar. Std setting 210 bar.

9 Pressure Setting (Cart B)

0 - Std factory setting
 1500 - 1500 psi

10 Seals

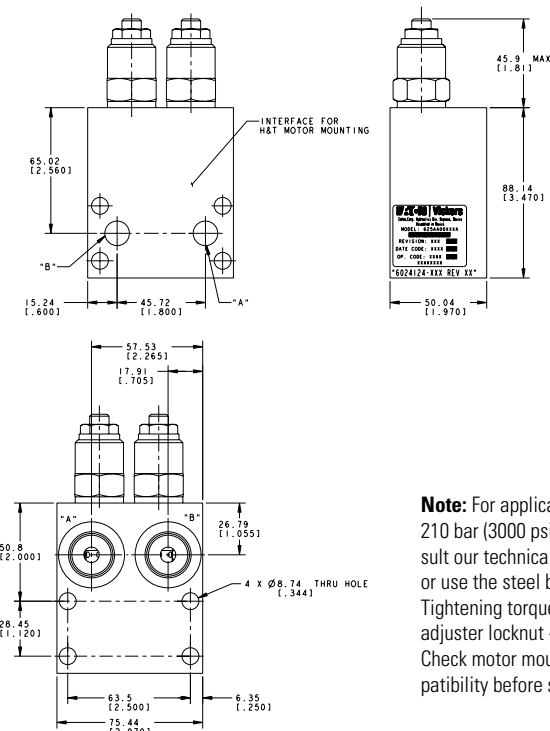
S - Buna-N
 SV - Viton

11 Pilot Ratio

2 - 2.5:1
 5 - 5:1
 10 - 10:1

Cavity plug part number

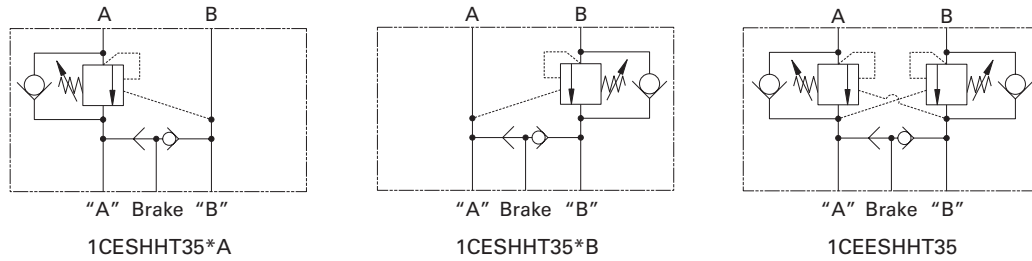
Nitrile - AXP13032-01-N
 Viton - AXP13032-01-V



Note: For applications over 210 bar (3000 psi), please consult our technical department or use the steel body option. Tightening torque of "F" adjuster locknut - 20 to 25 Nm. Check motor mounting compatibility before specifying.

ICESHHT35/ICEESHHT35 - Motor Mounted Valves

H & T Mounting Pattern Single and Dual Overcenter Valve with Brake Release Shuttle



Description

Overcenter Valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcenter valve will stop runaway in the event of hose burst and if open center directional control valves are used, will allow thermal expansion relief of the hydraulic fluid.

These dual overcenter valves also contain a brake release shuttle valve which ensures that pressure is applied to a brake release circuit regardless of whether pressure is applied to ports "A" or "B". These multifunction valves are normally used for the static and dynamic control of systems using motors or semi-rotary-actuators.

Operation

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimization of load control and energy usage, a choice of pilot ratios is available.

Performance Data

Ratings and Specifications

Figures based on: Oil Temp = 40°C Viscosity = 32 cSt (150 SUS)

Rated flow	30 L/min (8 USgpm)		
Max setting	Max load induced		
	Pressure:	270 bar (4000 psi)	
	Relief setting:	350 bar (5000 psi)	
Cartridge material	Working parts hardened & ground steel External surface zinc plated		
Body material	Standard aluminium (up to 210 bar*) Steel (up to 350 bar)		
Mounting position	Unrestricted		
Cavity Number	A6610 (See section M)		
Torque cartridge into cavity	45 Nm (33 lbs ft)		
Weight	1CESHHT35	2.29 kg	(5.04 lbs)
(inc cartridges)	1CEESHHT35	2.34 kg	(5.15 lbs)
Seal kit number	1CESHHT35	9900834-000 (Buna-N)	9900835-000 (Viton)
	1CEESHHT35	9900836-000 (Buna-N)	9900837-000 (Viton)
Recommended filtration level	BS5540/4 Class 18/13 (25 micron nominal)		
Operating Temp	-30°C to +90°C (-22° to 194°F)		
Leakage	0.3 milliL/min nominal (5 dpm)		
Nominal viscosity range	5 to 500 cSt		
Installation Kit (includes cap screws, washers, and o-rings)	9900828-000 (Buna-N) 9900829-000 (Viton)		

The pressure required to open the valve and start actuator movement can be calculated as follows:

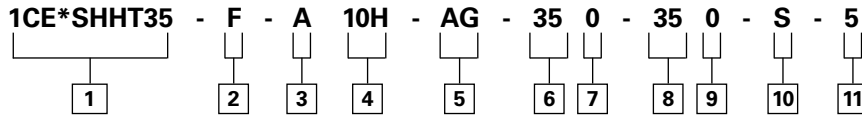
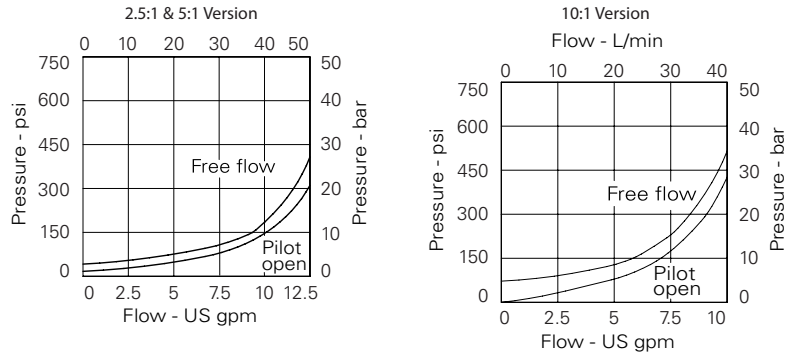
$$\text{Pilot Pressure} = \frac{(\text{Relief Setting}) - (\text{Load Pressure})}{\text{Pilot Ratio}}$$

Pilot Ratios

- 2.5:1 Best suited for extremely unstable applications such as long booms or flexible frameworks.
- 5:1 Best suited for applications where load varies (Standard) and machine structure can induce instability
- 10:1 Best suited for applications where the load remains relatively constant.

ICESHHT35/ICEESHHT35 - Motor Mounted Valves

H & T Mounting Pattern Single and Dual Overcenter Valve with Brake Release Shuttle



1 Basic Code

1CEESHHT35 – Double Cartridge and Body
 1CESHHT35*A – Single overcenter in line A-“A”
 1CESHHT35*B – Single overcenter in line B-“B”

2 Adjustment Means

F – Screw Adjustment

3 Housing Material

A – Aluminum
 S – Steel

4

Code	Port Size		Dual Housing Number	
	“A” & “B”	Brake	Aluminum	Steel
4W	1/2" BSP	1/4" BSP	6025216-001	6025216-003
10H	SAE 10	SAE 4	6025216-002	
10T	SAE 10	SAE 4		6025216-004

5 Port Acted Upon

A – A Port
 B – B Port
 AB – A & B Ports (dual)

6 Pressure Range (Cart A)

Note: Code Based on pressure in bar.

20 – (2.5:1 and 5:1): 70-210 bar. Std setting 100 bar.
 (10:1): 100-210 bar. Std setting 100 bar.

35 – (2.5:1 and 5:1): 100-350 bar. Std setting 210 bar.
 (10:1): 120-350 bar. Std setting 210 bar.

7 Pressure Setting (Cart A)

0 – Std factory setting
 1500 – 1500 psi

8 Pressure Range (Cart B)

Note: Code Based on pressure in bar.

20 – (2.5:1 and 5:1): 70-210 bar. Std setting 100 bar.
 (10:1): 100-210 bar. Std setting 100 bar.

35 – (2.5:1 and 5:1): 100-350 bar. Std setting 210 bar.
 (10:1): 120-350 bar. Std setting 210 bar.

9 Pressure Setting (Cart B)

0 – Std factory setting
 1500 – 1500 psi

10 Seals

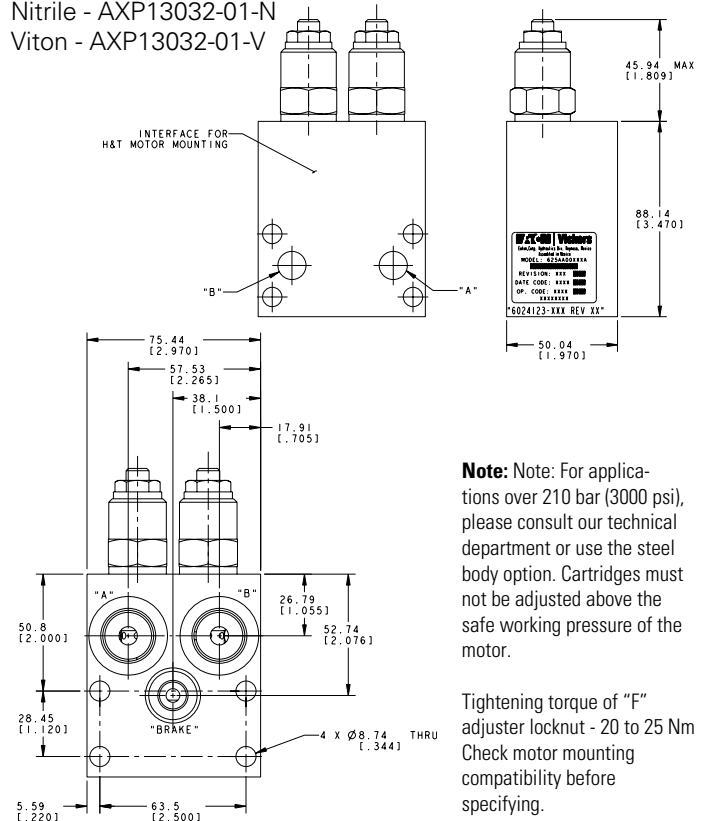
S – Buna-N
 SV – Viton

11 Pilot Ratio

2 – 2.5:1
 5 – 5:1
 10 – 10:1

Cavity plug part number

Nitrile - AXP13032-01-N
 Viton - AXP13032-01-V



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

Cartridge valves & manifolds for spool valve motors

Dual Crossover Relief Valve Assembly

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

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

How to Order

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

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

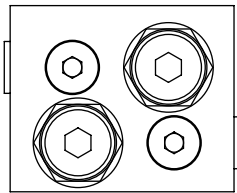
RATINGS AND SPECIFICATIONS

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

For detailed specifications refer to the RV3A-10 data sheet

Dimensions

mm (inch)

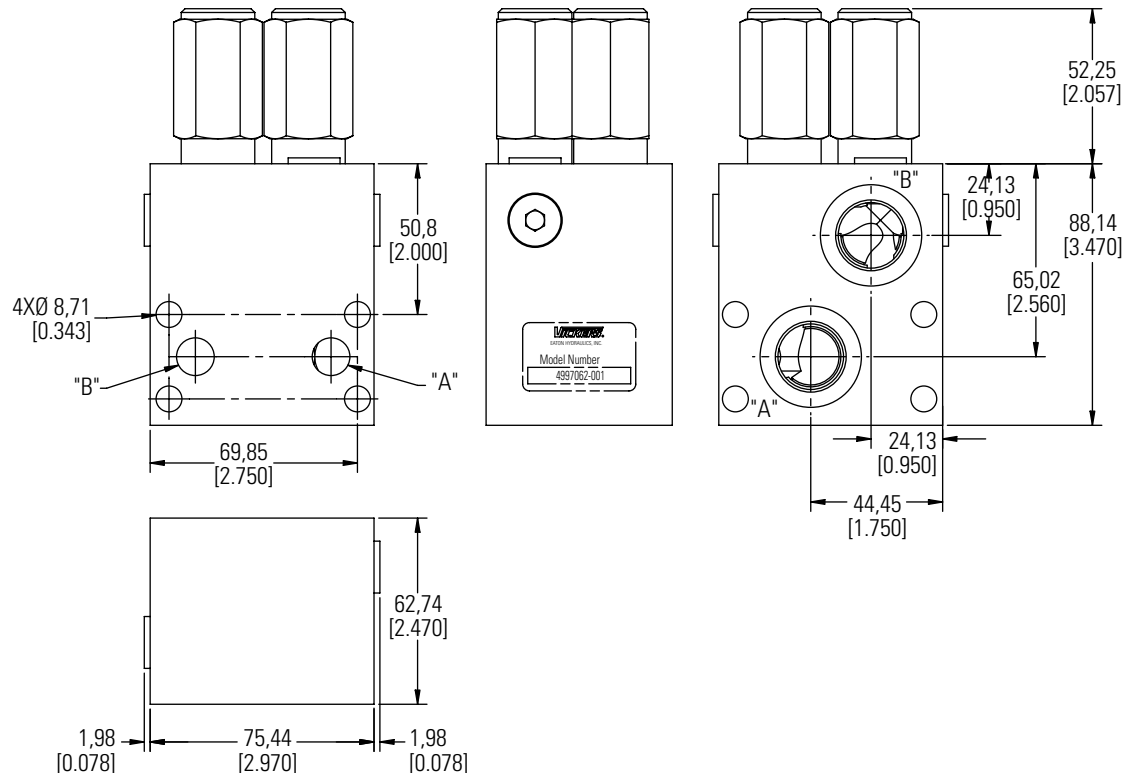
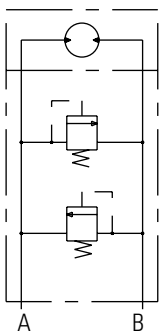


Port Sizes

"A", "B" – SAE10

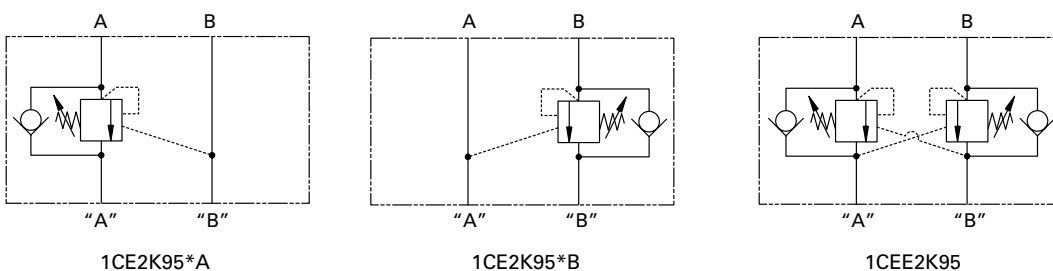
"Brake" – SAE4

Functional Symbol



1CE2K95/1CEE2K95 - Motor Mounted Valves

2K Mounting Pattern Single and Dual Overcenter Valves



Description

Overcenter valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcenter valve will stop runaway in the event of hose burst and if open center directional control valves are used, will allow thermal expansion relief of the hydraulic fluid.

The overcenter cartridge is ideal for mounting directly into a cavity machined in the body of the cylinder, motor or rotary actuator. The cartridge can also be mounted directly to the ports via a specifically machined body as part of a Hydraulic Integrated Circuit or single unit, or contained within one of our standard line bodies.

Single overcenter valves are normally used when the load is unidirectional, for example an aerial platform or crane and dual overcenter valves are used for controlling loads in both directions for motor applications or for cylinders going over center.

Operation

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimization of load control and energy usage, a choice of pilot ratios is available.

Performance Data

Ratings and Specifications

Figures based on: Oil Temp = 40°C Viscosity = 32 cSt (150 SUS)

Rated flow	90 L/min (23 USgpm)	
Max setting	Max load induced Pressure: 270 bar (4000 psi) Relief setting: 350 bar (5000 psi)	
Cartridge material	Working parts hardened & ground steel External surface zinc plated	
Body material	Standard aluminium (up to 210 bar*) Steel (up to 350 bar)	
Mounting position	Unrestricted	
Cavity Number	A12336 (See section M)	
Torque cartridge into cavity	60 Nm (44 lbs ft)	
Weight (inc cartridges)	1CE2K95	2.16 kg (4.75 lbs)
	1CEE2K95	2.26 kg (4.97 lbs)
Seal kit number	1CE2K95	9900830-000 (Buna-N) 9900831-000 (Viton)
	1CEE2K95	9900832-000 (Buna-N) 9900833-000 (Viton)
Recommended filtration level	BS5540/4 Class 18/13 (25 micron nominal)	
Operating Temp	-30°C to +90°C (-22° to 194°F)	
Leakage	0.3 milliL/min nominal (5 dpm)	
Nominal viscosity range	5 to 500 cSt	
Installation Kit (includes cap screws, washers, and o-rings)	9900826-000 (Buna-N) 9900827-000 (Viton)	

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{(\text{Relief Setting}) - (\text{Load Pressure})}{\text{Pilot Ratio}}$$

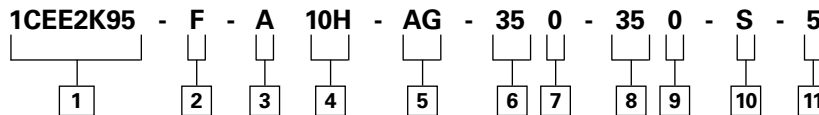
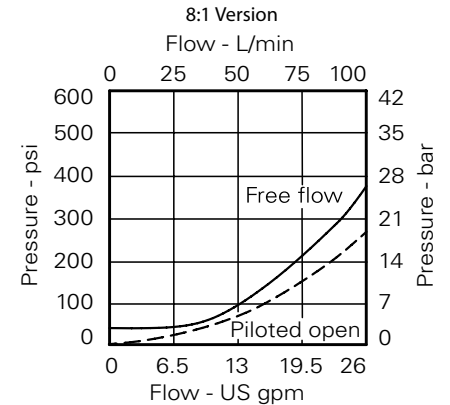
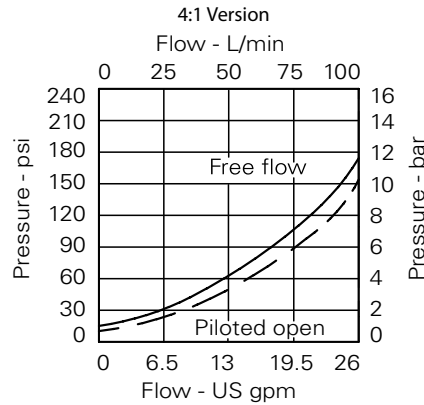
Pilot Ratios

- 4:1 Best suited for applications where load varies and machine structure can induce instability
- 8:1 Best suited for applications where the load remains relatively constant.

Other ratios available upon request

1CE2K95/1CEE2K95 Motor Mounted Valves

2K Mounting Pattern Single and Dual Overcenter Valves



1 Basic Code

1CEE2K95 Double Cartridge and Body
 1CE2K95*A Single overcenter in line A-"A"
 1CE2K95*B Single overcenter in line B-"B"

2 Adjustment Means

F – Screw Adjustment

3 Housing Material

A – Aluminum
 S – Steel

4

Code	Port Size "A" & "B"	Dual Housing Number	
		Aluminum	Steel
4W	1/2" BSP	6025185-001	6025185-003
10H	SAE 10	6025185-002	
10T	SAE 10		6025185-004

5 Port Acted Upon

A – A Port
 B – B Port
 AB – A & B Ports (dual)

6 Pressure Range (Cart A)

Note: Code Based on pressure in bar.

20 – 70-225 bar. Std setting 100 bar.
 35 – 200-350 bar. Std setting 210 bar.

7 Pressure Setting (Cart A)

0 – Std factory setting
 1500 – 1500 psi

8 Pressure Range (Cart B)

Note: Code Based on pressure in bar.

20 – 70-225 bar. Std setting 100 bar.
 35 – 200-350 bar. Std setting 210 bar.

9 Pressure Setting (Cart B)

0 – Std factory setting
 1500 – 1500 psi

10 Seals

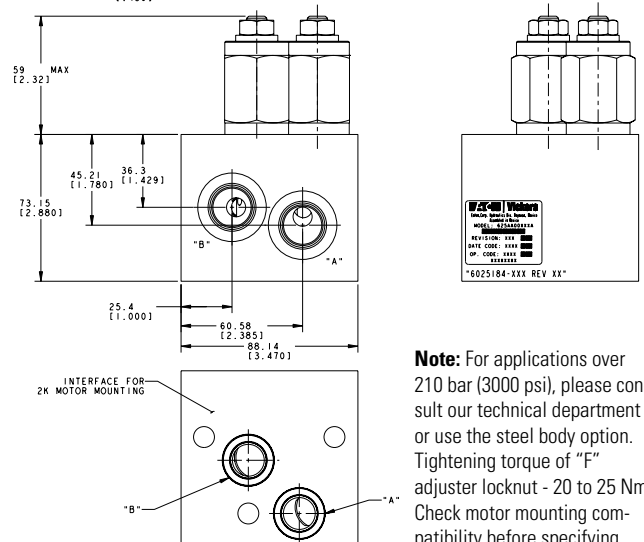
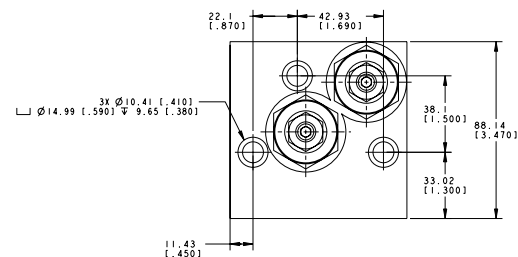
S – Buna-N
 SV – Viton

11 Pilot Ratio

4 – 4:1
 8 – 8:1

Cavity plug part number

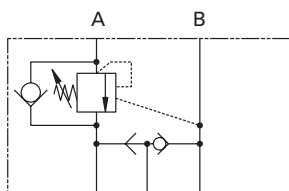
Nitrile - AXP14434-02-N
 Viton - AXP14434-02-V



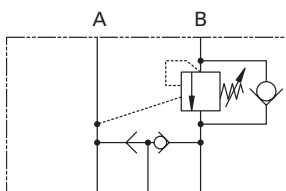
Note: For applications over 210 bar (3000 psi), please consult our technical department or use the steel body option. Tightening torque of "F" adjuster locknut - 20 to 25 Nm. Check motor mounting compatibility before specifying.

ICESH2K95/ICEESH2K95 - Motor Mounted Valves

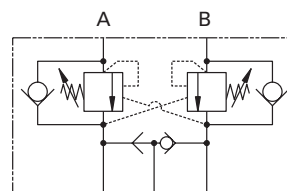
2K Mounting Pattern Single and Dual Overcenter Valves with Brake Release Shuttle



"A" Brake "B"
1CESH2K95*A



"A" Brake "B"
1CESH2K95*B



"A" Brake "B"
1CEESH2K95

Description

Overcenter Valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcenter valve will stop runaway in the event of hose burst and if open center directional control valves are used, will allow thermal expansion relief of the hydraulic fluid.

These dual overcenter valves also contain a brake release shuttle valve which ensures that pressure is applied to a brake release circuit regardless of whether pressure is applied to ports "A" or "B". These multifunction valves are normally used for the static and dynamic control of systems using motors or semi-rotary actuators.

Operation

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimization of load control and energy usage, a choice of pilot ratios is available.

Performance Data

Ratings and Specifications

Figures based on: Oil Temp = 40°C Viscosity = 32 cSt (150 SUS)

Rated flow	90 L/min (23 USgpm)	
Max setting	Max load induced	
	Pressure:	270 bar (4000 psi)
	Relief setting:	350 bar (5000 psi)
Cartridge material	Working parts hardened & ground steel External surface zinc plated	
Body material	Standard aluminium (up to 210 bar*) Steel (up to 350 bar)	
Mounting position	Unrestricted	
Cavity Number	A12336 (See section M)	
Torque cartridge into cavity	60 Nm (44 lbs ft)	
Weight (inc cartridges)	1CESH2K95	2.32 kg (5.10 lbs)
	1CEESH2K95	2.42 kg (5.32 lbs)
Seal kit number	1CESH2K95 9900834-000 (Buna-N)	9900835-000 (Viton)
	1CEESH2K95 9900836-000 (Buna-N)	9900837-000 (Viton)
Recommended filtration level	BS5540/4 Class 18/13 (25 micron nominal)	
Operating Temp	-30°C to +90°C (-22° to 194°F)	
Leakage	0.3 milliL/min nominal (5 dpm)	
Nominal viscosity range	5 to 500 cSt	
Installation Kit (includes cap screws, washers, and o-rings)	9900828-000 (Buna-N) 9900829-000 (Viton)	

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{(\text{Relief Setting}) - (\text{Load Pressure})}{\text{Pilot Ratio}}$$

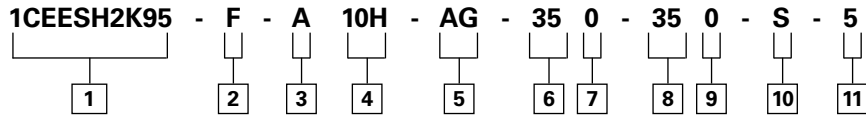
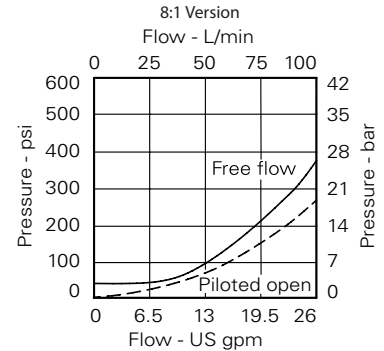
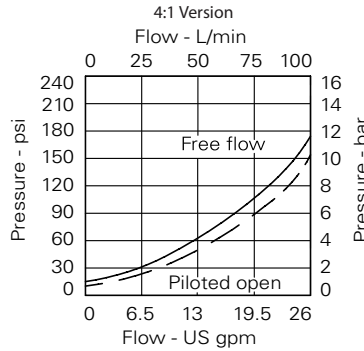
Pilot Ratios

- 4:1 Best suited for applications where load varies and machine structure can induce instability
- 8:1 Best suited for applications where the load remains relatively constant.

Other ratios available upon request

ICESH2K95/ICEESH2K95 - Motor Mounted Valves

2K Mounting Pattern Single and Dual Overcenter Valves with Brake Release Shuttle



1 Basic Code

1CEESH2K95 - Double Cartridge and Body
 1CESH2K95*A - Single overcenter in line A-"A"
 1CESH2K95*B - Single overcenter in line B-"B"

2 Adjustment Means

F - Screw Adjustment

3 Housing Material

A - Aluminum
 S - Steel

4

Code	Port Size "A" & "B"		Dual Housing Number	
	"A"	"B"	Aluminum	Steel
4W	1/2" BSP	1/4" BSP	6025134-001	6025134-003
10H	SAE 10	SAE 4	6025134-003	
10T	SAE 10	SAE 4		6025134-004

5 Port Acted Upon

A - A Port
 B - B Port
 AB - A & B Ports (dual)

6 Pressure Range (Cart A)

Note: Code Based on pressure in bar.

20 - 70-225 bar. Std setting 100 bar.
 35 - 200-350 bar. Std setting 210 bar.

7 Pressure Setting (Cart A)

0 - Std factory setting
 1500 - 1500 psi

8 Pressure Range (Cart B)

Note: Code Based on pressure in bar.

20 - 70-225 bar. Std setting 100 bar.
 35 - 200-350 bar. Std setting 210 bar.

9 Pressure Setting (Cart B)

0 - Std factory setting
 1500 - 1500 psi

10 Seals

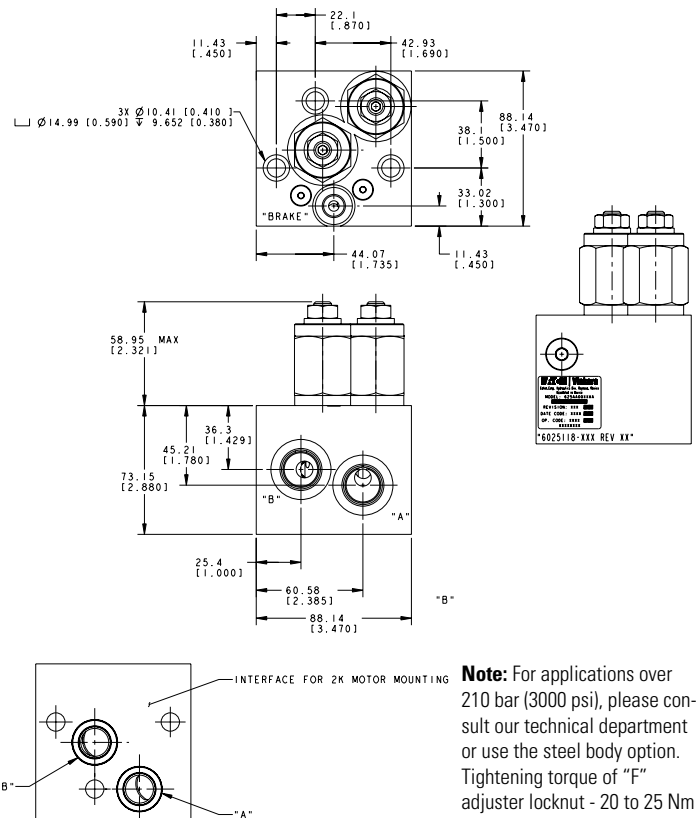
S - Buna-N
 SV - VitoN

11 Pilot Ratio

4 - 4:1
 8 - 8:1

Cavity plug part number

Nitrile - AXP13032-01-N
 Viton - AXP13032-01-V



Note: For applications over 210 bar (3000 psi), please consult our technical department or use the steel body option. Tightening torque of "F" adjuster locknut - 20 to 25 Nm. Check motor mounting compatibility before specifying.

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

Cartridge valves & manifolds for disc valve motors

Dual Crossover Relief Valve Assembly

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

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

How to Order

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

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

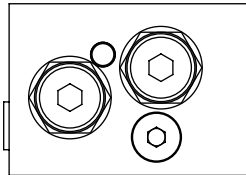
RATINGS AND SPECIFICATIONS

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

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

Dimensions

mm (inch)



Port Sizes

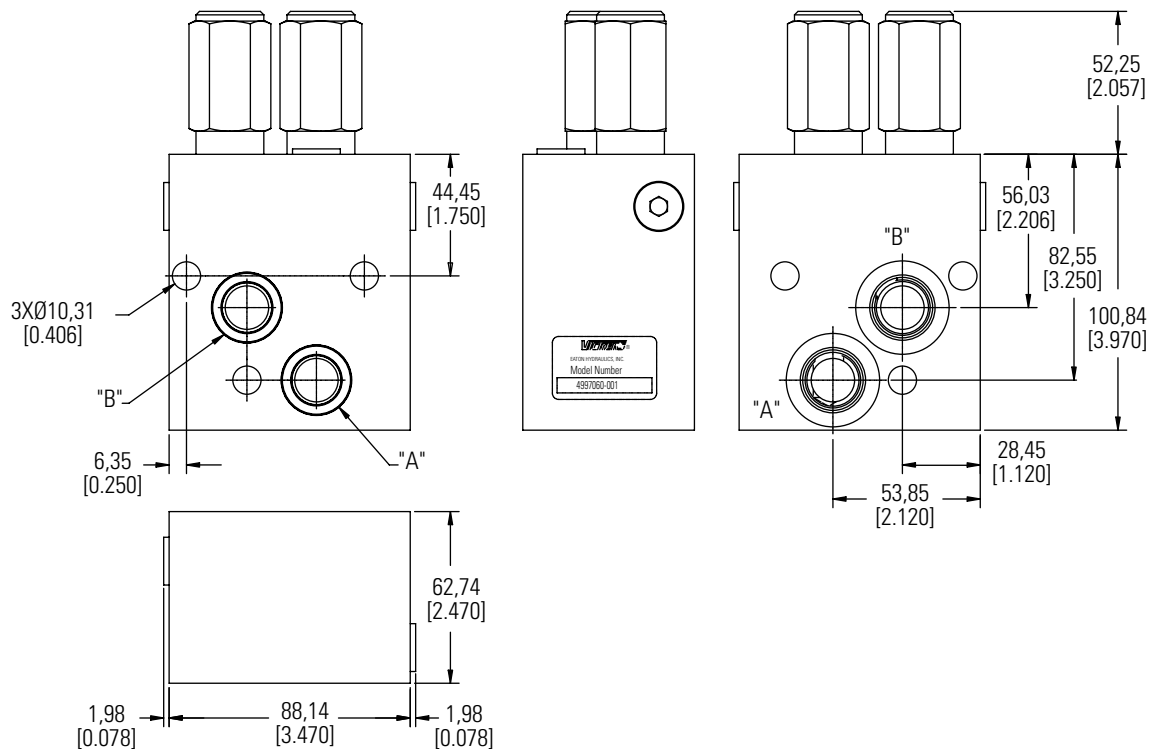
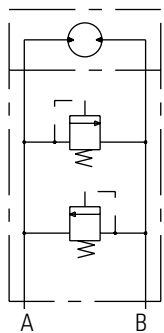
"A", "B" – SAE10
"Brake" – SAE4



Warning

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

Functional Symbol



ATEX Certification

This option is available on H,S,T, 2000 series, 4000 series, 4000 Compact series, 6000 series, 10,000 series, VIS 40, VIS 45 and HP 30 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 our motors allows our motors to be used in certain types of explosive environments. When you order 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

As mentioned above, it can be any application that operates in explosive environments. Typically, this includes Oil and Gas applications, Mining applications and applications in the rubber industry.

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.

Fluids Recommendations

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

Introduction

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 VI fluid shows relatively small change of viscosity with temperature. Lubricants used for hydraulic applications may contain viscosity index improvers (VII). 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 [VII]) 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 VIIs, 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, GG 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.

B-1

B-2

B-3

B-4

B-5



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

EATON

Powering Business Worldwide

Spool Valve Motors

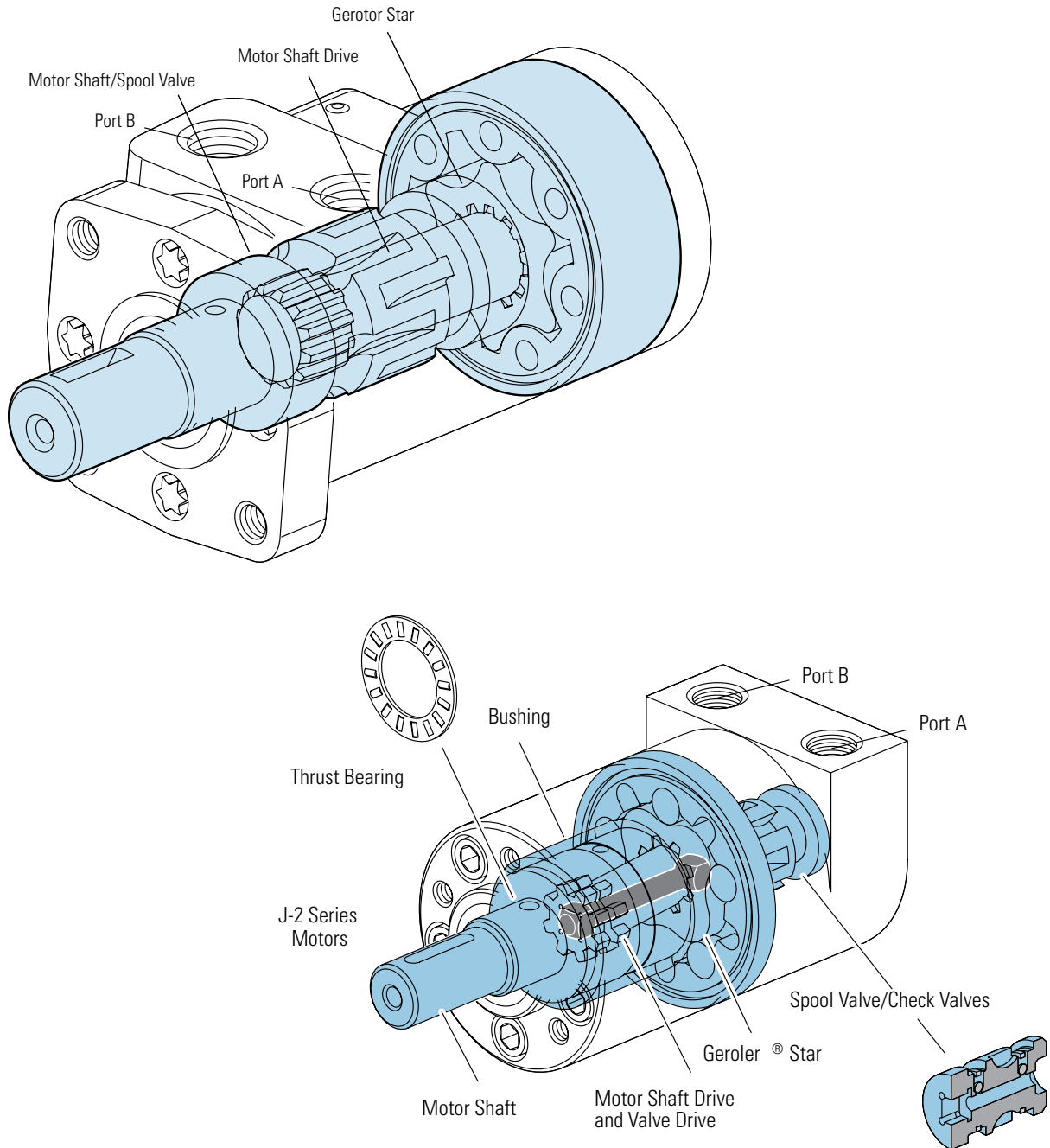
Highlights

Product Description

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

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

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



Features, Benefits, and Applications

B-1

B-2

B-3

B-4

B-5

Features

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

Benefits

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

Applications

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

Design Features

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

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

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

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

MOTOR QUICK-GUIDE (BASED ON MAXIMUM CONTINUOUS RATINGS)

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

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

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

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W Series (162-)

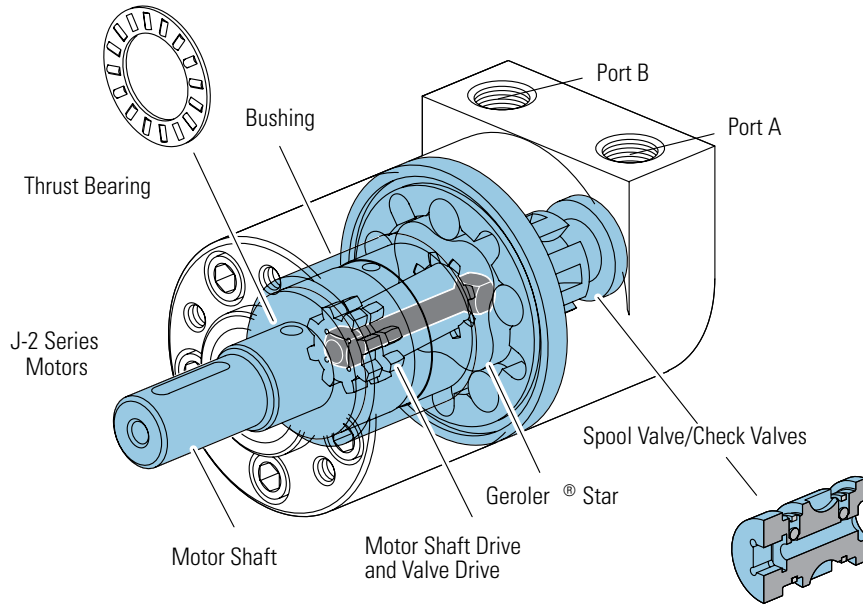
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W Series with Parking Brake (162-)

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J Series (129-)

Highlights



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 rotor
- Industrial sweepers and floor polishers
- Saw mill works
- Turf equipment reel drives
- Paint stripper
- Many more



Plastic Injection



Metal Forming



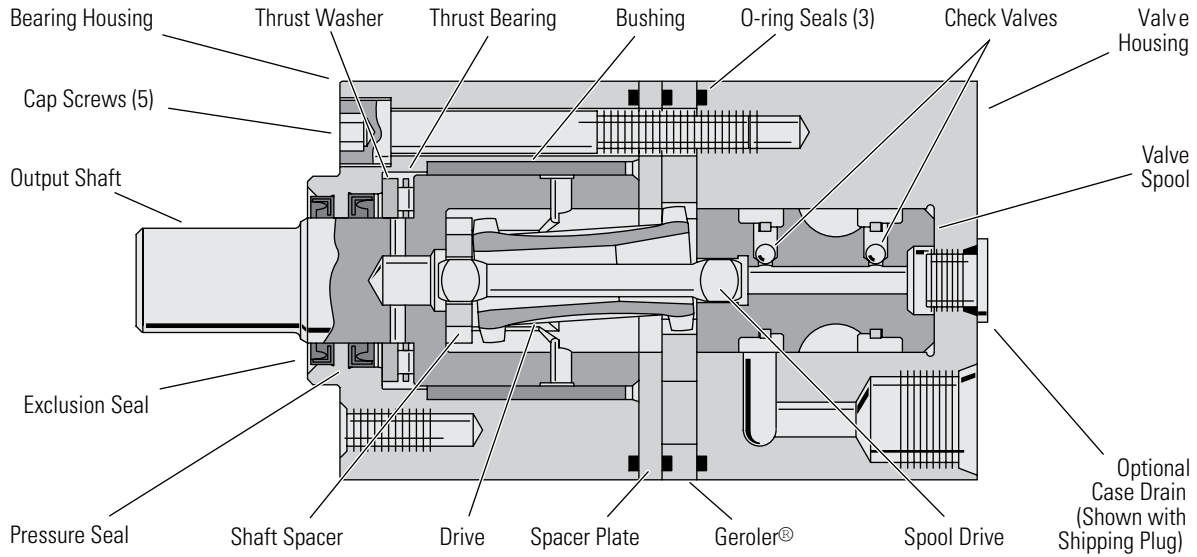
Food Processing



Ship-Boat Building

J Series (129-)

Specifications



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

Note:

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

Δ Pressure:

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

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

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C
[-30°F to 180°F]

Recommended Filtration:

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

J Series (129-)

Performance Data

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

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

8,2 cm³/r [.50 in³/r]

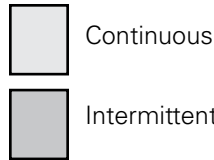
D Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

		[200] 14	[400] 28	[500] 34	[600] 41	[700] 48	[800] 55	[1000] 69	[1400] 97	[1500] 103	[2000] 138	[2030] 140	[2400] 165
Flow LPM [GPM]	[1] 3,8	[11] 1 456	[25] 3 444	[33] 4 437	[40] 5 429	[47] 5 422	[55] 6 412	[69] 8 394	[96] 11 347	[102] 12 332	[130] 15 250	[132] 15 239	[146] 16 170
	[2] 7,6	[9] 1 897	[24] 3 886	[31] 4 877	[38] 4 867	[46] 5 860	[53] 6 847	[68] 8 823	[97] 11 768	[105] 12 749	[139] 16 657	[141] 16 647	[163] 18 557
	[3] 11,4	[6] 1 1349	[20] 2 1331	[28] 3 1318	[35] 4 1309	[44] 5 1296	[51] 6 1285	[65] 7 1261	[94] 11 1198	[102] 12 1176	[137] 15 1070	[139] 16 1060	[164] 19 959
	[4.25] 16,0		[16] 2 1902	[23] 3 1885	[30] 3 1873	[36] 4 1858	[44] 5 1846	[60] 7 1817	[90] 11 1750	[97] 12 1721	[133] 15 1599	[135] 15 1585	[160] 18 1475
Max. Continuous	[4.5] 17,0		[16] 2 1992	[23] 3 1979	[29] 3 1964	[36] 4 1947	[43] 5 1929	[59] 7 1900	[89] 10 1833	[96] 11 1808	[131] 15 1684	[134] 15 1673	[160] 18 1553
Max. Intermittent	[5.5] 20,8		[12] 1 2458	[18] 2 2437	[26] 3 2420	[33] 4 2405	[40] 5 2387	[54] 6 2353	[83] 9 2272	[92] 10 2255	[124] 14 2134	[129] 15 2115	[154] 17 1994



12,9 cm³/r [0.79 in³/r]

D Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

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

[42] Torque [lb-in]
5 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. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

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

19.8 cm³/r [1.21 in³/r]

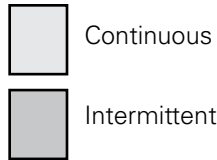
D Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

		[200] 14	[400] 28	[500] 34	[600] 41	[700] 48	[800] 55	[1000] 69	[1400] 97	[1450] 100	[1500] 103	[2000] 138	[2030] 140	[2400] 165
Flow LPM [GPM]	[1] 3,8	[32] 4 189	[67] 8 187	[85] 10 186	[102] 12 185	[119] 13 183	[136] 15 182	[170] 19 179	[236] 27 172	[244] 28 170	[253] 29 169	[321] 36 141	[325] 37 138	[374] 42 114
	[2] 7,6	[30] 3 379	[65] 7 375	[83] 9 373	[101] 11 370	[119] 13 368	[136] 15 366	[172] 19 361	[223] 25 351	[248] 28 349	[257] 29 347	[328] 37 312	[333] 38 309	[388] 44 285
	[3] 11,4	[21] 2 569	[57] 6 565	[75] 8 563	[93] 11 560	[111] 13 558	[128] 14 556	[163] 18 551	[231] 26 529	[240] 27 526	[248] 28 523	[325] 37 487	[330] 37 484	[405] 46 459
	[4] 15,1	[12] 1 761	[47] 5 758	[65] 7 754	[83] 9 751	[101] 11 749	[119] 13 746	[154] 17 741	[221] 25 717	[230] 26 711	[239] 27 707	[316] 36 660	[320] 34 656	[382] 43 628
Max. Continuous	[5.5] 20,8	[31] 4 1043	[49] 6 1040	[67] 8 1035	[84] 9 1033	[101] 11 1028	[137] 15 1021	[202] 23 997	[211] 24 993	[218] 25 990	[295] 33 938	[299] 34 934	[365] 41 899	
Max. Intermittent	[6.5] 24,6	[21] 2 1226	[38] 4 1222	[56] 6 1219	[74] 8 1215	[91] 10 1211	[126] 14 1204	[189] 21 1179	[196] 22 1174	[206] 23 1169	[278] 31 1121	[283] 32 1117	[347] 39 1079	



31.6 cm³/r [1.93 in³/r]

D Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

		[200] 14	[400] 28	[500] 34	[600] 41	[700] 48	[800] 55	[1000] 69	[1400] 97	[1450] 100	[1500] 103	[1750] 121	[2175] 150
Flow LPM [GPM]	[1] 3,8	[51] 6 118	[106] 12 116	[133] 15 115	[160] 18 113	[187] 21 112	[213] 24 111	[265] 30 107	[362] 41 91	[372] 42 85	[383] 43 81	[439] 50 70	
	[2] 7,6	[46] 5 236	[103] 12 234	[132] 15 232	[159] 18 230	[187] 21 228	[214] 24 225	[269] 30 221	[362] 41 187	[374] 42 179	[387] 44 175	[446] 50 165	[546] 62 145
	[3] 11,4	[36] 4 355	[94] 11 352	[122] 14 349	[149] 17 347	[177] 20 345	[205] 23 342	[259] 29 336	[351] 40 296	[364] 41 292	[377] 43 287	[440] 50 273	[542] 61 245
	[4] 15,1	[24] 3 474	[79] 9 472	[107] 12 469	[135] 15 466	[162] 18 462	[190] 21 460	[246] 28 452	[337] 38 404	[349] 39 397	[362] 41 393	[425] 48 373	[528] 60 346
Max. Continuous	[5.5] 20,8	[55] 6 650	[83] 9 647	[111] 13 645	[139] 16 640	[167] 19 636	[221] 25 629	[307] 35 584	[320] 36 580	[334] 38 575	[400] 45 550	[505] 57 513	
Max. Intermittent	[6.5] 24,6	[35] 4 767	[64] 7 764	[93] 11 760	[121] 14 755	[150] 17 751	[204] 23 742	[279] 32 712	[294] 33 707	[308] 35 701	[378] 43 675	[485] 55 637	

50.0 cm³/r [3.00 in³/r]

D Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

		[200] 14	[400] 28	[500] 34	[600] 41	[700] 48	[800] 55	[1000] 69	[1100] 76	[1200] 83	[1300] 90	[1400] 97	[2030] 140
Flow LPM [GPM]	[1] 3,8	[82] 9 75	[167] 19 72	[211] 24 72									
	[2] 7,6	[70] 8 149	[156] 18 147	[201] 23 145	[243] 28 144	[286] 32 143	[327] 37 142						
	[3] 11,4	[53] 6 221	[140] 16 220	[184] 21 218	[227] 26 217	[271] 31 215	[311] 35 213	[396] 45 209	[441] 50 205	[484] 55 201	[521] 59 200	[549] 62 191	
	[4] 15,1	[30] 3 296	[120] 14 292	[162] 18 289	[204] 23 286	[250] 28 284	[292] 33 282	[374] 42 273	[419] 47 270	[460] 52 265	[501] 57 263	[541] 61 259	[743] 84 213
Max. Continuous	[5.5] 20,8	[81] 9 393	[127] 14 392	[170] 19 389	[214] 24 387	[254] 29 383	[339] 38 377	[379] 43 372	[422] 48 369	[463] 52 364	[506] 57 358	[702] 79 302	
Max. Intermittent	[6.5] 24,6	[47] 5 465	[90] 10 462	[133] 15 460	[176] 20 458	[219] 25 455	[307] 35 448	[345] 39 445	[385] 43 440	[429] 48 435	[467] 53 430	[685] 77 364	

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

J Series (129-)

Dimensions

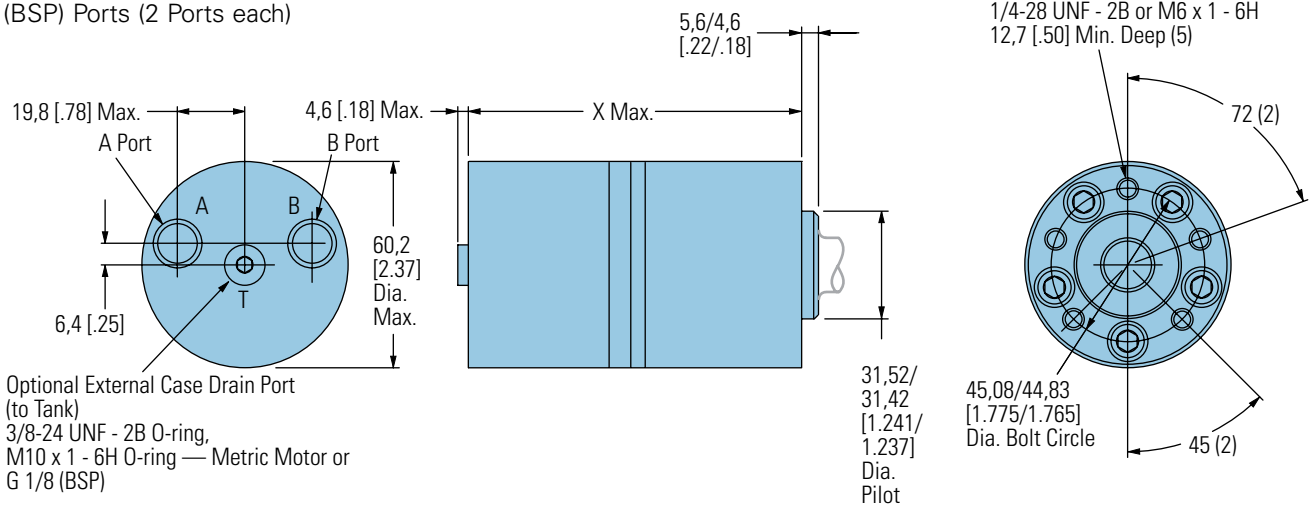
Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

9/16 Inch End Port

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

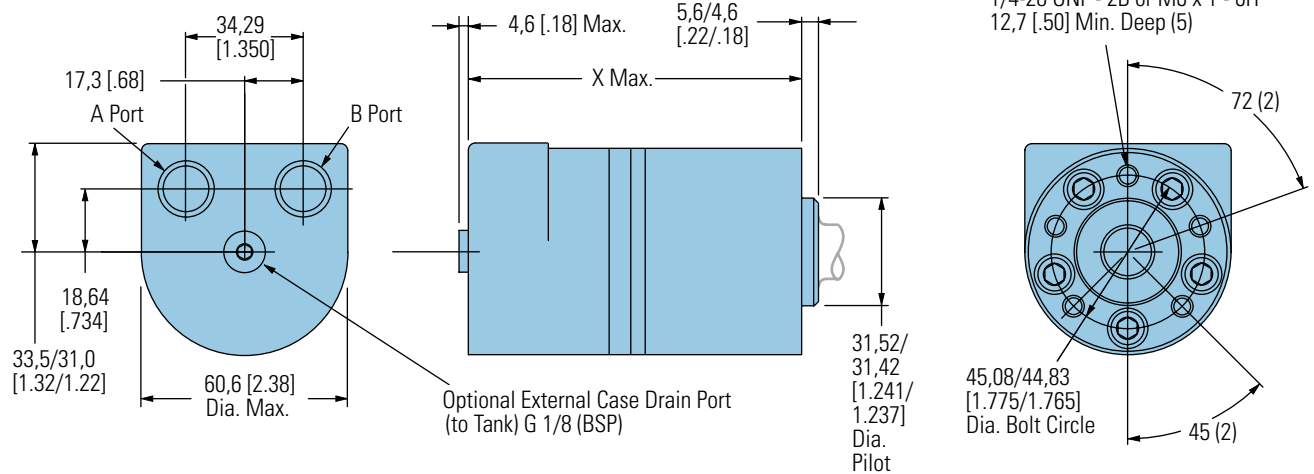


Optional External Case Drain Port
 (to Tank)
 3/8-24 UNF - 2B O-ring,
 M10 x 1 - 6H O-ring — Metric Motor or
 G 1/8 (BSP)

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]

3/8 Inch 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]	130,0 [5.12]
160,5 [6.32]	132,3 [5.21]

J Series (129-)

Dimensions

Ports

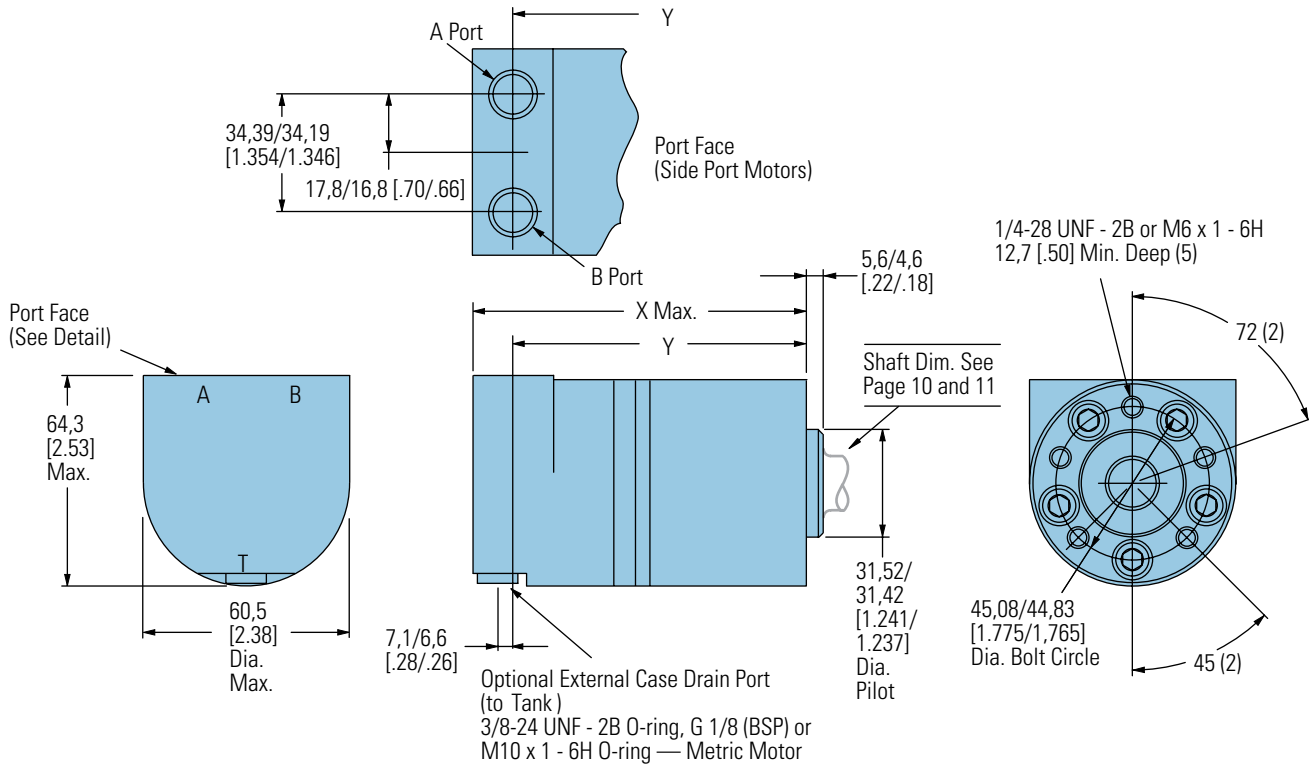
9/16 -18 UNF - 2B O-Ring Ports,
 M14 x 1,5 -6H O-Ring Ports — Metric Motor,
 G 3/8 or G 1/4 (BSP) Ports (2)

Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

Side Port



SIDE PORT MOTORS

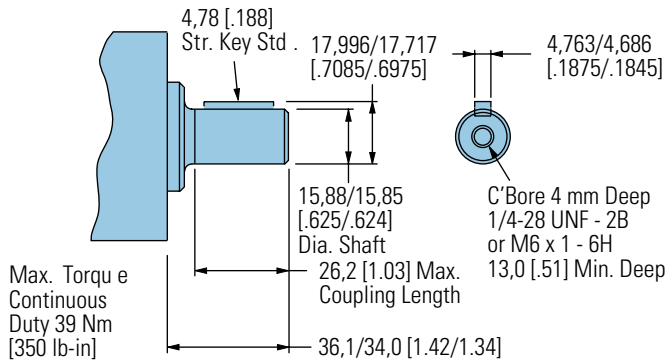
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
8,2 [.50]	103,9 [4.09]	89,4/ 87,4 [3.52/3.44]
12,9 [.79]	106,9 [4.21]	92,5/ 90,4 [3.64/3.56]
19,8 [1.21]	112,5 [4.38]	96,8/ 94,7 [3.81/3.73]
31,6 [1.93]	118,9 [4.68]	104,4/102,4 [4.11/4.03]
50,0 [3.00]	130,0 [5.12]	115,7/113,9 [4.56/4.48]

J Series (129-)

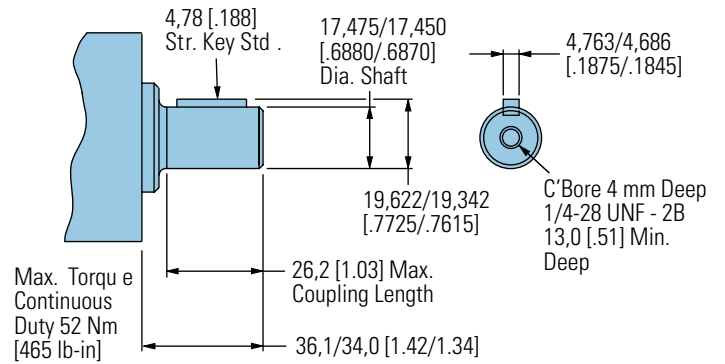
Dimensions

Shafts

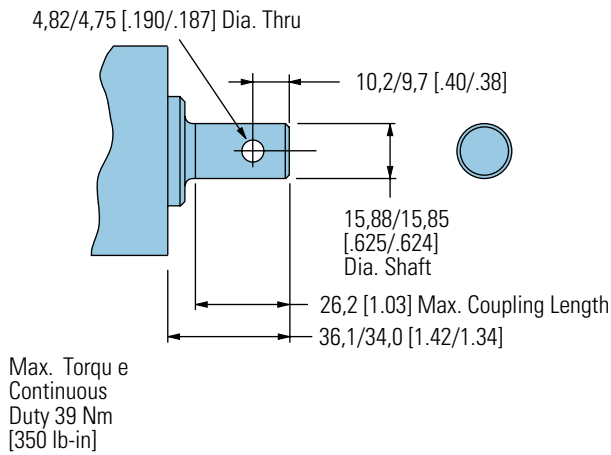
5/8 Inch Straight Keyed



11/16 Inch Straight Keyed



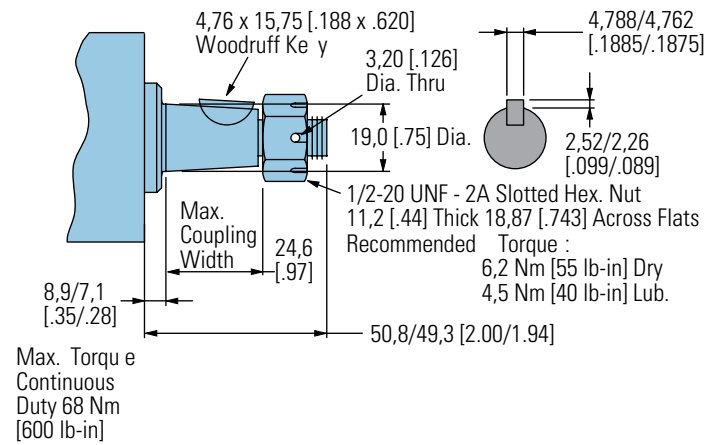
5/8 Inch Straight Keyed w/ Crosshole



3/4 Inch Tapered

(Tapered Shaft End Per SAE J744)

Except as Specified — 1.5 : 12 Ratio)

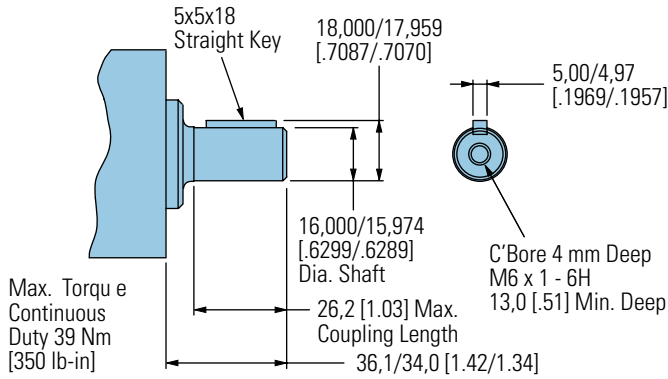


J Series (129-)

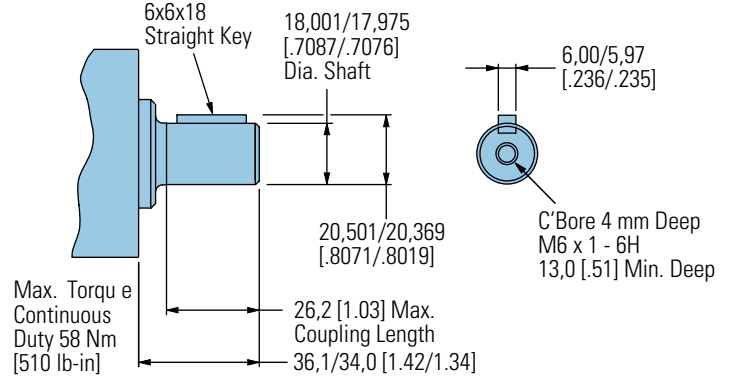
Dimensions

Shafts and Flange Kit

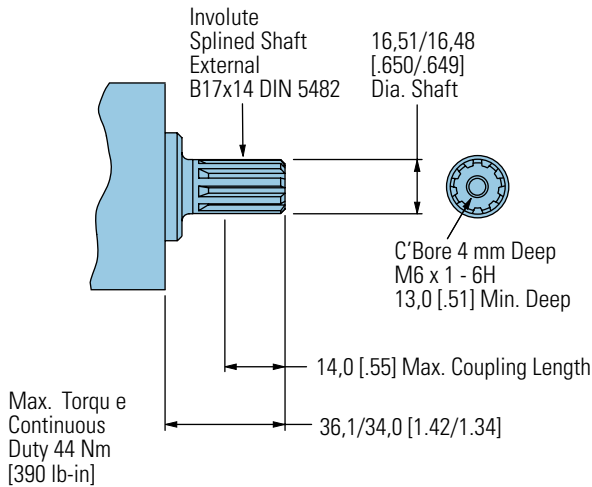
16 mm Straight Keyed



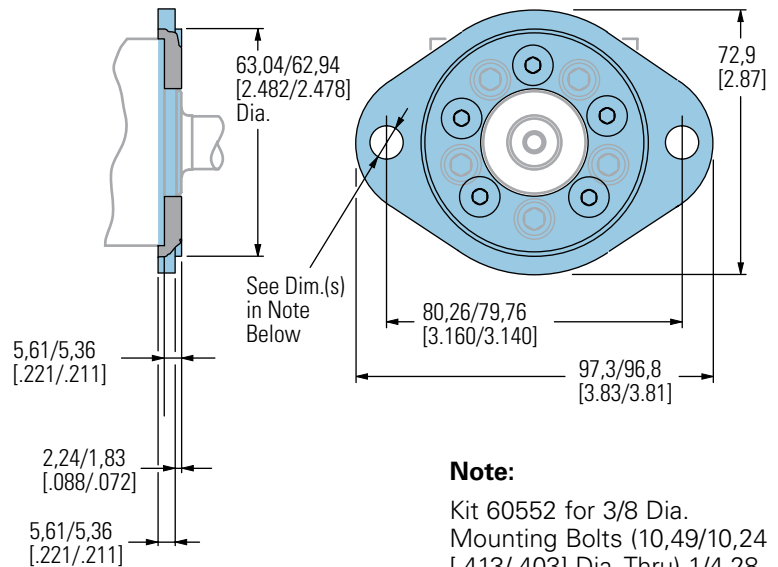
18 mm Straight Keyed



Involute 9T Splined – Metric



2 Bolt Flange Kits (2)



Note:

Kit 60552 for 3/8 Dia. Mounting Bolts (10,49/10,24 [.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.**

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 2B O-Ring (2)	129-0295	-0296	-0297	-0298	-0459
	Splined — Metric		129-0299	-0300	-0301	-0302	-0460
	3/4 inch Tapered		129-0480				
M6 x 1 - 6H	16 mm Straight	M14 x 1,5 - 6H O-Ring (2)	129-0303	-0304	-0305	-0306	-0461
	18 mm Straight		129-0307	-0308	-0309	-0310	-0462
	Splined — Metric		129-0311	-0312	-0313	-0314	-0463
	16 mm Straight	G 1/4 (BSP) (2)	129-0315	-0316	-0317	-0318	-0464
	18 mm Straight		129-0319	-0320	-0321	-0322	-0465
	Splined — Metric		129-0323	-0324	-0325	-0326	-0466
	16 mm Straight		129-0327	-0328	-0329	-0330	-0467
	18 mm Straight	G 3/8 (BSP) (2)*	129-0331	-0332	-0333	-0334	-0468
Splined — Metric	129-0335		-0336	-0337	-0338	-0469	

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

129-0336

Side Port

MOUNTING	SHAFT	PORT SIZE	DISPL. cm 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 2B O-Ring (2)	129-0343	-0344	-0345	-0346	-0471
	Splined — Metric		129-0347	-0348	-0349	-0350	-0472
	3/4 inch Tapered		129-0481				
M6 x 1 - 6H	16 mm Straight	M14 x 1,5 - 6H O-Ring (2)	129-0351	-0352	-0353	-0354	-0473
	18 mm Straight		129-0355	-0356	-0357	-0358	-0474
	Splined — Metric		129-0359	-0360	-0361	-0362	-0475
	16 mm Straight	G 1/4 (BSP) (2)	129-0363	-0364	-0365	-0366	-0476
	18 mm Straight		129-0367	-0368	-0369	-0370	-0477
	Splined — Metric		129-0371	-0372	-0373	-0374	-0403
	16 mm Straight		129-0375	-0376	-0377	-0378	-0478
	18 mm Straight	G 3/8 (BSP) (2)	129-0375	-0376	-0377	-0378	-0478
Splined — Metric	129-0379		-0380	-0381	-0382	-0479	

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

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

J Series (129-)

Shaft Side Load Capacity

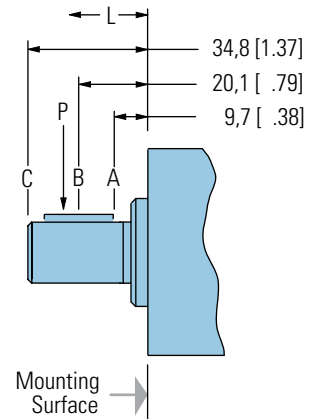
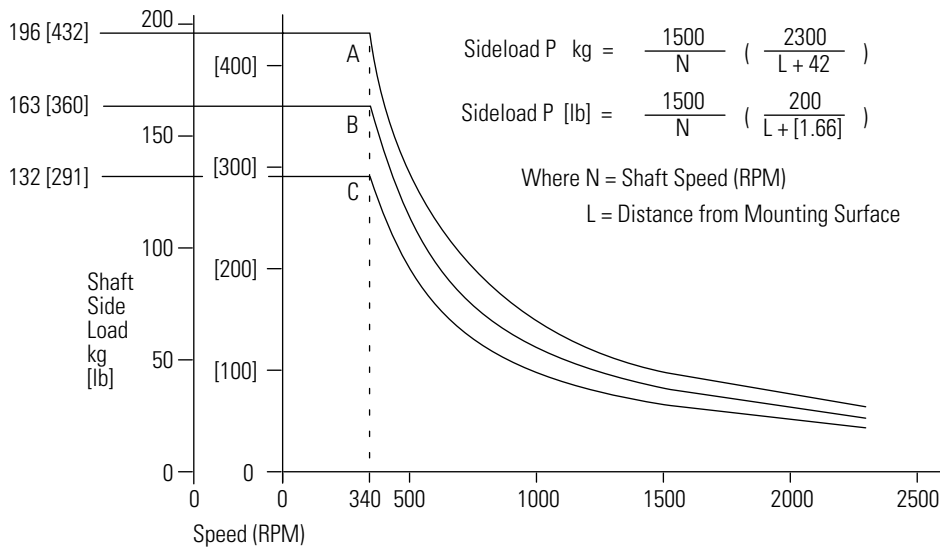
The hydrodynamic bearing has infinite life when shaft load ratings are not exceeded. Hence, the shaft side load capacity is more than adequate to handle most externally applied loads (such as belts, chains, etc.), providing the motor to shaft size is applied within its torque rating.

Allowable side load chart, shaft load location drawing (right) and load curves (below) are based on the

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

ALLOWABLE SIDE LOAD – KG [LB]

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



J Series (129-)

Case Pressure and Case Drain

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

Case Drain Advantage

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

Contamination Control — flushing the motor case.

Motor Cooler — exiting oil draws motor heat away.

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

Example:

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

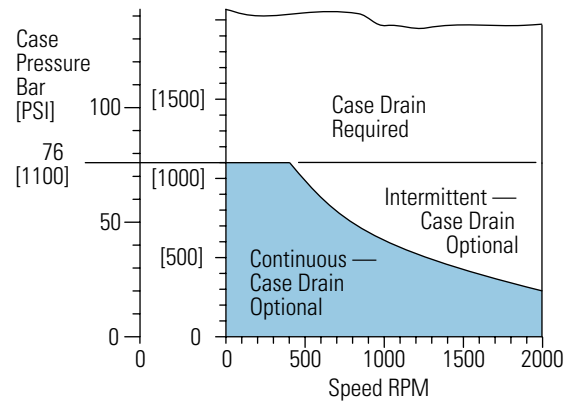
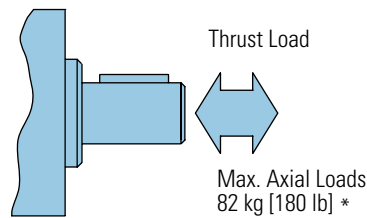
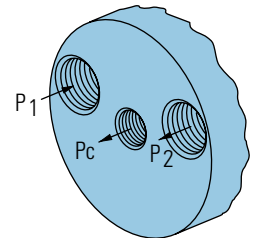
Example:

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

Note:

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

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

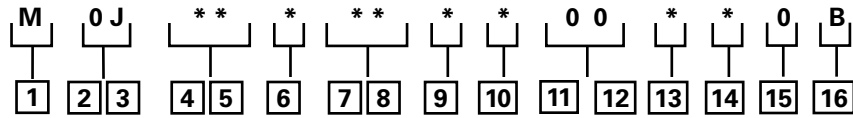


Case Pressure Seal Limitation

J Series (129-)

Model Code

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



1 Product

M – Motor

2, 3 Series

0J – J Series

4, 5 Displacement 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

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

7, 8 Output Shaft

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

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

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

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

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

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

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

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

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

9 Ports

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

B – G 1/4 (BSP) End Ported

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

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

E – G 3/8 (BSP) Side Ported

F – G 1/4 (BSP) Side Ported

H – G 3/8 (BSP) End Ported

10 Case Flow Options

0 – No Case Drain

1 – 3/8 -24 UNF - 2B O-Ring

2 – G 1/8 (BSP)

3 – M10 x 1 - 6H O-Ring

11, 12 Special Features (Hardware)

00 – None

13 Special Features (Assembly)

0 – None

1 – Reverse Rotation

14 Paint/Special Packaging

0 – No Paint, Individual Box

A – Low Gloss Black Primer, Individual Box

B – No Paint, Bulk Box Option

15 Eaton Assigned Code when Applicable

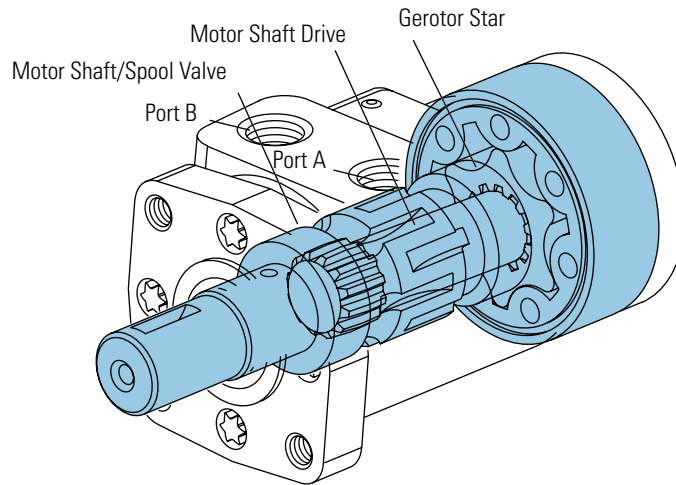
0 – Assigned Code

16 Eaton Assigned Design Code

B – Assigned Design Code

H Series (101-)

Highlights



Description

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

Specifications

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

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

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

Features:

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

Benefits:

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

Applications:

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

B-2



Conveyer



Combine



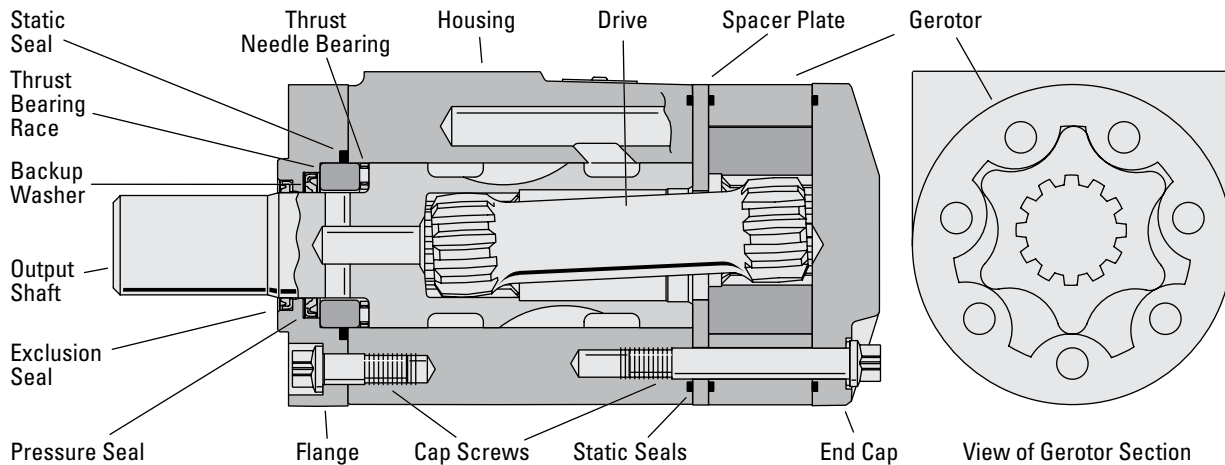
Sweeper



Salt and Sand Spreader

H Series (101-)

Specifications



SPECIFICATION DATA – H MOTORS

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

A simultaneous maximum torque and maximum speed NOT recommended.

Note:

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

Note:

Δ pressure is derated for end ported units.

Maximum Inlet Pressure:

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

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

Δ Pressure:

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

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Recommended Fluids:

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

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

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

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

H Series (101-)

Performance Data

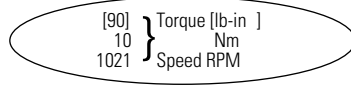
Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

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

 Continuous
 Intermittent

36 cm³/r [2.2 in³/r]
Δ Pressure Bar [PSI]
Continuous

	[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	Max. Continuous [2400] 165	
Flow LPM [GPM]	[2] 7.6	[49] 6 204	[103] 12 201	[162] 18 198	[189] 21 194	[270] 31 189	[325] 37 184	[379] 43 177	[432] 49 170	[489] 55 162	[650] 73 122
	[4] 15.1	[47] 5 408	[106] 12 407	[160] 18 402	[191] 22 399	[274] 31 394	[327] 37 387	[384] 43 381	[439] 50 373	[495] 56 365	[654] 74 323
	[6] 22.7	[44] 5 613	[102] 12 612	[158] 18 609	[188] 21 604	[272] 31 599	[328] 37 591	[383] 43 586	[440] 50 576	[496] 56 565	[661] 75 523
Max. Continuous	[8] 30.3	[40] 5 817	[97] 11 817	[153] 17 814	[184] 21 807	[270] 31 799	[326] 37 793	[383] 43 785	[440] 50 776	[497] 56 762	[668] 75 721
	[10] 37.9	[36] 4 1021	[90] 10 1021	[148] 17 1015	[180] 20 1008	[265] 30 1001	[322] 36 991	[380] 43 981	[438] 49 969	[495] 56 959	[664] 75 920



46 cm³/r [2.8 in³/r]
Δ Pressure Bar [PSI]
Continuous

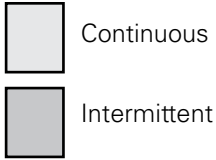
	[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	Max. Continuous [2400] 165	
Flow LPM [GPM]	[2] 7.6	[64] 7 161	[136] 15 158	[212] 24 156	[284] 32 153	[355] 40 148	[426] 48 145	[497] 56 139	[567] 64 133	[641] 72 127	[852] 96 95
	[4] 15.1	[61] 7 323	[139] 16 320	[209] 24 316	[286] 32 314	[359] 41 310	[429] 48 304	[503] 57 300	[576] 65 293	[649] 73 287	[857] 97 253
	[6] 22.7	[58] 7 486	[134] 15 481	[207] 23 479	[282] 32 475	[356] 40 471	[430] 49 464	[502] 57 461	[577] 65 453	[650] 73 444	[867] 98 410
Max. Continuous	[8] 30.3	[52] 6 648	[128] 14 643	[200] 23 640	[276] 31 635	[354] 40 628	[428] 48 623	[502] 57 617	[577] 65 610	[651] 74 599	[876] 99 566
	[10] 37.9	[47] 5 808	[118] 13 803	[194] 22 798	[269] 30 793	[347] 39 787	[423] 48 779	[498] 56 771	[575] 65 761	[649] 73 753	[871] 98 722
	[12] 45.4	[36] 4 969	[109] 12 964	[188] 21 960	[260] 29 952	[340] 38 946	[417] 47 938	[492] 56 931	[567] 64 922	[643] 73 914	[864] 98 877
Max. Intermittent	[14] 53.0	[25] 3 1127	[98] 11 1123	[175] 20 1115	[249] 28 1108	[327] 37 1100	[404] 46 1093	[484] 55 1086	[559] 63 1079	[634] 72 1068	

H Series (101-)

Performance Data

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

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



59 cm³/r [3.6 in³/r]
Pressure Bar [PSI]
Continuous

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	Max. Continuous	Max. Intermittent
		14	28	41	55	69	83	97	110	124	[2400]	165
Flow LPM [GPM]	[2]	[79]	[169]	[260]	[305]	[437]	[526]	[616]	[704]	[796]	[1055]	[1055]
	7.6	9 127	19 125	29 123	34 121	49 117	59 114	70 109	80 103	90 96	119 65	119 65
	[4]	[76]	[168]	[257]	[307]	[441]	[529]	[620]	[710]	[800]	[1065]	[1065]
	15.1	9 254	19 254	29 251	35 249	50 246	60 241	70 236	80 230	90 224	120 193	120 193
	[6]	[73]	[161]	[252]	[303]	[439]	[529]	[618]	[709]	[802]	[1069]	[1069]
	22.7	8 381	18 381	28 380	34 377	50 373	60 368	70 364	80 358	91 349	121 319	121 319
	[8]	[64]	[151]	[243]	[294]	[428]	[519]	[609]	[701]	[794]	[1076]	[1076]
	30.3	7 508	17 508	27 508	33 504	48 500	59 496	69 491	79 484	90 476	122 446	122 446
	[10]	[57]	[141]	[234]	[283]	[419]	[512]	[602]	[693]	[786]	[1071]	[1071]
	37.9	6 635	16 635	26 634	32 630	47 626	58 621	68 614	78 608	89 601	121 571	121 571
[12]	[45]	[131]	[227]	[274]	[409]	[505]	[593]	[684]	[778]	[1058]	[1058]	
45.4	5 762	15 762	26 762	31 757	46 753	57 747	67 741	77 734	88 728	120 694	120 694	
[14]	[33]	[118]	[213]	[266]	[396]	[492]	[583]	[676]	[770]	[1055]	[1055]	
53.0	4 889	13 889	24 887	30 882	45 877	56 872	66 866	76 860	87 851	119 813	119 813	
[15]	[29]	[111]	[205]	[260]	[389]	[486]	[576]	[670]	[765]	[1055]	[1055]	
56.8	3 953	13 953	23 951	29 945	44 940	55 935	65 929	76 921	86 913	119 872	119 872	
Max. Intermittent	[20]	[17]	[98]	[192]	[252]	[377]	[475]	[567]	[660]	[757]		
75.7	2 1080	11 1080	22 1077	28 1071	43 1067	54 1062	64 1055	75 1049	86 1040			

[111] } Torque [lb-in]
13 } Nm
953 } Speed RPM

74 cm³/r [4.5 in³/r]
Pressure Bar [PSI]
Continuous

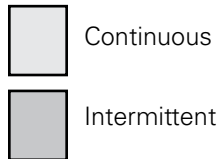
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	Max. Continuous	Max. Intermittent
		14	28	41	55	69	83	97	110	124	[2400]	165
Flow LPM [GPM]	[2]	[103]	[220]	[339]	[454]	[569]	[685]	[801]	[916]	[1036]	[1373]	[1373]
	7.6	12 101	25 99	38 98	51 96	64 93	77 90	91 86	103 81	117 76	155 51	155 51
	[4]	[99]	[219]	[335]	[457]	[574]	[689]	[808]	[925]	[1042]	[1386]	[1386]
	15.1	11 203	25 201	38 199	52 197	65 194	78 191	91 187	105 182	118 177	157 153	157 153
	[6]	[94]	[210]	[328]	[451]	[571]	[689]	[805]	[924]	[1044]	[1392]	[1392]
	22.7	11 305	24 303	37 301	51 298	65 296	78 292	91 288	104 283	118 276	157 252	157 252
	[8]	[86]	[196]	[319]	[438]	[558]	[676]	[793]	[913]	[1033]	[1401]	[1401]
	30.3	10 406	22 404	36 402	49 399	63 396	76 393	90 388	103 383	117 377	158 352	158 352
	[10]	[74]	[183]	[310]	[422]	[545]	[667]	[784]	[903]	[1024]	[1394]	[1394]
	37.9	8 507	21 505	35 502	48 499	62 496	75 492	89 486	102 482	116 476	158 452	158 452
[12]	[58]	[171]	[295]	[408]	[533]	[657]	[773]	[891]	[1013]	[1377]	[1377]	
45.4	7 608	19 606	33 603	46 600	60 596	74 591	87 587	101 581	114 576	156 549	156 549	
[14]	[43]	[154]	[277]	[396]	[515]	[640]	[760]	[880]	[1002]	[1374]	[1374]	
53.0	5 709	17 706	31 702	45 698	58 694	72 691	86 686	99 681	113 674	155 643	155 643	
[15]	[36]	[145]	[268]	[387]	[506]	[632]	[750]	[873]	[996]	[1373]	[1373]	
56.8	4 760	16 757	30 753	44 749	57 744	71 740	85 735	99 729	113 723	155 690	155 690	
Max. Intermittent	[20]	[14]	[121]	[233]	[351]	[482]	[609]	[725]	[856]	[981]		
75.7	2 904	14 902	26 898	40 895	54 891	69 887	82 882	97 877	111 869			

H Series (101-)

Performance Data

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

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



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



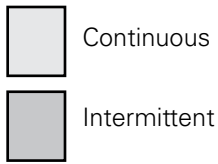
		120 cm ³ /r [7.3 in ³ /r]											
		Δ Pressure Bar [PSI]											
		Continuous											
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2400]		
		14	28	41	55	69	83	97	110	124	165		
Flow LPM [GPM]	[2]	[162]	[357]	[544]	[736]	[927]	[1116]	[1305]	[1498]	[1687]	[2231]		
	7,6	18 62	40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

H Series (101-)

Performance Data

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

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



		146 cm ³ /r [8.9 in ³ /r] Δ Pressure Bar [PSI] Continuous									Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1700]		[2300]
		14	28	41	55	69	83	97	110	117		159
Flow LPM [GPM]	[2] 7,6	[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	[2611] 295 24	
	[4] 15,1	[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	[2648] 299 78	
	[6] 22,7	[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	[2653] 300 128	
	[8] 30,3	[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	[2649] 299 180	
	[10] 37,9	[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	[2789] 315 231	
	[12] 45,4	[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	[2606] 294 281	
	[14] 53,0	[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	[2580] 292 331	
	Max. Continuous 56,8	[82] 9 85	[308] 35 384	[544] 61 383	[771] 87 381	[1010] 114 379	[1256] 142 378	[1480] 167 375	[1720] 194 373	[1840] 208 371	[2569] 290 356	
	Max. Intermittent 75,7	[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		

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



H Series (101-)

Performance Data

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

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

	Continuous
	Intermittent

		185 cm ³ /r [11.3 in ³ /r]								Max. Contin-uous	Max. Inter-mittent
		Δ Pressure Bar [PSI]									
		Continuous									
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]		
		14	28	41	55	69	83	97	110	[2150]	148
Flow LPM [GPM]	[2]	[257]	[554]	[847]	[1150]	[1447]	[1739]	[2035]	[2320]	[3103]	351
	7,6	29	63	96	130	163	196	230	262	12	
	[4]	29	[546]	[845]	[1145]	[1448]	[1744]	[2049]	[2343]	[3147]	356
		81	81	80	79	78	77	76	74	63	
	[6]	28	[540]	[834]	[1137]	[1434]	[1736]	[2036]	[2337]	[3151]	356
		121	121	120	120	119	117	115	112	100	
	[8]	25	[520]	[820]	[1117]	[1414]	[1716]	[2014]	[2315]	[3133]	354
		162	162	161	160	159	157	155	152	140	
	[10]	23	[499]	[793]	[1095]	[1394]	[1699]	[1997]	[2299]	[3112]	352
		202	202	201	201	200	198	196	193	181	
[12]	20	[475]	[767]	[1063]	[1368]	[1664]	[1969]	[2268]	[3088]	349	
	243	242	242	241	240	238	236	234	222		
[14]	16	[443]	[735]	[1035]	[1340]	[1637]	[1936]	[2227]	[3051]	345	
	283	283	282	281	280	279	277	274	262		
Max. Contin-uous	[15]	[120]	[425]	[719]	[1014]	[1320]	[1618]	[1914]	[2205]	[3023]	342
	56,8	14	48	81	115	149	183	216	249	283	
Max. Inter-mittent	[20]	[27]	[321]	[612]	[911]	[1211]	[1504]	[1795]			
	75,7	3	36	69	103	137	170	203			

		231 cm ³ /r [14.1 in ³ /r]								Max. Contin-uous	Max. Inter-mittent
		Δ Pressure Bar [PSI]									
		Continuous									
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1450]	[2000]	138
		14	28	41	55	69	83	97	100		
Flow LPM [GPM]	[2]	[338]	[707]	[1074]	[1456]	[1827]	[2192]	[2572]	[2657]		
	7,6	38	80	121	165	206	248	291	300		
	[4]	37	[695]	[1076]	[1447]	[1827]	[2201]	[2577]	[2669]	[3671]	415
		65	65	64	63	62	62	60	60	50	
	[6]	36	[687]	[1057]	[1434]	[1811]	[2186]	[2555]	[2650]	[3668]	414
		97	78	97	96	95	94	92	91	80	
	[8]	33	[659]	[1038]	[1406]	[1777]	[2160]	[2531]	[2625]	[3644]	412
		130	74	130	129	128	127	124	124	112	
	[10]	30	[631]	[1004]	[1381]	[1751]	[2131]	[2510]	[2602]	[3608]	408
		162	71	162	162	160	158	156	156	145	
[12]	26	[599]	[968]	[1345]	[1722]	[2088]	[2480]	[2571]	[3571]	403	
	195	68	195	194	193	192	189	189	178		
[14]	22	[563]	[927]	[1299]	[1686]	[2058]	[2428]	[2519]	[3532]	399	
	227	64	227	226	226	224	222	221	212		
Max. Contin-uous	[15]	[167]	[538]	[904]	[1279]	[1661]	[2030]	[2404]	[2493]	[3488]	394
	56,8	19	61	102	145	188	229	272	282	229	
Max. Inter-mittent	[20]	[29]	[411]	[785]	[1152]	[1520]	[1877]	[2222]	[2318]		
	75,7	3	46	89	130	172	212	251	262		

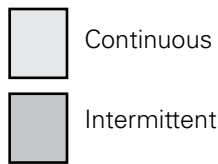
[538] } Torque [lb-in]
61 } Nm
243 } Speed RPM

H Series (101-)

Performance Data

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

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



		293 cm ³ /r [17.9 in ³ /r] Δ Pressure Bar [PSI] Continuous						Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1350]	[1800]
		14	28	41	55	69	83	93	124
Flow LPM [GPM]	[2] 7,6	[427] 48 26	[893] 101 25	[1361] 154 25	[1829] 207 24	[2293] 259 22	[2672] 302 16	[2977] 336 13	
	[4] 15,1	[419] 47 51	[886] 100 51	[1362] 154 51	[1833] 207 50	[2305] 260 49	[2771] 313 47	[3110] 351 44	[4107] 464 22
	[6] 22,7	[402] 45 77	[872] 99 77	[1342] 152 76	[1819] 206 76	[2291] 259 74	[2757] 312 71	[3098] 350 68	[4121] 466 54
	[8] 30,3	[367] 41 102	[838] 95 102	[1316] 149 102	[1785] 202 101	[2252] 254 100	[2723] 308 98	[3070] 347 95	[4086] 462 84
	[10] 37,9	[332] 38 128	[803] 91 128	[1276] 144 128	[1749] 198 127	[2215] 250 126	[2684] 303 123	[3034] 343 120	[4061] 459 108
	[12] 45,4	[289] 33 153	[760] 86 153	[1230] 139 153	[1706] 193 153	[2177] 246 151	[2634] 298 149	[2989] 338 146	[4012] 453 135
	[14] 53,0	[241] 27 179	[712] 80 179	[1176] 133 179	[1650] 186 179	[2126] 240 177	[2592] 293 175	[2935] 332 172	[3963] 448 161
	Max. Continuous 56,8	[211] 24 192	[683] 77 192	[1149] 130 192	[1623] 183 191	[2096] 237 190	[2558] 289 188	[2905] 328 185	[3914] 442 174
	Max. Intermittent 75,7	[43] 5 256	[527] 60 256	[1001] 113 255	[1463] 165 255	[1919] 217 254	[2375] 268 252	[2720] 307 249	

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



H Series (101-)

Dimensions

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

Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

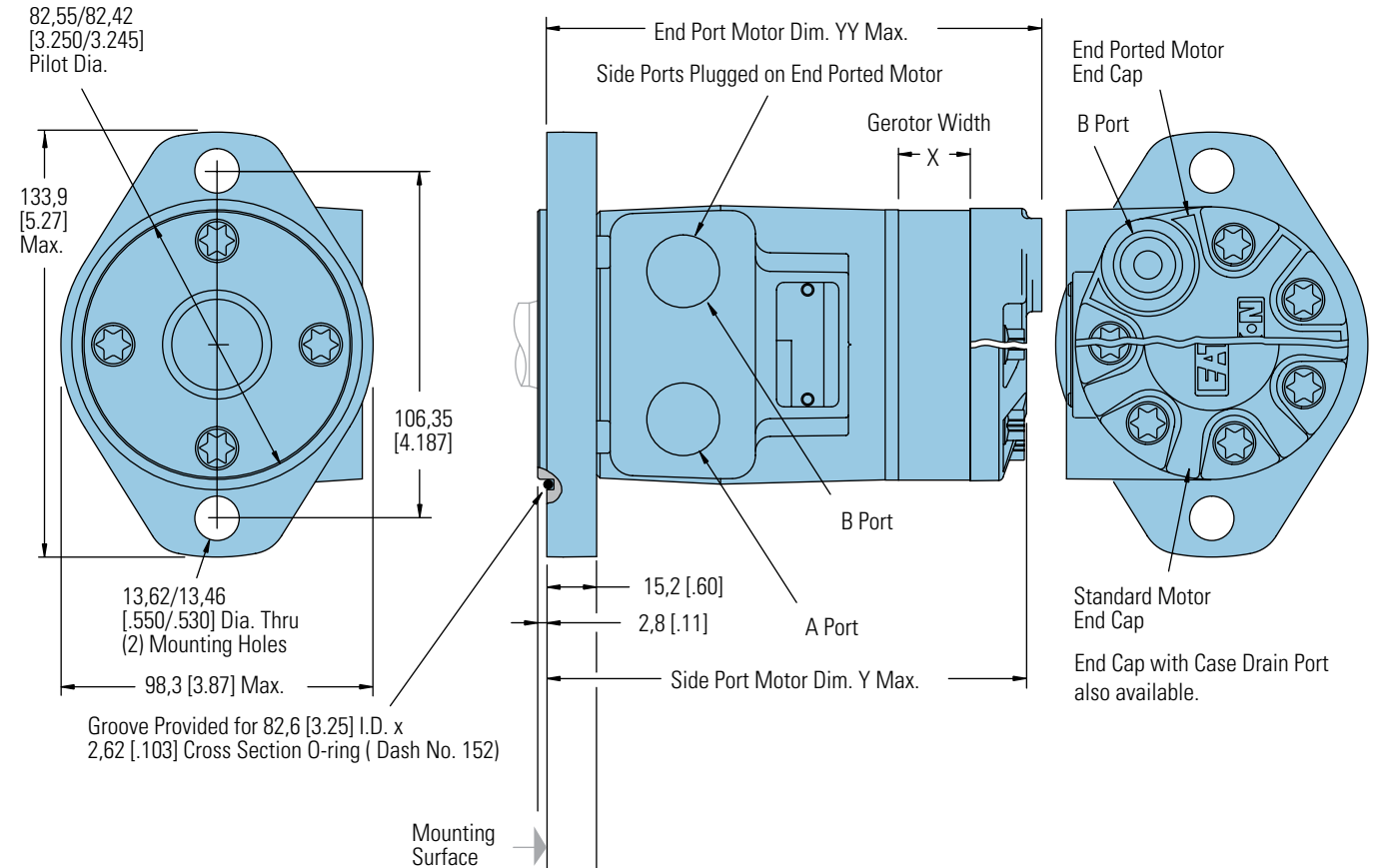
Note:

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

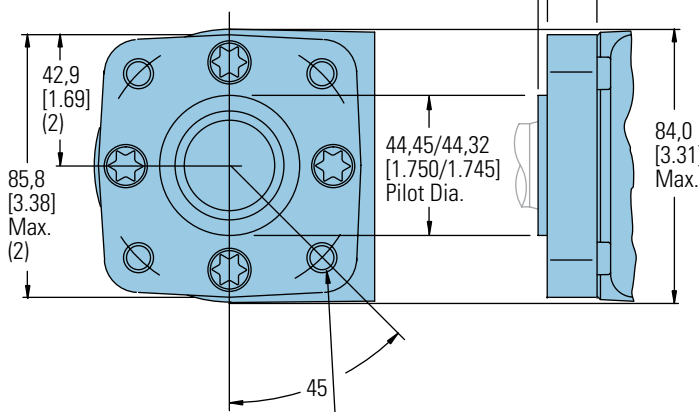
Note:

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

2 Bolt Flange



4 Bolt Flange



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

2 AND 4 BOLT FLANGE

Displacement cm 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]	

H Series (101-)

Product Numbers

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

2 Bolt Flange

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

101-1834

4 Bolt Flange

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

101-1868

4 Bolt Flange with Corrosion Protection

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

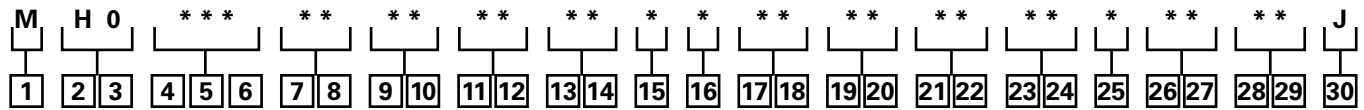
*Manifold product numbers shown are for motors with four 5/16-18 port face mounting threads. Manifold, manifold mounting O-Rings and bolts are NOT included.

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

H Series (101-)

Model Code

The following 30-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 30-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1 Product

M - 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

A - 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.

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

DD - 2 Bolt (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., w/o O-ring Groove

9, 10 Output Shaft

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

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

07 - 25.4 [1.00] Dia. Straight, 8.03 [.316] Dia. Cross Hole 11.2 [.44] from End, 5.6 [.22] Extra Length

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)

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

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

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

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

†† Note: End ported motor pressure is derated. Reference page B-2-2 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)

03 - Manifold case drain

04 - .4375-20 UNF-2B SAE O-ring port (side of housing)

05 - .3125-24 UNF-2B SAE O-ring port (mounting flange)

11 - Internal Check Valves

15 Gerotor Options

0 - None

A - Free Running

16 Shaft Options

0 - None

N - Electroless Nickel Plated

17, 18 Seal Options

00 - Standard Seals

02 - Seal Guard

03 - Viton Seals

04 - Viton Shaft Seal

07 - High Pressure Shaft Seal

11 - High pressure shaft seal, slinger seal

19 - Extreme duty seal guard

19, 20 Speed Sensor Options

00 - None

AA - 12mm digital speed pickup (15 pulse) without lead wire

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

21, 22 Valve Options

00 - None

* - Contact your Eaton Sales Representative for available options.

23, 24 Special Features (Hardware)

00 - None

AB - Low Speed Valving

SS - Stainless Steel Flange Bolts

25 Special Assembly Instructions

0 - None

1 - Reverse Rotation

2 - Flange Rotated 90°

26, 27 Paint/ Special Packaging

00 - No Paint

AA - Low Gloss Black Primer

AD - Environmental Coated Gloss White

AF - Environmental Coated Black

28, 29 Eaton Assigned Code when Applicable

00 - Assigned Code

30 Eaton Assigned Design Code

J - Nine (9)

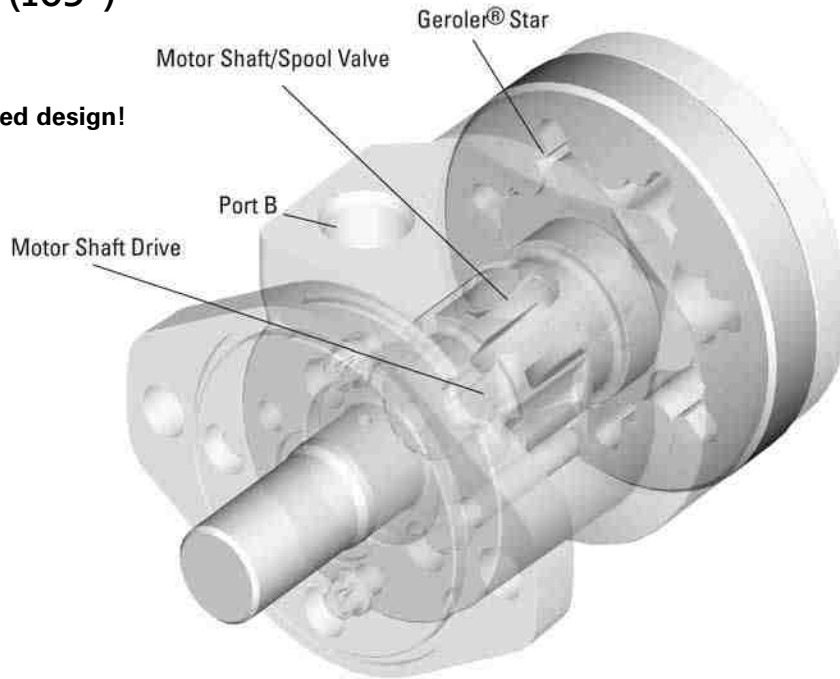
Feature in **bold** are preferred and allow for shorter lead time.

Notes

S Series (103-)

Highlights

New, improved design!



Description

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

Specifications

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

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

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

Features:

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

Benefits:

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

Applications:

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

B-3



Conveyor



Casting



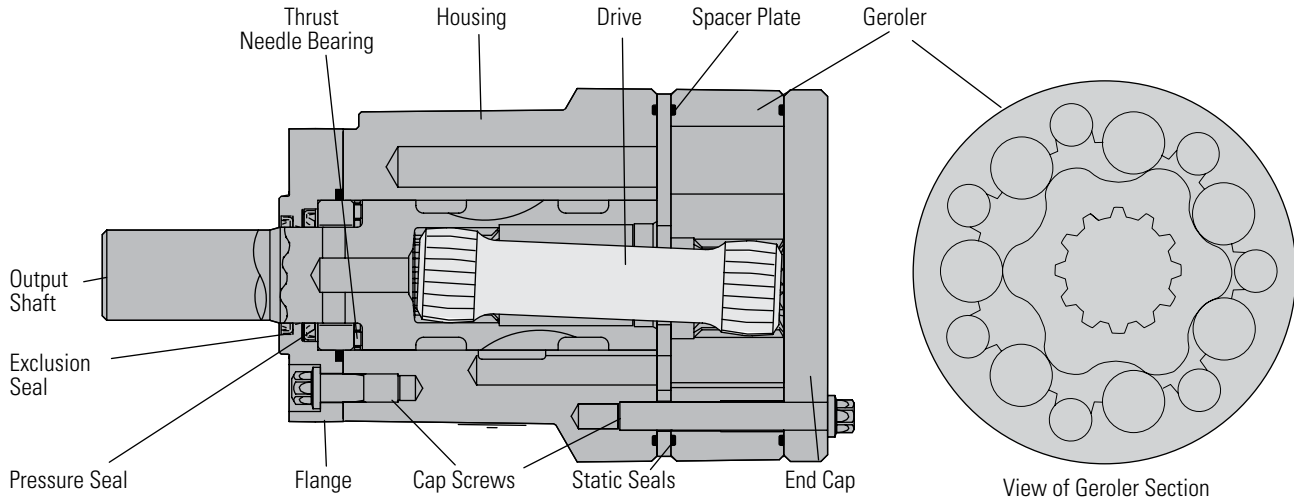
Amusement ride



Combine

S Series (103-)

Specifications



SPECIFICATION DATA – S MOTORS

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

A simultaneous maximum torque and maximum speed NOT recommended.

Note:

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

Maximum Inlet Pressure:

172 Bar [2500 PSI] without regard to 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 70 SUS at operating temperature.

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

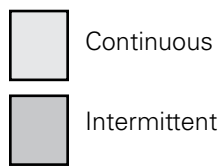
per ISO Cleanliness Code 4406, level 20/18/13

S Series (103-)

Performance Data

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

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



S Motor 59 cm³/r [3.6 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]
	14	28	41	55	69	83	97	110	124	138	172
[2]	86	190	292	390	484	578	662	729	764	803	
	10	22	33	44	55	65	75	82	86	91	
7,6	126	121	115	107	97	85	75	63	45	24	
[4]	79	185	289	395	498	600	702	804	903	998	1156
	9	21	33	45	56	68	79	91	102	113	131
15,1	256	250	243	235	224	212	199	183	166	147	89
[6]	71	177	280	387	495	602	704	808	909	1011	1257
	8	20	32	44	56	68	80	91	103	114	142
22,7	383	377	369	360	349	336	320	302	284	266	207
[8]	62	166	274	379	488	594	699	806	907	1007	1264
	7	19	31	43	55	67	79	91	102	114	143
30,3	514	508	500	490	477	464	448	430	409	390	333
[10]	52	155	264	369	475	583	686	793	897	1000	1257
	6	17	30	42	54	66	78	90	101	113	142
37,9	642	635	628	617	605	591	575	557	538	517	461
[12]	38	141	248	354	462	568	674	777	884	987	1244
	4	16	28	40	52	64	76	88	100	111	141
45,4	772	764	757	747	736	722	706	687	670	648	592
[14]	21	125	231	337	445	551	658	763	868	972	1233
	2	14	26	38	50	62	74	86	98	110	139
53,0	900	893	885	876	866	852	836	819	798	778	721
[15]	8	116	223	328	434	543	648	756	862	965	1225
	1	13	25	37	49	61	73	85	97	109	138
56,8	482	958	949	940	929	915	900	882	863	842	784
[18]		86	191	296	403	511	617	726	831	935	1195
		10	22	33	46	58	70	82	94	106	135
68,1		1151	1139	1128	1117	1105	1090	1074	1054	1033	977

S Motor 75 cm³/r [4.6 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]
	14	28	41	55	69	83	97	110	124	138	172
[2]	91	218	343	467	590	708	815	900	981	1086	
	10	25	39	53	67	80	92	102	111	123	
7,6	93	89	81	75	66	59	43	21	23	16	
[4]	87	217	352	484	616	748	874	1001	1123	1236	1472
	10	25	40	55	70	85	99	113	127	140	166
15,1	193	188	181	173	163	150	139	125	107	89	37
[6]	82	219	355	492	627	763	898	1027	1155	1284	1590
	9	25	40	56	71	86	101	116	131	145	180
22,7	292	286	277	269	258	244	228	214	202	186	140
[8]	69	202	341	481	619	761	896	1032	1165	1296	1618
	8	23	38	54	70	86	101	117	132	146	183
30,3	390	384	375	364	355	342	326	309	295	276	230
[10]	56	193	330	471	610	751	887	1025	1162	1297	1628
	6	22	37	53	69	85	100	116	131	147	184
37,9	489	484	476	467	457	444	431	416	399	381	336
[12]	39	175	315	453	595	736	873	1011	1148	1284	1617
	4	20	36	51	67	83	99	114	130	145	183
45,4	587	582	573	564	552	540	526	510	494	476	427
[14]	12	153	290	431	571	716	856	993	1129	1265	1605
	1	17	33	49	65	81	97	112	128	143	181
53,0	343	680	673	665	654	641	628	613	594	578	533
[15]	9	143	281	424	567	708	846	985	1121	1259	1599
	1	16	32	48	64	80	96	111	127	142	181
56,8	491	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
75,7		970	963	957	948	935	921	906	888	871	825

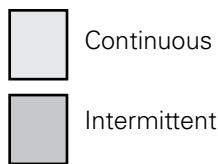
[143] } Torque [lb-in]
16 } Nm
729 } Speed RPM

S Series (103-)

Performance Data

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

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



S Motor 93 cm³/r [5.7 in³/r]

Δ Pressure Bar [PSI]

	[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2500] 172
[2]	146	308	466	620	771	913	1031	1086	1176	1281	
7,6	16	35	53	70	87	103	116	123	133	145	
	76	72	64	55	48	34	22	7	4	1	
[4]	136	301	466	633	797	959	1116	1275	1430	1570	1798
15,1	15	34	53	72	90	108	126	144	162	177	203
	158	153	146	138	126	115	103	90	77	59	17
[6]	113	278	446	616	786	952	1116	1280	1444	1603	1971
22,7	13	31	50	70	89	108	126	145	163	181	223
	238	232	225	215	206	191	175	161	145	129	87
[8]	98	262	431	604	777	947	1112	1279	1446	1610	2006
30,3	11	30	49	68	88	107	126	144	163	182	227
	319	313	306	296	284	270	255	240	224	208	165
[10]	81	246	415	590	763	935	1100	1271	1439	1604	2012
37,9	9	28	47	67	86	106	124	144	163	181	227
	400	394	388	378	366	353	340	324	306	288	244
[12]	65	232	401	574	746	916	1081	1255	1425	1591	2001
45,4	7	26	45	65	84	103	122	142	161	180	226
	481	476	469	460	448	435	423	408	394	374	326
[14]	42	207	376	552	721	893	1064	1235	1405	1570	1983
53,0	5	23	43	62	81	101	120	140	159	177	224
	561	557	549	541	531	519	504	489	470	455	412
[15]	31	196	364	538	708	881	1052	1223	1391	1560	1974
56,8	4	22	41	61	80	100	119	138	157	176	223
	602	597	591	582	571	559	546	530	514	498	453
[20]		119	290	461	633	807	976	1145	1315	1485	1904
75,7		13	33	52	72	91	110	129	149	168	215
		799	792	785	775	762	748	734	717	702	660

S Motor 120 cm³/r [7.3 in³/r]

Δ Pressure Bar [PSI]

	[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2500] 172
[2]	191	403	605	801	978	1146	1288	1440	1552	1679	
7,6	22	46	68	91	110	129	146	163	175	190	
	60	56	50	43	36	29	19	15	8	6	
[4]	188	403	617	829	1031	1236	1438	1632	1816	1990	1914
15,1	21	46	70	94	117	140	162	184	205	225	216
	122	118	112	106	98	87	78	67	56	49	16
[6]	172	391	607	821	1030	1241	1449	1654	1858	2056	2522
22,7	19	44	69	93	116	140	164	187	210	232	285
	186	180	175	167	159	149	137	126	114	103	73
[8]	156	375	593	807	1015	1229	1439	1648	1855	2059	2557
30,3	18	42	67	91	115	139	163	186	210	233	289
	249	244	237	229	220	210	199	185	174	162	128
[10]	130	349	567	785	995	1210	1420	1630	1838	2045	2559
37,9	15	39	64	89	112	137	160	184	208	231	289
	311	307	301	293	286	275	264	252	239	227	193
[12]	103	320	539	756	965	1175	1383	1593	1799	2003	2500
45,4	12	36	61	85	109	133	156	180	203	226	282
	374	369	363	355	346	336	327	314	303	288	253
[14]	70	285	502	715	923	1131	1335	1540	1745	1948	2452
53,0	8	32	57	81	104	128	151	174	197	220	277
	437	433	427	419	411	402	391	379	369	355	322
[15]	54	267	485	705	913	1122	1329	1540	1746	1947	2441
56,8	6	30	55	80	103	127	150	174	197	220	276
	469	465	459	452	444	433	423	411	400	386	349
[20]		159	377	600	815	1026	1232	1444	1651	1859	2383
75,7		18	43	68	92	116	139	163	186	210	269
		621	618	612	603	594	583	571	560	549	515

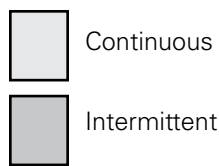
[267]
30
465 } Torque [lb-in]
Nm
Speed RPM

S Series (103-)

Performance Data

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

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



S Motor 144 cm³/r [8.8 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1900]	[2350]
	14	28	41	55	69	83	97	110	124	138	172
[2]	222	480	729	967	1190	1402	1591	1786	2031	2107	
7,6	25	54	82	109	134	158	180	202	229	238	
[4]	217	475	728	987	1237	1488	1727	1957	2181	2292	2310
15,1	24	54	82	112	140	168	195	221	246	259	261
[6]	193	453	715	976	1234	1494	1746	1995	2239	2358	2867
22,7	22	51	81	110	139	169	197	225	253	266	324
[8]	173	434	699	961	1218	1479	1735	1984	2235	2358	2894
30,3	20	49	79	109	138	167	196	224	252	266	327
[10]	144	407	673	940	1197	1459	1715	1967	2218	2344	2890
37,9	16	46	76	106	135	165	194	222	251	265	327
[12]	118	380	644	907	1167	1429	1685	1941	2194	2319	2878
45,4	13	43	73	102	132	161	190	219	248	262	325
[14]	87	346	610	871	1131	1395	1651	1907	2163	2289	2851
53,0	10	39	69	98	128	158	187	215	244	259	322
[15]	69	327	592	853	1113	1376	1633	1890	2146	2271	2835
56,8	8	37	67	96	126	156	185	214	242	257	320
[20]		200	460	726	987	1251	1512	1770	2025	2153	2724
75,7		23	52	82	112	141	171	200	229	243	308
		516	513	507	499	491	480	470	459	454	427

S Motor 166 cm³/r [10.1 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1900]	[2300]
	14	28	41	55	69	83	97	110	124	138	172
[2]	267	563	841	1105	1364	1622	1852	2081	2288		
7,6	30	64	95	125	154	183	209	235	259		
[4]	247	544	838	1129	1418	1707	1988	2255	2514	2641	3116
15,1	28	61	95	128	160	193	225	255	284	298	352
[6]	217	517	813	1108	1401	1700	1994	2281	2559	2692	3214
22,7	25	58	92	125	158	192	225	258	289	304	363
[8]	195	494	794	1089	1387	1687	1983	2269	2552	2691	3239
30,3	22	56	90	123	157	191	224	256	288	304	366
[10]	176	477	776	1072	1371	1668	1960	2249	2537	2676	3228
37,9	20	54	88	121	155	188	221	254	287	302	365
[12]	136	436	737	1037	1335	1636	1928	2217	2509	2651	3210
45,4	15	49	83	117	151	185	218	251	284	300	363
[14]	93	394	696	995	1296	1599	1890	2185	2475	2617	3178
53,0	11	44	79	112	146	181	214	247	280	296	359
[15]	73	371	672	973	1272	1575	1867	2159	2453	2596	3158
56,8	8	42	76	110	144	178	211	244	277	293	357
[20]		227	527	829	1128	1430	1724	2020	2313	2457	3030
75,7		26	60	94	127	162	195	228	261	278	342
		452	449	443	435	426	417	407	396	390	366



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

S Series (103-)

Performance Data

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

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

 Continuous
 Intermittent

S Motor 187 cm³/r [11.4 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1850]	[2250]
	14	28	41	55	69	83	97	110	124	138	172
[2]	298	627	944	1244	1532	1805	2030	2250	2478		
7,6	34	71	107	141	173	204	229	254	280		
[4]	298	640	969	1291	1607	1919	2219	2511	2799	2869	3411
15,1	34	72	109	146	182	217	251	284	316	324	385
[6]	279	621	953	1283	1608	1930	2243	2551	2850	2922	3502
22,7	32	70	108	145	182	218	253	288	322	330	396
[8]	252	593	928	1257	1579	1905	2224	2542	2855	2932	3539
30,3	28	67	105	142	178	215	251	287	323	331	400
[10]	211	555	888	1217	1546	1872	2193	2516	2831	2909	3518
37,9	24	63	100	138	175	211	248	284	320	329	397
[12]	162	502	835	1164	1490	1818	2139	2463	2780	2857	3476
45,4	18	57	94	131	168	205	242	278	314	323	393
[14]	118	452	786	1117	1443	1772	2095	2417	2736	2814	3438
53,0	13	51	89	126	163	200	237	273	309	318	388
[15]	91	425	759	1089	1418	1747	2068	2389	2708	2786	3410
56,8	10	48	86	123	160	197	234	270	306	315	385
[20]		259	590	925	1255	1585	1907	2229	2552	2633	3265
75,7		29	67	105	142	179	216	252	288	297	369
		403	400	394	387	379	370	359	347	344	319

S Motor 225 cm³/r [13.7 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1700]	[2050]
	14	28	41	55	69	83	97	110	124	138
[2]	358	765	1139	1498	1842	2163	2474	2738	2894	
7,6	40	86	129	169	208	244	280	309	327	
[4]	367	774	1177	1577	1956	2325	2680	3022	3191	3753
15,1	41	87	133	178	221	263	303	341	361	424
[6]	348	758	1161	1567	1960	2344	2716	3083	3264	3863
22,7	39	86	131	177	221	265	307	348	369	437
[8]	313	721	1124	1529	1921	2312	2696	3073	3265	3894
30,3	35	81	127	173	217	261	305	347	369	440
[10]	262	669	1069	1473	1859	2247	2627	2997	3184	3810
37,9	30	76	121	166	210	254	297	339	360	430
[12]	203	609	1006	1400	1782	2160	2531	2912	3098	3721
45,4	23	69	114	158	201	244	286	329	350	420
[14]	143	544	938	1324	1700	2079	2452	2824	3008	3639
53,0	16	62	106	150	192	235	277	319	340	411
[15]	106	504	897	1281	1653	2027	2393	2761	2944	3576
56,8	12	57	101	145	187	229	270	312	333	404
[20]		303	697	1091	1477	1854	2214	2581	2765	3399
75,7		34	79	123	167	210	250	292	312	384
		336	334	330	325	318	312	304	298	282

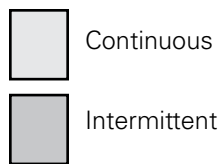
{ [504]
57
251 } Torque [lb-in]
Nm
Speed RPM

S Series (103-)

Performance Data

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

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



S Motor 298 cm³/r [18.2 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1500]	[1800]
	14	28	41	55	69	83	97	110	124
[2]	487	1009	1509	1991	2460	2931	3360	3577	4113
7,6	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
15,1	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
22,7	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
30,3	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
37,9	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
45,4	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
53,0	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
56,8	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
75,7		47	107	166	224	283	339	368	452
		253	251	248	244	239	231	226	212

S Motor 372 cm³/r [22.7 in³/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1500]
	14	28	41	55	69	83	97	110
[2]	629	1287	1905	2501	3066	3624	3886	4370
7,6	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
15,1	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
22,7	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
30,3	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
37,9	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
45,4	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
53,0	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
56,8	22	97	171	245	316	387	421	488
	153	152	150	148	144	138	135	129
[20]		534	1187	1832	2470	3093	3402	4004
75,7		60	134	207	279	349	384	452
		204	202	200	197	192	189	183



S Series (103-)

Dimensions

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

Ports

7/8-14 SAE O-Ring

6-1/2 (BSP) Straight thread manifold

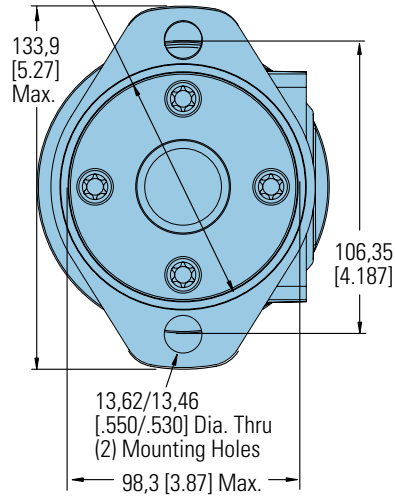
Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

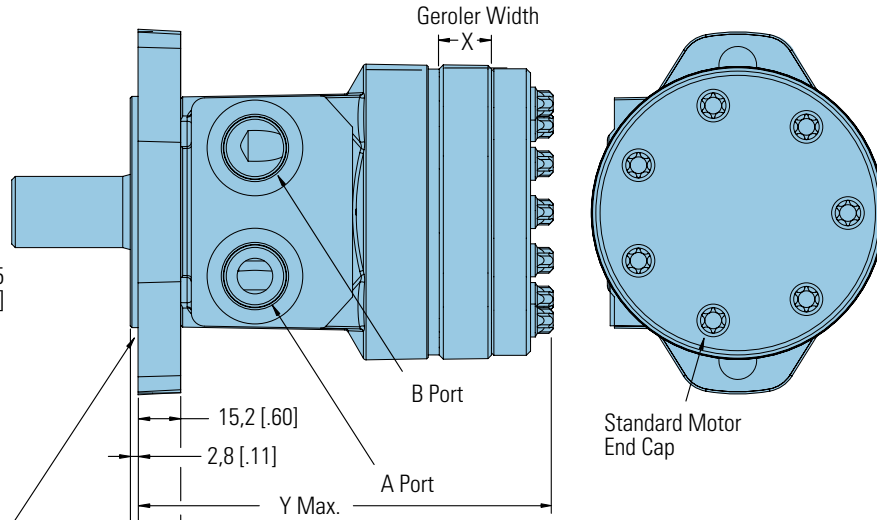
Port B Pressurized — CCW

2 Bolt Flange

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

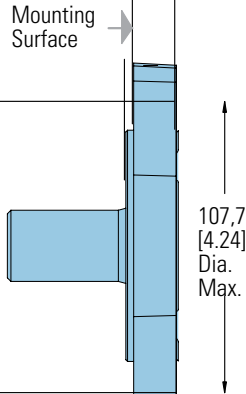
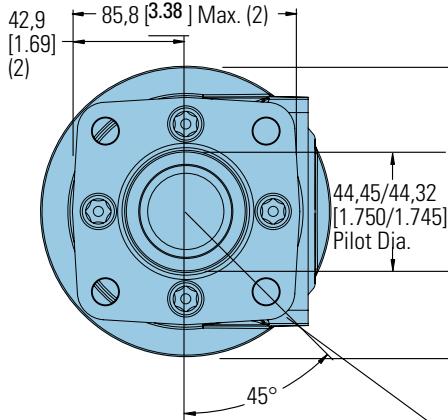


Groove Provided for 82,6 [3.25] I.D. x 2,62 [1.03] Cross Section O-ring (Dash No. 152)



Standard Motor End Cap

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

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]

S Series (103-)

Product Numbers

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

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	103-1537	-1034	-1035	-1538	-1539	-1036	-1037	-1038	-1039	-1040
	1/2 NPTF	103-1540	-1026	-1027	-1541	-1542	-1028	-1029	-1030	-1031	-1032
	Manifold	103-1543	-1042	-1043	-1544	-1545	-1044	-1045	-1046	-1047	-1048
1 in. SAE 6B Splined	7/8-14 O-Ring	103-1552	-1082	-1083	-1553	-1554	-1084	-1085	-1086	-1087	-1088
	1/2 NPTF	103-1555	-1074	-1075	-1556	-1557	-1076	-1077	-1078	-1079	-1080
	Manifold	103-1558	-1090	-1091	-1559	-1560	-1092	-1093	-1094	-1095	-1096

103-1093

4 Bolt Flange

SHAFT	PORT SIZE	DISPL. cm 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	103-1570	-1010	-1011	-1571	-1572	-1012	-1013	-1014	-1015	-1016
	1/2 NPTF	103-1573	-1002	-1003	-1574	-1575	-1004	-1005	-1006	-1007	-1008
	Manifold	103-1576	-1018	-1019	-1577	-1578	-1020	-1021	-1022	-1023	-1024
1 in. SAE 6BSplined	7/8-14 O-Ring	103-1579	-1058	-1059	-1580	-1581	-1060	-1061	-1062	-1063	-1064
	1/2 NPTF	103-1582	-1050	-1051	-1583	-1584	-1052	-1053	-1054	-1055	-1056
	Manifold	103-1585	-1066	-1067	-1586	-1587	-1068	-1069	-1070	-1071	-1072

103-1069

S Series Motors with Corrosion Protection

SHAFT	MOUNTING	PORT SIZE	DISPL. cm 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	2 Bolt Flange	7/8-14 O-Ring	103-1645	-	-	-	-	-	-	-1649	-	-1650
	4 Bolt Flange	1/2 NPTF	-	-	-	-	-	-	-	-1620	-	-1621

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

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

S Series with Low Speed Valving

Product Number

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.

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	—	—	-1675	—	—
	1/2 NPTF	103- —	—	-1634	—	—	—	—	—	—	—
	Manifold*	103- —	-1522	-2678	—	—	—	—	—	—	-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	103-1625	-1410	-1411	-1626	-2531	-1412	-1413	-1414	-1415	-1416	
	1/2 NPTF	103-1644	-1402	-1403	—	—	-1404	-1405	-1406	-1407	-1408	

103-1404

103-1527

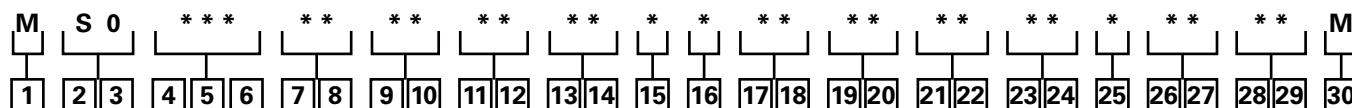
*Manifold product numbers shown are for motors with four 5/16 -18 port face mounting threads. Manifold, manifold mounting O-Rings and bolts are NOT included.

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

S Series (103-)

Model Code

The following 30-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 30-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1 Product

M – Motor

2, 3 Series

S0 – S Series Motor

4, 5, 6 Displacement cm³/r [in³/r]

036 – 58 [3.6]

046 – 76 [4.6]

057 – 93 [5.7]

073 – 120 [7.3]

088 – 144 [8.8]

101 – 165 [10.1]

114 – 186 [11.4]

137 – 224 [13.7]

182 – 299 [18.2]

227 – 371 [22.7]

7, 8 Mounting Type

AA – 2 Bolt Std: 82.50 [3.248] Dia. x 3.05 [1.20] Pilot, 13.59 [5.35] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.

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

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

DD – 2 Bolt Std: 101.60 [4.000] Dia. x 6.10 [2.40] Pilot, 14.35 [5.665] Dia. Mounting Holes on 146.05 [5.750] Dia. B.C. (SAE B) (Ductile)

EA – 4 Bolt Magneto: 82.50 [3.248] Dia. x 3.05 [1.20] Pilot, 13.59 [5.35] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.

FA – 4 Bolt Std: 44.40 [1.748] Dia. x 3.05 [1.20] Pilot, M10 x 1.5-6h Mounting Holes on 82.55 [3.250] Dia. B.C.

LA – 2 Bolt Std: 44.45 [1.750]

Dia. x 3.05 [1.20] Pilot, 13.59 [5.35] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.

MA – 2 Bolt (Standard) 82.50 [3.248] Dia. x 8.13 [3.20] Pilot, 13.59 [5.35] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C., w/o O-ring Groove

9, 10 Output Shaft

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

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

07 – 25.4 [1.00] Dia. Straight, 8.03 [3.16] Dia. Crosshole 11.2 [4.44] From End, 5.6 [2.22] Extra Length

08 – 25.4 [1.00] Dia. Straight, 10.31 [4.06] Dia. Crosshole 15.7 [6.2] From End, .250-20 UNC-2B Hole in Shaft End

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

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

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

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

39 – 25.00 [.984] Dia. Straight (k6), 8.00 [.315] Key, M8 x 1.25-6H Hole in Shaft End

11, 12 Port Type

AA – .875-14 UNF-2B SAE O-Ring Ports

AB – .500-14 NPTF Dryseal Pipe Thread Ports

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

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

AF – G 1/2 BSP Straight Thread Ports

13, 14 Case Flow Options ††

00 – None Specified

01 – 4375-20 UNF-2B SAE O-Ring Port (End Cap)

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

03 – Manifold Case Drain

04 – .4375-20 UNF-2B SAE O-RING PORT (SIDE OF HOUSING)

05 – .3125-24 UNF-2B SAE O-RING PORT (MOUNTING FLANGE)

11 – Internal Check Valves

†† – Internal check valves are standard features.

15 Geroler® Options

0 – None Specified

16 Shaft Options

0 – None Specified

N – Electroless Nickel Plated

17, 18 Seal Options

00 – Standard Seals

02 – Seal Guard

03 – Viton Seals

04 – Viton Shaft Seal

07 – High Pressure Shaft Seal

11 – High pressure shaft seal, slinger seal

19 – Extreme duty seal guard

19, 20 Speed Sensor Options

00 – None

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

AB – Magnetic Speed Pickup (60 Pulse by Quadrature), No lead wire with M12 connector (A=Power, B=Common, C=Signal)

21, 22 Manifold Block Options

00 – None

* Contact your Eaton sales representative for available options.

23, 24 Special Features (Hardware)

00 – None Specified

AB – Low Speed Valving

SS – Stainless Steel Flange Bolts

25 Special Assembly Instructions

0 – None

1 – Reverse Rotation

2 – Flange Rotated 90°

3 – Reverse Rotation, Flange Rotated 90°

26, 27 Paint/Packaging Options

00 – No Paint

AA – Low Gloss Black Primer

AD – Environmental Coated Gloss White

AF – Environmental Coated Black

28, 29 Eaton Assigned Code When Applicable

00 – Assigned Code

30 Eaton Assigned Design Code

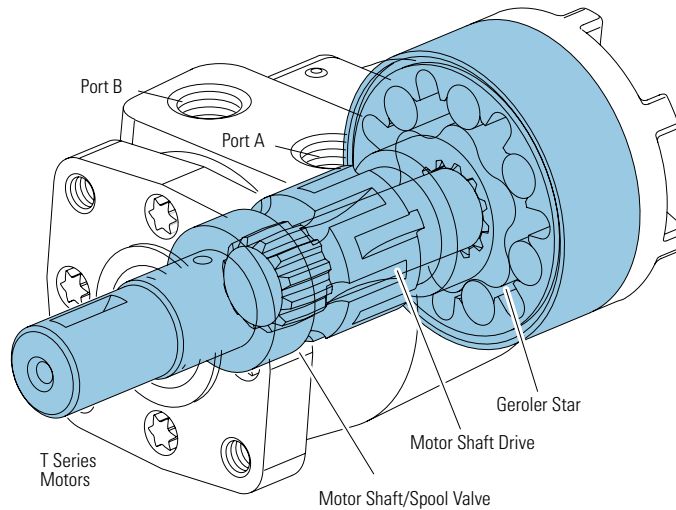
M – Twelve (12)

Feature in **bold** are preferred and allow for shorter lead time.

Notes

T Series (158-)

Highlights



Description

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

Specifications for T Series Motors

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

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

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

Features:

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

Benefits:

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

Applications:

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

B-4



Crane (winch)



Paving



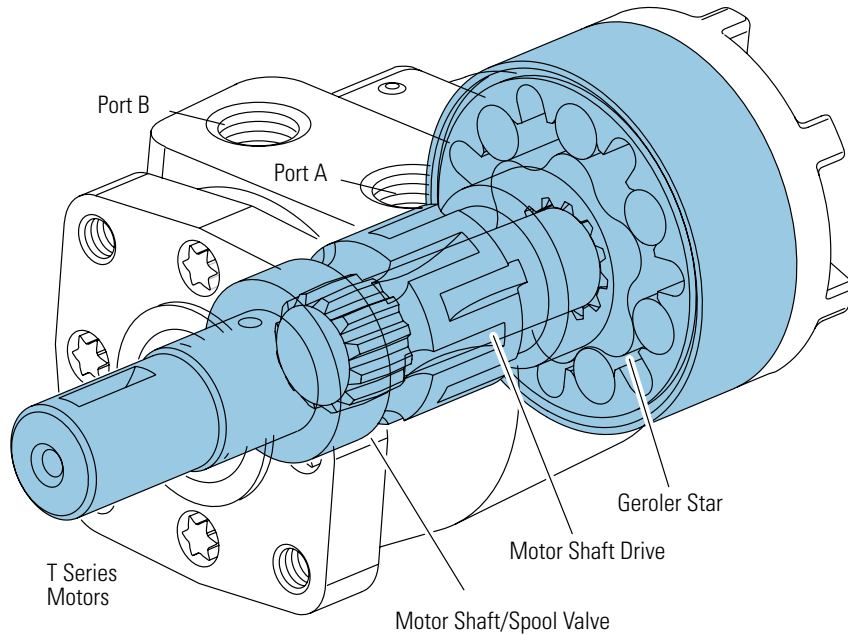
Harvester



Crane and winches

T Series (158-, 185-)

Specifications



SPECIFICATION DATA – T MOTORS

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

A simultaneous maximum torque and maximum speed NOT recommended.

Note:

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

Maximum Inlet Pressure:

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

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

Δ Pressure:

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

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

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

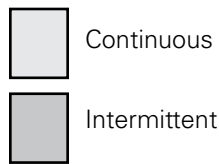
T Series

(158-, 185-)

Performance Data

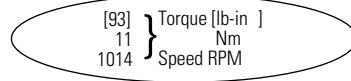
Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

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



36 cm³/r [2.2 in³/r]
Δ Pressure Bar [PSI]
Continuous

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	Max. Continuous	Max. Intermittent	
	[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2200] 152	[2250] 155	[2750] 190		
Flow LPM [GPM]	[2] 7.6	[50] 6 209	[110] 12 203	[172] 19 197	[233] 26 191	[291] 33 189	[348] 39 181	[401] 45 167	[455] 51 164	[501] 57 153	[546] 62 139	[590] 67 122	[596] 67 116	[635] 72 64	
	[4] 15.1	[50] 6 415	[109] 12 411	[172] 19 398	[233] 26 388	[296] 33 384	[355] 40 381	[414] 47 368	[475] 54 357	[534] 60 354	[584] 66 323	[646] 73 304	[659] 74 302	[786] 89 283	
	[6] 22.7	[43] 5 617	[108] 12 613	[171] 19 602	[233] 26 595	[298] 34 585	[361] 41 570	[420] 47 563	[479] 54 558	[538] 61 534	[595] 67 520	[657] 74 504	[672] 76 496	[824] 93 425	
	[8] 30.3	[39] 4 821	[101] 11 815	[164] 19 803	[226] 26 797	[292] 33 784	[354] 40 774	[415] 47 758	[475] 54 747	[538] 61 732	[592] 67 707	[656] 74 688	[670] 76 680	[819] 92 607	
	Max. Continuous 37.9	[30] 3 1021	[93] 11 1014	[155] 18 1002	[214] 24 999	[278] 31 981	[342] 39 965	[406] 46 953	[473] 53 937	[532] 60 921	[590] 67 903	[650] 73 880	[668] 75 873	[805] 91 799	



49 cm³/r [3.0 in³/r]
Δ Pressure Bar [PSI]
Continuous

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	Max. Continuous	Max. Intermittent	
	[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1800] 124	[2000] 138	[2200] 152	[2250] 155	[2750] 190		
Flow LPM [GPM]	[2] 7.6	[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	[1023] 116 58	
	[4] 15.1	[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	[1123] 127 152	
	[6] 22.7	[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	[1131] 128 344	
	[8] 30.3	[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	[1125] 127 503	
	Max. Continuous 37.9	[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	[1121] 127 638	
Max. Intermittent 45.4	[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	[1061] 120 788		
Max. Intermittent 56.8	[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			

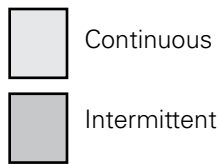
T Series

(158-, 185-)

Performance Data

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

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



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

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



T Series

(158-, 185-)

Performance Data

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

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

	Continuous
	Intermittent

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

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

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

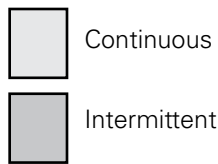
T Series

(158-, 185-)

Performance Data

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

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



157 cm³/r [9.6 in³/r]

Δ Pressure Bar [PSI]
Continuous

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] 7.6	[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] 15.1	[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	[3063] 346 60
	[6] 22.7	[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	[3169] 358 99
	[8] 30.3	[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	[3178] 359 140
	[10] 37.9	[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	[3170] 358 183
	[12] 45.4	[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	[3162] 357 225
	[14] 53.0	[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	[3147] 356 274
	Max. Continuous 56.8	[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	[3136] 354 300
	Max. Intermittent 75.7	[20]	[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	

195 cm³/r [11.9 in³/r]

Δ Pressure Bar [PSI]
Continuous

Max. Continuous
Max. Intermittent

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1750]	[1800]	[2000]	[2500]
		14	28	41	55	69	83	97	110	121	125	138	172
Flow LPM [GPM]	[2] 7.6	[330] 37 38	[671] 76 36	[1016] 115 34	[1345] 152 33	[1654] 187 31	[1969] 222 28	[2242] 253 25	[2507] 283 20	[2689] 304 16	[2748] 310 14	[2973] 336 8	
	[4] 15.1	[328] 37 77	[675] 76 77	[1026] 116 75	[1366] 154 73	[1692] 191 73	[2010] 227 71	[2289] 259 68	[2586] 292 65	[2799] 316 62	[2867] 324 61	[3144] 355 55	[3797] 429 40
	[6] 22.7	[306] 35 115	[658] 74 113	[1011] 114 111	[1360] 154 110	[1698] 192 109	[2021] 228 107	[2324] 263 104	[2604] 294 100	[2829] 320 97	[2901] 328 95	[3178] 359 87	[3831] 433 68
	[8] 30.3	[272] 31 153	[634] 72 151	[980] 111 150	[1331] 150 148	[1675] 189 146	[2003] 226 144	[2300] 260 142	[2592] 293 139	[2815] 318 134	[2888] 326 132	[3174] 359 123	[3864] 437 99
	[10] 37.9	[238] 27 192	[596] 67 189	[945] 107 188	[1296] 146 186	[1637] 185 184	[1960] 221 183	[2255] 255 181	[2565] 290 176	[2786] 315 168	[2857] 323 166	[3140] 355 156	[3816] 431 133
	[12] 45.4	[181] 20 230	[545] 62 228	[908] 103 226	[1260] 142 224	[1607] 182 222	[1924] 217 221	[2223] 251 219	[2529] 286 213	[2759] 312 207	[2836] 320 204	[3121] 353 192	[3807] 430 160
	[14] 53.0	[154] 17 268	[500] 56 266	[860] 97 264	[1211] 137 261	[1556] 176 259	[1869] 211 259	[2175] 246 256	[2483] 281 251	[2713] 307 244	[2792] 315 242	[3080] 348 229	[3778] 427 199
	Max. Continuous 56.8	[140] 16 287	[465] 53 285	[832] 94 283	[1179] 133 281	[1525] 172 279	[1835] 207 278	[2144] 242 275	[2459] 278 269	[2693] 304 262	[2768] 313 260	[3061] 346 247	[3764] 425 220
	Max. Intermittent 75.7	[20]	[291] 33 382	[653] 74 378	[1013] 114 375	[1366] 154 373	[1689] 191 372	[1987] 225 368	[2298] 260 363	[2540] 287 356	[2622] 296 353	[2928] 331 342	



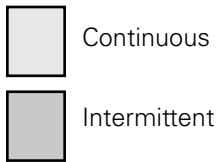
T Series

(158-, 185-)

Performance Data

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

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



244 cm³/r [14.9 in³/r]

Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

		[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1600] 110	[1650] 114	[1800] 125	[1850] 127	[2250] 155
Flow LPM [GPM]	[2] 7.6	[406] 46 30	[833] 94 29	[1260] 142 27	[1655] 187 26	[2038] 230 24	[2403] 272 22	[2707] 306 17	[2597] 293 12	[2552] 288 11	[2373] 268 7	[2299] 260 6	
	[4] 15.1	[404] 46 62	[843] 95 62	[1277] 144 60	[1695] 192 59	[2083] 235 59	[2468] 279 57	[2820] 319 55	[3177] 359 50	[3261] 368 49	[3509] 396 46	[3589] 406 44	[4194] 474 35
	[6] 22.7	[382] 43 92	[823] 93 91	[1261] 142 90	[1687] 191 89	[2088] 236 88	[2477] 280 86	[2843] 321 82	[3196] 361 78	[3285] 371 76	[3547] 401 72	[3633] 410 71	[4290] 485 60
	[8] 30.3	[341] 39 123	[787] 89 123	[1220] 138 121	[1651] 187 120	[2059] 233 119	[2454] 277 116	[2820] 319 113	[3177] 359 108	[3265] 369 106	[3530] 399 109	[3615] 408 99	[4285] 484 85
	[10] 37.9	[297] 34 154	[744] 84 152	[1177] 133 151	[1611] 182 150	[2017] 228 148	[2412] 273 146	[2774] 313 143	[3151] 356 136	[3241] 366 134	[3504] 396 127	[3593] 406 125	[4269] 482 107
	[12] 45.4	[225] 25 184	[687] 78 183	[1132] 128 181	[1553] 175 180	[1967] 222 179	[2360] 267 177	[2734] 309 173	[3105] 351 166	[3194] 361 163	[3466] 392 156	[3554] 402 153	[4237] 479 134
	[14] 53.0	[154] 17 214	[628] 71 213	[1072] 121 212	[1498] 169 211	[1910] 216 209	[2298] 260 207	[2674] 302 202	[3052] 345 205	[3148] 365 193	[3419] 386 185	[3510] 397 182	[4226] 477 161
	Max. Continuous 56.8	[119] 13 229	[586] 66 228	[1035] 117 227	[1458] 165 226	[1872] 212 224	[2261] 255 222	[2637] 298 217	[3022] 341 209	[3116] 352 207	[3389] 383 200	[3488] 394 197	[4220] 477 174
	Max. Intermittent 75.7	[20]	[372] 42 305	[816] 92 303	[1251] 141 301	[1663] 188 300	[2067] 234 297	[2448] 277 292	[2832] 320 284	[2928] 331 281	[3214] 363 273	[3312] 374 270	

306 cm³/r [18.7 in³/r]

Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

		[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1400] 97	[1500] 103	[1600] 110	[1800] 124
Flow LPM [GPM]	[2] 7.6	[499] 56 24	[1035] 117 23	[1560] 176 22	[2034] 230 21	[2501] 283 19	[2912] 329 16	[3239] 366 11	[2859] 323 8	[2400] 271 5	
	[4] 15.1	[497] 56 49	[1052] 119 49	[1590] 180 48	[2101] 237 48	[2561] 289 47	[3023] 342 47	[3464] 391 44	[3680] 416 41	[3886] 439 38	[4221] 477 30
	[6] 22.7	[480] 54 74	[1031] 116 74	[1578] 178 72	[2096] 237 72	[2564] 290 71	[3023] 342 69	[3464] 391 64	[3689] 417 62	[3905] 441 60	[4275] 483 51
	[8] 30.3	[427] 48 99	[975] 110 98	[1520] 172 97	[2051] 232 97	[2525] 285 96	[2998] 339 94	[3448] 390 89	[3667] 414 86	[3881] 438 83	[4264] 482 73
	[10] 37.9	[370] 42 123	[930] 105 122	[1467] 166 121	[2001] 226 120	[2477] 280 120	[2955] 334 117	[3406] 385 112	[3631] 410 108	[3852] 435 104	[4264] 482 92
	[12] 45.4	[281] 32 147	[871] 98 146	[1410] 159 145	[1908] 216 145	[2400] 271 145	[2887] 326 142	[3352] 379 136	[3573] 404 131	[3790] 428 127	[4189] 473 112
	[14] 53.0	[192] 22 171	[791] 89 171	[1338] 151 170	[1851] 209 170	[2338] 264 169	[2816] 318 165	[3281] 371 159	[3511] 397 154	[3743] 423 150	[4135] 467 133
	Max. Continuous 56.8	[148] 17 183	[738] 83 183	[1288] 146 182	[1803] 204 182	[2287] 258 181	[2773] 313 177	[3243] 366 171	[3475] 393 165	[3705] 419 160	[4098] 463 146
	Max. Intermittent 75.7	[20]	[476] 54 243	[1020] 115 242	[1544] 174 242	[2010] 227 241	[2519] 285 238	[3010] 340 231	[3243] 366 226	[3495] 395 209	



370 cm³/r [22.6 in³/r]

Pressure Bar [PSI]

Continuous

Max. Continuous

Max. Intermittent

		[200] 14	[400] 28	[600] 41	[800] 55	[1000] 69	[1200] 83	[1300] 90	[1500] 103
Flow LPM [GPM]	[2] 7.6	[590] 67 20	[1237] 140 19	[1858] 210 18	[2406] 272 17	[2953] 334 15	[3388] 383 12	[3586] 405 11	
	[4] 15.1	[588] 66 41	[1263] 143 41	[1906] 215 40	[2506] 283 40	[3029] 342 39	[3557] 402 38	[3811] 431 37	[4252] 480 36
	[6] 22.7	[580] 66 61	[1245] 141 60	[1899] 215 60	[2506] 283 59	[3029] 342 58	[3544] 400 57	[3788] 428 56	[4300] 486 54
	[8] 30.3	[514] 58 82	[1164] 132 81	[1824] 206 80	[2452] 277 79	[2975] 336 78	[3518] 397 77	[3783] 427 77	[4284] 484 75
	[10] 37.9	[444] 50 102	[1119] 126 102	[1759] 199 101	[2391] 270 101	[2928] 331 100	[3479] 393 97	[3750] 424 96	[4275] 483 93
	[12] 45.4	[337] 38 122	[1062] 120 121	[1690] 191 120	[2256] 255 119	[2813] 318 119	[3393] 383 118	[3685] 416 116	[4273] 483 112
	[14] 53.0	[231] 26 142	[958] 108 141	[1608] 182 140	[2201] 249 139	[2748] 310 138	[3319] 375 137	[3610] 408 134	[4198] 474 129
	Max. Continuous 56.8	[178] 20 152	[896] 101 152	[1543] 174 151	[2147] 243 150	[2683] 303 149	[3272] 370 147	[3572] 404 146	[4187] 473 140
	Max. Intermittent 75.7	[20]	[587] 66 202	[1228] 139 201	[1833] 207 201	[2331] 263 200	[2948] 333 198	[3273] 370 196	

T Series (158-)

Dimensions

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

Ports

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

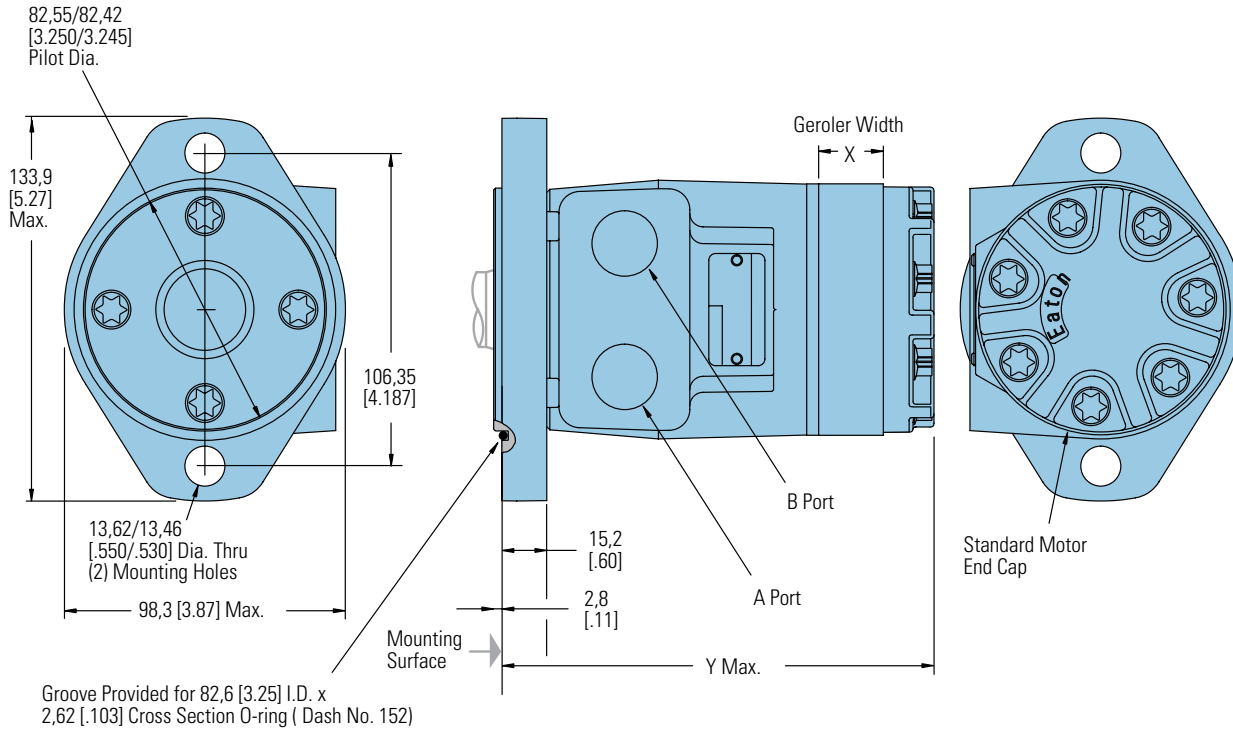
Note:

Mounting Surface Flatness Requirement is ∇ ,13 mm [.005 inch] Max.

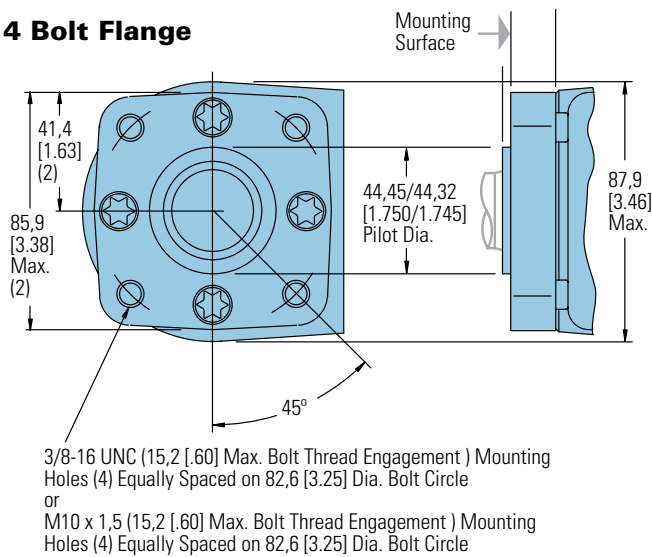
Standard Rotation Viewed from Shaft End

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

2 Bolt Flange



4 Bolt Flange



2 AND 4 BOLT FLANGE PORT DIMENSIONS

Displacement cm 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. 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-	—	—	-1537	-1034	-1035	-1538	-1036	-1037	-1038	-1039	-1040
		1/2 NPTF	158-	—	—	-1540	-1026	-1027	-1541	-1028	-1029	-1030	-1031	-1032
		Manifold*	158-	—	—	-1543	-1042	-1043	-1544	-1044	-1045	-1046	-1047	-1048
	1 in. SAE 6B Splined	7/8 -14 O-Ring	158-	—	—	-1552	-1082	-1083	-1553	-1084	-1085	-1086	-1087	-1088
		1/2 NPTF	158-	—	—	-1555	-1074	-1075	-1556	-1076	-1077	-1078	-1079	-1080
		Manifold*	158-	—	—	-1558	-1090	-1091	-1559	-1092	-1093	-1094	-1095	-1096
4 Bolt Flange	1 in. Straight w/Woodruff Key	7/8 -14 O-Ring	158-	—	—	-1570	-1010	-1011	-1571	-1012	-1013	-1014	-1015	-1016
		1/2 NPTF	158-	—	—	-1573	-1002	-1003	-1574	-1004	-1005	-1006	-1007	-1008
		Manifold*	158-	—	—	-1576	-1018	-1019	-1577	-1020	-1021	-1022	-1023	-1024
	1 in. SAE 6B Splined	7/8 -14 O-Ring	158-	—	—	-1579	-1058	-1059	-1580	-1060	-1061	-1062	-1063	-1064
		1/2 NPTF	158-	—	—	-1582	-1050	-1051	-1583	-1052	-1053	-1054	-1055	-1056
		Manifold*	158-	—	—	-1585	-1066	-1067	-1586	-1068	-1069	-1070	-1071	-1072

158-1067

T Series Motors with Corrosion Protection

MOUNTING	SHAFT	PORT SIZE	DISPL. cm 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-	—	—	—	1645	—	—	—	—	-1649	—	-1650
4 Bolt Flange		1/2 NPTF	158-	—	—	—	—	—	—	—	—	-1620	—	-1621

158-1620

T Series Motors with Low Speed Valving

MOUNTING	SHAFT	PORT SIZE	DISPL. cm 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	-1425	
		Manifold*	158-	—	—	—	—	—	—	—	—	—	—	
4 Bolt Flange	1 in. SAE 6B Splined	7/8 -14 O-Ring	158-	—	—	-1525	—	—	—	—	-1675	—	—	
		1/2 NPTF	158-	—	—	—	-1634	—	—	—	—	—	—	
		Manifold*	158-	—	—	-1522	-2678	—	—	—	—	—	-1527	
4 Bolt Flange	1 in. Straight w/ Woodruff Key	7/8 -14 O-Ring	158-	—	—	-1625	-1410	-1411	-1626	-1412	-1413	-1414	-1415	-1416
		1/2 NPTF	158-	—	—	-1644	-1402	-1403	—	-1404	-1405	-1406	-1407	-1408

158-1403

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

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

T Series (158-)

Model Code

The following 30-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 30-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

M	T	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	25	26	27	28	29	30

1 Product

M – Motor

2, 3 Product Series

T0 – T Series

4, 5, 6 Displacement

cm³/r [in³/r]

022 – 35 [2.2]

030 – 49 [3.0]

040 – 65 [4.0]

049 – 80 [4.9]

062 – 102 [6.2]

080 – 131 [8.0]

096 – 158 [9.6]

119 – 195 [11.9]

149 – 244 [14.9]

187 – 306 [18.7]

226 – 370 [22.6]

7, 8 Mounting Type

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.

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.

CA – 2 Bolt (Standard) 82,50 [3.248] Dia. x 6,10 [.240] pilot, 10,41 [.410] Dia. Mounting Holes 106,35 [4.187] Dia. B.C. (SAE A)

DD – 2 Bolt (Std.) 101,60 [4.000] Dia. x 6,10 [.240] pilot, 14,35 [.565] Dia. Mounting Holes 146,05 [5.750] Dia. B.C. (SAE B) (Ductile)

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.

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., w/o O-ring Groove

9, 10 Output Shaft Description

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, .25-20 UNC-2B Hole in Shaft End

07 – 25,4 [1.00] Dia. Straight, 8,03 [.316] Dia. Crosshole 11,2 [.44] from End, 5,6 [.22] Extra Length

08 – 25,4 [1.00] Dia. Straight, 10,31 [.406] Dia. Crosshole 15,7 [.62] from End, .250-20 UNC-2B Hole in Shaft End

16 – 22,22 [.875] Dia. SAE 13 Tooth Spline (SAE B)

17 – 22,22 [.875] Straight Dia. 6,4 [2.5] x 19,0 [.75] Square Key (SAE B)

18 – 25,4 [1.00] Dia. Tapered, Woodruff Key and Nut, 34,92 [1.375] Taper Length

24 – 25,00 [.984] Dia. Straight, 8,0 [.315] Key, MB 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 Port Type

AA – .875-14 UNF-2B SAE O-Ring Ports

AB – .500-14 NPTF Dryseal Pipe Thread Ports

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

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

AF – G 1/2 BSP Straight Thread Ports

13, 14 Case Flow Options

00 – None Specified

01 – .4375-20 UNF-2B SAE O-Ring Port (End Cap)

02 – G 1/4 BSP Straight Thread Port (End Cap)

03 – MANIFOLD CASE DRAIN

04 – .4375-20 UNF-2B SAE O-RING PORT (SIDE OF HOUSING)

05 – .3125-24 UNF-2B SAE O-RING PORT (MOUNTING FLANGE)

11 – Internal Check Valves

15 Geroler® Options

0 – None

A – Free Running

16 Shaft Options

0 – None

N – Electroless Nickel Plated

17, 18 Seal Options

00 – Standard Seals

02 – Seal Guard

03 – Viton Seals

04 – Viton Shaft Seal

07 – High Pressure Shaft Seal

11 – High pressure shaft seal, slinger seal

19 – Extreme duty seal guard

19, 20 Speed Sensor Options

00 – None

AA – 12 mm Digital Speed Pickup (15 Pulse) without Lead Wire

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

21, 22 Valve Options

0 – None

23, 24 Special Features (Hardware)

00 – None Specified

AB – Low Speed Valving
SS – Stainless Steel Flange Bolts

25 Special Assembly Instructions

0 – None

A – Reverse Rotation

2 – Flange Rotation 90°

26, 27 Paint/Packaging Options

00 – No Paint

AA – Low Gloss Black Primer

AD – Environmental Coated Gloss White

28, 29 Customer ID/ Nameplate Options

0 – None Specified

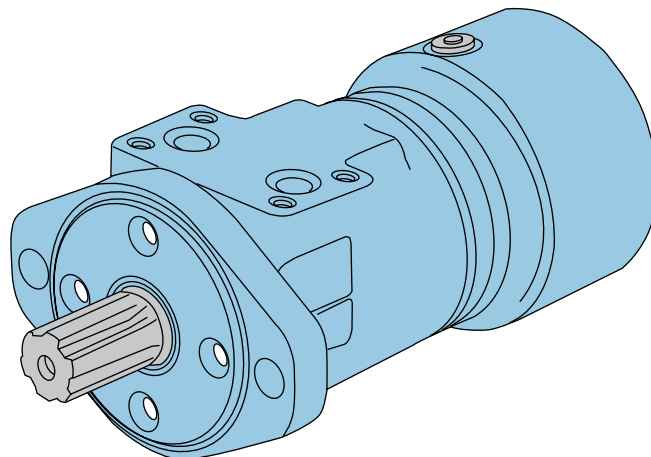
30 Design Code

A – One (1)

Feature in **bold** are preferred and allow for shorter lead time.

T Series with Parking Brake (185-)

Highlights



Description

Eaton's latest offering in LSHT motor technology is the new T Series Motor with Parking Brake.

T Series Motor with Parking Brake utilizes brake pads that rotate at 6 times the speed of the output shaft, thereby giving the brake a 6-to-1 mechanical advantage. The T Series Motor with Parking Brake utilizes the same Geroler, and Spool Valve technologies as the standard Char-Lynn motors. Therefore, in addition to providing dependable load-holding capability, T Series Motor with Parking Brake provides the same smooth, reliable operation, with similar performance, as the T Series Motor.

Specifications

Geroler Element	11 Displacements
Flow l/min [GPM]	55 [15] Continuous
	75 [20] Intermittent
Speed	Up to 1055 RPM
Pressure bar [PSI]	155 [2250] Cont.
	190 [2750] Inter.
Torque Nm [lb-in]	441 [3905] Cont.
	486 [4300] Inter.

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 overriding 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-4-15). However, seal life is reduced at higher case pressure.

Residual Pressure

Residual pressure is the pressure trapped in the system by restrictions or long return lines.

Residual pressure in the motor case will lower the rated load holding torque of the brake.

Therefore, special attention needs to be given when applying this product. Keep in mind that long return lines create higher pressure that will reduce brake holding torque. In applications with high system pressures, the use of a pressure reducing valve to limit case and release pressure is recommended.

Holding Torque and Motor Output Torque

Holding torque is based on grade holding requirements for a vehicle or other load holding requirements in the application. System pressure and motor displacement are the factors in determining motor output torque. Motor displacement, measured in cubic centimeters or cubic inches, is the volume of fluid required to make one revolution. Motor output torque is the rotary force and is usually measured in inch pounds, newton meters or foot pounds. Maximum motor torque depends on pressure and motor displacement. Both output shaft size and shaft type can also affect motor torque. The T Series Motor with Parking Brake load holding capacity is factory set to match any limiting factor in each specific motor configuration (e.g. displacement, output shaft, etc).

Note:

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

Note:

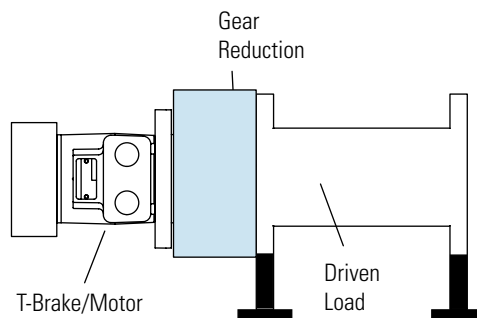
Special attention should be given to system back pressure. System back pressure directly affects brake release pressure and can cause the brake to release at undesired conditions.

Note:

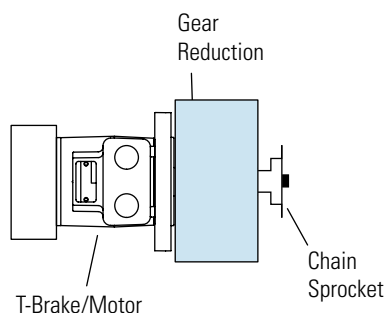
The T Series with parking brake is not compatible with water based fluids.

Typical Applications

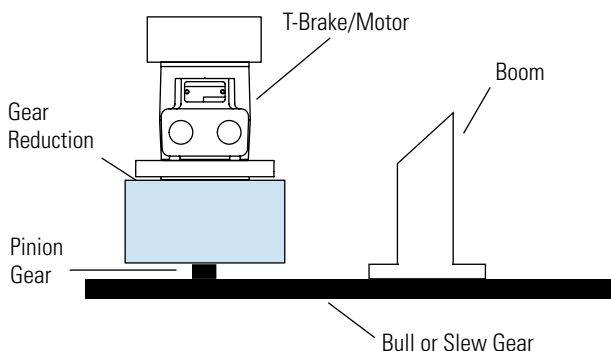
Winch



Machine Drive

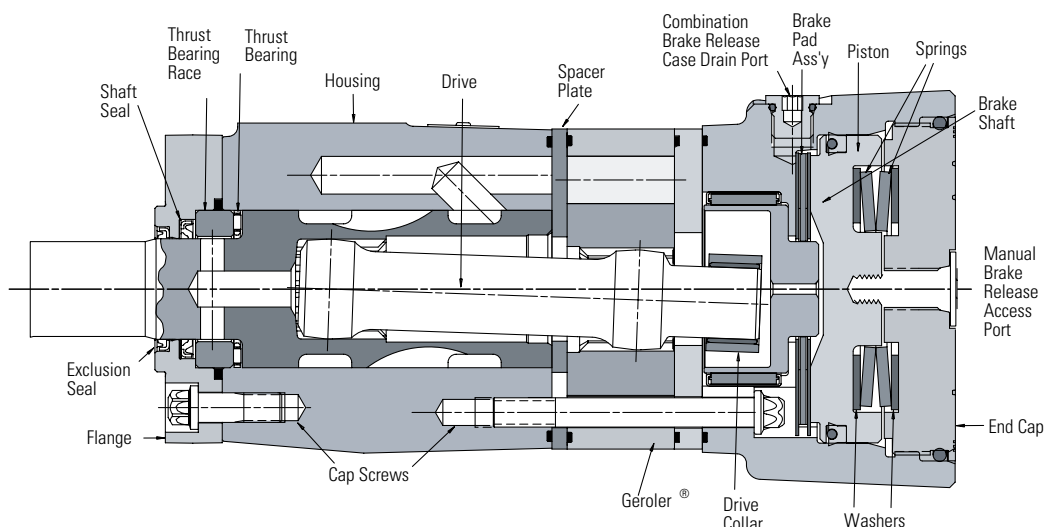


Swing Boom



T Series with Parking Brake (185-)

Specifications



B-4

SPECIFICATION DATA – T SERIES WITH PARKING BRAKE MOTORS

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

Note:

See page B-4-2 for additional motor specification notes and definitions. The T Series with Parking Brake performance is similar to the standard T Series motor. High speed conditions may reduce performance on T Series with Parking Brake.

T SERIES BRAKE HOLDING TORQUE SETTINGS:

Shaft Code	Output Shaft Description	[in 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

in-lbs Full Capacity Brake

in-lbs Limited Capacity Brake

Note:

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

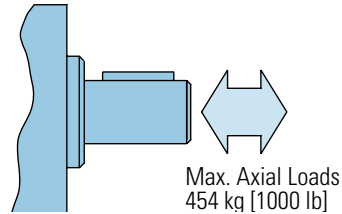
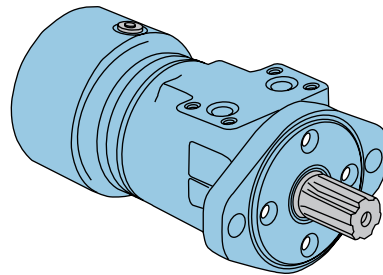
T Series with Parking Brake (185-)

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.

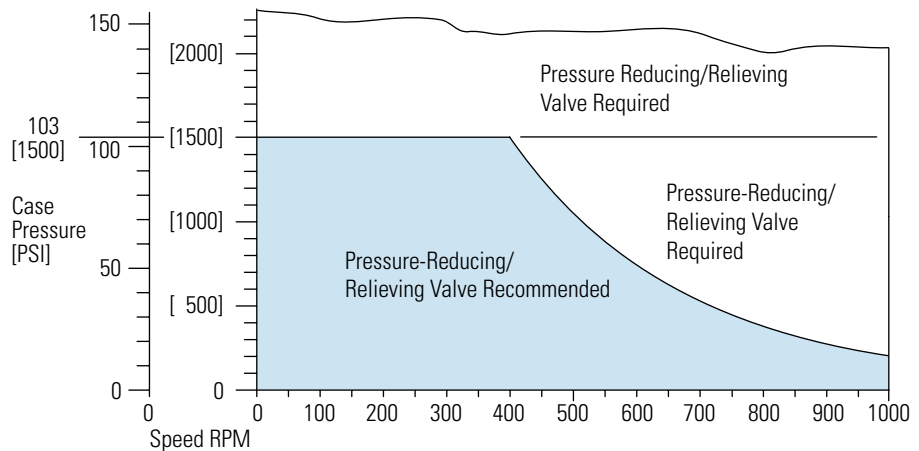
B-4



$$P_C \approx 6 DP + P_2$$

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

Case Pressure/Shaft Seal



T Series with Parking Brake (185-)

Product Numbers

Use digit prefix —
185 plus four digit number
from charts for complete
product number —
Example 185-2068.

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

Standard Valving

MOUNTING	SHAFT	PORT SIZE	DISPL. cm 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 Manifold	185-2000 185-2010	2001 2011	2002 2012	2003 2013	2004 2014	2005 2015	2006 2016	2007 2017	2008 2018	2009 2019
		6B Splined	7/8-14 O-Ring Manifold	185-2020 185-2030	2021 2031	2022 2032	2023 2033	2024 2034	2025 2035	2026 2036	2027 2037	2028 2038
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2040 185-2050	2041 2051	2042 2052	2043 2053	2044 2054	2045 2055	2046 2056	2047 2057	2048 2058	2049 2059
4-Bolt	1 Keyed	7/8-14 O-Ring Manifold	185-2060 185-2070	2061 2071	2062 2072	2063 2073	2064 2074	2065 2075	2066 2076	2067 2077	2068 2078	2069 2079
		6B Splined	7/8-14 O-Ring Manifold	185-2080 185-2090	2081 2091	2082 2092	2083 2093	2084 2094	2085 2095	2086 2096	2087 2097	2088 2098
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2100 185-2110	2101 2111	2102 2112	2103 2113	2104 2114	2105 2115	2106 2116	2107 2117	2108 2118	2109 2119
2-Bolt SAE B	1 Keyed	7/8-14 O-Ring Manifold	185-2120 185-2130	2121 2131	2122 2132	2123 2133	2124 2134	2125 2135	2126 2136	2127 2137	2128 2138	2129 2139
		6B Splined	7/8-14 O-Ring Manifold	185-2140 185-2150	2141 2151	2142 2152	2143 2153	2144 2154	2145 2155	2146 2156	2147 2157	2148 2158
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2160 185-2170	2161 2171	2162 2172	2163 2173	2164 2174	2165 2175	2166 2176	2167 2177	2168 2178	2169 2179

Low Speed Valving

MOUNTING	SHAFT	PORT SIZE	DISPL. cm 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 Manifold	185-2180 185-2190	2181 2191	2182 2192	2183 2193	2184 2194	2185 2195	2186 2196	2187 2197	2188 2198	2189 2199
		6B Splined	7/8-14 O-Ring Manifold	185-2200 185-2210	2201 2211	2202 2212	2203 2213	2204 2214	2205 2215	2206 2216	2207 2217	2208 2218
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2220 185-2230	2221 2231	2222 2232	2223 2233	2224 2234	2225 2235	2226 2236	2227 2237	2228 2238	2229 2239
4-Bolt	1 Keyed	7/8-14 O-Ring Manifold	185-2240 185-2250	2241 2251	2242 2252	2243 2253	2244 2254	2245 2255	2246 2256	2247 2257	2248 2258	2249 2259
		6B Splined	7/8-14 O-Ring Manifold	185-2260 185-2270	2261 2271	2262 2272	2263 2273	2264 2274	2265 2275	2266 2276	2267 2277	2268 2278
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2280 185-2290	2281 2291	2282 2292	2283 2293	2284 2294	2285 2295	2286 2296	2287 2297	2288 2298	2289 2299
2-Bolt SAE B	1 Keyed	7/8-14 O-Ring Manifold	185-2300 185-2310	2301 2311	2302 2312	2303 2313	2304 2314	2305 2315	2306 2316	2307 2317	2308 2318	2309 2319
		6B Splined	7/8-14 O-Ring Manifold	185-2320 185-2330	2321 2331	2322 2332	2323 2333	2324 2334	2325 2335	2326 2336	2327 2337	2328 2338
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2340 185-2350	2341 2351	2342 2352	2343 2353	2344 2354	2345 2355	2346 2356	2347 2357	2348 2358	2349 2359

185-2357

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

Designed to run continuously at up to 200 RPM at standard rated pressures and reduced

flows, this option provides smooth operation at low speeds. Furthermore, they resist slippage and have more momentary load holding ability than the standard 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

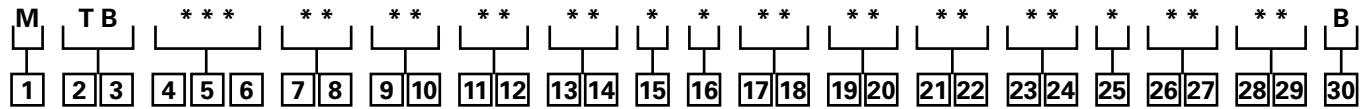
this valving.

For a T Series motor with parking brake configuration not shown in the charts above use the model code system on page B-4-17 to specify the product in detail.

T Series with Parking Brake (185-)

Model Code

The following 30-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 30-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1 Product

M – Motor

2, 3 Series

T B – T Series Motor with Parking Brake

4, 5, 6 Displacement cm³/r [in³/r]

022 – 36 [2.2]
030 – 49 [3.0]
040 – 66 [4.0]
049 – 80 [4.9]
062 – 102 [6.2]
080 – 131 [8.0]
096 – 157 [9.6]
119 – 195 [11.9]
149 – 244 [14.9]
187 – 306 [18.7]
226 – 370 [22.6]

7, 8 Mounting Type

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.

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.

CA – 2 Bolt (Standard) 82,50 [3.248] Dia. x 6,10 [.240] pilot, 10,41 [.410] Dia. Mounting Holes 106,35 [4.187] Dia. B.C. (SAE A)

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)

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.

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.

9, 10 Output Shaft Description

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, .25-20 UNC-2B Hole in Shaft End

16 – SAE 13 Tooth Spline, 16/32 Pitch, 21,74 (.856) Dia. (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, 8,0 [.315] Key, MB x 1.25-6H Hole in Shaft End

11, 12 Port Type

AA – .875-14 UNF-2B SAE O-Ring Ports

AB – .500-14 NPTF Dryseal Pipe Thread Ports

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

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

AF – G 1/2 BSP Straight Thread Ports

13, 14 Case Flow Options

00 – None Specified

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

03 – Manifold Case Drain

04 – .4375-20 UNF-2B SAE O-RING PORT (SIDE OF HOUSING)

05 – .3125-24 UNF-2B SAE O-RING PORT (MOUNTING FLANGE)

11 – Internal Check Valves

15 Geroler® Options

A – Standard

B – Free Running

16 Shaft Options

0 – None

N – Electroless Nickel Plated

17, 18 Seal Options

00 – Standard Seals

02 – Seal Guard

03 – Viton Seals

04 – Viton Shaft Seal

07 – High Pressure Shaft Seal

11 – High pressure shaft seal, slinger seal

19 – Extreme duty seal guard

19, 20 Speed Sensor Options

00 – None

AA – 12 mm Digital Speed Pickup (15 Pulse) without Lead Wire

21, 22 Valve Options

0 – 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 Customer ID/ Nameplate Options

0 – None Specified

30 Design Code

B – Two (2)

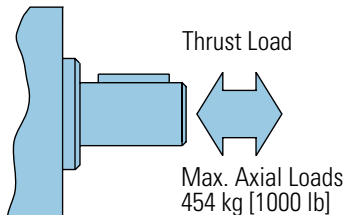
Feature in **bold** are preferred and allow for shorter lead time.

B-4

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

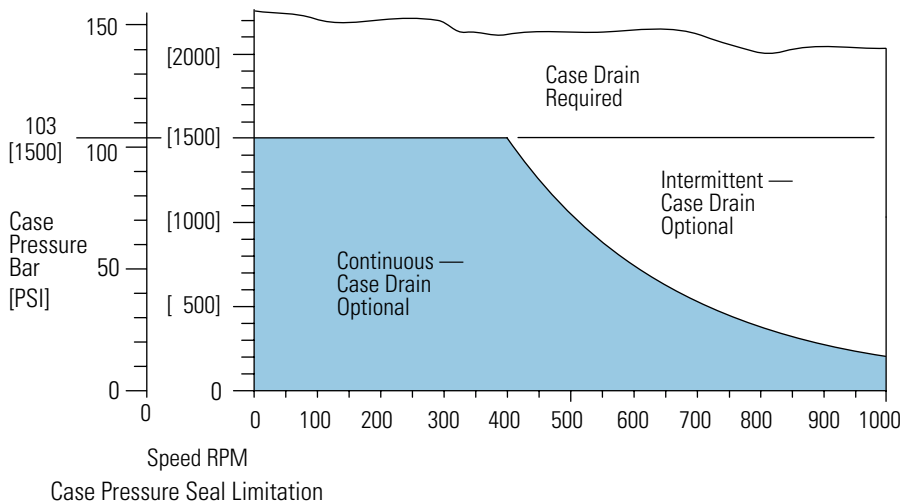
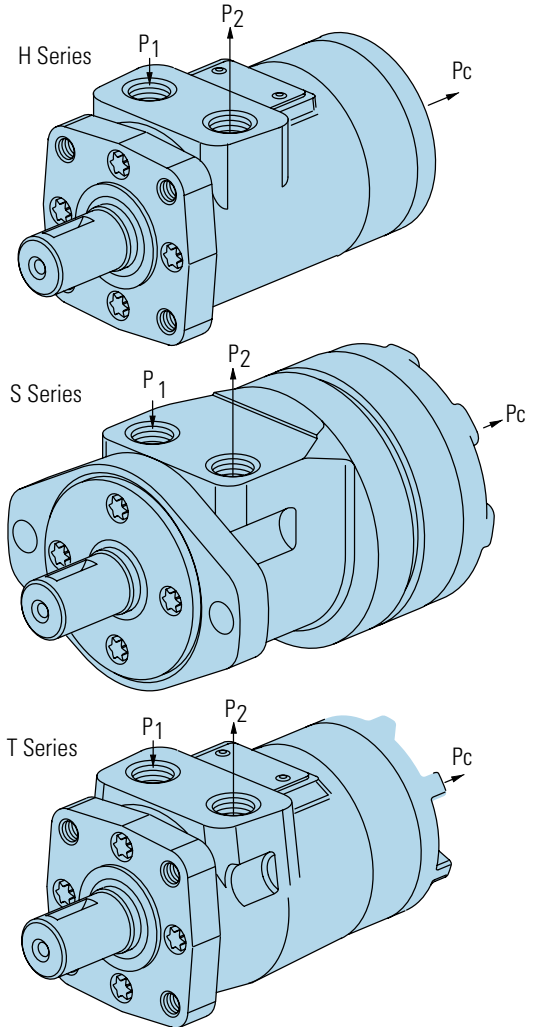
Char-Lynn H Series, S Series and T Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with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

from the case pressure seal limitation chart below — chart based on case pressure and shaft speed. If a case drain line is needed, connect drain line to assure that the motor will always remain full of fluid. A pressure restriction should be added to the case drain line, during which a motor case pressure of 3,5 Bar [50 PSI] is maintained.



$$P_C \approx 6 \Delta P + P_2$$

P_C = Case Pressure
 P_1 = Inlet Line Pressure
 P_2 = Back Pressure
 $\Delta P = P_1 - P_2$



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

Side Load Capacity

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

Allowable side load chart, shaft load location drawing and load curves (below) are based on the side / radial loads being applied to shaft at locations A, B, and C, to

determine the shaft side load capacity at locations other than those shown use the formula (shown below).

For more information about shaft side loads on Char-Lynn motors contact your Eaton representative.

Note:

When the speed sensor option is used, side load ratings are reduced 25%.

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

B-2

B-3

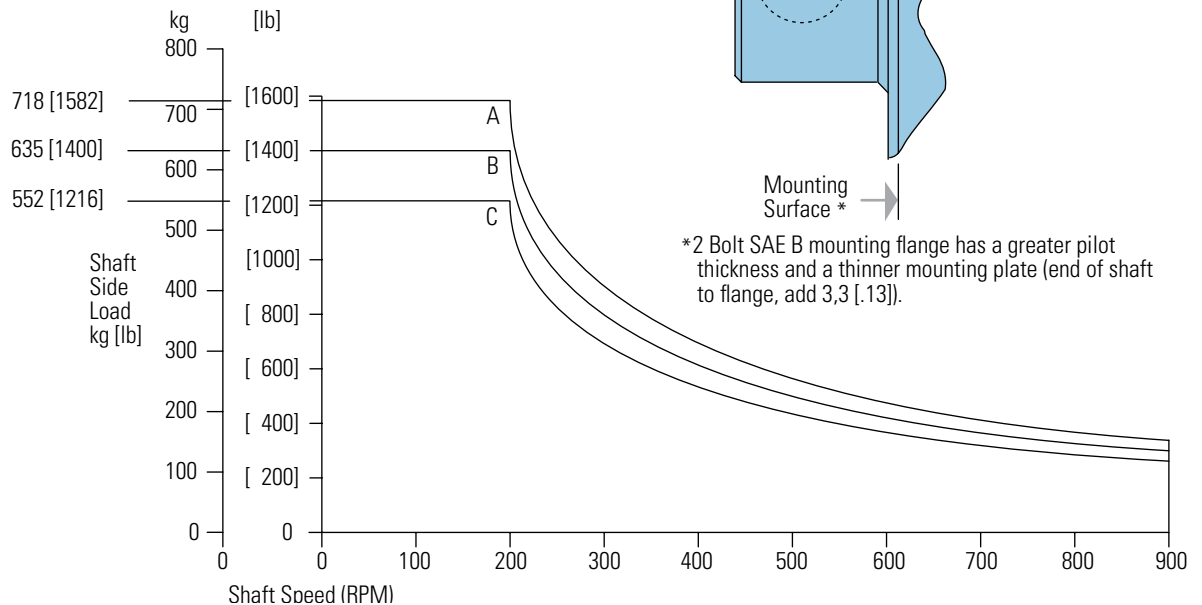
B-4

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

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

Where N = Shaft Speed (RPM)

L = Distance from Mounting Surface

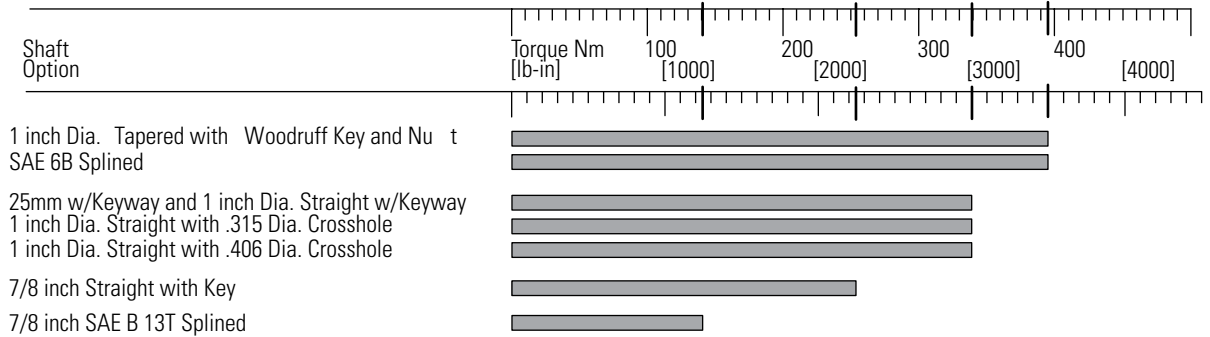


H, S and T Series (101, 103- 158, 185)

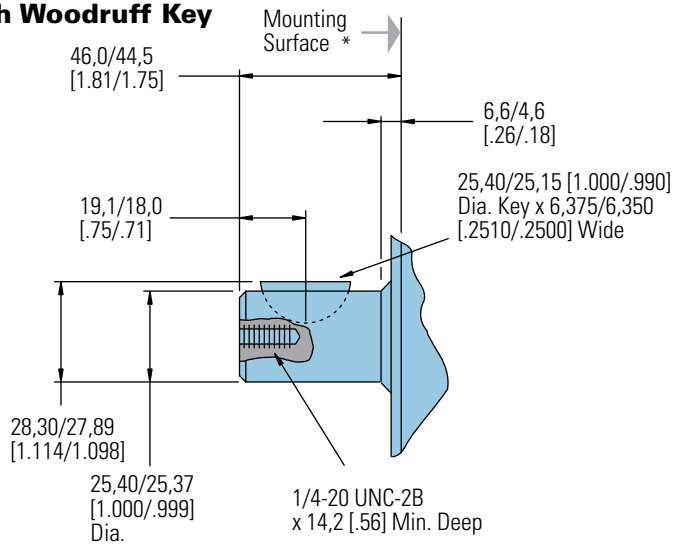
Dimensions

Shafts

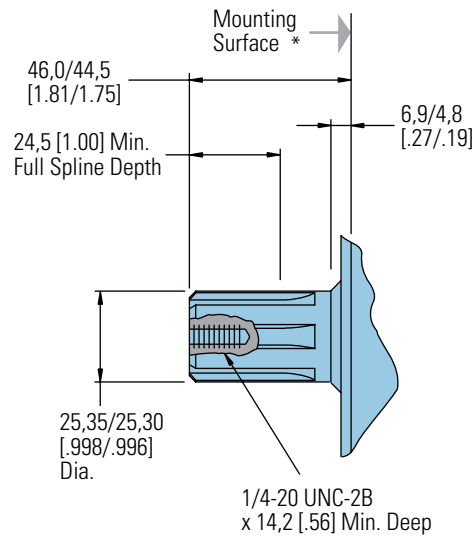
Shaft Size Motor Torque Combination Limit Guide



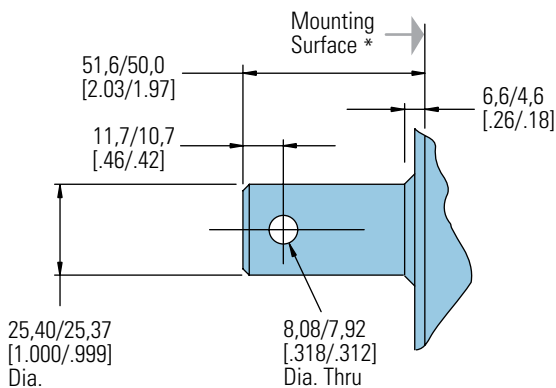
1 in. Dia. Straight with Woodruff Key



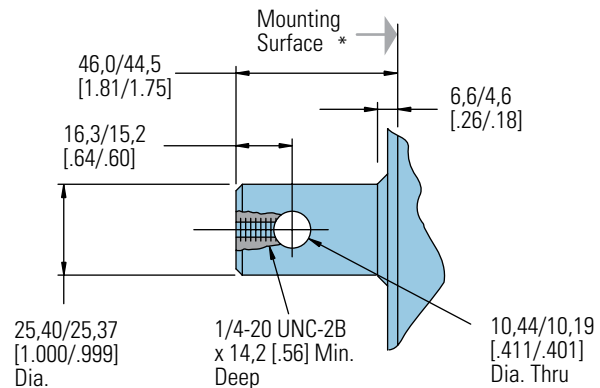
SAE 6B Splined Shaft



1 in. Dia. Straight Shaft with .315 Dia. Crosshole



1 in. Dia. Straight Shaft with .406 Dia. Crosshole



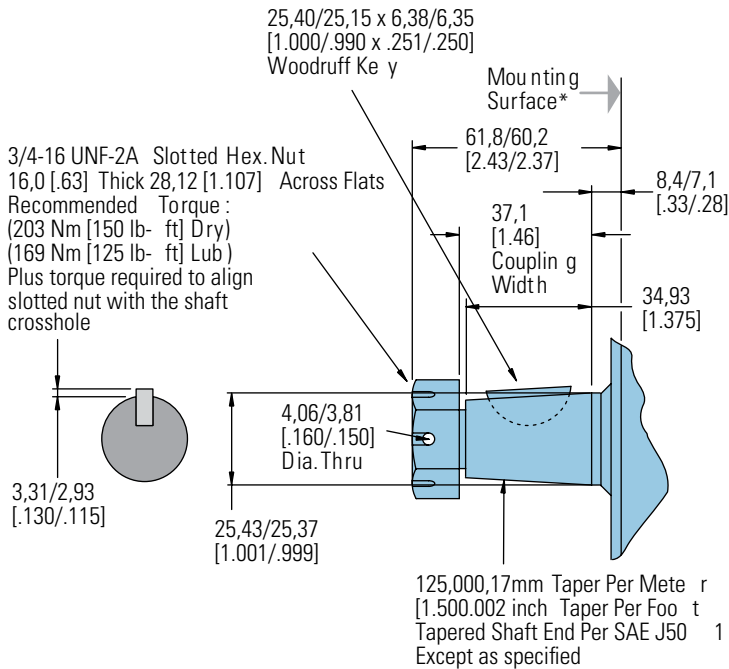
* 2 Bolt SAE B mounting flange has a greater pilot thickness and a thinner mounting plate (end of shaft to flange, add 3,3 [.13]).

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

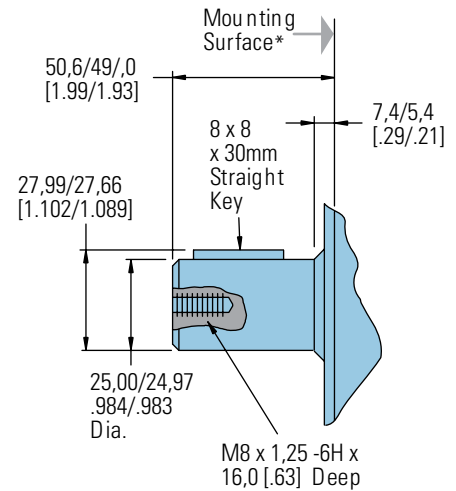
Dimensions

Shafts

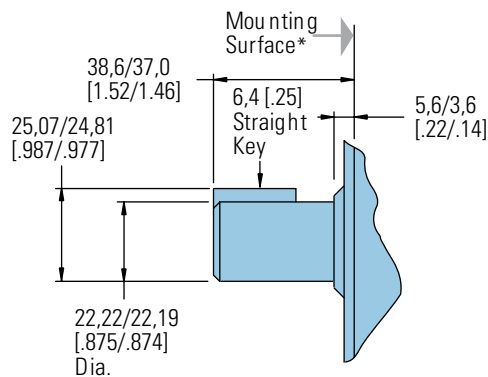
1 in. Dia. Tapered Shaft with Woodruff Key and Nut



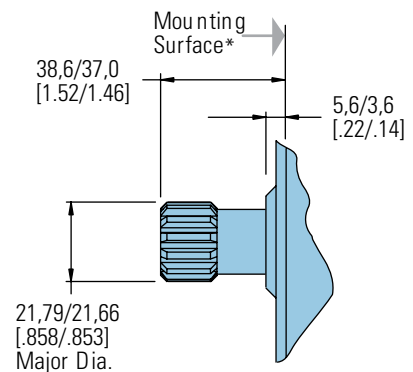
25mm Dia. Straight Shaft with 8mm Keyway



7/8 in. Dia. Straight Shaft with Key



7/8 in. Dia. SAE B Shaft 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]).

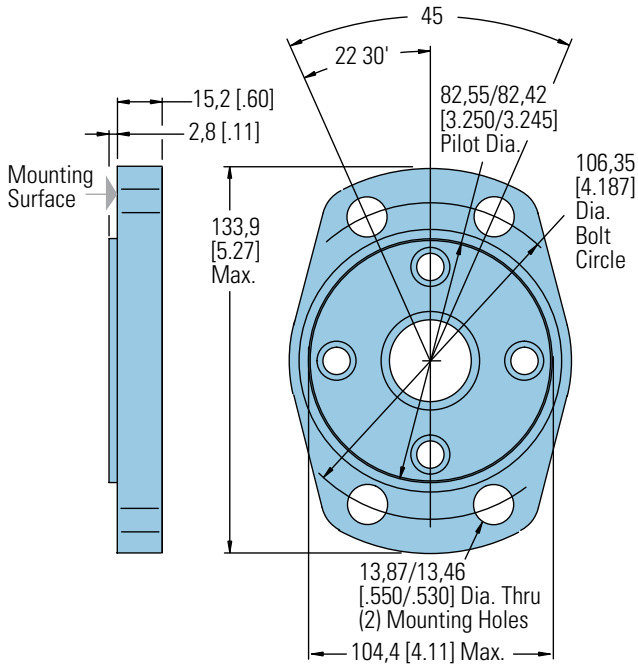
H, S and T Series (101-, 103- 158-, 185-)

Mounting Options

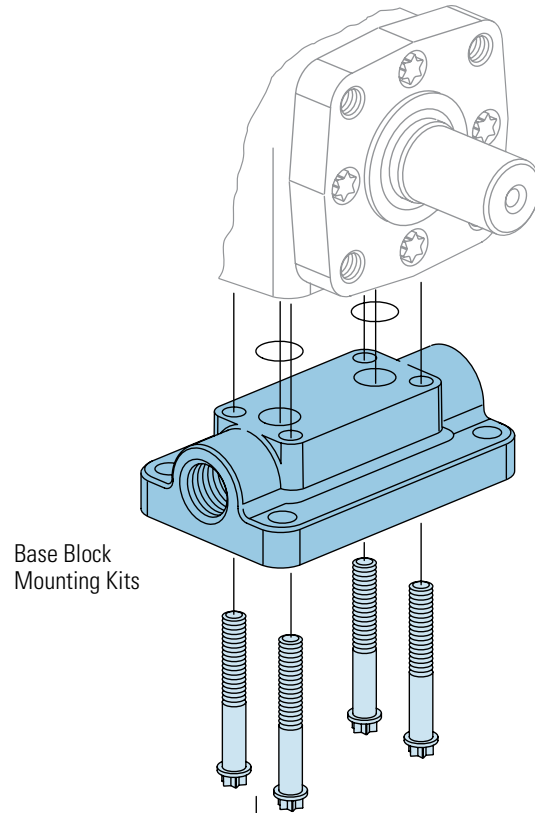
Note:

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

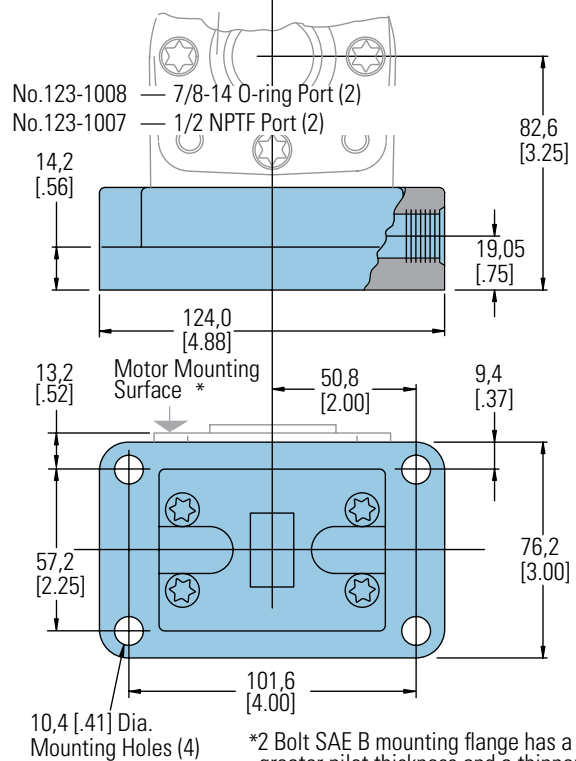
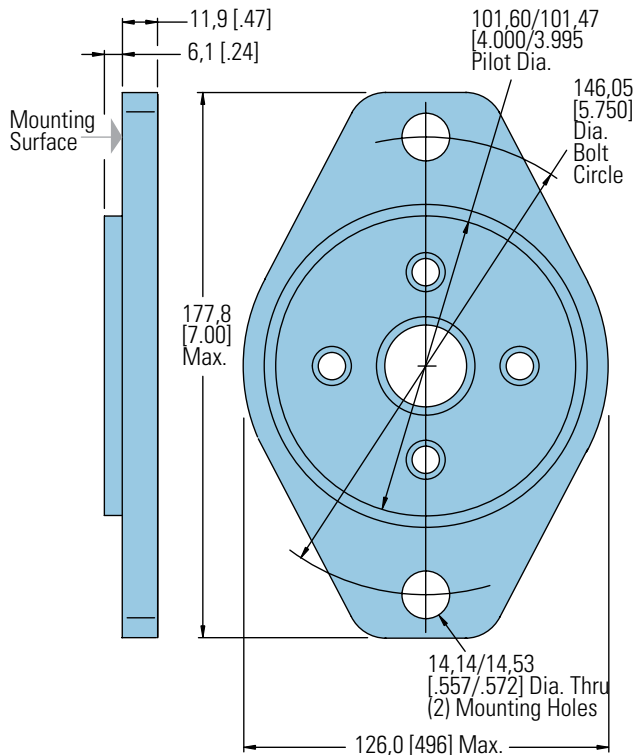
4 Bolt Magneto



Base Block Mounting Kits



2 Bolt SAE B



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

Dimensions

Ports

Ports

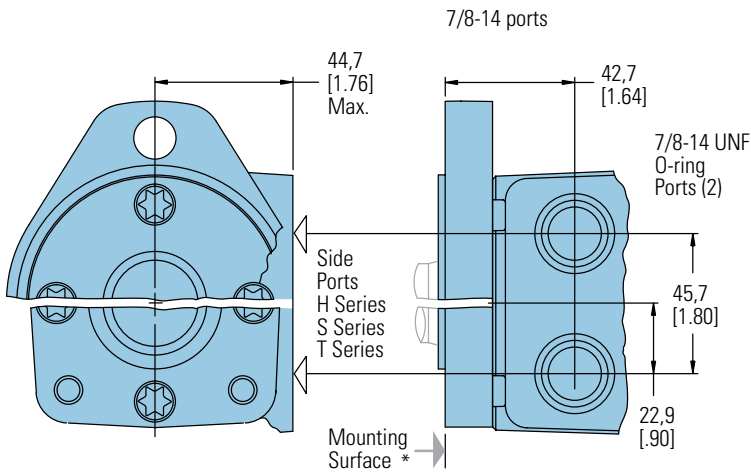
End Ports — H Series only
G 1/2 (BSP) (2)
or 3/4-16 O-Ring (2)

Standard Rotation Viewed from Drive End

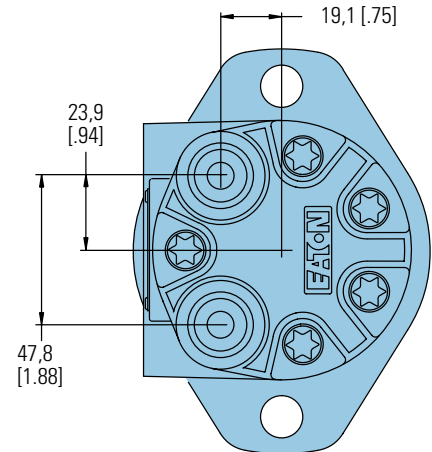
Port A Pressurized — CW
Port B Pressurized — CCW

Note:

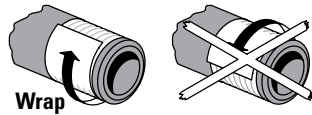
End ported motor pressure is derated. Reference page B-2-2 for ratings.



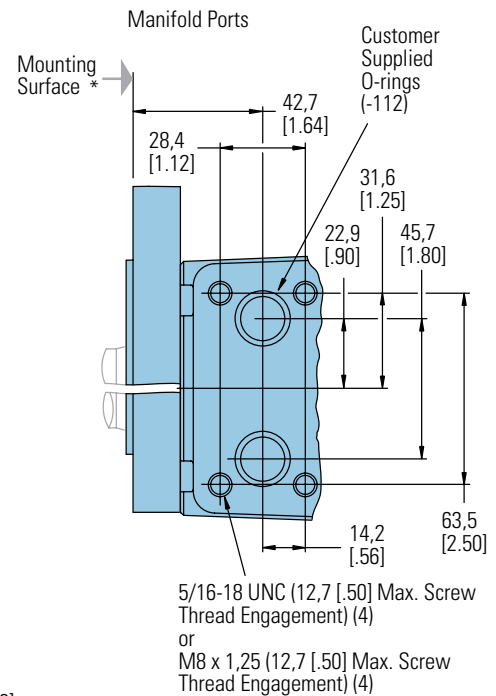
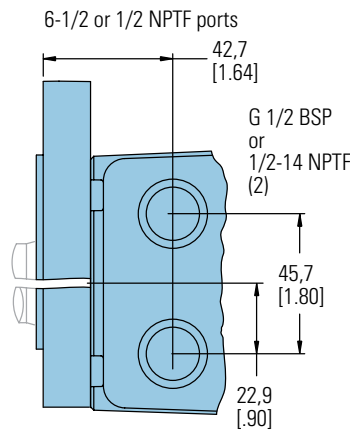
End Ports (H Series only)



Use of Teflon Tape Sealant/Lubricant (with 1/2 14 NPTF Port Connectors only).

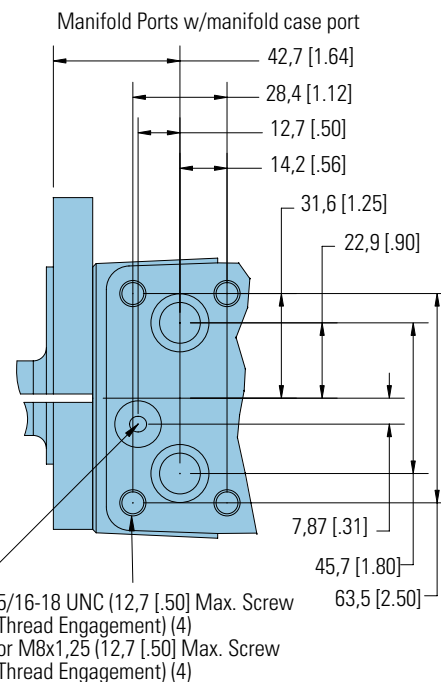


When using fittings with Teflon tape, be careful when taping and tightening. Over tightening or improperly taped fittings can cause damage to housing or leakage.



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.



Note:

End ported motor option is derated to 1400 continuous, 1700 psi intermittent.

*2 Bolt SAE B mounting flange has a greater pilot thickness and a thinner mounting plate.

B-2

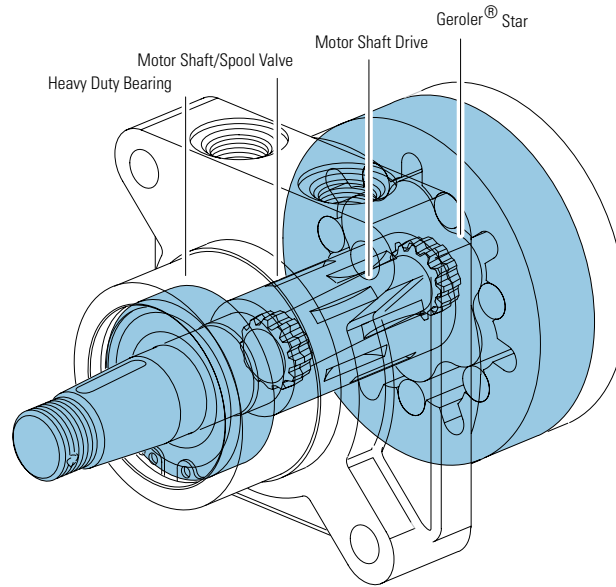
B-3

B-4

Notes

W Series (162-)

Highlights



Features:

- Heavy duty bearing
- Wheel drive interface
- Three-pressure zone design (ability to reduce case pressure)
- Variety of displacements, shafts, mounts and special options
- Special options to meet customer needs

Benefits:

- High side-load capacity
- High shock load capability
- Wheel mount interface
- Compact powerful package
- High efficiency
- Smooth low-speed operation
- Extended leak-free performance

Applications:

- Scissors lifts
- Boom lifts
- Mid-size ZTR mowers
- Turf equipment
- Greens mowers
- Sand trap rakes
- Railroad maintenance equipment
- Industrial sweepers and floor polishers
- Skid steer attachments
- Many more

Description

Char-Lynn W Series motors with the Geroler displacement element offer the same low friction and long-life advantages as the S and T Series.

The W Series features the simplicity of Eaton’s proven spool valve and a Geroler element that provides superior drive life and smooth performance. In addition, this motor has a rugged housing with an extra large capacity side load bearing.

W Series Motors

Geroler Element	7 Displacements
Flow l/min [GPM]	68 [18] Continuous*** 76 [20] Intermittent**
Speed	288 RPM
Pressure bar [PSI]	165 [2400] Cont.*** 179 [2600] Inter.**
Torque Nm [lb-in]	410 [3624] Cont.*** 562 [4970] Inter.**

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

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



Scissor Lift



Sweeper



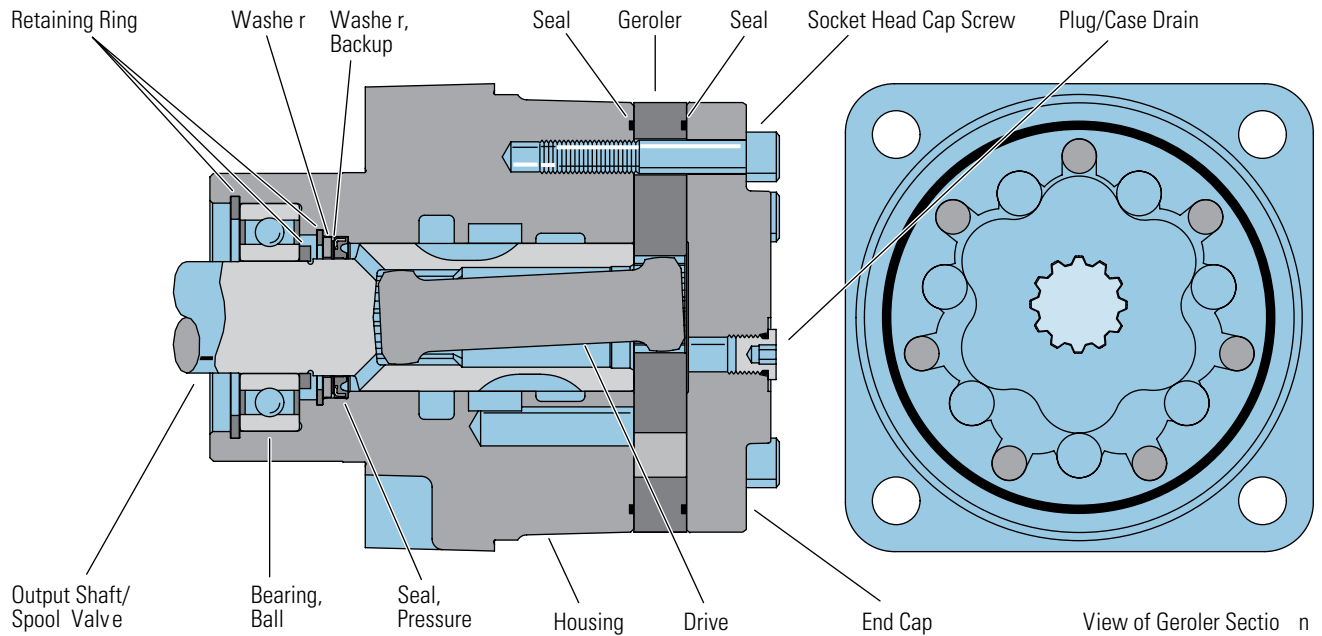
Trencher



Boom Lift

W Series (162-)

Specifications



SPECIFICATION DATA – W SERIES MOTORS

Displ. cm ³ /r [in ³ /r]		80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Max. Speed (RPM)		267	288	214	200	200	200	200
Flow l/min [GPM]	Continuous	23 [6]	30 [8]	34 [9]	38 [10]	53 [14]	62 [16.5]	68 [18]
	Intermittent	23 [6]	30 [8]	34 [9]	38 [10]	53 [14]	62 [16.5]	76 [20]
Theo. Torque Nm [lb-in]	Continuous	176 [1555]	279 [2470]	318 [2813]	318 [2816]	375 [3319]	387 [3429]	410 [3624]
	Intermittent	189 [1676]	298 [2640]	373 [3301]	439 [3882]	548 [4849]	539 [4769]	562 [4970]
Pressure Δbar [ΔPSI]	Continuous	165 [2400]	165 [2400]	152 [2200]	124 [1800]	110 [1600]	97 [1400]	83 [1200]
	Intermittent	179 [2600]	179 [2600]	179 [2600]	179 [2600]	165 [2400]	138 [2000]	124 [1800]

Note:

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

Maximum Inlet Pressure:

179 bar [2600 PSI]
Do Not Exceed Δ Pressure Rating (for displacement size see chart above).

Return Pressure (Back-Pressure):

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

Note:

Optional version can be used without case drain.

Case Pressure:

Minimum – No Pressure
Maximum – 103 bar [1500 PSI] without case drain.

Note:

The case must be flooded when the motor is operating.

Δ Pressure:

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

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:



per ISO Cleanliness Code, level 20/18/13

W Series (162-)

Performance Data

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

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

 Continuous
 Intermittent

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

		Continuous											
		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow /min [GPM]	[2]	[204]	[337]	[474]	[612]	[748]	[883]	[1019]	[1149]	[1281]	[1412]	[1540]	[1610]
	7.6	23 93	38 89	54 88	69 84	85 83	100 79	115 73	130 69	145 61	160 61	174 56	182 39
	[4]	[223]	[357]	[489]	[627]	[769]	[902]	[1035]	[1169]	[1295]	[1424]	[1555]	[1676]
	15.1	25 178	40 172	55 170	71 168	87 165	102 159	117 157	132 154	146 146	161 142	176 131	189 117
[6]	[255]	[342]	[477]	[612]	[749]	[879]	[1014]	[1154]	[1286]	[1408]	[1533]	[1648]	
22.7	29 267	39 265	54 262	69 258	85 257	99 252	115 248	130 241	145 235	159 229	173 219	186 206	

126 cm³/r [7.7 in³/r] Δ Pressure bar [PSI]

		Continuous											
		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow /min [GPM]	[2]	[390]	[605]	[817]	[1032]	[1248]	[1448]	[1656]	[1871]	[2069]	[2243]	[2414]	[2513]
	7.6	44 58	68 56	92 55	117 51	141 49	164 45	187 43	211 41	234 33	253 32	273 26	284 17
	[4]	[382]	[605]	[817]	[1036]	[1252]	[1463]	[1694]	[1908]	[2113]	[2306]	[2470]	[2640]
	15.1	43 113	68 106	92 106	117 104	141 93	165 97	191 94	216 88	239 82	261 79	279 74	298 60
[6]	[367]	[587]	[802]	[1017]	[1236]	[1444]	[1668]	[1882]	[2091]	[2284]	[2459]	[2637]	
22.7	41 172	66 167	91 164	115 161	140 156	163 152	188 147	213 141	236 134	258 130	278 128	298 103	
[8]	[346]	[561]	[769]	[981]	[1203]	[1419]	[1634]	[1849]	[2039]	[2217]	[2432]	[2633]	
30.3	39 228	63 225	87 220	111 216	136 213	160 208	185 201	209 195	230 188	250 174	275 163	297 149	

154 cm³/r [9.4 in³/r] Δ Pressure bar [PSI]

		Continuous											
		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow /min [GPM]	[2]	[450]	[723]	[989]	[1249]	[1512]	[1769]	[2021]	[2269]	[2502]	[2714]	[2904]	[3019]
	7.6	51 47	82 47	112 46	141 44	171 40	200 39	228 36	256 33	283 30	307 26	329 18	341 10
	[4]	[470]	[737]	[1009]	[1276]	[1540]	[1802]	[2064]	[2323]	[2570]	[2813]	[3019]	[3242]
	15.1	53 94	83 93	114 90	144 89	174 87	204 84	233 81	262 78	290 73	318 67	341 65	366 52
[6]	[435]	[715]	[984]	[1252]	[1513]	[1787]	[2020]	[2274]	[2521]	[2812]	[3042]	[3301]	
22.7	49 143	81 140	111 138	141 137	171 134	202 131	228 128	257 124	285 117	318 112	344 103	373 91	
[8]	[407]	[677]	[945]	[1214]	[1477]	[1740]	[2005]	[2260]	[2503]	[2735]	[2964]	[3206]	
30.3	46 190	76 188	107 186	137 184	167 182	197 179	227 176	255 171	283 166	309 158	335 148	362 137	
[9]	[380]	[648]	[914]	[1183]	[1452]	[1714]	[1981]	[2243]	[2499]	[2733]	[2964]	[3195]	
34	43 214	73 212	103 210	134 207	164 206	194 202	224 200	253 196	282 191	309 182	335 173	361 162	

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

		Continuous											
		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow /min [GPM]	[2]	[478]	[827]	[1171]	[1511]	[1839]	[2153]	[2452]	[2756]	[3027]	[3275]	[3513]	[3673]
	7.6	54 38	93 38	132 37	171 36	208 35	243 34	277 34	311 30	342 29	370 26	397 22	415 16
	[4]	[515]	[872]	[1220]	[1558]	[1886]	[2206]	[2518]	[2816]	[3107]	[3382]	[3647]	[3882]
	15.1	58 75	99 73	138 73	176 71	213 70	249 69	284 66	318 64	351 62	382 52	412 52	439 44
[6]	[524]	[878]	[1214]	[1551]	[1875]	[2199]	[2518]	[2824]	[3113]	[3389]	[3666]		
22.7	59 114	99 111	137 111	175 110	212 108	248 106	284 105	319 103	352 99	383 95	414 91		
[8]	[518]	[856]	[1187]	[1524]	[1861]	[2187]	[2499]	[2782]	[3064]	[3334]			
30.3	59 151	97 150	134 150	172 149	210 147	247 145	282 144	314 143	346 141	377 136			
[10]	[462]	[797]	[1133]	[1468]	[1799]	[2118]	[2442]	[2739]	[3023]	[3281]			
38	52 190	90 188	128 187	166 186	203 184	239 184	276 182	309 179	342 176	371 160			

[3673] } Torque [lb-in]
 415 } Nm
 16 } Speed RPM

W Series (162-)

Performance Data

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

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

251 cm³/r [15.3 in³/r] Δ Pressure bar [PSI]

		Continuous										
		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]
		28	41	55	69	83	97	110	124	140	152	165
Flow /min [GPM]	[2]	[759]	[1194]	[1683]	[2122]	[2535]	[2928]	[3319]	[3634]	[3946]	[4242]	[4553]
	7.6	86 30	135 29	190 29	240 28	286 27	331 27	375 25	411 22	446 17	479 15	514 14
	[4]	[806]	[1257]	[1691]	[2130]	[2563]	[2988]	[3381]	[3799]	[4147]	[4515]	[4849]
	15.1	91 59	142 58	191 58	241 56	290 55	338 55	382 52	429 48	469 47	510 41	548 40
	[6]	[780]	[1219]	[1646]	[2084]	[2515]	[2933]	[3336]	[3716]			
	22.7	88 90	138 88	186 87	235 86	284 85	331 83	377 83	420 79			
	[8]	[720]	[1148]	[1590]	[2029]	[2449]	[2861]	[3236]	[3627]			
	30.3	81 120	130 118	180 117	229 117	277 114	323 112	366 111	410 108			
	[10]	[645]	[1080]	[1513]	[1947]	[2371]	[2779]	[3151]	[3515]			
	37.9	73 148	122 147	171 147	220 145	268 145	314 143	358 141	397 137			
	[12]	[557]	[992]	[1428]	[1864]	[2292]	[2697]	[3087]				
	45.4	63 178	112 177	161 176	211 174	259 174	305 172	349 169				
	[14]	[460]	[888]	[1330]	[1761]	[2191]	[2615]	[3035]				
	53.0	52 208	100 206	150 206	199 203	248 202	295 200	343 197				



303 cm³/r [18.5 in³/r] Δ Pressure bar [PSI]

		Continuous								
		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]
		28	41	55	69	83	97	110	124	140
Flow /min [GPM]	[2]	[920]	[1454]	[1974]	[2480]	[2969]	[3429]	[3859]	[4230]	[4583]
	7.6	104 24	164 24	223 24	280 23	335 22	387 22	436 20	478 18	518 16
	[4]	[960]	[1487]	[2007]	[2513]	[3006]	[3457]	[3905]	[4338]	[4769]
	15.1	108 49	168 49	227 47	284 47	340 46	391 45	441 44	490 41	539 39
	[6]	[911]	[1445]	[1961]	[2473]	[2952]	[3411]	[3842]	[4276]	
	22.7	103 73	163 73	222 72	279 72	334 71	385 69	434 68	483 66	
	[8]	[843]	[1375]	[1888]	[2393]	[2886]	[3350]	[3763]		
	30.3	95 99	155 98	213 97	270 96	326 95	379 94	425 93		
	[10]	[752]	[1274]	[1789]	[2303]	[2792]	[3274]	[3650]		
	37.9	85 123	144 122	202 122	260 120	316 119	370 119	412 118		
	[12]	[652]	[1170]	[1691]	[2199]	[2691]	[3123]			
	45	74 148	132 147	191 146	248 145	304 145	353 144			
	[14]	[526]	[1039]	[1560]	[2064]	[2548]	[2999]			
	53	59 172	117 172	176 171	233 170	288 169	339 168			
[16.5]	[353]	[864]	[1367]	[1876]	[2369]					
62	40 203	98 203	154 201	212 200	268 200					

[4583]
518 } Torque [lb-in]
16 } N·m
16 } Speed RPM

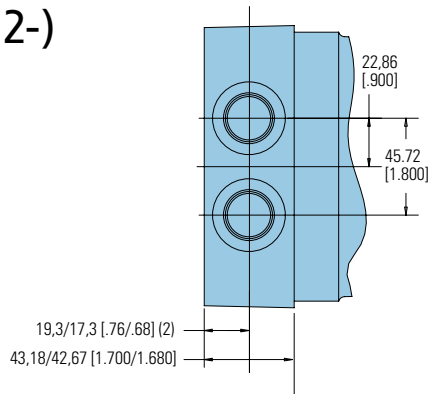
374 cm³/r [22.8 in³/r] Δ Pressure bar [PSI]

		Continuous							
		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]
		28	41	55	69	83	97	110	124
Flow /min [GPM]	[2]	[1086]	[1753]	[2365]	[2960]	[3533]	[4025]	[4484]	[4970]
	7.6	123 20	198 19	267 17	334 16	399 14	455 12	507 12	562 11
	[4]	[1152]	[1797]	[2431]	[3048]	[3624]	[4129]	[4599]	
	15.1	130 39	203 39	275 38	344 36	409 34	467 33	520 31	
	[6]	[1099]	[1749]	[2377]	[2996]	[3557]	[4077]		
	22.7	124 60	198 58	269 57	339 56	402 54	461 53		
	[8]	[1018]	[1662]	[2290]	[2894]	[3440]	[3952]		
	30.3	115 80	188 79	259 78	327 76	389 75	447 74		
	[10]	[940]	[1582]	[2210]	[2812]	[3346]	[3816]		
	37.9	106 100	179 99	250 97	318 96	378 95	431 95		
	[12]	[809]	[1454]	[2077]	[2677]	[3216]			
	45.4	91 120	164 119	235 117	302 116	363 115			
	[14]	[648]	[1284]	[1907]	[2506]	[3033]			
	53.0	73 141	145 139	215 138	283 137	343 137			
	[16]	[485]	[1107]	[1722]	[2315]	[2838]			
	60.6	55 160	125 159	195 157	262 157	321 157			
	[18]	[307]	[930]	[1543]	[2133]				
	68.1	35 180	105 179	174 178	241 178				
[20]	[111]	[730]	[1342]	[1939]					
75.7	13 201	82 199	152 198	219 197					

 Continuous
 Intermittent

W Series (162-)

Dimensions



Ports

7/8-14 SAE O-Ring Ports

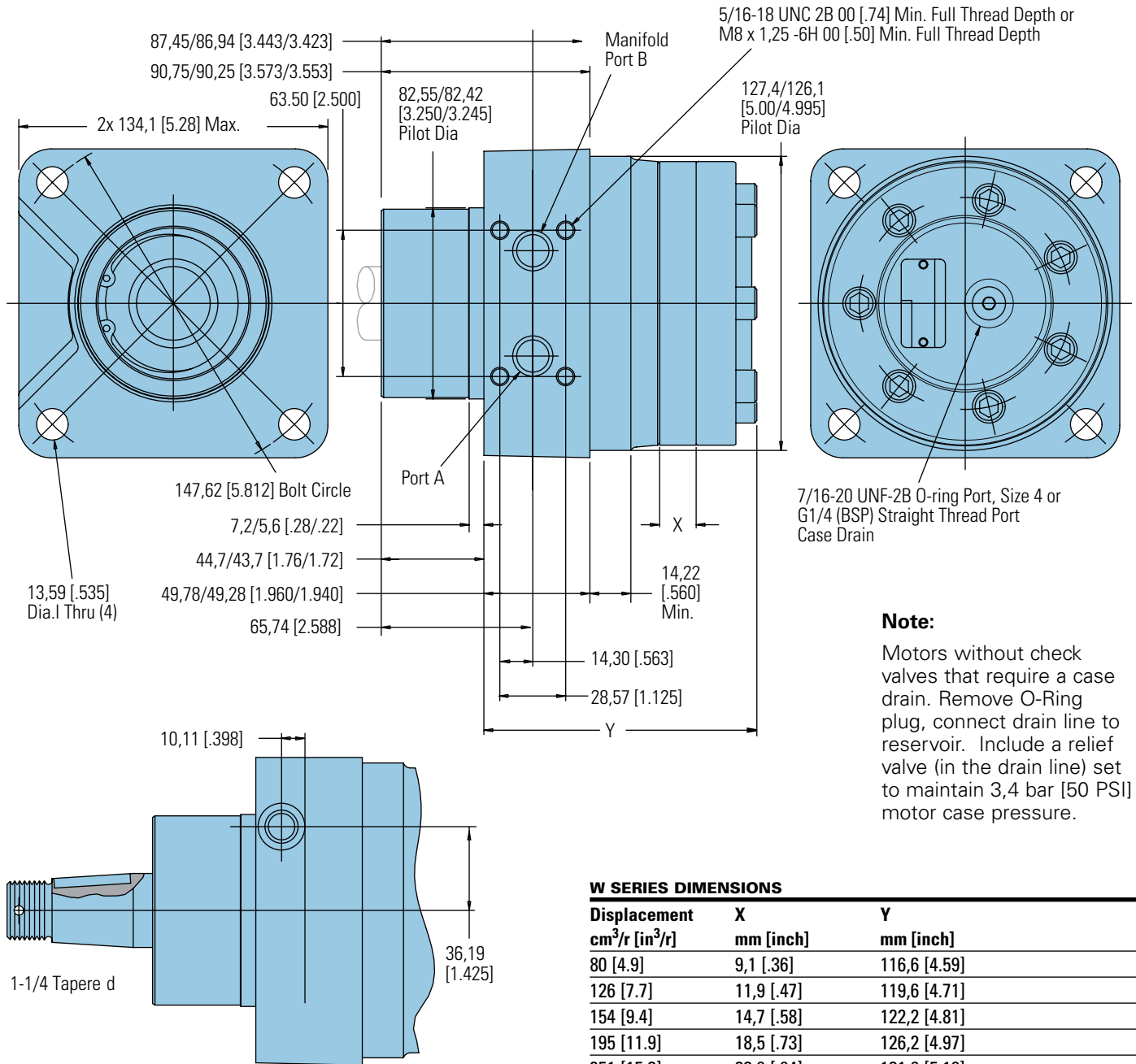
G1/2 BSP Straight Thread Port

Manifold (15/16-18 Mounting Threads)

Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW



B-5

Note:
Motors without check valves that require a case drain. Remove O-Ring plug, connect drain line to reservoir. Include a relief valve (in the drain line) set to maintain 3,4 bar [50 PSI] motor case pressure.

W SERIES DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
80 [4.9]	9,1 [.36]	116,6 [4.59]
126 [7.7]	11,9 [.47]	119,6 [4.71]
154 [9.4]	14,7 [.58]	122,2 [4.81]
195 [11.9]	18,5 [.73]	126,2 [4.97]
251 [15.3]	23,9 [.94]	131,6 [5.18]
303 [18.5]	29,0 [1.14]	136,4 [5.37]
374 [22.8]	35,6 [1.40]	143,3 [5.64]

W Series (162-)

Dimensions Shafts

Recommended Torque:

(373 Nm [275 lb-ft] Dry)

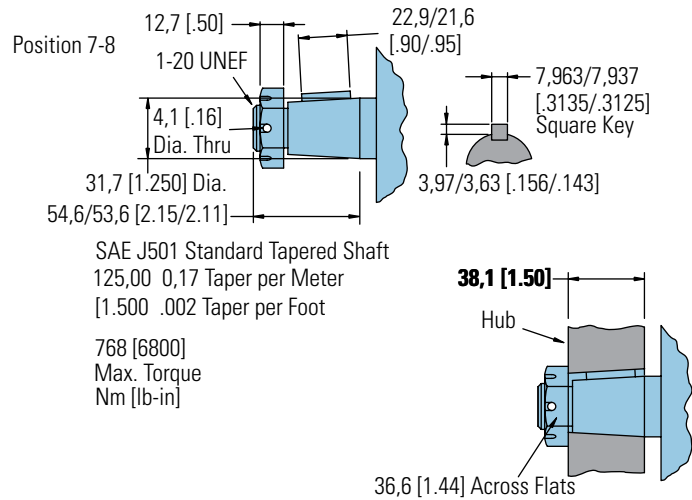
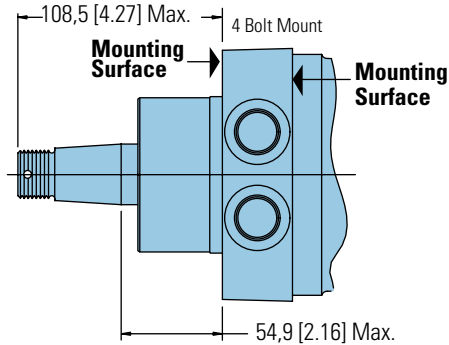
(305 Nm [225 lb-ft] Lub) Plus

Torque required to align the

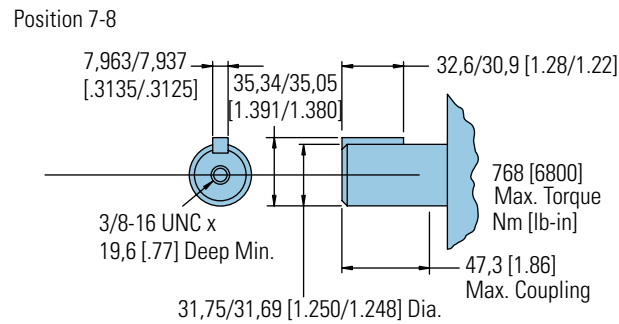
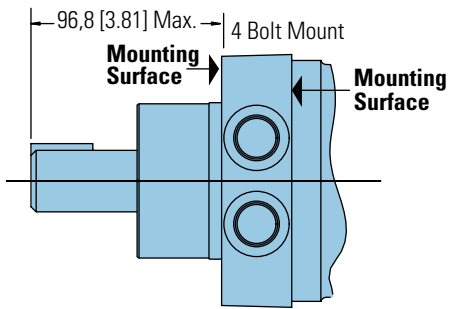
slotted nut with the Shaft

Crosshole.

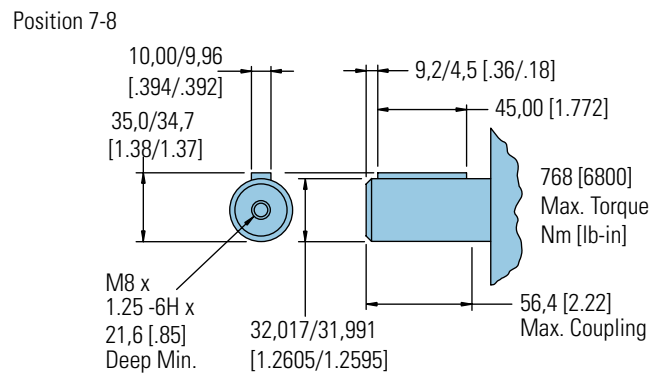
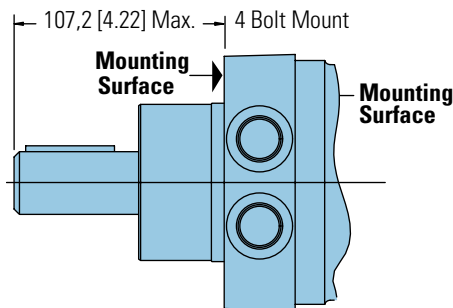
1 1/4 Tapered



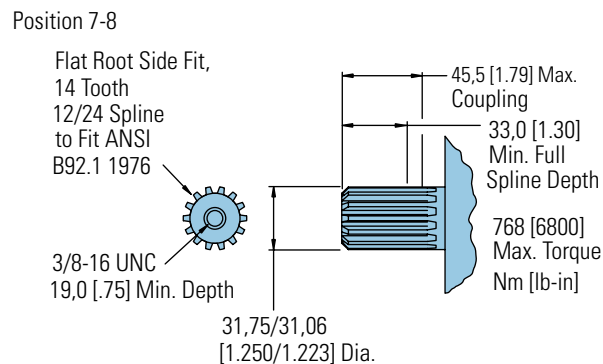
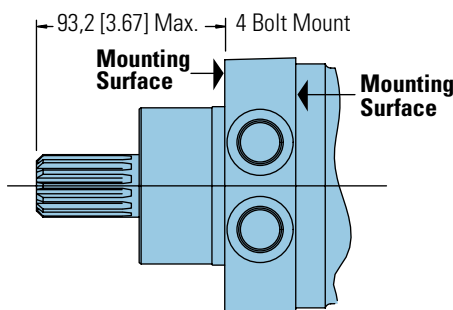
1 1/4 Inch Straight



32 mm Straight



1 1/4 14 Tooth Splined



W Series (162-)

Shaft Side Load Capacity

- 1) Case pressure needs to be added to the outward axial thrust load and subtracted from inward axial thrustload – Case Pressure bar x 87, 1 [PSI x 1.35]
- 2) Life values in Chart A can be adjusted for speeds up to 200 rpm.

$$\frac{\text{Life value} \times 100 \text{ rpm}}{\text{application rpm}}$$
- 3) Shaded areas are intermittent loading.
- 4) To convert application radial load at any load location to sideload at the center of keyway multiply load by the application factor from Chart B.

Example:

Side Load: 4849 N @ 120 mm [1090 lbf @ 4.75 inch] from flange.

Average Thrust Load: 890 N [200 lbf] inward (toward motor).

Case Pressure: 66 bar [960 PSI].

Average Speed: 150 rpm.

Expected Life Calculation: Adjust side load value (due to load variation): from Chart B look at 120mm [4.75 inch] read at angled curve for load adjustment factor of 1.38.
 Adjusted load is: $(4849 \text{ N [1090 lbf]} \times 1.38) = 6690 \text{ N [1504 lbf]}$

Thrust Load Value (due to case pressure):
 $(960 \text{ PSI}) \times (1.35) = [1296 \text{ lbf}]$
 $(66 \text{ bar}) \times (87,1) = 5750 \text{ N}$

Average thrust load found to be 890 N [200 lbf] inwards so subtract from thrust load due from case pressure:

$5750 \text{ N} - 890 \text{ N} = 4860 \text{ N}$ or
 $[1296 \text{ lbf}] - 200 \text{ lbf} = [1096 \text{ lbf}]$

Read Life Expectancy from Chart A: Value from chart reading across top to 6672 [1500] (6090 N [1504 lbf]) and down left side to 4895 [1100] (4875 N [1096 lbf])

Life = 1800 Hours

Speed Adjustment for over 100 rpm:

$\frac{(1800 \text{ hrs}) \times (100 \text{ rpm})}{150 \text{ rpm}} = 1200 \text{ Hours}$

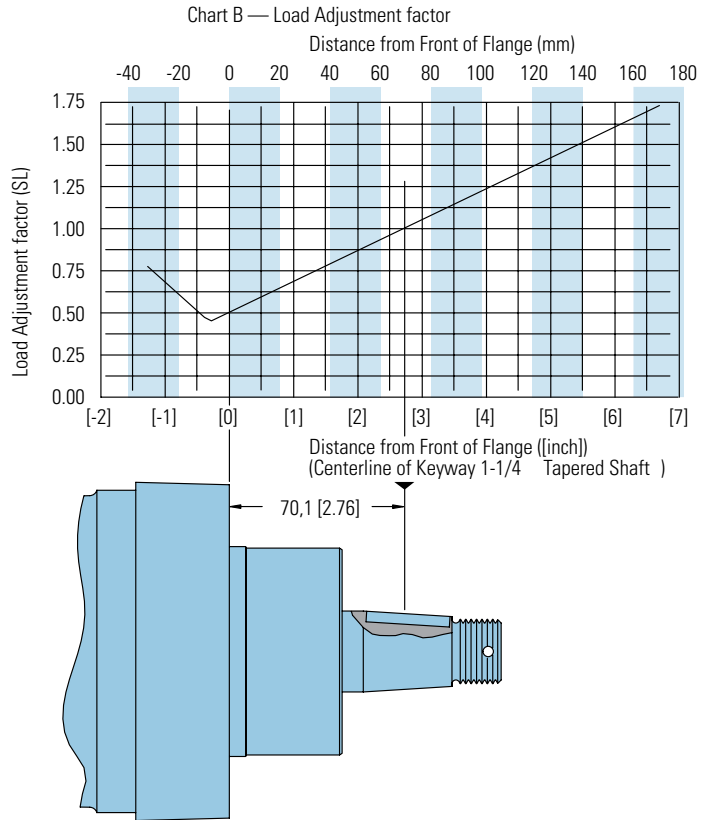


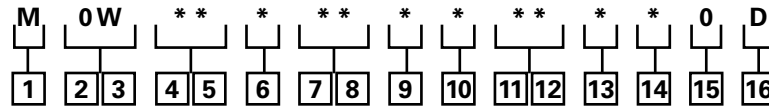
CHART A – EXPECTED B10 LIFE (HOURS) OF BEARING UNDER VARIOUS LOADS

Axial Thrust		Radial Load at Centerline of keyway at 100 RPM									
N	lbf]	1110 [250]	2225 [500]	3335 [750]	4450 [1000]	4560 [1250]	6670 [1500]	7785 [1750]	8895 [2000]	11120 N [2500lbf]	13345 N [3000lbf]
445	[100]	410 600	66 000	19 600	8 300	4 200	2 400	1 500	1 000	530	310
1335	[300]	92 700	40 900	19 600	8 300	4 200	2 400	1 500	1 000	530	310
2225	[500]	39 400	20 900	12 400	7 900	4 200	2 400	1 500	1 000	530	310
3115	[700]	21 400	12 600	8 100	5 500	3 900	2 400	1 500	1 000	530	
4005	[900]	13 300	8 400	5 700	4 000	2 900	2 200	1 500	1 000	530	
4895	[1100]	9 000	6 000	4 200	3 100	2 300	1 800	1 400	1 000		
5785	[1300]	6 500	4 500	3 200	2 400	1 900	1 500	1 200	900		
6670	[1500]	4 800	3 500	2 600	2 000	1 500	1 200	1 000			
7560	[1700]	3 700	2 800	2 100	1 600	1 300					
8450	[1900]	3 000	2 200								
8895	[2000]	Max. Thrust									

W Series (162-)

Model Code

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



1 Product

M – Motor

2, 3 Series

0W – W Series

4, 5 Displacement cm³/r [in³/r]

05 – 30 [4.9]

08 – 126 [7.7]

09 – 154 [9.4]

12 – 195 [11.9]

15 – 251 [15.3]

19 – 303 [18.5]

23 – 374 [22.8]

6 Mounting Type

B – 4 Bolt (Wheel) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 147,6 [5.81] Dia., B.C., 127,0 127,0 [5.00] rear pilot

7, 8 Output Shaft

02 – 1 1/4 inch Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline with 3/8-16 UNC-2B Thread in End, 33,0 [1.30] Min. Full Spline

03 – 1 1/4 inch Dia. .125:1 Tapered Shaft Per SAE J501 with 1– 20 UNEF -2A Threaded Shaft End and Slotted Hex Nut, 7,938 [.3125] Square x 22,22 [.875] Straight Key

04 – 32mm Dia. Straight Shaft with M8 x 1, 25-6H Thread in End, 9,982 [.3930] Wide x 7,995 [.3132] High x 45,00 [1.772] Long Key

06 – 1 1/4 inch Dia. Straight Shaft with 3/8 – 16 UNC 2B Thread in End, 7,938 [.3125] Square x 34,92 [1.375] Straight Key

9 Ports

A – 7/8 -14 UNF - 2B SAE O-Ring Port

B – G 1/2 (BSP) Straight Thread Port

10 Case Flow Options

A – 7/16 - 20 UNF - 2B SAE O-Ring Port

B – G 1/4 (BSP) Straight Thread Port

C – Internal Check Valve

11, 12 Special Features (Hardware)

00 – None

01 – Viton Seals

13 Special Features (Assembly)

0 – None

1 – Reverse Rotation

14 Paint/Special Packaging

0 – No Paint, Individual Box

A – Low Gloss Black Primer, Bulk Box Option

15 Eaton Assigned Code when Applicable

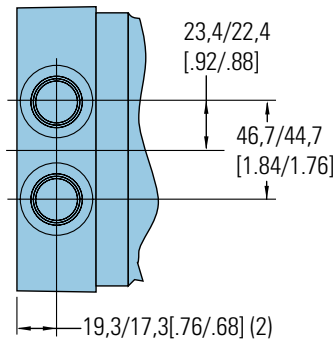
0 – Assigned Code

16 Eaton Assigned Design Code

D – Assigned Design Code

W Series (162-) with Parking Brake

Dimensions



Ports

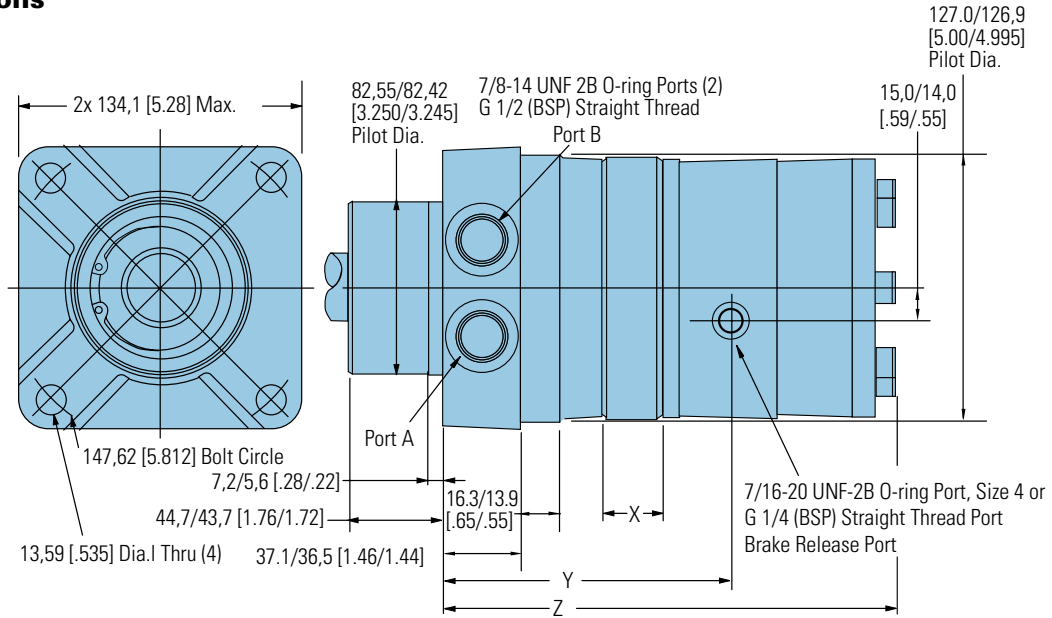
7/8 -14 UNF 2B SAE O-Ring Ports (2) or G 1/2 (BSP) Straight Thread

Standard Rotation Viewed from Shaft End

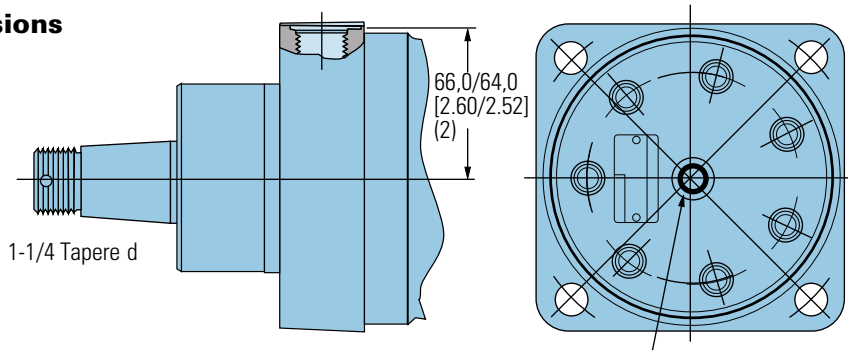
Port A Pressurized — CW

Port B Pressurized — CCW

Port Dimensions



Mounting Dimensions



7/16-20 UNF-2B O-ring Port, Size 4 or G 1/4 (BSP) Straight Thread Port— Manual Brake Release Access Port. Tighten plug to manually release brake.

PORTING AND MOUNTING DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
80 [4.9]	9,1 [0.36]	119,9 [4.72]	198,4 [7.81]
126 [7.7]	11,9 [0.47]	122,9 [4.84]	201,2 [7.92]
154 [9.4]	14,7 [0.58]	125,5 [4.94]	204,0 [8.03]
195 [11.9]	18,5 [0.73]	129,6 [5.10]	207,8 [8.18]
251 [15.3]	23,9 [0.94]	134,9 [5.31]	213,4 [8.40]
303 [18.5]	29,0 [1.14]	139,7 [5.50]	217,7 [8.59]
374 [22.8]	35,6 [1.40]	146,6 [5.77]	226,8 [8.85]

SPECIFICATIONS

Brake Release Pressure 205 bar [3000 PSI] Max.; 15 bar [250 PSI] Min.

W Series, W Series (162-) with Parking Brake

Product Numbers

Use digit prefix —
162 plus four digit number
from charts for complete
product number —
Example 162-1153.

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

Standard

SHAFT	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER						
	80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Standard	162-1016	-1017	-1018	-1019	-1020	-1021	-1022
w/Case Drain	162-1023	-1024	-1025	-1009	-1008	-1026	-1027

162-1009

W Series with Parking Brake

SHAFT	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER						
	80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Standard	162-1143	-1144	-1145	-1146	-1183	-1148	-1149

162-1146

Note:

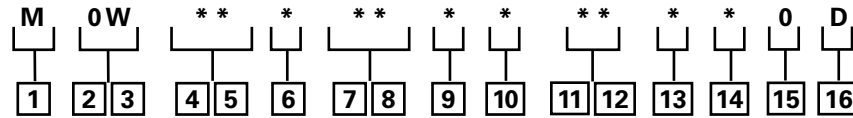
All above motors have
1-1/4 inch tapered output
shaft, 7/8 inch O-Ring Ports,
internal check valves.

For W Series Motors with
a configuration not shown
in the chart above: Use the
model code number system
to specify the product in
detail. (see page B-5-8
and use the model code
supplement shown on page
B-5-11 for spring-applied
hydraulic-release parking
brake).

W Series with Parking Brake (162-)

Model Code

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



1 Product

M – Motor

2, 3 Series

0W – W Series with Parking Brake

4, 5 Displacement cm³/r [in³/r]

05 – 30 [4.9]

08 – 126 [7.7]

09 – 154 [9.4]

12 – 195 [11.9]

15 – 251 [15.3]

19 – 303 [18.5]

23 – 374 [22.8]

6 Mounting Type

B – 4 Bolt (Wheel) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 147,6 [5.81] Dia., B.C., 127,0 127,0 [5.00] rear pilot

7, 8 Output Shaft

02 – 1 1/4 inch Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline with 3/8-16 UNC-2B Thread in End, 33,0 [1.30] Min. Full Spline

03 – 1 1/4 inch Dia. .125:1 Tapered Shaft Per SAE J501 with 1– 20 UNEF -2A Threaded Shaft End and Slotted Hex Nut, 7,938 [.3125] Square x 22,22 [.875] Straight Key

04 – 32mm Dia. Straight Shaft with M8 x 1, 25-6H Thread in End, 9,982 [.3930] Wide x 7,995 [.3132] High x 45,00 [1.772] Long Key

06 – 1 1/4 inch Dia. Straight Shaft with 3/8 – 16 UNC 2B Thread in End, 7,938 [.3125] Square x 34,92 [1.375] Straight Key

9 Ports

A – 7/8 -14 UNF - 2B SAE O-Ring Port

B – G 1/2 (BSP) Straight Thread Port

10 Case Flow Options

A – 7/16 - 20 UNF - 2B SAE O-Ring Port

B – G 1/4 (BSP) Straight Thread Port

C – Internal Check Valve

11, 12 Special Features (Hardware)

00 – None

01 – Viton Seals

11 – Spring-applied hydraulic-release brake

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

15 Eaton Assigned Code when Applicable

0 – Assigned Code

16 Eaton Assigned Design Code

D – Assigned Design Code

B-5



State of the art motors benefiting from 55 years of experience and innovating constantly to fit your demands.

C-1

C-2

C-3

C-4

C-5

C-6

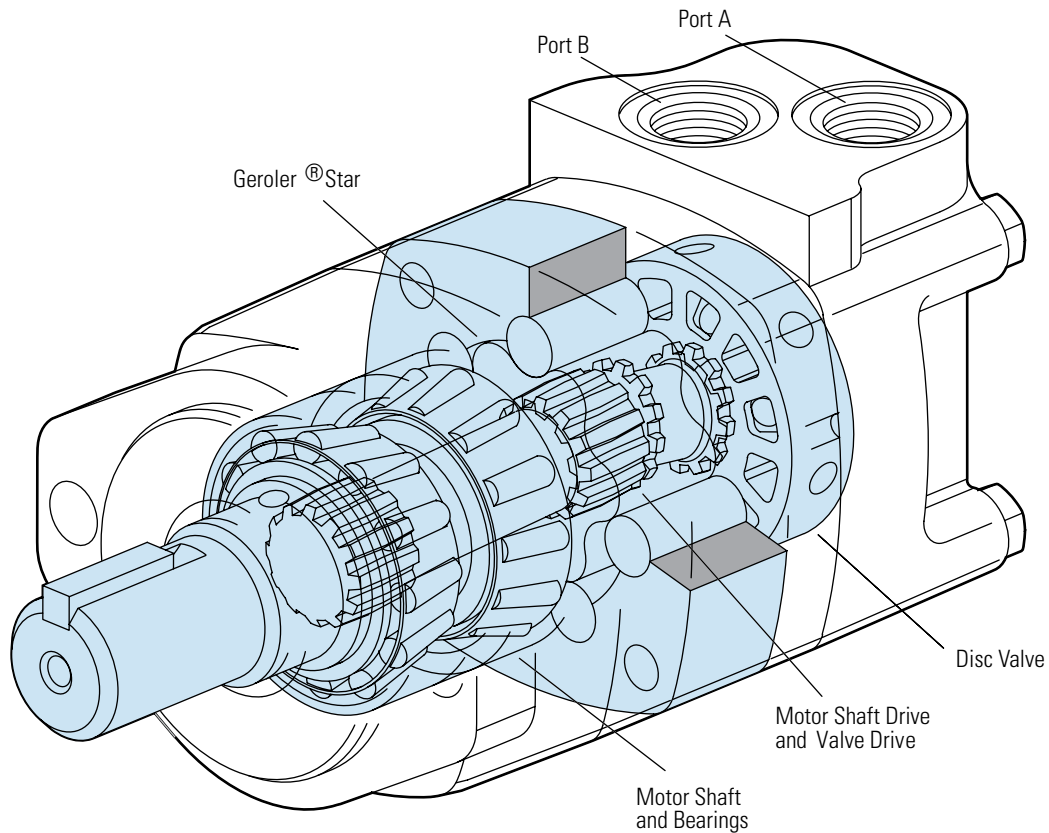
Disc Valve Hydraulic Motors

Highlights

Product Description

In the late 1950's the original low speed, high torque hydraulic motor was developed from a pump Geroter element consisting of an internal gear ring and a mating gear or star. While attaching the internal gear ring to the housing as a non moving part, oil was ported to pressurize and turn the internal star in an orbit around a center point. This slow turning star coupled with a splined drive to the output shaft became the Char-Lynn Orbit® motor.

A few years after this original Char-Lynn Orbit motor was introduced another original motor concept went into production. This motor had rolls incorporated into the internal gear ring, this element was identified by the name Geroler and is a registered trade name of Eaton Hydraulics. From these early years the Geroler motor has seen many design changes to make these Geroler motors the best the industry has to offer. Examine the simplicity of these Geroler disc valve motors shown below. Also examine all the following pages for high value Char-Lynn disc valve motors from Eaton Hydraulics.



Features, Benefits, and Applications

Features

Char-Lynn Hydraulic motors provide design flexibility. All disc valve motors are available with various configurations consisting of:

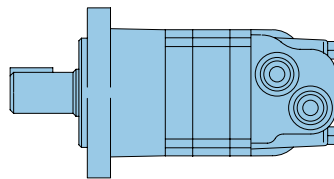
- Displacement (Geroler size)
- Output Shaft
- No Shaft and Bearing Assembly (Bearingless Motor)
- Port Configuration
- Mounting Flange
- Other Special Features

Benefits

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

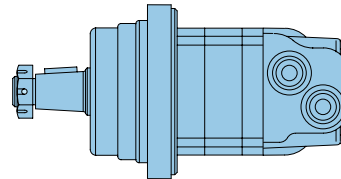
Applications

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



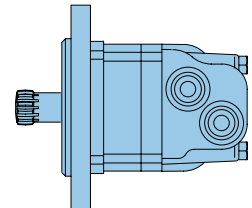
Standard Motor

The standard motor mounting flange is located as close to the output shaft as possible. This type of mounting supports the motor close to the shaft load. This mounting flange is also compatible with many standard gear boxes.



Wheel Motor

The wheel motor mounting flange is located near the center of the motor which permits part or all of the motor to be located inside the wheel or roller hub. In traction drive applications, loads can be positioned over the motor bearings for best bearing life. This wheel motor mounting flange provides design flexibility in many applications.



Bearingless Motor

The bearingless motor has the same drive components as the standard and wheel motors (with the exception that the motor is assembled without the output shaft, bearings and bearing housing). The bearingless motor is especially suited for applications such as gear boxes, winch drives, reel and roll drives. Bearingless motor applications must be designed with a bearing supported internal spline to mate with the bearingless motor drive. Product designs using these hydraulic motors provide considerable cost savings.

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Model Code	C-4-17

6000 Series

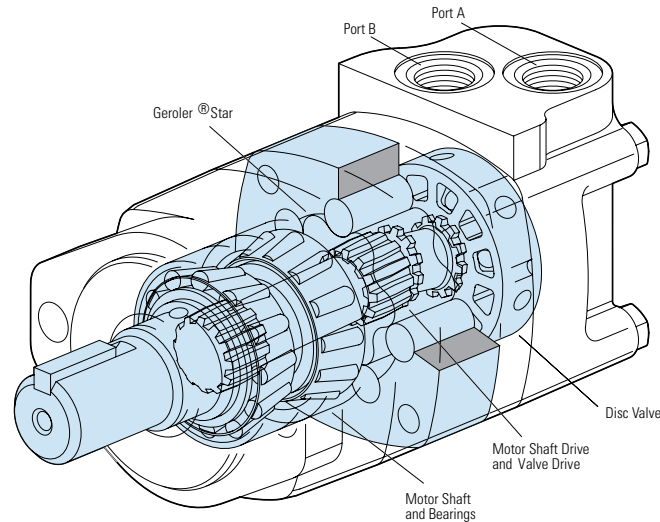
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2000 Series

Highlights



Features

- Three zone design for longer life and true bi-directionality.
- Bearings that meet the highest standards of the industry
- Options to optimize performance in every application
- Integrated cross-over relief valve option

Benefits

- Easy to design in a system
- 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

C-1

Description

The popular 2000 Series provides torque up to 7500 lb-in. This proven design is reliable and durable. Eaton has added options that make the motor more flexible to use in a wide variety of applications. The expanded displacement range using patented “Drive in Drive” technology is the latest innovation in the 2000 series of motors

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



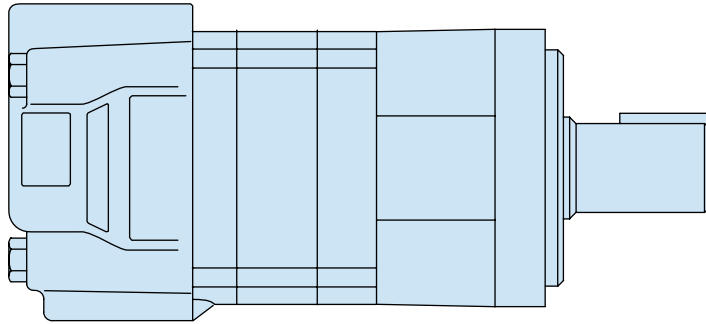
Conveyors



Boom Lifts

2000 Series

Specifications



SPECIFICATION DATA – 2000 SERIES MOTORS

Displ. cm ³ /r [in ³ /r]		34 [2.1]	41 [2.5]	66 [4.0]	80 [4.9]	90 [5.5]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
Max Speed	Continuous	1215	1104	1075	908	836	742	576	477	385	308	246	191	153
(RPM) @ Flow	Intermittent	1215	1216	1214	908	1042	924	720	713	577	462	365	287	230
Flow	Continuous	42 [11]	45 [12]	72 [19]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
l/min [GPM]	Intermittent	42 [11]	53 [14]	87 [23]	75 [20]	95 [25]	95 [25]	95 [25]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]
Torque*	Continuous	98 [864]	112 [988]	186 [1643]	235 [2065]	265 [2326]	295 [2630]	385 [3420]	455 [4040]	540 [4780]	660 [5850]	765 [6750]	775 [6840]	845 [7470]
Nm [lb-in]	Intermittent	141 [1250]	169 [1497]	276 [2446]	345 [3035]	390 [3458]	445 [3950]	560 [4970]	570 [5040]	665 [5890]	820 [7250]	885 [7820]	925 [8170]	930 [8225]
Pressure	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	155 [2250]	120 [1750]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	260 [3750]	260 [3750]	260 [3750]	240 [3500]	190 [2750]	140 [2000]
Δ bar [Δ PSI]	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	225 [3250]	170 [2500]
Weight	Standard or Wheel Mount	8.8 [19.4]	8.8 [19.4]	8.8 [19.4]	9.3 [20.5]	9.3 [20.5]	9.5 [21.0]	9.8 [21.5]	10.0 [22.0]	10.4 [23.0]	11.3 [25.0]	11.3 [25.0]	11.8 [26.0]	12.2 [27.0]
kg [lb]	Bearingless	6.8 [15.0]	6.8 [15.0]	6.8 [15.0]	7.3 [16.0]	7.3 [16.0]	7.5 [16.5]	7.7 [17.0]	7.9 [17.5]	8.4 [18.5]	9.3 [20.5]	9.3 [20.5]	9.8 [21.5]	10.2 [22.5]

Note:

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

Maximum Inlet Pressure:

310 bar [4500 PSI]
Do not exceed Δ pressure rating (see chart above).

Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.
Do not exceed Δ pressure rating (see chart above).

Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:





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

2000 Series

Performance Data

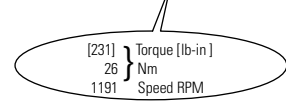
Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

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

	Continuous		Peak
	Intermittent		No Operation

34cm³/r [2.1 in³/r]
ΔPressure Bar [PSI]

	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
	34	69	103	138	172	207	241	276	310
[2]	[114]	[262]	[405]	[549]					
8	13 210	30 189	46 178	62 162					
[4]	[110]	[256]	[404]	[552]	[704]	[828]	[962]		
15	12 432	29 416	46 393	62 363	80 347	94 313	109 284		
[6]	[115]	[249]	[400]	[550]	[708]	[864]	[996]	[1099]	[1250]
23	13 651	28 636	45 613	62 580	80 546	98 518	113 467	124 425	141 404
[8]	[126]	[232]	[393]	[548]	[702]	[856]	[1003]	[1135]	[1244]
30	14 856	26 856	44 830	62 795	79 759	97 712	113 657	128 578	141 549
[10]	[114]	[239]	[386]	[541]	[697]	[850]	[995]	[1136]	[1261]
38	13 1105	27 1077	44 1049	61 1015	79 975	96 923	112 859	128 775	142 707
[11]	[99]	[231]	[380]	[533]	[679]	[834]	[987]	[1133]	[1245]
42	11 1215	26 1191	43 1160	60 254	77 1073	94 1023	112 945	128 854	141 819



41cm³/r [2.5 in³/r]
ΔPressure Bar [PSI]

	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
	34	69	103	138	172	207	241	276	310
[2]	[138]	[306]	[468]	[659]					
8	16 171	35 160	53 156	74 135					
[4]	[129]	[296]	[466]	[552]	[807]	[966]	[1110]	[1316]	[1421]
15	15 364	33 352	53 336	62 363	91 295	109 272	125 248	149 235	161 217
[6]	[135]	[300]	[473]	[550]	[818]	[985]	[1147]	[1292]	[1495]
23	15 550	34 535	53 516	62 580	92 465	111 437	130 406	146 352	169 326
[8]	[130]	[285]	[461]	[548]	[816]	[988]	[1150]	[1320]	[1477]
30	15 734	32 722	52 699	62 795	92 641	112 616	130 568	149 519	167 470
[10]	[137]	[276]	[455]	[541]	[802]	[979]	[1153]	[1329]	[1497]
38	15 921	31 909	51 884	61 1015	91 825	111 784	130 743	150 687	169 635
[12]	[119]	[268]	[441]	[1340]	[794]	[969]	[1141]	[1321]	[1494]
45	13 1104	30 1093	50 1068	150 254	90 1003	109 972	129 902	149 833	169 785
[14]				[597]	[787]	[953]	[1124]	[1309]	[1479]
53				67 1216	89 1184	108 1144	127 1073	148 997	167 921

C-1

66cm³/r [4.0 in³/r]
ΔPressure Bar [PSI]

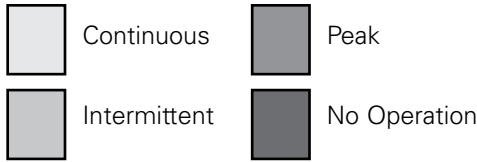
	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
	34	69	103	138	172	207	241	276	310
[2]	[226]	[503]	[746]	[987]					
8	26 103	57 102	84 93	112 88					
[4]	[226]	[508]	[791]	[1072]	[1342]	[1609]	[1810]	[2012]	[2220]
15	26 214	57 208	89 194	121 188	152 181	182 172	204 158	227 136	251 134
[6]	[216]	[503]	[792]	[1075]	[1353]	[1629]	[1890]	[2123]	[2332]
23	24 329	57 318	89 305	121 290	153 284	184 270	214 257	240 235	264 228
[8]	[208]	[495]	[781]	[1070]	[1352]	[1633]	[1910]	[2186]	[2405]
30	23 444	56 430	88 415	121 401	153 387	184 372	216 355	247 339	272 320
[10]	[195]	[486]	[777]	[1070]	[1359]	[1643]	[1920]	[2191]	[2446]
38	22 560	55 544	88 529	121 513	154 497	186 480	217 461	248 440	276 419
[12]	[182]	[472]	[757]	[1052]	[1345]	[1627]	[1912]	[2189]	[2444]
45	21 672	53 658	86 643	119 623	152 606	184 586	216 565	247 547	276 528
[14]	[187]	[459]	[750]	[1045]	[1339]	[1633]	[1926]	[2198]	[2443]
53	21 788	52 776	85 758	118 738	151 720	184 701	218 680	248 654	276 640
[16]	[182]	[436]	[724]	[1019]	[1313]	[1604]	[1915]	[2181]	[2443]
61	21 901	49 887	82 870	115 849	148 829	181 808	216 785	246 753	276 734
[19]	[167]	[407]	[702]	[996]	[1283]	[1588]	[1866]	[2157]	[2441]
72	19 1075	46 1061	79 1040	113 1017	145 996	179 967	211 950	244 919	276 876
[21]	[162]	[391]	[679]	[967]	[1255]	[1556]	[1840]	[2268]	[2432]
79	18 1188	44 1175	77 1152	109 1129	142 1105	176 1075	208 1052	256 987	275 988
[23]				[1226]	[1523]	[1814]	[1985]	[2387]	
87				139 1214	172 1185	205 1155	224 1125	270 1107	

2000 Series

Performance Data

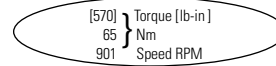
Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

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



80cm³/r [4.9 in³/r]
ΔPressure Bar [PSI]

	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
	35	70	105	140	170	205	240	275	310
[.25]	[210]	[420]							
.95	25 3	45 1							
[.5]	[250]	[500]	[740]						
1.9	30 17	50 8	85 3						
[1]	[330]	[670]	[990]	[1300]	[1550]	[1800]	[1950]	[2110]	
3.8	35 44	75 40	110 37	145 34	175 28	205 22	220 14	240 2	
[2]	[330]	[670]	[995]	[1310]	[1580]	[1840]	[2100]	[2365]	[2630]
7.5	35 90	75 85	110 81	150 78	180 72	210 65	235 57	265 49	295 42
[4]	[325]	[670]	[1005]	[1330]	[1620]	[1920]	[2200]	[2480]	[2765]
15	35 182	75 176	115 170	150 166	185 159	215 152	250 140	280 128	310 117
[6]	[320]	[665]	[1010]	[1340]	[1655]	[1975]	[2270]	[2570]	[2880]
23	35 273	75 267	115 259	150 254	185 246	225 238	255 223	290 207	325 192
[8]	[310]	[660]	[1015]	[1345]	[1685]	[2020]	[2330]	[2640]	[2960]
30	35 365	75 375	115 349	150 341	190 333	230 325	265 306	300 286	335 266
[10]	[300]	[650]	[1010]	[1350]	[1700]	[2050]	[2370]	[2690]	[3010]
38	35 456	75 448	115 439	155 429	190 420	230 411	270 388	305 364	340 341
[12]	[285]	[640]	[1005]	[1350]	[1705]	[2065]	[2390]	[2715]	[3035]
45	30 547	70 537	115 530	155 516	195 507	235 497	270 470	305 442	345 415
[14]	[270]	[625]	[990]	[1340]	[1705]	[2065]	[2395]	[2720]	[3030]
53	30 638	70 629	110 622	150 603	195 593	235 584	270 553	305 521	340 490
[16]	[255]	[610]	[975]	[1330]	[1690]	[2055]	[2385]	[2700]	[2995]
61	30 729	70 720	110 714	150 689	190 679	230 670	270 635	305 599	340 564
[18]	[230]	[590]	[955]	[1310]	[1680]	[2025]	[2355]	[2660]	[2935]
68	25 818	65 810	110 795	150 775	190 765	230 756	265 717	300 677	330 638
[20]	[210]	[570]	[930]	[1290]	[1645]	[1985]	[2305]	[2600]	[2845]
76	25 908	65 901	105 880	145 861	185 851	225 842	260 799	295 755	320 712



90cm³/r [5.5 in³/r]
ΔPressure Bar [PSI]

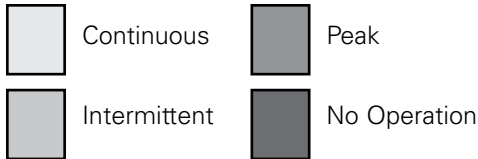
	[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[4000]	[4500]
	15	35	70	105	140	170	205	240	275	310
[.25]	[124]	[233]	[471]							
.95	14 5	26 2	53 1							
[.5]	[133]	[273]	[555]	[832]						
1.9	15 15	31 13	63 6	94 2						
[1]	[151]	[358]	[744]	[1091]	[1424]	[1697]	[1952]	[2189]	[2368]	
3.8	17 39	40 39	84 35	123 32	161 28	192 21	221 13	247 12	268 2	
[2]	[151]	[358]	[744]	[1099]	[1439]	[1737]	[2015]	[2293]	[2570]	[2855]
7.5	17 82	40 80	84 76	124 72	163 68	196 61	228 50	259 38	290 29	323 20
[4]	[151]	[350]	[899]	[1113]	[1473]	[1800]	[2132]	[2454]	[2775]	[3100]
15	17 167	40 163	102 158	126 152	166 148	203 139	241 126	277 115	314 102	350 90
[6]	[142]	[348]	[736]	[613]	[1492]	[1851]	[2208]	[2552]	[2898]	[3249]
23	16 250	39 245	83 240	69 233	169 227	209 218	249 203	288 191	327 176	367 161
[8]	[133]	[338]	[729]	[1128]	[1509]	[1890]	[2269]	[2635]	[3000]	[3367]
30	15 35	38 328	82 329	127 314	170 306	214 295	256 281	298 266	339 249	380 231
[10]	[124]	[331]	[724]	[1130]	[1521]	[1912]	[2309]	[2670]	[3036]	[3398]
38	14 418	37 410	82 404	128 395	172 385	216 373	261 361	302 342	343 322	384 302
[12]	[106]	[315]	[714]	[1127]	[1525]	[1924]	[2326]	[2704]	[3082]	[3458]
45	12 502	36 493	81 485	127 477	172 464	217 451	263 441	306 417	348 394	391 372
[14]	[98]	[298]	[706]	[1115]	[1525]	[1924]	[2326]	[2707]	[3080]	[3450]
53	11 585	34 575	80 567	126 559	172 543	217 529	263 521	306 493	348 467	390 431
[16]	[80]	[285]	[688]	[1107]	[1510]	[1907]	[2311]	[2697]	[3070]	[3432]
61	9 670	32 658	78 650	125 641	171 622	215 607	261 610	305 568	347 541	388 513
[18]	[62]	[262]	[673]	[1087]	[1490]	[1892]	[2281]	[2662]	[3030]	[3381]
68	7 753	30 740	76 732	123 719	168 701	214 685	258 680	301 643	342 613	382 583
[20]	[53]	[242]	[644]	[1045]	[1447]	[1850]	[2246]	[2617]	[2988]	[3301]
76	6 836	27 822	73 814	118 796	163 780	209 765	254 748	296 719	338 686	373 653
[22]	[35]	[231]	[639]	[1047]	[1437]	[1836]	[2218]	[2599]	[2981]	
83	4 920	26 916	72 907	118 895	162 876	207 854	251 749	294 803	337 774	
[24]	[18]	[204]	[612]	[1011]	[1366]	[1792]	[2182]	[2573]	[2963]	
91	2 1003	23 1000	69 991	114 978	154 960	202 940	247 918	291 882	335 850	
[25]		[195]	[594]	[994]	[1384]	[1765]	[2173]	[2564]		
95		22 1042	67 1033	112 1020	156 1003	199 984	246 954	290 921		

2000 Series

Performance Data

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

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

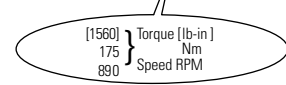


100cm³/r [6.2 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.25]	[140] 15 4	[260] 30 2								
[.5]	[150] 15 13	[300] 35 9	[620] 70 5	[940] 105 2						
[1]	[170] 20 35	[390] 45 34	[830] 95 31	[1210] 135 28	[1570] 175 23	[1870] 210 15	[2130] 240 6			
[2]	[170] 20 73	[390] 45 71	[830] 95 68	[1220] 140 63	[1590] 180 59	[1920] 215 51	[2220] 250 38	[2520] 285 24	[2810] 315 14	[3120] 355 4
[4]	[170] 20 148	[380] 45 145	[820] 90 141	[1240] 140 136	[1640] 185 131	[2010] 225 121	[2380] 270 104	[2750] 310 94	[3120] 355 80	[3490] 395 69
[6]	[160] 20 222	[380] 45 219	[820] 90 215	[1260] 140 209	[1670] 190 202	[2080] 235 192	[2480] 280 172	[2880] 325 163	[3280] 370 149	[3680] 415 134
[8]	[150] 15 297	[370] 40 294	[810] 90 288	[1260] 140 281	[1700] 190 273	[2130] 240 261	[2560] 290 243	[2990] 340 231	[3420] 385 216	[3840] 435 200
[10]	[140] 15 371	[368] 40 367	[810] 90 362	[1270] 145 354	[1720] 195 344	[2160] 245 330	[2610] 295 316	[3020] 340 300	[3440] 390 283	[3850] 435 266
[12]	[120] 15 445	[350] 40 442	[800] 90 436	[1270] 145 427	[1730] 195 415	[2180] 245 399	[2630] 295 389	[3070] 345 369	[3510] 395 350	[3950] 445 332
[14]	[110] 10 519	[330] 35 516	[800] 90 509	[1260] 140 500	[1740] 195 486	[2180] 245 469	[2630] 295 463	[3070] 345 437	[3500] 395 417	[3940] 445 378
[16]	[90] 10 594	[320] 35 591	[780] 90 583	[1260] 140 573	[1720] 195 558	[2160] 245 540	[2610] 295 537	[3060] 345 506	[3500] 395 485	[3940] 445 463
[18]	[70] 10 668	[300] 35 665	[770] 85 657	[1240] 140 646	[1700] 190 630	[2140] 240 611	[2580] 290 609	[3020] 340 574	[3460] 390 552	[3900] 440 529
[20]	[60] 5 742	[280] 30 739	[730] 80 731	[1180] 135 715	[1630] 185 703	[2090] 235 684	[2550] 290 662	[2980] 335 643	[3440] 390 619	[3830] 435 595
[22]	[40] 5 816	[260] 30 813	[720] 80 805	[1180] 135 794	[1620] 185 777	[2070] 235 758	[2500] 280 749	[2930] 330 712	[3360] 380 687	
[24]	[20] 1.0 890	[230] 230 887	[690] 80 879	[1140] 130 868	[1540] 175 852	[2020] 230 834	[2460] 280 814	[2900] 330 782	[3340] 375 754	
[25]		[220] 25 924	[670] 75 916	[1120] 125 905	[1560] 175 890	[1990] 225 873	[2450] 275 846	[2890] 325 817		

130cm³/r [8.0 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.25]	[170] 20 3									
[.5]	[190] 20 12	[410] 45 8	[870] 100 2							
[1]	[230] 25 28	[510] 60 27	[1070] 120 23	[1580] 180 19	[2050] 230 16	[2520] 285 13	[2920] 309 9	[3310] 375 3		
[2]	[230] 25 56	[510] 60 56	[1080] 120 53	[1600] 180 47	[2090] 235 42	[2580] 290 39	[2930] 330 36	[3320] 375 28	[3640] 410 21	[3990] 450 13
[4]	[220] 25 114	[500] 55 113	[1080] 120 111	[1620] 185 104	[2150] 245 97	[2660] 300 95	[3100] 350 92	[3540] 400 85	[3980] 450 77	[4420] 500 70
[6]	[220] 25 172	[490] 55 171	[1080] 120 169	[1640] 185 161	[2190] 245 153	[2740] 310 149	[3260] 370 146	[3770] 425 132	[4280] 485 118	[4800] 540 104
[8]	[200] 25 230	[480] 55 224	[1080] 120 222	[1650] 185 219	[2220] 250 210	[2780] 315 204	[3310] 375 201	[3840] 435 192	[4360] 495 184	[4890] 550 175
[10]	[180] 20 287	[470] 55 286	[1070] 120 282	[1650] 185 276	[2230] 250 269	[2800] 315 261	[3420] 385 255	[3940] 445 243	[4450] 505 231	[4970] 560 219
[12]	[160] 20 345	[460] 50 344	[1060] 120 338	[1640] 185 333	[2230] 250 327	[2800] 315 317	[3350] 380 307	[3910] 440 295	[4440] 500 284	[4960] 560 272
[14]	[150] 15 403	[440] 50 402	[1030] 115 395	[1620] 185 391	[2220] 250 385	[3000] 340 373	[3350] 380 360	[3910] 440 348	[4440] 500 336	
[16]	[130] 15 461	[420] 45 460	[1010] 115 452	[1600] 180 447	[2200] 250 443	[2780] 315 430	[3330] 375 411	[3890] 440 397	[4440] 500 384	
[18]	[110] 10 518	[400] 45 517	[990] 110 509	[1580] 180 504	[2160] 245 500	[2750] 310 484	[3300] 375 471	[3860] 435 456	[4410] 500 440	
[20]	[90] 10 576	[380] 45 575	[960] 110 568	[1550] 175 560	[2130] 240 551	[2710] 305 539	[3280] 370 524	[3840] 435 508		
[22]	[60] 5 634	[350] 40 633	[940] 105 624	[1520] 170 619	[2100] 235 604	[2680] 305 597	[3250] 365 579	[3820] 430 560		
[24]	[40] 5 692	[325] 35 691	[920] 105 682	[1490] 170 676	[2070] 235 665	[2650] 300 651	[3220] 365 633	[3780] 425 616		
[25]	[20] 1.0 720	[310] 35 719	[900] 100 712	[1480] 165 705	[2050] 230 692	[2630] 295 679	[3200] 360 682	[3700] 420 656		



2000 Series

Performance Data

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

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

Continuous
 Peak
 Intermittent
 No Operation

160cm³/r [9.6 in³/r]
ΔPressure Bar [PSI]

[250]	[500]	[1000]	[1500]	[2000]	[2500]	[3000]	[3500]	[3750]
15	35	70	105	140	170	205	240	260

[.25]	[200]									
0.95	25 3									
[.5]	[240]	[490]	[990]	[1570]	[2140]					
1.9	25 9	55 7	110 5	175 3	240 1					
[1]	[280]	[590]	[1170]	[1730]	[2290]	[2830]	[3330]	[3820]	[4070]	
3.8	30 23	65 21	130 19	195 17	260 13	320 8	375 3	430 2	460 1	
[2]	[300]	[610]	[1210]	[1790]	[2350]	[2920]	[3480]	[4050]	[4330]	
7.5	35 46	70 45	135 42	200 39	265 35	330 34	395 33	460 28	490 22	
[4]	[320]	[630]	[1260]	[1890]	[2530]	[3170]	[3820]	[4460]	[4780]	
15	35 93	70 92	140 89	215 85	285 79	360 77	430 75	505 59	540 43	
[6]	[320]	[650]	[1300]	[1960]	[2620]	[3280]	[3940]	[4600]	[4930]	
23	35 142	75 140	145 137	220 131	295 124	370 118	445 113	520 104	560 96	
[8]	[310]	[650]	[1330]	[2010]	[2670]	[3330]	[4000]	[4660]	[4990]	
30	35 190	75 187	150 184	225 178	300 170	375 166	450 164	525 153	565 142	
[10]	[290]	[640]	[1340]	[2030]	[2690]	[3350]	[4020]	[4680]	[5010]	
38	35 237	70 235	150 231	230 226	300 217	375 212	450 212	525 193	570 187	
[12]	[270]	[620]	[1320]	[2020]	[2700]	[3370]	[4040]	[4710]	[5040]	
45	30 286	70 283	150 279	230 274	305 265	380 254	455 246	530 235	570 224	
[14]	[240]	[590]	[1300]	[2020]	[2690]	[3360]	[4030]	[4700]	[5030]	
53	25 334	65 331	145 326	230 322	305 312	380 305	455 297	530 286	570 274	
[16]	[220]	[570]	[1300]	[1980]	[2660]	[3330]	[4010]	[4680]	[5010]	
61	25 382	65 378	145 374	225 369	300 360	375 349	450 339	525 326	570 314	
[18]	[190]	[540]	[1240]	[1960]	[2640]	[3320]	[3990]	[4660]	[5000]	
68	20 429	60 426	140 422	220 416	300 407	375 394	450 387	525 374	570 362	
[20]	[170]	[510]	[1210]	[1920]	[2630]	[3310]	[3980]	[4650]	[4990]	
76	20 477	60 474	135 469	215 462	300 451	375 440	450 430	525 417	570 406	
[22]	[150]	[480]	[1170]	[1880]	[2600]	[3290]	[3970]	[4640]	[4980]	
83	15 525	55 522	130 517	210 510	295 501	375 484	450 473	525 514	570 503	
[24]	[120]	[450]	[1150]	[1860]	[2570]	[3260]	[3940]	[4610]	[4950]	
91	15 572	50 569	130 564	210 556	290 546	370 531	440 522	520 510	570 500	
[25]	[90]	[440]	[1140]	[1840]	[2560]	[3250]	[3930]	[4600]	[4940]	
95	10 596	50 593	130 587	210 580	290 566	375 553	450 544	525 511	570 500	
[30]	[300]	[1040]	[1750]	[2470]	[3140]	[3800]	[4470]	[5140]	[5480]	
114	35 713	120 706	200 696	280 682	360 672	440 658	520 646	600 634	680 622	

[330] } Torque [lb-in]
35 } Nm
713 } Speed RPM

195cm³/r [11.9 in³/r]
ΔPressure Bar [PSI]

[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

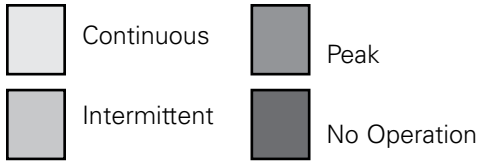
[.25]	[240]	[590]													
.95	25 4	65 2													
[.5]	[290]	[640]	[990]	[1340]											
1.9	35 8	70 6	110 5	150 2											
[1]	[380]	[730]	[1100]	[1430]	[1790]	[2120]	[2450]	[2720]	[2990]	[3260]	[3540]	[3810]	[4080]	[4350]	[4620]
3.8	45 17	80 16	125 15	160 14	200 13	275 11	340 9	405 7	470 5	535 4	600 3	665 2	730 2	795 1	860 1
[2]	[390]	[755]	[1135]	[1470]	[1860]	[2195]	[2535]	[2880]	[3120]	[3680]	[4090]	[4500]	[4800]	[5100]	[5400]
7.5	45 37	85 35	130 34	165 33	210 32	250 31	285 28	325 26	355 24	415 21	460 20	510 19	540 17	575 14	610 14
[4]	[405]	[795]	[1185]	[1540]	[1970]	[2310]	[2675]	[3040]	[3420]	[3790]	[4160]	[4520]	[4890]	[5260]	[5630]
15	45 76	90 74	135 73	175 72	225 71	260 70	300 66	345 64	385 62	430 61	470 59	510 57	550 55	595 51	635 45
[6]	[405]	[815]	[1220]	[1590]	[2035]	[2395]	[2780]	[3170]	[3560]	[3940]	[4320]	[4700]	[5070]	[5450]	[5830]
23	45 115	90 113	140 111	180 110	230 109	270 108	315 104	360 102	400 100	445 99	490 96	530 94	570 91	615 87	660 81
[8]	[400]	[820]	[1230]	[1625]	[2065]	[2450]	[2850]	[3260]	[3670]	[4040]	[4410]	[4780]	[5150]	[5520]	[5890]
30	45 154	90 151	140 149	185 148	235 147	275 146	320 143	370 140	415 137	455 135	500 132	540 130	580 127	625 123	665 117
[10]	[380]	[810]	[1230]	[1645]	[2095]	[2480]	[2895]	[3310]	[3730]	[4100]	[4470]	[4840]	[5210]	[5590]	
38	45 193	95 190	140 188	185 187	235 186	280 184	325 181	375 177	420 175	465 173	505 170	545 168	590 164	630 160	
[12]	[355]	[790]	[1215]	[1650]	[2100]	[2485]	[2915]	[3340]	[3760]	[4120]	[4480]	[4850]			
45	40 231	90 229	135 227	185 226	235 224	280 221	330 219	375 218	425 215	465 211	505 208	550 204			
[14]	[320]	[765]	[1190]	[1645]	[2090]	[2475]	[2915]	[3350]	[3770]	[4130]	[4480]	[4860]			
53	35 269	85 267	135 267	185 264	235 261	280 260	330 257	380 254	425 250	465 248	505 245	550 241			
[16]	[290]	[730]	[1160]	[1625]	[2070]	[2455]	[2900]	[3340]	[3760]	[4130]	[4490]	[4860]			
61	30 308	80 306	130 305	185 303	235 299	275 296	330 294	375 290	425 286	465 283	505 279	550 276			
[18]	[290]	[690]	[1120]	[1590]	[2035]	[2420]	[2870]	[3310]	[3730]	[4100]	[4480]				
68	30 346	80 345	125 345	180 342	230 337	270 334	325 333	375 327	420 321	465 315	505 308				
[20]	[210]	[650]	[1080]	[1550]	[1995]	[2380]	[2830]	[3270]	[3690]	[4070]	[4450]				
76	25 385	75 384	120 383	175 380	225 375	270 372	320 371	370 367	415 363	460 359	500 355				
[22]	[170]	[610]	[1040]	[1500]	[1955]	[2340]	[2785]	[3220]	[3640]	[4050]					
83	20 424	70 423	120 422	170 418	220 414	265 410	315 408	365 404	410 399	460 395					
[24]	[135]	[570]	[1000]	[1440]	[1910]	[2300]	[3170]	[3590]	[3980]	[3980]					
91	15 462	65 461	115 460	165 457	215 453	260 449	360 441	405 436	450 432	495 432					
[25]	[120]	[550]	[980]	[1410]	[1890]	[2280]	[3150]	[3570]	[3960]	[3960]					
95	15 484	60 482	110 479	160 476	215 473	260 469	355 459	405 454	445 449	485 449					
[30]	[420]	[860]	[1290]	[1700]	[2120]	[2530]	[2940]	[3400]							
114	45 577	95 575	145 571	190 567	240 562	285 556	330 550	385 542							

2000 Series

Performance Data

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

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

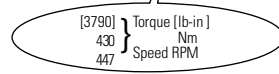


245cm³/r [14.9 in³/r]
 Δ Pressure Bar [PSI]

	[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
[.5]	[410]	[850]													
1.9	45 4	95 2													
[1]	[450]	[930]	[1420]	[1850]	[2320]	[2780]	[3250]	[3650]	[4100]	[4540]	[4980]	[5430]	[5870]	[6310]	
3.8	50 14	105 13	160 12	210 11	260 10	315 9	365 8	410 6	465 5	515 4	560 4	615 3	665 2	715 1	
[2]	[460]	[960]	[1460]	[1900]	[2400]	[2860]	[3340]	[3780]	[4320]	[4770]	[5210]	[5660]	[6110]	[6570]	[6950]
7.5	50 29	110 28	165 27	215 26	270 25	325 23	375 22	425 20	490 19	540 18	590 17	640 15	690 14	740 12	785 10
[4]	[470]	[1000]	[1540]	[1980]	[2510]	[3010]	[3480]	[3980]	[4450]	[4910]	[5380]	[5850]	[6320]	[6780]	[7250]
15	55 60	115 59	175 58	225 56	285 54	340 53	395 51	450 49	505 48	555 47	605 47	660 46	715 45	765 44	820 42
[6]	[460]	[1020]	[1550]	[2040]	[2580]	[3110]	[3590]	[4120]	[4580]	[5050]	[5520]	[5980]	[6440]	[6910]	
23	50 91	115 90	175 89	230 87	290 84	350 83	405 81	465 78	515 76	570 73	625 71	675 69	730 67	780 65	
[8]	[460]	[1010]	[1560]	[2080]	[2630]	[3170]	[3670]	[4210]	[4680]	[5160]	[5630]	[6110]	[6590]		
30	50 122	115 121	175 120	235 118	295 115	360 113	415 111	475 108	530 106	585 104	635 102	690 101	745 99		
[10]	[440]	[1000]	[1550]	[2110]	[2650]	[3200]	[3730]	[4250]	[4730]	[5210]	[5700]	[6200]			
38	50 153	115 152	175 150	240 148	300 146	360 144	420 142	480 139	535 137	590 135	645 133	705 103			
[12]	[410]	[960]	[1530]	[2100]	[2640]	[3190]	[3760]	[4260]	[4740]	[5220]	[5730]				
45	45 184	110 183	175 182	235 180	300 177	360 175	425 173	480 170	535 168	590 165	645 162				
[14]	[380]	[910]	[1500]	[2080]	[2600]	[3160]	[3760]	[4230]	[4710]	[5190]					
53	40 215	105 214	170 213	235 211	295 209	355 207	425 204	480 201	530 198	585 195					
[16]	[340]	[860]	[1460]	[2040]	[2570]	[3120]	[3740]	[4180]	[4660]	[5140]					
61	40 246	95 245	165 244	230 242	290 240	355 238	425 235	470 232	525 227	580 223					
[18]	[290]	[810]	[1420]	[2000]	[2520]	[3060]	[3700]	[4130]	[4610]	[5090]					
68	30 277	90 276	160 275	225 273	285 271	345 269	420 266	465 263	520 258	575 253					
[20]	[250]	[800]	[1350]	[1910]	[2460]	[3010]	[3630]	[4110]	[4610]						
76	30 308	90 306	155 304	215 302	280 300	340 298	410 295	465 291	520 288						
[22]	[200]	[710]	[1300]	[1870]	[2390]	[2940]	[3560]	[4010]	[4510]						
83	25 339	80 337	145 337	210 334	270 332	330 330	400 327	455 323	510 318						
[24]	[150]	[670]	[1240]	[1790]	[2330]	[2880]	[3460]	[3960]	[4460]						
91	15 370	75 369	140 367	200 364	265 362	325 360	390 357	445 353	505 344						
[25]	[120]	[660]	[1210]	[1750]	[2300]	[2860]	[3410]	[3950]	[4470]						
95	15 385	75 384	135 382	200 379	260 377	325 375	385 372	445 367	505 363						
[30]		[520]	[1080]	[1620]	[2180]	[2720]	[3260]	[3790]							
114		60 462	120 460	185 458	245 456	305 453	370 450	430 447							

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

	[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
[.5]	[500]	[1050]												
1.9	55 4	120 2												
[1]	[610]	[1180]	[1750]	[2330]	[2870]	[3440]	[3930]	[4410]	[4900]	[5380]				
3.8	70 12	135 11	200 11	260 10	325 10	390 9	445 8	500 6	555 3	610 1				
[2]	[620]	[1210]	[1800]	[2400]	[2970]	[3510]	[4050]	[4600]	[5140]	[5680]	[6220]	[6750]	[7290]	[7820]
7.5	70 24	135 24	205 23	270 22	335 22	395 20	460 19	520 18	580 17	640 15	705 13	765 11	825 8	885 6
[4]	[680]	[1250]	[1880]	[2500]	[3120]	[3690]	[4260]	[4840]	[5410]	[5980]	[6550]	[7120]	[7690]	
15	75 49	140 49	210 48	280 47	355 47	415 45	480 43	545 42	610 40	675 38	740 36	805 34	870 33	
[6]	[620]	[1270]	[1920]	[2560]	[3230]	[3810]	[4390]	[4970]	[5550]	[6130]	[6710]	[7290]		
23	70 74	145 74	215 72	290 72	365 71	430 69	495 66	560 64	630 61	695 58	760 55	825 52		
[8]	[600]	[1270]	[1940]	[2600]	[3290]	[3880]	[4470]	[5070]	[5660]	[6250]	[6840]			
30	70 98	145 98	220 97	295 96	370 95	440 93	505 90	575 86	640 83	705 80	775 77			
[10]	[570]	[1250]	[1940]	[2610]	[3310]	[3920]	[4530]	[5150]	[5760]	[6370]				
38	65 123	140 122	220 121	295 120	375 119	440 117	510 113	580 110	650 106	720 102				
[12]	[530]	[1220]	[1920]	[2600]	[3300]	[3920]	[4530]	[5150]	[5760]	[6370]				
45	60 148	140 147	215 145	295 144	375 143	440 142	510 138	580 133	650 128	720 124				
[14]	[480]	[1180]	[1870]	[2560]	[3260]	[3900]	[4510]	[5120]	[5730]					
53	55 172	135 172	210 170	290 168	370 167	440 165	510 160	580 156	645 152					
[16]	[430]	[1120]	[1820]	[2500]	[3210]	[3870]	[4480]	[5080]	[5690]					
61	50 196	125 196	205 194	280 192	365 191	440 188	505 183	575 178	645 174					
[18]	[370]	[1060]	[1760]	[2440]	[3140]	[3800]	[4420]	[5050]						
68	40 221	120 221	200 218	275 217	355 215	440 212	500 207	570 202						
[20]	[320]	[980]	[1680]	[2360]	[3050]	[3710]	[4370]	[5020]						
76	35 246	110 245	190 243	265 241	345 239	420 236	495 231	565 226						
[22]	[240]	[920]	[1620]	[2300]	[2990]	[3560]	[4190]	[4820]						
83	25 271	105 270	185 268	260 266	340 263	400 260	475 258	545 255						
[24]	[180]	[870]	[1550]	[2240]	[2920]	[3420]	[4020]	[4630]						
91	20 296	100 294	175 293	255 290	330 288	385 285	455 283	525 280						
[25]	[150]	[840]	[1520]	[2200]	[2890]	[3340]	[3930]	[4520]						
95	15 308	95 307	170 305	250 303	325 302	375 298	445 295	510 293						
[30]		[680]	[1360]	[2040]	[2720]	[3140]	[3810]							
114		75 365	155 362	230 360	305 357	355 356	430 352							



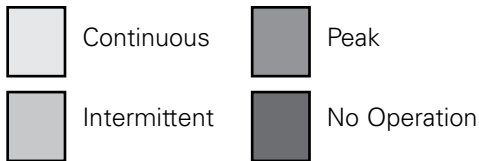
C-1

2000 Series

Performance Data

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

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

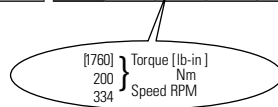


490cm³/r [29.8 in³/r]
ΔPressure Bar [PSI]

	[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]
	15	35	50	70	85	105	120	140
[.5]	[670]	[1600]						
1.9	75 2	180 1						
[1]	[920]	[2000]	[2990]	[3900]	[4880]			
3.8	105 7	225 6	340 5	440 4	550 2			
[2]	[950]	[2060]	[3110]	[4080]	[5110]	[6320]		
7.5	105 14	235 13	350 12	460 10	575 9	715 7		
[4]	[980]	[2130]	[3230]	[4270]	[5350]	[6370]	[7380]	[7980]
15	110 30	240 29	365 28	480 27	605 26	720 24	835 22	900 20
[6]	[980]	[2120]	[3230]	[4300]	[5370]	[6420]	[7470]	[8225]
23	110 45	240 44	365 43	485 42	605 41	725 39	845 37	930 35
[8]	[980]	[2110]	[3220]	[4330]	[5400]	[6470]	[7550]	
30	110 61	240 60	365 59	490 58	610 57	730 55	855 52	
[10]	[920]	[2050]	[3170]	[4300]	[5390]	[6460]	[7550]	
38	105 76	230 75	360 74	485 73	610 72	730 70	855 68	
[12]	[860]	[1990]	[3120]	[4260]	[5370]	[6460]	[7560]	
45	95 91	225 90	355 90	480 89	605 87	730 85	855 84	
[14]	[790]	[1930]	[3055]	[4185]	[5300]	[6400]		
53	90 106	220 105	345 105	475 104	600 102	725 100		
[16]	[720]	[1870]	[2990]	[4110]	[5230]	[6340]		
61	80 122	210 121	340 120	465 119	590 118	715 116		
[18]	[630]	[1770]	[2890]	[4020]	[5140]	[6260]		
68	70 137	200 136	325 135	455 134	580 133	705 131		
[20]	[550]	[1670]	[2800]	[3940]	[5060]	[6180]		
76	60 153	190 152	315 151	445 150	570 149	700 146		
[22]	[450]	[1570]	[2700]	[3830]	[4960]	[6070]		
83	50 168	175 168	305 167	435 165	560 164	685 161		
[24]	[360]	[1480]	[2600]	[3730]	[4860]	[5970]		
91	40 184	165 184	295 183	420 181	550 179	675 177		
[26]	[270]	[1390]	[2510]	[3640]	[4770]			
98	30 199	155 195	285 194	410 192	540 190			
[28]		[1260]	[2370]	[3520]	[4630]			
106		140 212	270 211	400 209	525 207			
[30]		[1130]	[2240]	[3400]	[4500]			
114		125 230	255 229	385 227	510 224			

395cm³/r [24.0 in³/r]
ΔPressure Bar [PSI]

	[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]	[2750]
	15	35	50	70	85	105	120	140	155	170	190
[.5]	[560]	[1310]									
1.9	85 4	150 3									
[1]	[770]	[1540]	[2290]	[3080]	[3780]	[4480]	[5170]	[5880]	[6580]	[7270]	[7980]
3.8	85 9	175 9	260 9	350 8	430 8	505 7	585 7	665 6	745 5	820 4	900 3
[2]	[790]	[1580]	[2360]	[3180]	[3930]	[4680]	[5430]	[6180]	[6940]	[7700]	[8470]
7.5	90 18	180 18	265 18	360 17	445 17	530 16	615 15	700 14	775 13	845 11	925 10
[4]	[810]	[1660]	[2480]	[3320]	[4130]	[4940]	[5740]	[6550]	[7330]	[8100]	
15	90 37	190 37	280 37	375 36	465 36	560 35	650 34	740 33	815 31	890 28	
[6]	[820]	[1700]	[2550]	[3420]	[4250]	[5080]	[5920]	[6750]	[7580]	[8400]	
23	90 57	190 56	290 56	385 55	480 55	575 54	670 53	765 49	840 47	905 45	
[8]	[820]	[1700]	[2580]	[3460]	[4300]	[5130]	[5960]	[6800]			
30	90 76	190 75	290 75	390 74	485 73	580 71	675 69	770 68			
[10]	[800]	[1700]	[2590]	[3480]	[4320]	[5160]	[6000]	[6840]			
38	90 95	190 94	295 94	395 93	490 92	585 90	680 88	775 86			
[12]	[770]	[1680]	[2570]	[3470]	[4310]	[5150]	[5990]	[6830]			
45	85 114	190 113	290 113	390 112	485 111	580 109	675 106	770 103			
[14]	[740]	[1640]	[2530]	[3430]	[4280]	[5120]	[5960]				
53	85 133	185 132	285 132	390 131	485 129	580 127	675 124				
[16]	[690]	[1590]	[2480]	[3370]	[4220]	[5060]	[5910]				
61	80 153	180 152	280 152	380 150	475 149	570 146	670 144				
[18]	[640]	[1530]	[2420]	[3310]	[4160]	[5010]	[5870]				
68	70 172	170 171	275 171	375 170	470 169	565 167	665 164				
[20]	[580]	[1470]	[2370]	[3260]	[4110]	[4960]	[5820]				
76	65 191	165 190	270 190	370 189	465 188	560 186	660 184				
[22]	[510]	[1390]	[2290]	[3170]	[4030]	[4880]					
83	60 210	155 209	260 209	360 208	455 207	550 206					
[24]	[440]	[1330]	[2220]	[3100]	[3950]	[4800]					
91	50 230	150 229	250 228	350 227	445 225	540 224					
[26]	[350]	[1240]	[2130]	[3020]	[3880]	[4730]					
98	40 249	140 248	240 247	340 246	440 244	535 242					
[28]	[270]	[1150]	[2050]	[2930]	[3790]	[4650]					
106	30 268	130 267	230 265	330 264	430 261	525 259					
[30]	[180]	[1060]	[1960]	[2850]	[3710]	[4570]					
114	20 287	120 286	220 284	320 283	420 281	515 277					
[35]		[840]	[1760]	[2640]	[3480]						
132		95 335	200 334	300 333	395 332						



2000 Series

Dimensions

Standard Mount

Ports

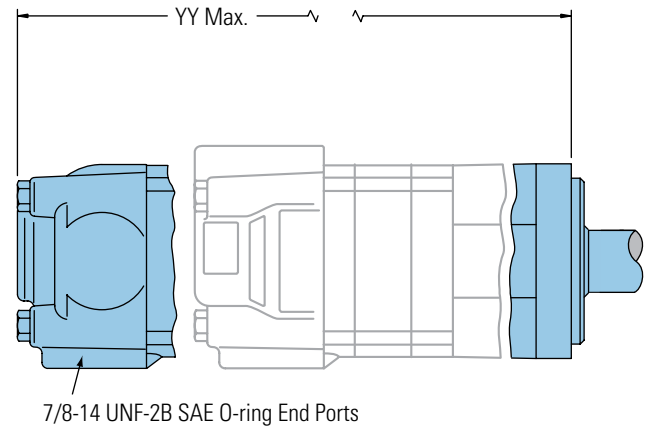
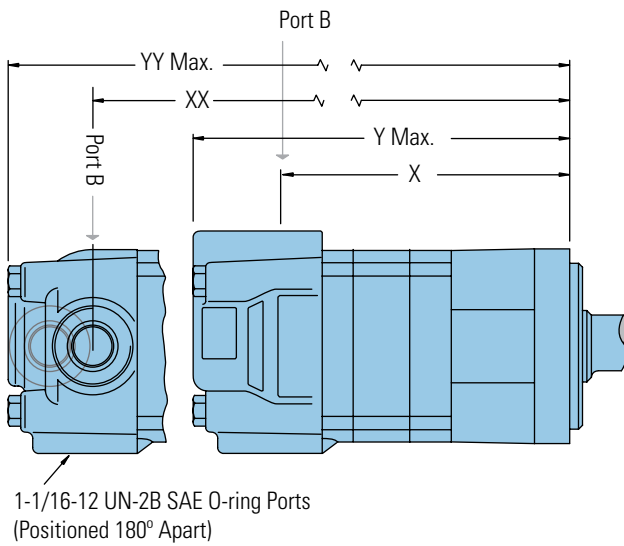
- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

Standard Mount



C-1

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]	270,1 [10.12]

2000 Series

Dimensions

Standard Mount with
Integral Relief Valve

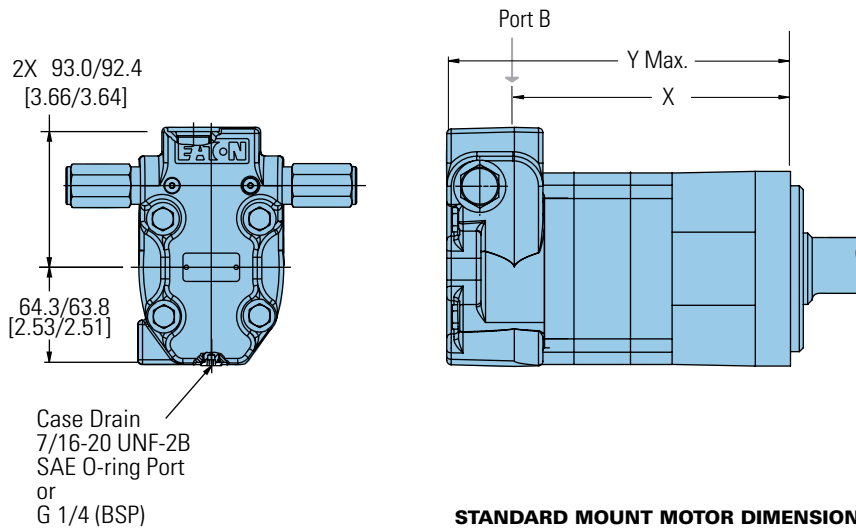
Ports

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



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]

2000 Series

Dimensions

Wheel Mount

Ports

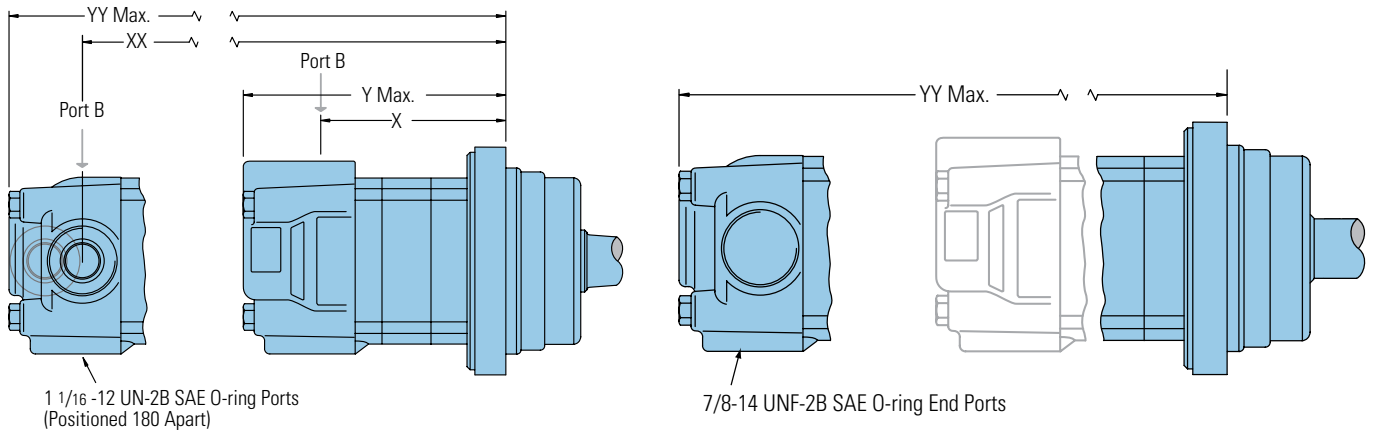
- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

Wheel Mount



WHEEL MOUNT MOTOR DIMENSIONS

Displacement	X	Y	XX	YY
cm ³ /r [in ³ /r]	mm [inch]	mm [inch]	mm [inch]	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]	172,3 [6.78]
305 [18.7]	135,0 [5.32]	182,1 [7.17]	137,4 [5.41]	183,4 [7.22]
395 [24.0]	150,9 [5.94]	198,4 [7.81]	153,2 [6.03]	199,7 [7.86]
490 [29.8]	168,2 [6.63]	215,7 [8.49]	170,7 [6.72]	217,0 [8.54]

2000 Series

Dimensions

Wheel Mount with Integral Relief Valve

Ports

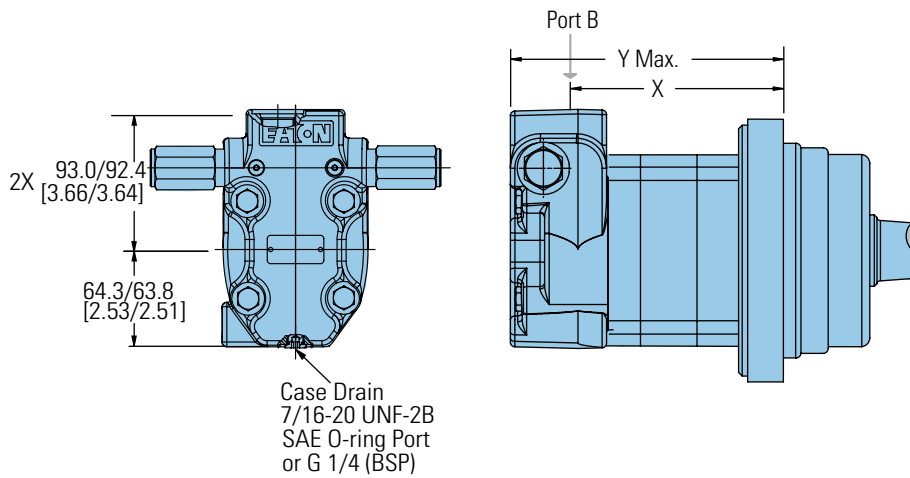
7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

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

Standard Rotation Viewed from Shaft End

Port A Pressurized — CW
 Port B Pressurized — CCW

Wheel Mount with Integral Relief Valve



WHEEL MOUNT MOTOR DIMENSIONS

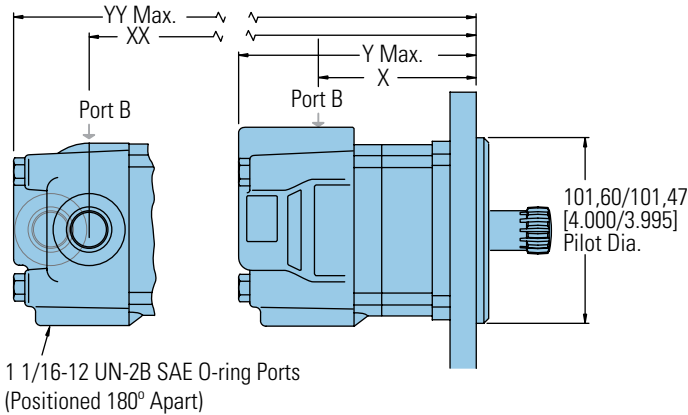
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
34 [2.1]	86,5 [3.41]	133,8 [5.27]
41 [2.5]	88,0 [3.47]	135,3 [5.33]
66 [4.0]	93,7 [3.69]	141,0 [5.55]
80 [4.9]	96,9 [3.82]	144,3 [5.68]
100 [6.2]	101,4 [4.00]	148,9 [5.86]
130 [8.0]	107,8 [4.25]	155,2 [6.11]
160 [9.6]	107,8 [4.25]	155,2 [6.11]
195 [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]

2000 Series

Dimensions

Bearingless

Bearingless



Ports

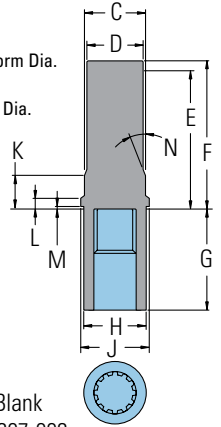
- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

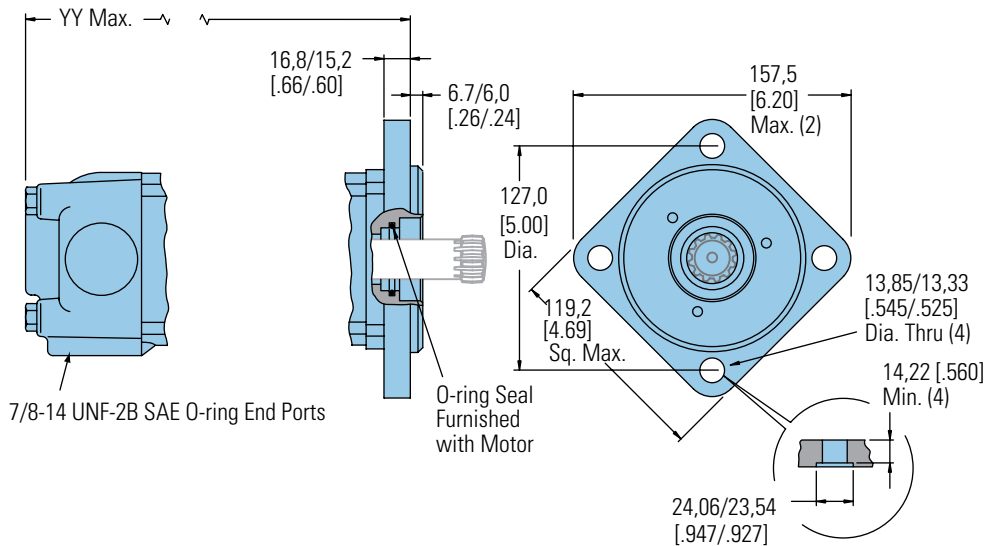
- Port A Pressurized — CW
- Port B Pressurized — CCW

MAT'L

- C 35,86 [1.412] Dia.
- D 34,04 [1.340] Dia.
- E 81,0 [3.19] Min. Full Form Dia.
- F 86,1 [3.39] Max.
- G 62,10 [2.445] Full Form Dia.
- H 38,40 [1.512] Dia.
- J 43,7 [1.72] Dia.
- K 25,91 [1.020]
- L 8,25 [.325]
- M 0,89 [.035]
- N 15°



C-1



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

Note:

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

BEARINGLESS MOTOR DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
34 [2.1]	68,7 [2.71]	116,3 [4.58]	70,9 [2.79]	117,6 [4.63]
41 [2.5]	70,1 [2.76]	117,6 [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 MOTOR 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]	144,3 [5.68]	99,0 [3.90]	145,5 [5.73]
245 [14.9]	105,6 [4.16]	153,5 [6.04]	107,9 [4.25]	154,7 [6.09]
305 [18.7]	117,1 [4.61]	164,6 [6.48]	119,4 [4.70]	165,9 [6.53]
395 [24.0]	133,1 [5.24]	180,9 [7.12]	135,4 [5.33]	182,1 [7.17]
490 [29.8]	150,3 [5.92]	198,2 [7.80]	152,7 [6.01]	199,3 [7.85]

2000 Series

Dimensions

Bearingless with Integral Relief Valve

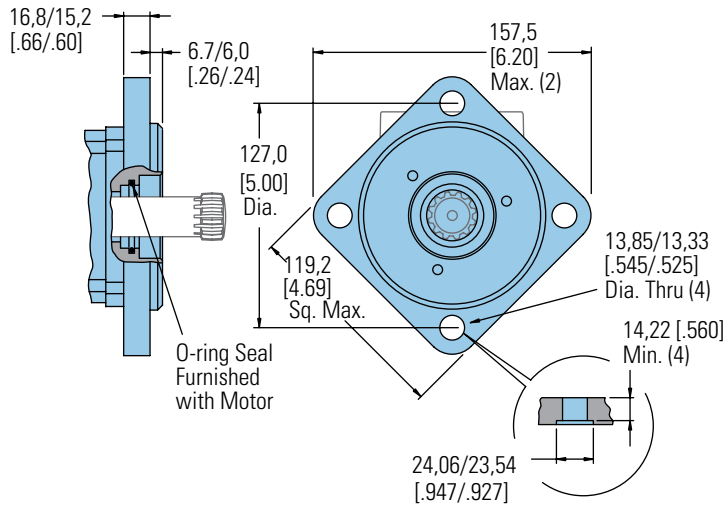
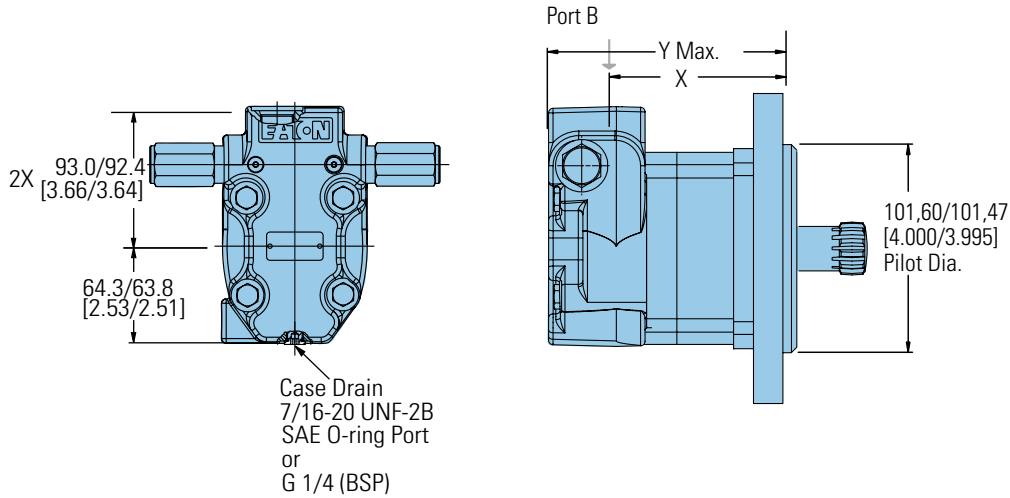
Ports

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



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

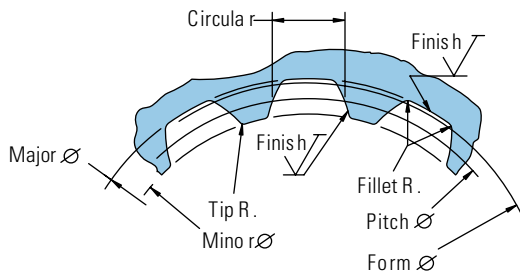
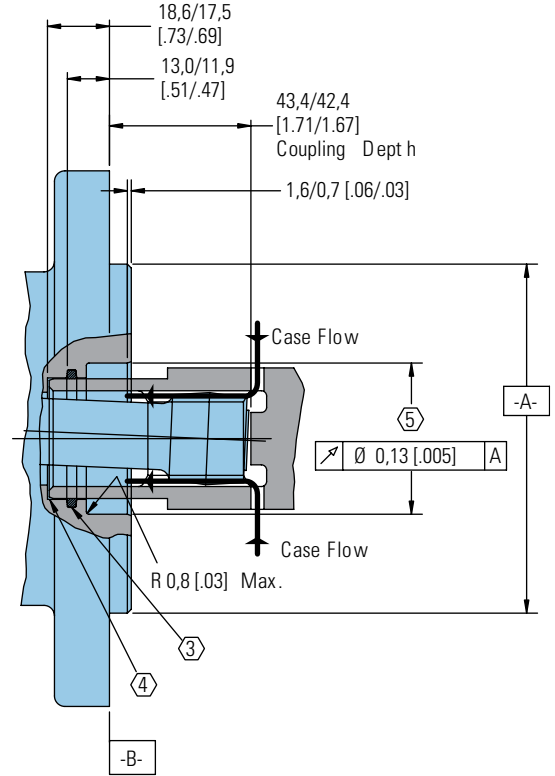
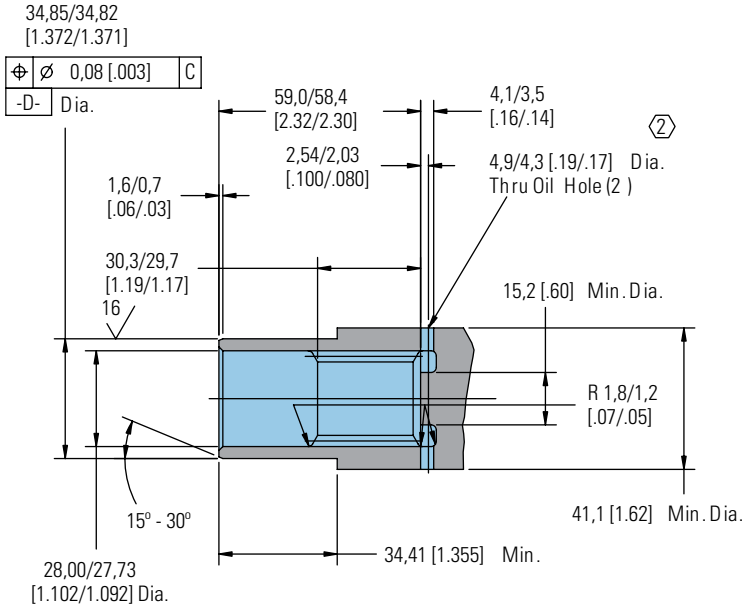
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
160 [9.6]	89,9 [3.54]	137,7 [5.42]
195 [11.9]	96,8 [3.81]	144,6 [5.69]
245 [14.9]	105,6 [4.16]	153,5 [6.04]
305 [18.7]	117,1 [4.61]	164,9 [6.49]
395 [24.0]	133,1 [5.24]	180,9 [7.12]
490 [29.8]	150,3 [5.92]	198,2 [7.80]

2000 Series

Installation Information

- 1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H vacuum degassed alloy steel carbonize to a hardness of 59-62 HRC with case depth (to 50HRC) of 0,076 -1,02 [.030 -.040]. Dimensions apply after heat treat.
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.
- 4 Some means of maintaining clearance between shaft and mounting flange must be provided.
- 5 Counterbore designed to adapt a standard sleeve bearing 35,010 -35,040 [1.3784 -1.3795] I.D. by 44,040 -44,070 [1.7339 -1.7350] O.D. (Oilite Bronze Sleeve Bearing AAM3544-22).

Bearingless



Spline Pitch.....	12/24
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Side Pitch Diameter.....	Ref. 25,400000 [1.0000000]
Base Diameter.....	Ref. 21,997045 [.8660254] $\text{C} \text{ } 0,21 \text{ } [0.008] \text{ } \text{ } D$
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 [1.133]
	Wide Flat for Root Clearance

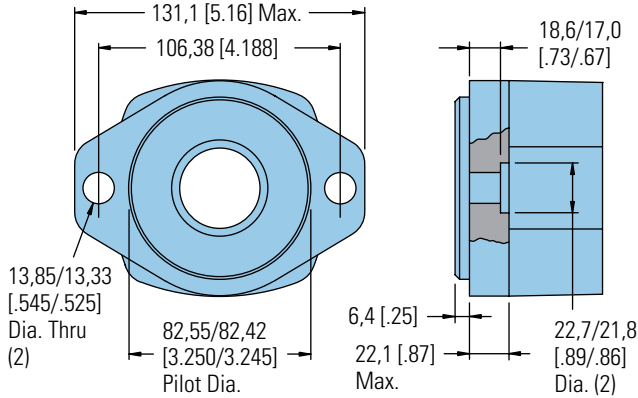
2000 Series

Dimensions

Mounting Options

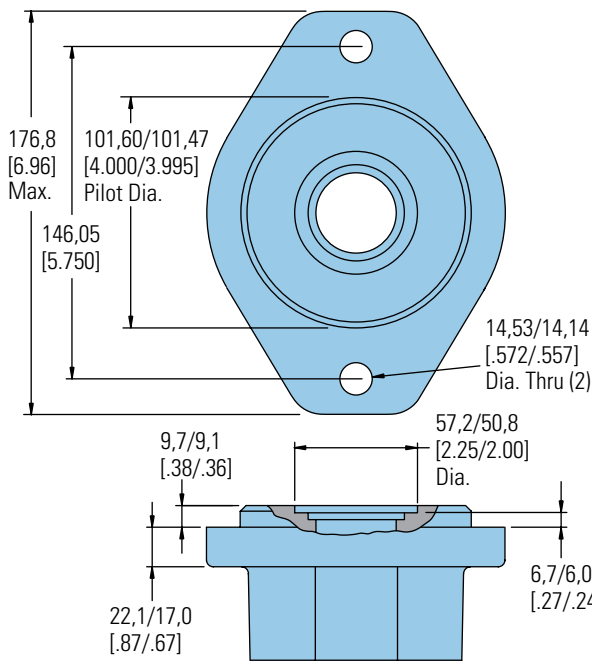
Mounting Code : AC

SAE A – Two Bolt (Standard Motor)



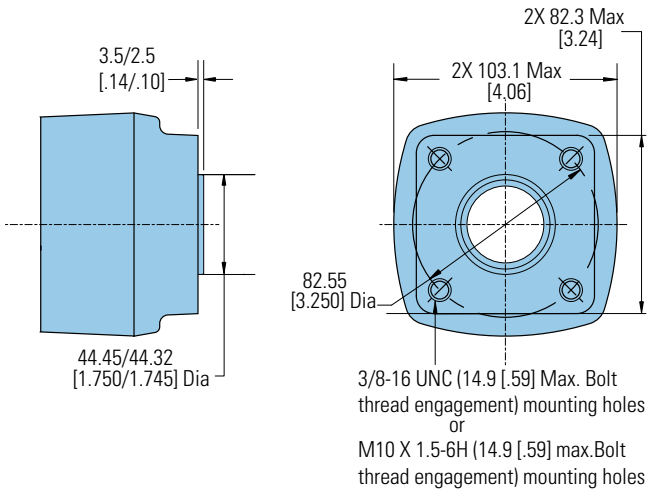
Mounting Code: AF

SAE B – Two Bolt



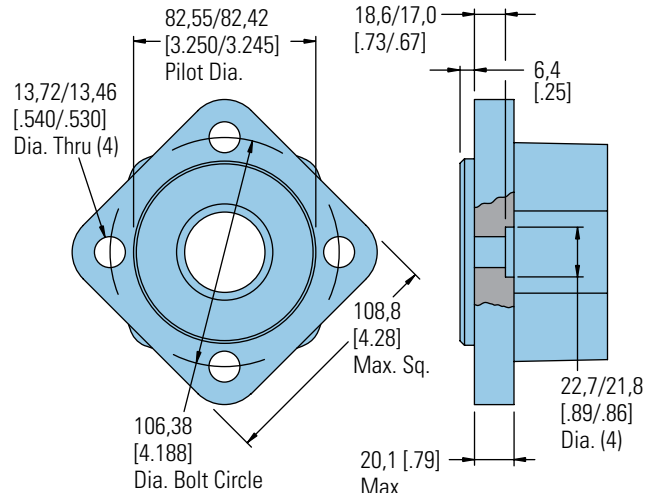
Mounting Code: BY

Four Bolt (Standard Motor)



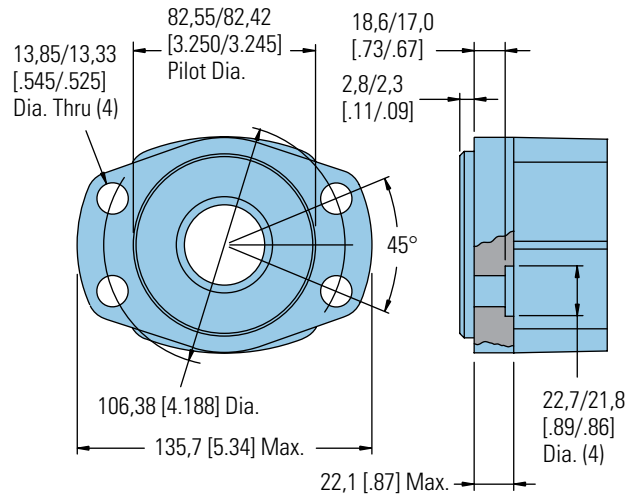
Mounting Code : AH

Four Bolt



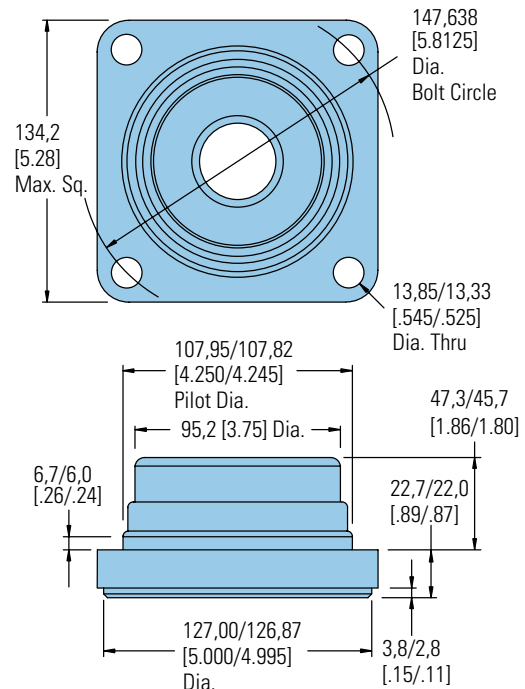
Mounting Code : AJ

Four Bolt Magneto



Mounting Code : AB

Four Bolt (Wheel Motor)

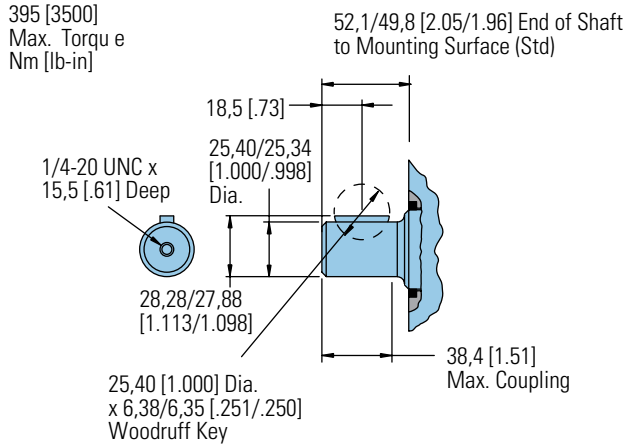


2000 Series

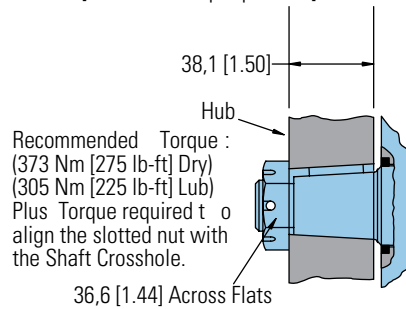
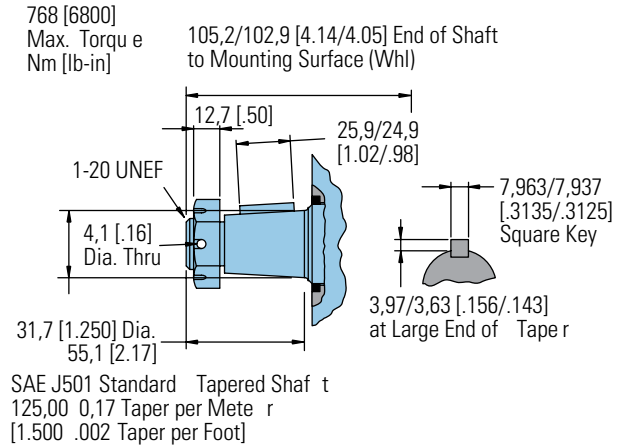
Dimensions

Shafts

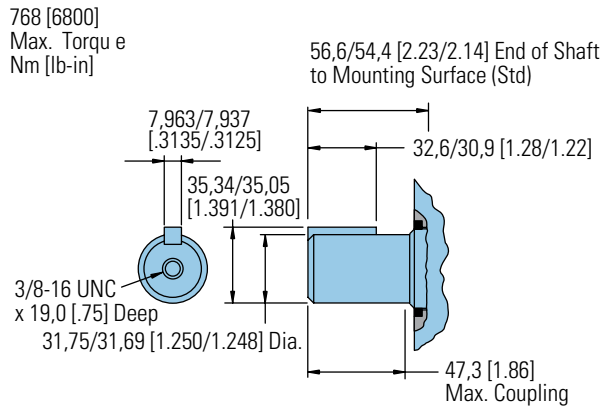
Shaft Code: 01 1 Inch Straight



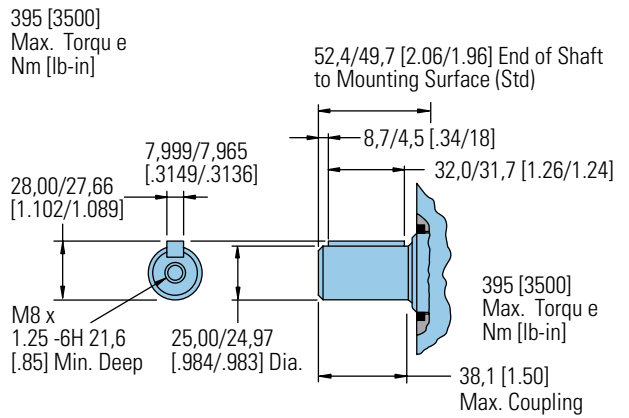
Shaft Code: 03 1 1/4 Inch Tapered



Shaft Code: 02 1 1/4 Inch Straight



Shaft Code: 19 25 mm Straight

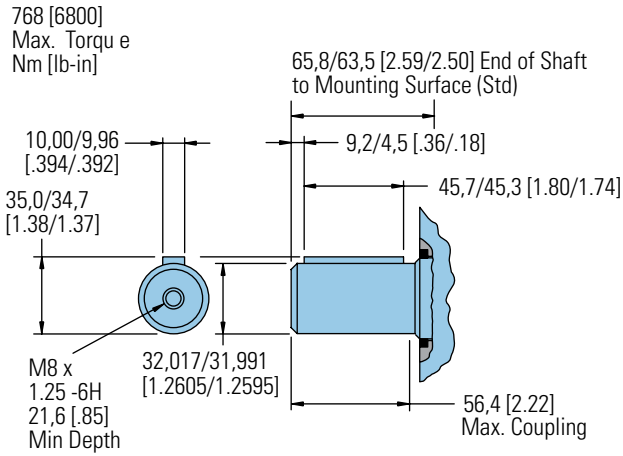


2000 Series

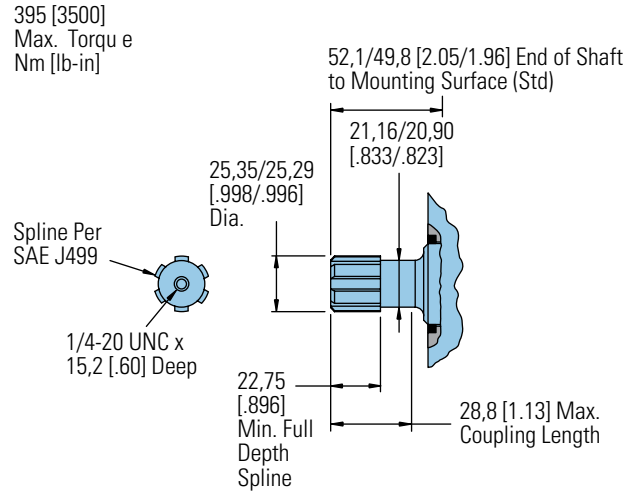
Dimensions

Shafts

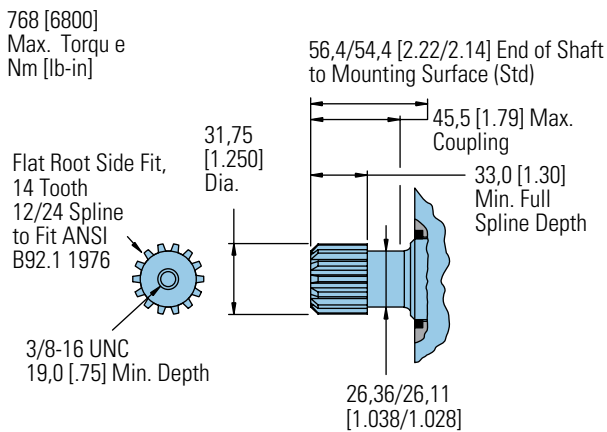
Shaft Code: 16 32 mm Straight



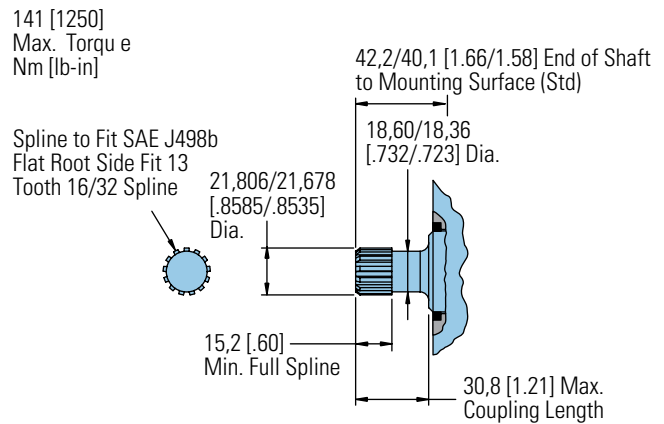
Shaft Code: 05 SAE 6B Splined



Shaft Code: 04 1 1/4 -14 Tooth Splined



Shaft Code: 07 13 Tooth Splined



2000 Series

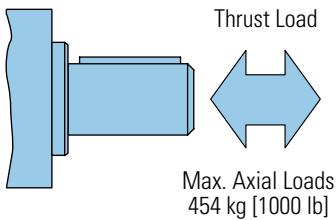
Shaft Side Load Capacity

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

Note:

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 61 kg/7 Bar [135 lb/100 PSI].

Each curve is based on B 10 bearing life (2000



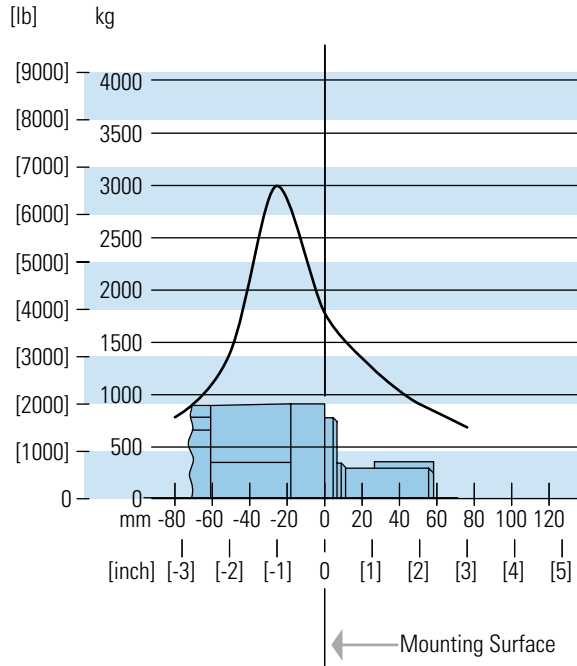
hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

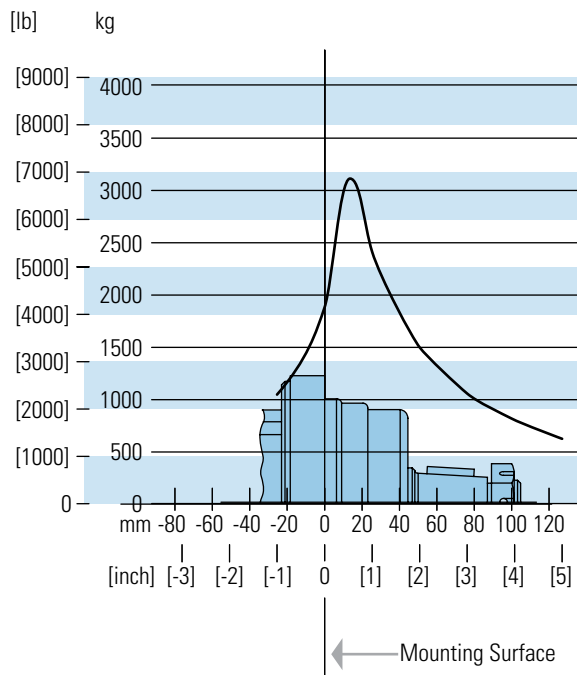
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

Standard Motor
Straight and Splined Shafts



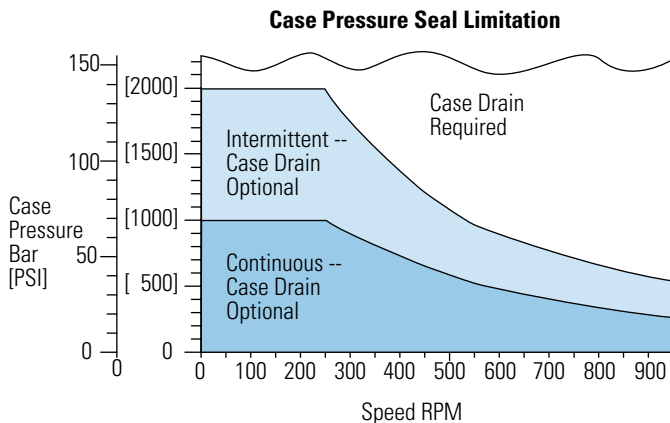
Wheel Motor
Tapered Shaft



2000 Series

Case Pressure and Case Porting

Char-Lynn 2000 Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation chart.



Case Porting Advantage

Contamination Control — flushing the motor case.

Cooler Motor — exiting oil draws motor heat away.

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

2000 Series

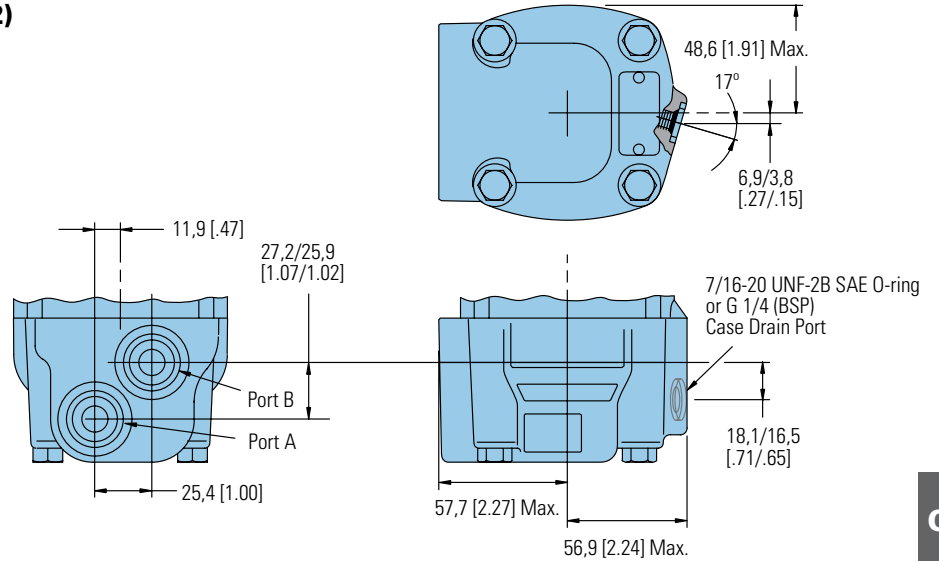
Dimensions

Ports

Port Code: AA

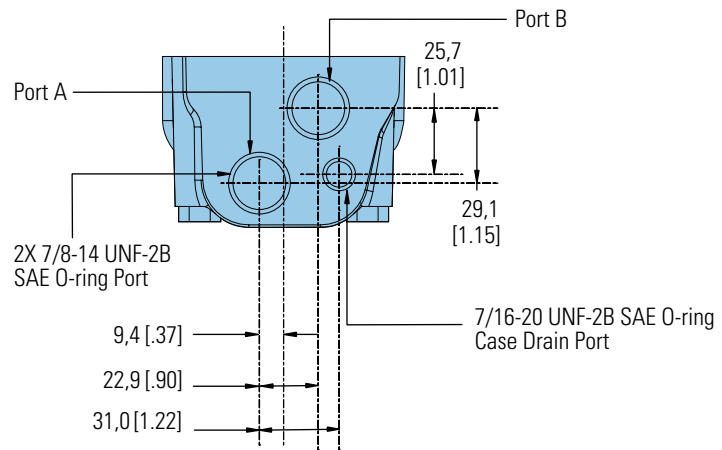
Port Code: AG

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



Case Flow Code: 23

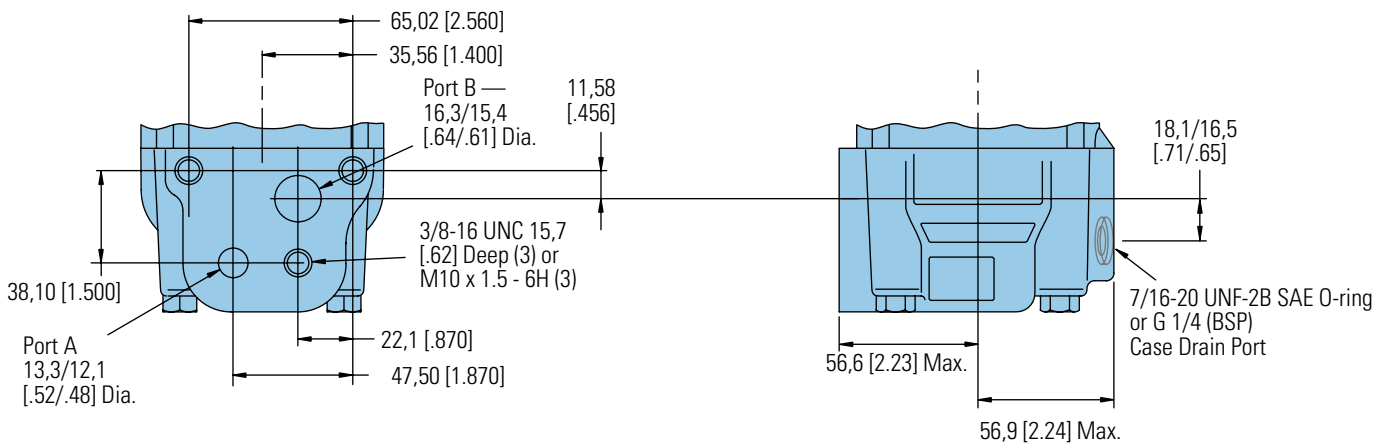
**7/8-14 UNF-2B SAE O-ring Ports (2)
with Top Ported Case Drain**



Port Code: AB

Port Code: AE

Manifold Mount



2000 Series

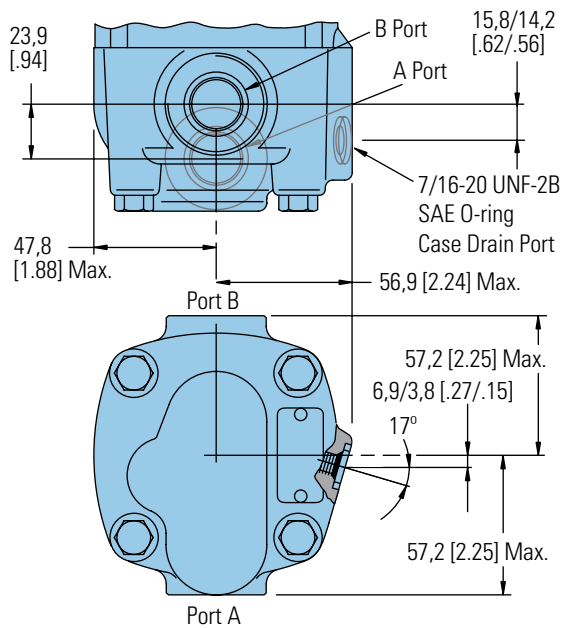
Dimensions

Ports

Port Code: AF

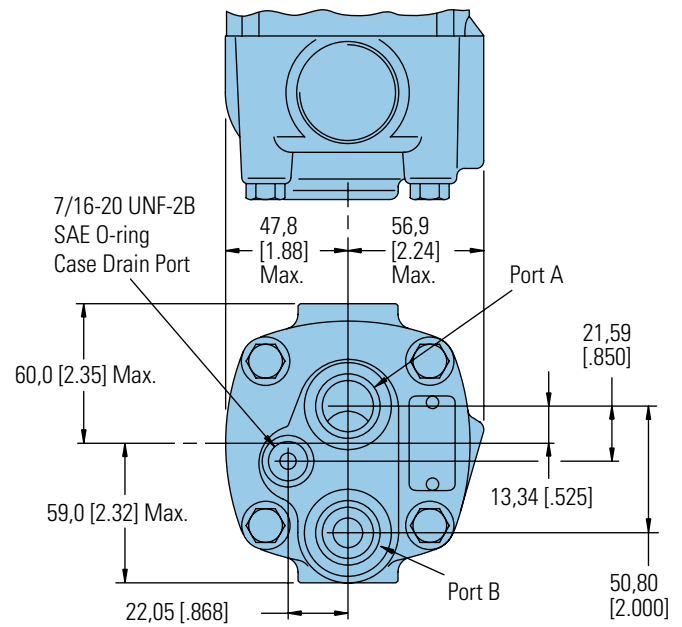
1-1/16-12 UN-2B SAE O-ring Ports (2)

Positioned 180° Apart



Port Code: AD

7/8-14 UNF-2B SAE O-ring End Ports (2)



2000 Series

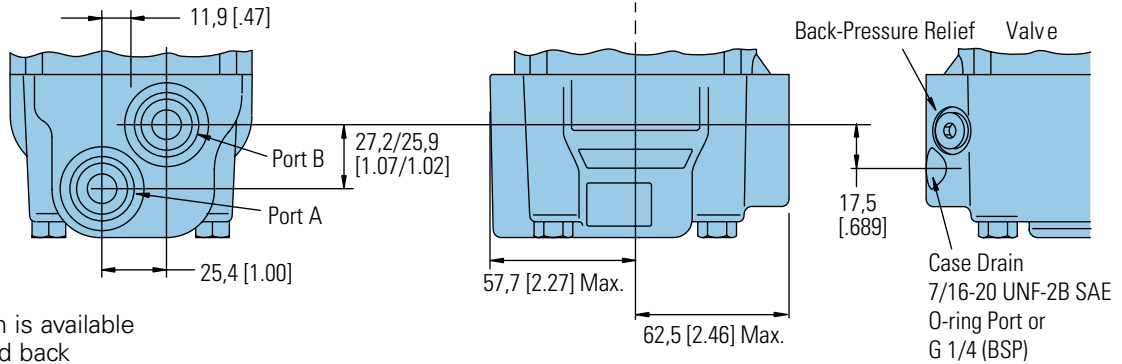
Dimensions

Ports with Shuttle

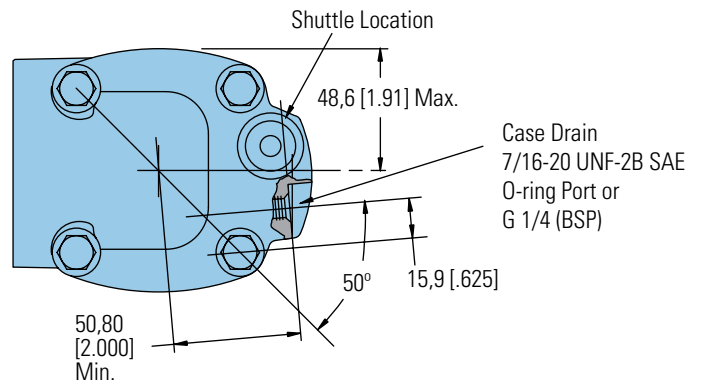
Port Code: AA

Port Code: AG

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

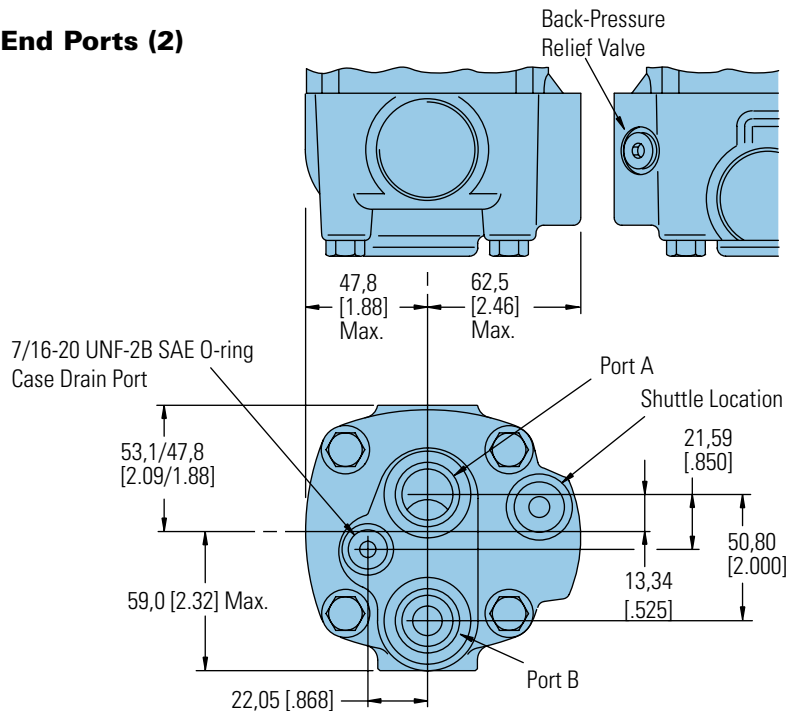


This port option is available with shuttle and back pressure relief valve for closed loop applications.



Port Code: AD

7/8 -14 UNF-2B SAE O-ring End Ports (2)



This port option is available with shuttle and back pressure relief valve for closed loop applications.

C-1

2000 Series

Product Numbers

Note:

For 2000 Series Motors with a configuration **Not Shown** in the charts below: Use model code number system on the next page to specify product in detail.

Use digit prefix — 104-, 105-, or 106- plus four digit number from charts for complete product number— Example 106-1043.

Orders will not be accepted without three digit prefix.

MOUNTING SHAFT	PORT SIZE	DISPL. cm ³ / r [in ³ / 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 1/4 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 1/4 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 1/4 Inch Straight	7/8-14 O-ring Staggered	104—	-1200	—	-1201	-1202	-1203	-1204	-1205	-1206	-1207	—
	1 1/4 Inch Involute SAE C Splined	7/8 -14 O-ring Staggered	104—	-1208	—	-1209	-1210	-1211	-1212	-1213	-1214	-1215	—
	1 Inch SAE 6B Splined	7/8 -14 O-ring Staggered	104—	-1193	—	-1194	-1195	-1196	-1197	-1198	-1199	—	—
	7/8 Inch SAE B Splined	7/8 -14 O-ring Staggered	104—	-1216	—	-1217	-1218	-1219	-1220	—	—	—	—
Standard with 4 Bolt Flange	32 mm Straight	G 1/2 (BSP))	104-4672	-1384	—	-1385	-1386	-1387	-1388	-1389	-1390	-1391	—
	1 1/4 Inch 14 T Splined	G 1/2 (BSP)	104—	-1376	—	-1377	-1378	-1379	-1380	-1381	-1382	-1383	—
Wheel Motor	1 1/4 Inch Straight	7/8 -14 O-ring Staggered	105—	—	—	—	—	—	—	—	—	—	-1148
		1 1/16 -12 O-ring 180° Apart	105—	—	—	—	—	—	—	—	—	—	—
	32 mm Straight	G 1/2 (BSP)	105—	-1134	—	-1135	-1136	-1137	-1138	-1139	-1140	-1141	—
	1 1/4 Inch Tapered	7/8 -14 O-ring Staggered	105—	-1001	—	-1002	-1003	-1004	-1005	-1006	-1007	-1060	-1152
		1 1/16 -12 O-ring 180° Apart	105—	-1071	—	-1072	-1073	-1074	-1075	-1076	-1077	-1078	—
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	105—	-1029	—	-1030	-1031	-1032	-1033	-1034	-1035	-1096	—
1 1/16 -12 O-ring 180° Apart		105—	-1079	—	-1080	-1081	-1082	-1083	-1084	-1085	-1086	—	
Bearingless	7/8 -14 O-ring Staggered		106—	-1008	—	-1009	-1010	-1011	-1012	-1013	-1014	-1015	-1047
	G 1/2 (BSP)		106—	-1038	—	-1039	-1040	-1041	-1042	-1043	-1044	-1045	—

*New Release

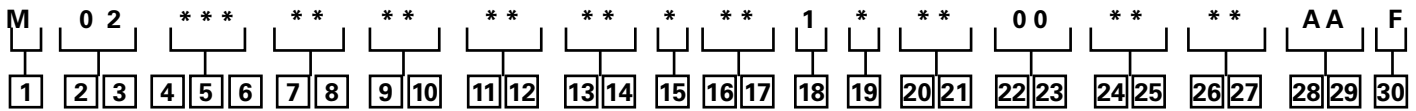
106-1044

MOUNTING SHAFT	PORT SIZE	DISPL. cm ³ / r [in ³ / 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—	-1516	—	-1536	-1537	-1538	-1539	-1452	-1479	-1509	-1489

*New Release

2000 Series

Model Code



The following 30-digit coding system has been developed to identify all of the configuration options for the 2000 Series motor. Use this model code to specify a motor with the desired features. All 30 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

1 Product
M – 2000 Series Motor

2, **3** Product Series
02 – 2000 Series Motor

4, **5**, **6** Displacement
021 - 34 cm³/r [2.07 in³/r]
025 - 40.8 cm³/r [2.49 in³/r]
040 - 66.5 cm³/r [4.06 in³/r]
049 – 80.6 cm³/r [4.92 in³/r]
055 – 90.6 cm³/r [5.53 in³/r]
062 – 101.6 cm³/r [6.20 in³/r]
080 – 130.6 cm³/r [7.97 in³/r]
096 – 158.1 cm³/r [9.65 in³/r]
119 – 194.8 cm³/r [11.89 in³/r]
149 – 244.3 cm³/r [14.91 in³/r]
187 – 306.6 cm³/r [18.71 in³/r]
240 – 393.8 cm³/r [24.03 in³/r]
298 – 489.0 cm³/r [29.84 in³/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 [5.35] Dia. Holes on 106.4 [4.19] Dia. Bolt Circle
AJ – Standard (Magneto), 4 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [5.35] 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.

9, **10** Output Shaft
00 – None (Bearingless)
01 – 25.40 [1.000] Dia. Straight Shaft with 1/4-20UNC-2B Thread in End, 6.35 [.250] Wide x 25.40 [1.000] Dia. Woodruff Key
02 – 31.75 [1.250] Dia. Straight Shaft with .375-16UNC-2B Thread in End, 7.938 [.3125] Sq x 31.75 [1.250] Straight Key
03 – 31.75 [1.250] Dia. .125:1 Tapered Shaft per SAE J501 with/1.000-20 UNEF-2A Threaded Shaft End and Slotted Hex Nut, 7.938 [.3125] Sq x 25.40 [1.0] Straight Key
04 – 31.75 [1.250] Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline w/ .375-16UNC-2B Thread in End, 33.0 [1.30] Min. Full Spline Length
05 – 25.40 [1.000] Dia. 6B Spline per SAE J499 with .250-20UNC-2B Thread in End, 22.76 [.896] Min. Full Spline Length
07 – 22.22 [.875] Dia. Flat Root Side Fit, 13 Tooth, 16/32 DP 30° SAE B Involute Spline, 15.2 [.60] Min. Full Spline Length
16 – 32.00 [1.260] Dia. Straight Shaft with M8 x 1.25-6H Thread in End, 9.982 [.3930] W x 7.995 [.3132] H x 45.00 [1.772] L Key
17 – 31.75 [1.250] Dia. Straight Shaft With 3/8 -16 UNC-2B Thread in End, 7.938 [.3125] Sq x 31.75 [1.250] Straight Key, Corrosion Resistant (Seal area to shaft end)
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
41 – 35.00 [1.378] Dia. 10:1 Tapered Shaft Per ISO R775 with M20 x 1.5-6g Threaded Shaft End and Slotted Hex Nut, 6.00 [.236] Sq. X 20.00 [.787] Key
42 – 35.00 [1.378] Dia. Straight Shaft with M8 x 1.25-6h Thread in End, 9.982 [.3930]W x 7.995 [.3132]H x 45.00 [1.772]L Key

11, **12** Ports
AA – .875-14 UNF-2B SAE O-ring Ports - Staggered Ports
AB – 12.70 [.500] and 15.88 [.625] Dia. Manifold Ports with 3 x .375-16 UNC-2B Port Block Mounting Holes
AC – .875-14 UNF-2B SAE O-ring Ports - Ports Oriented 180° to each other
AE – 12.70 [.500] And 15.88 [.625] Dia. Manifold Ports with 3 x M10 x 1.5-6H Port Block Mounting Holes
AF – 1.0625-12 UN-2B SAE O-ring Ports - Ports Oriented 180° to each other
AG – G-1/2 BSP Straight THD Ports - Staggered Ports
AN – G-1/2 BSP Straight THD Ports - End Ported
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
09 – Reverse Flow Shuttle Valve w/ G-1/4 BSP Straight THD Port, .062 Dia. Shuttle Flow Orifice
13 – Reverse Flow Shuttle Valve w/ .4375-20 UNF-2B SAE O-Ring Port, .062 Dia. Shuttle Flow Orifice

15 Low Pressure Relief
0 – None
A – Set at 4.5 bar [65 lbf/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
00 – 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]
51 – 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 Options
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 - Long Body Digital Speed Pickup (30 Pulse) 127 [5.0] Lead Wire With Packard Weather Pac Shroud Connector (A=Power, B=Signal, C=Common)
AD – M 12 Threaded Connector, Digital Speed Pickup (30 Pulse)
AG - M 12 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)

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 – Environmental coated black, individual box
BJ – Nickel plated motor (excluding shaft), individual box

28, **29** Customer ID
AA – None

30 Design Code
F – Sixth
Feature in bold are preferred and allow for shorter lead time



2000 Series Two-Speed

Description

The Eaton 2000 Series motors are available with an integral two speed feature that changes the displacement in a ratio of 1 to 2 and shifts the motor from a low speed high torque (LSHT) mode to a high speed low torque (HSLT) mode. The open center selector valve shifts the speed mode from low to high speed when pilot pressure of 6.9 Δ Bar [100 Δ 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 Δ Bar [100 Δ PSI] minimum, up to the full operating pressure of the motor.

In normal LSHT operation the Char-Lynn two speed motor will function with equal shaft output in either direction (CW or CCW), the same as the single speed Char-Lynn disc valve motors.

However, to prevent cavitation in the HSLT mode, the preferred direction of shaft rotation is counter clockwise (port B pressurized). This unique disc valve is not symmetrical in porting the fluid for the HSLT mode. Consequently, when the pressure is reversed for HSLT CW rotation, cavitation

can occur. Installing a restriction (200 psi or more depending on flow) in the hydraulic line that connects port B will prevent cavitation.

If you are operating in a critical area and a restriction in the hydraulic line causes concern, these two speed motors can be ordered timed with CW preferred HSLT shaft rotation. Hence, with this option port B will have to be pressurized for CW preferred HSLT shaft rotation. The restriction recommended for the line connecting port B remains unchanged.

Finally in closed circuit applications a hydraulic line restriction is not required. Instead, the charge pump can be used to supply and maintain a minimum pressure of 14 Bar [200 PSI].

Performance Data

In the high speed mode torque values are approximately one half with twice the speed of the conventional 2000 Series single speed motors.

In the low speed mode torque and speed values are the same as the conventional 2000 Series motors.

Note:

Low displacement (4.9 to 8.0 CID) motors have limited starting torque when started in high speed mode.

Be certain in closed loop applications that the charge pump when used for back pressure on the B port, has sufficient displacement to maintain charge pressure especially in dynamic braking or overrunning load conditions.

Important!

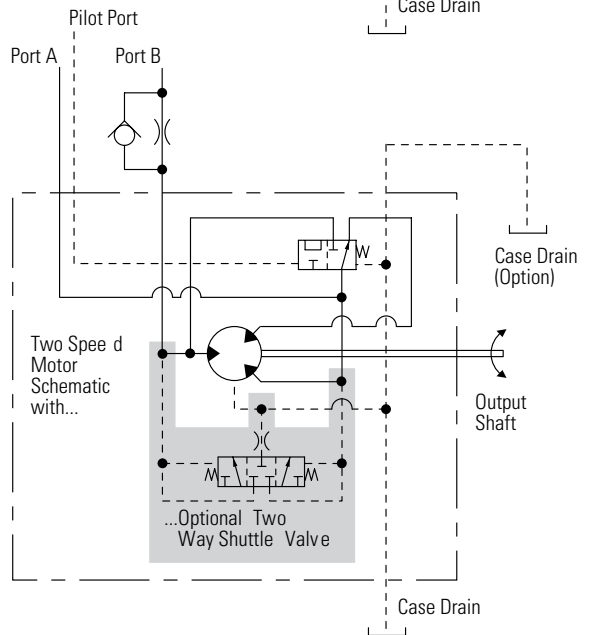
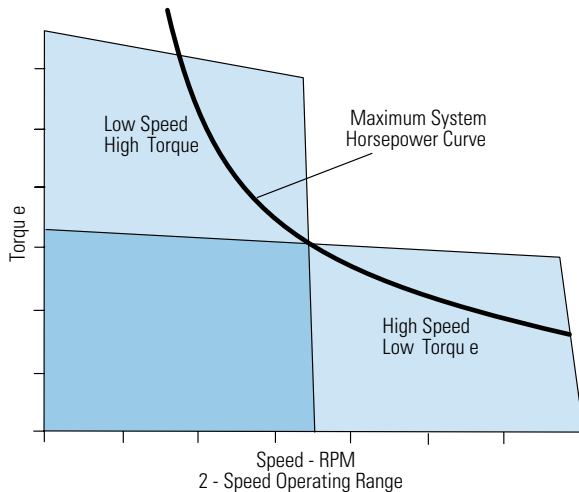
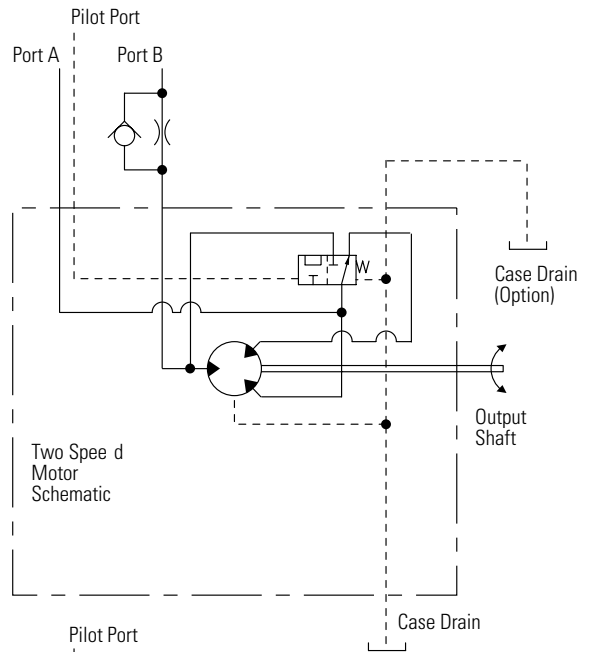
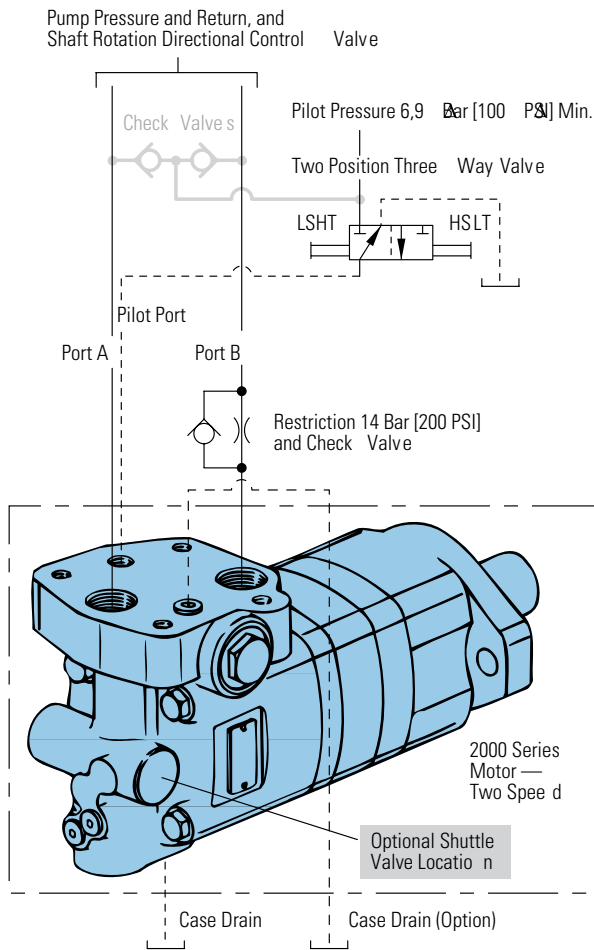
Due to potential problems in maintaining charge pump pressure at port B for uninterrupted back pressure during dynamic braking, Eaton does not recommend the two speed motor where overrunning conditions may exist.

2000 Series Two-Speed

Typical Hydraulic Circuit

Note:

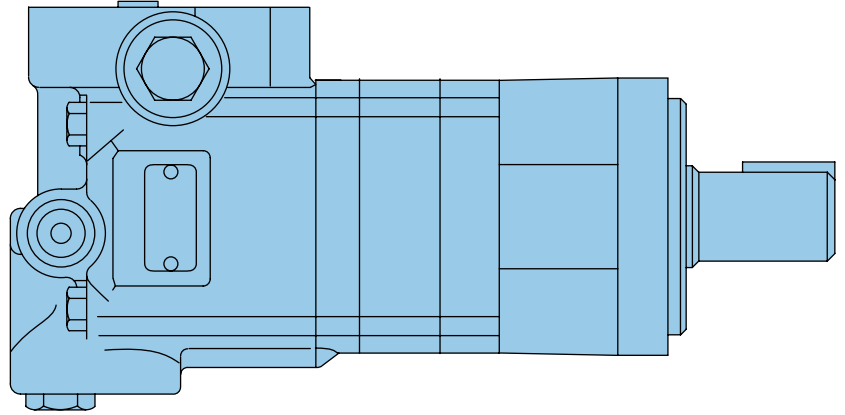
This is the low speed biased motor circuit. For the high speed biased motor motor circuit please contact your Eaton Hydraulics representative.



C-1

2000 Series Two-Speed

Specifications



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 Continuous	100 [880]	125 [1115]	165 [1450]	195 [1725]	240 [2150]	300 [2675]	380 [3350]	365 [3225]	448 [3970]
	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 Continuous	235 [2065]	295 [2630]	385 [3420]	455 [4040]	540 [4780]	660 [5850]	765 [6750]	775 [6840]	845 [7470]
	Intermittent	345 [3035]	445 [3950]	560 [4970]	570 [5040]	665 [5890]	820 [7250]	885 [7820]	925 [8170]	930 [8225]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	155 [2250]	120 [1750]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	260 [3750]	260 [3750]	260 [3750]	240 [3500]	190 [2750]	140 [2000]
Weight kg [lb]	Standard or Wheel Mount	13,8 [30.5]	14,1 [31.0]	14,3 [31.5]	14,5 [32.0]	15,0 [33.0]	15,4 [34.0]	15,9 [35.0]	16,3 [36.0]	16,8 [37.0]
	Bearingless	11,8 [26.0]	12,0 [26.5]	12,2 [27.0]	12,5 [27.5]	12,9 [28.5]	13,4 [29.5]	13,8 [30.5]	14,3 [31.5]	14,7 [32.5]

Maximum Case Pressure: See case pressure seal limitation graph.

*See shaft torque ratings for limitations.

Note:

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

High Speed Mode

(Reduced Motor Displacement)

Low Speed Mode

(Full Motor Displacement)

Maximum Inlet Pressure:

310 bar [4500 PSI]

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

Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.

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

Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

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

2000 Series Two-Speed

Dimensions

Standard and Wheel

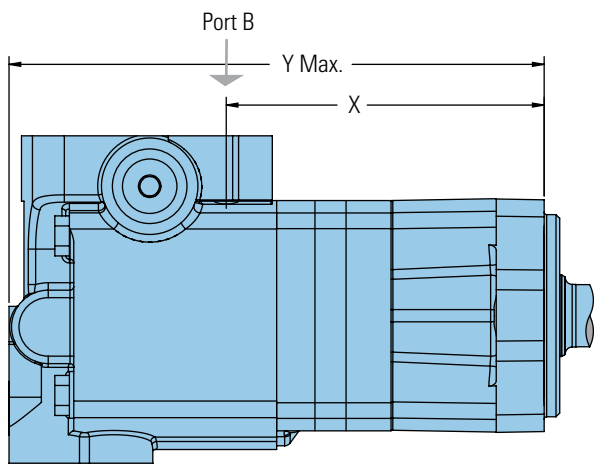
Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)
- G 1/4 (BSP) Pilot Control Port (1)

Standard Rotation Viewed from Shaft End

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

Two-Speed Standard Motors

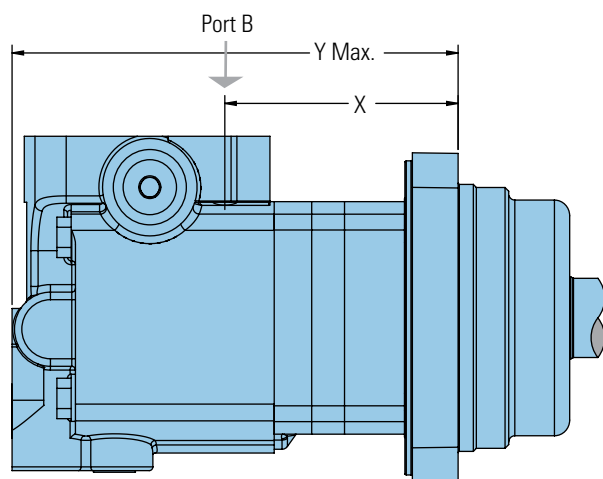


STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm 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]

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Two-Speed Wheel Motors



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]

2000 Series Two-Speed

Dimensions

Bearingless

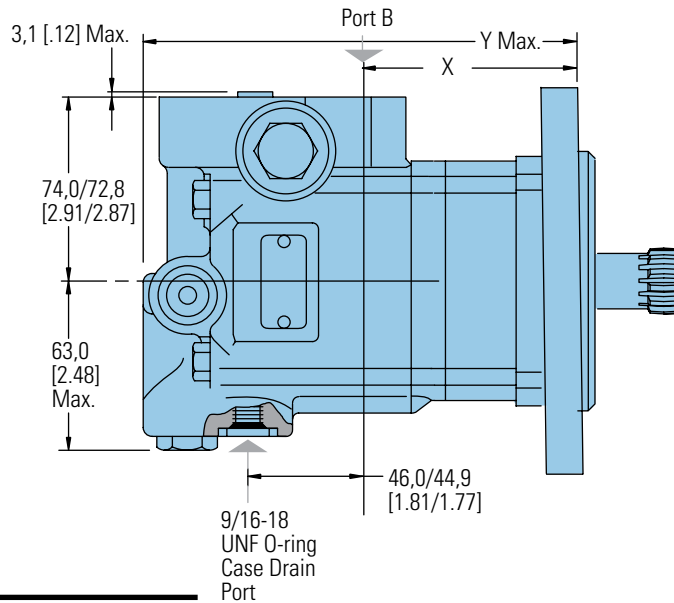
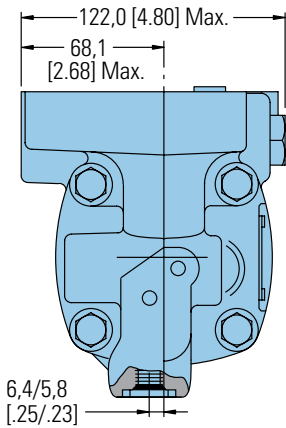
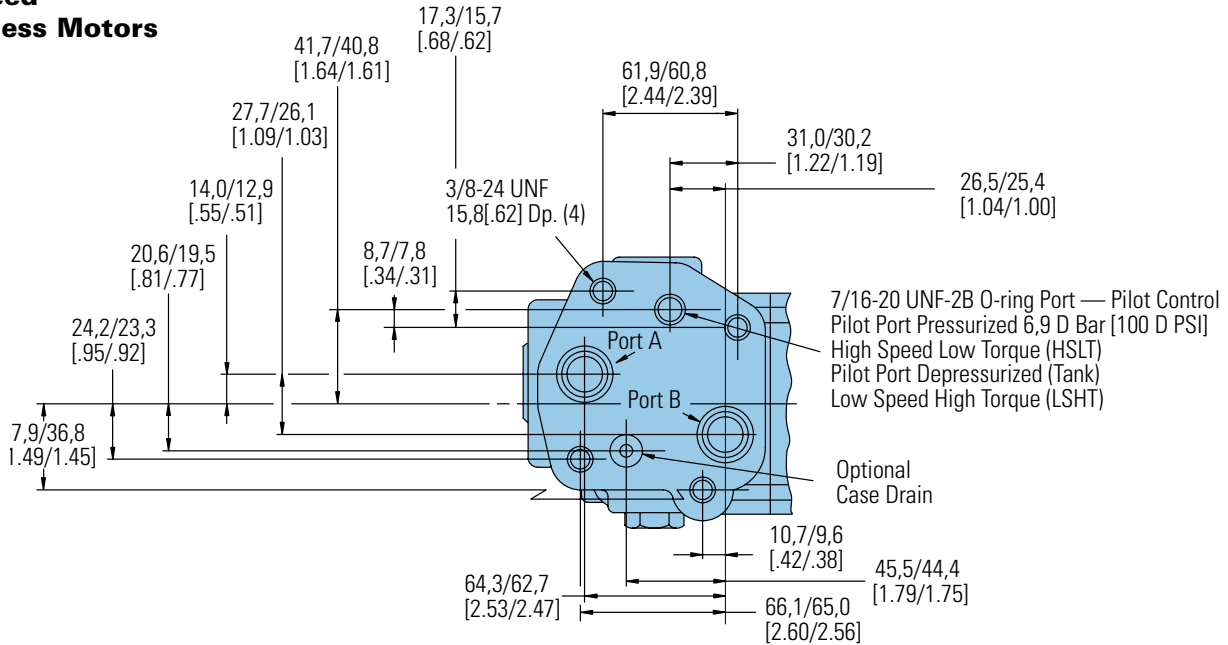
Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)
- G 1/4 (BSP) Pilot Control Port (1)

Standard Rotation Viewed from Shaft End

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

Two-Speed Bearingless Motors



BEARINGLESS MOTOR DIMENSIONS

Displacement cm 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]

2000 Series Two-Speed

Product Numbers

Note:

For 2000 Series Motors with a configuration **Not Shown** in the charts below, contact your Eaton Representative.

Use digit prefix — 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 [4.9]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
2 Bolt SAE A Flange	1 Inch Straight	7/8 -14 O-ring Staggered	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	-0223	-0224	-0225	-0226	-0227	-0228	-0229	—
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	193-0230-001	-0231	-0232	-0233	-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

2000 Series Two-Speed

Model Code (193-)

The following 30-digit coding system has been developed to identify all of the configuration options for the 2000 Series motor. Use this model code to specify a motor with the desired features. All 30 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

M	2	2	**	**	**	**	**	*	**	1	*	**	00	**	**	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

1 **Product**
M – Motor

2, 3 **Series**
22 – 2000 2 Speed Series
(1:2 Ratio)

4, 5, 6 **Displacement**
049 – 80.6 cm³/r [4.92 in³/r]
062 – 101.6 cm³/r [6.20 in³/r]
080 – 130.6 cm³/r [7.97 in³/r]
096 – 158.1 cm³/r [9.65 in³/r]
119 – 194.8 cm³/r [11.89 in³/r]
149 – 244.3 cm³/r [14.91 in³/r]
187 – 306.6 cm³/r [18.71 in³/r]
240 – 393.8 cm³/r [24.03 in³/r]
298 – 489.0 cm³/r [29.84 in³/r]

7, 8 **Mounting Description**
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
AE – 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
Dia Bolt Circle (European)

9, 10 **Output Shaft Description**
00 – None (Bearingless)
01 – 25.40 [1.000] Dia. Straight Shaft with 1/4-20UNC-2B Thread in End, 6.35 [.250] Wide x 25.40 [1.000] Dia. Woodruff Key
02 – 31.75 [1.250] Dia. Straight

Shaft with .375-16UNC-2B Thread in End, 7.938 [.3125] Sq x 31.75 [1.250] Straight Key
03 – 31.75 [1.250] Dia. .125:1 Tapered Shaft per SAE J501 with/1.000-20 UNEF-2A Threaded Shaft End and Slotted Hex Nut, 7.938 [.3125] Sq x 25.40 [1.0] Straight Key
04 – 31.75 [1.250] Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline w/ .375-16UNC-2B Thread in End, 33.0 [1.30] Min. Full Spline

11, 12 **Ports Description**
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

13, 14 **Case Flow Options / Selector Valve**
01 – .5625-10 UNF-2B SAE O-Ring Case Drain Port, .4375-20 UNF-2B SAE O-Ring Pilot Control Port, Optional
.4375-20 UNF-2B SAE Case Drain Port for Pilot Operated Normally Low Speed

15 **Shuttle Valve / Low Pressure Relief**
0 – NONE

16, 17 **Pressure / Flow Option**
00 – NONE

18 **Geroler Option**
1 – STANDARD

19 **Seal Option**
00 – Standard Seals
02 – Seal Guard
03 – Viton Seals
04 – Viton Shaft Seal
11 – High pressure shaft seal, slinger seal
19 – Extreme duty seal guard

20, 21 **Accessories**
00 – NONE

22, 23 **Special Features (Hardware)**
00 – NONE

24, 25 **Special Features (Assembly)**
00 – NONE

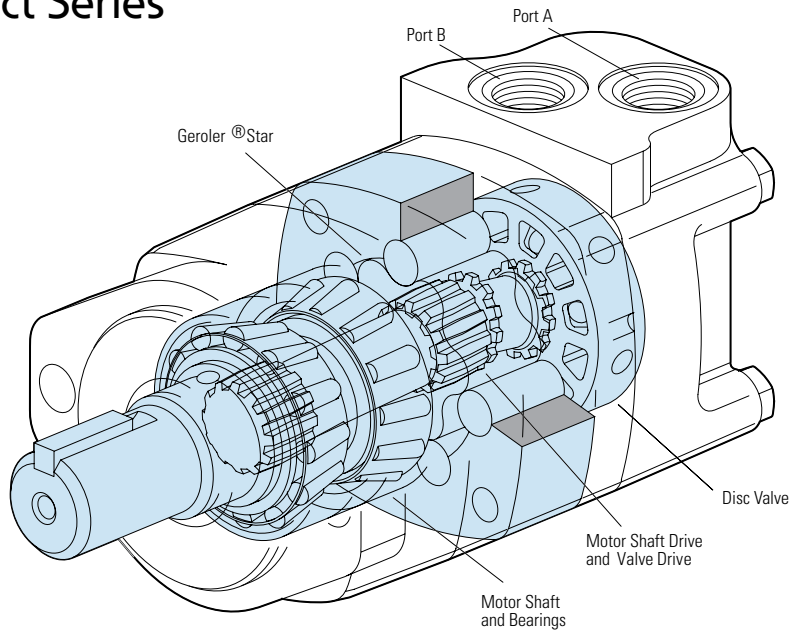
26, 27 **Paint / Packaging**
AA – No Paint, Individual Box
AB – Low Gloss Black Primer, Individual Box

28, 29 **Customer Identification**
AA – NONE

30 **Design Code**
A – FIRST

4000 Compact Series

Highlights



Features

- Shuttle Valve with Back-Pressure Relief Valve
- Speed Sensors
- End Ports.

Benefits

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

Applications

- Skid Steer Loaders
- Fairway Mowers
- Harvesters
- Vehicles where space may be at a premium.

Description

This new compact addition in a family of disc valve hydraulic motors produces the same amount of torque as the current 4000 Series. Yet, it is housed in an envelope similar to its smaller counterpart, the 2000 Series. The unit's intermittent torque rating is 1220 Nm [10800 lb-in]. A variety of mounting options include two 2 bolt mounts (SAE A, SAE B), and four 4 bolt mounts (magneto, standard and wheel mounts.) For added flexibility, the motor can be specified with either the larger size shafts of the 2000 Series of standard output shaft sizes of the 4000 Series, plus one new 1-1/2 inch straight (the small envelope and optional shaft sizes make this motor ideal for vehicles like skid-steer loaders whose hallmark is high power and productivity in a small frame.)

Specifications

Geroler Element	6 Displacements
Flow l/min [GPM]	75 [20] Continuous**
	115 [30] Intermittent*
Speed RPM	464 Cont.**
	699 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	300 [4500] Inter.*
Torque Nm [lb-in]	975 [8627] Cont.**
	1218 [10788] Inter.*

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

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



Lawn and Turf



Skid Steer



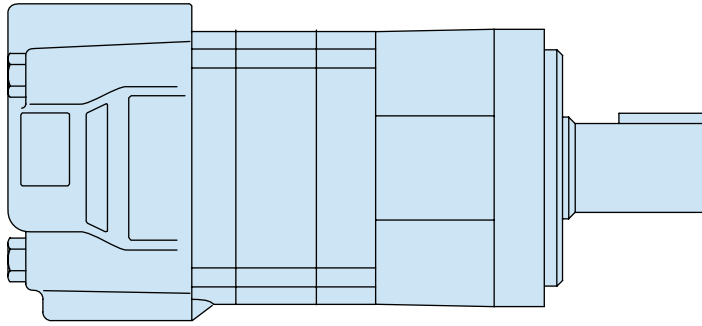
Boom Lift



Harvester

4000 Compact Series

Specifications



SPECIFICATION DATA – 4000 COMPACT SERIES MOTORS

Displ. cm 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	562	450	351	282	232
Flow l/min [GPM]	Continuous	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
	Intermittent	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]
Torque* Nm [lb-in]	Continuous	510 [4514]	758 [5715]	734 [6500]	793 [7021]	800 [7079]	975 [8627]
	Intermittent	690 [6108]	840 [7436]	935 [8272]	1053 [9320]	921 [8153]	1218 [10778]
Pressure Δ bar [Δ PSI]	Continuous	225 [3000]	225 [3000]	205 [3000]	170 [2500]	140 [2000]	140 [2000]
	Intermittent	310 [4500]	295 [4250]	260 [3750]	240 [3500]	170 [2500]	171 [2500]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	275 [4000]	260 [3750]
Weight kg [lb]	Standard or Wheel Mount	10,4 [23.0]	10,9 [24.0]	11,3 [25.0]	11,8 [26.0]	12,2 [27.0]	12,2 [27.0]
	Bearingless	8,4 [18.5]	8,8 [19.5]	9,3 [20.5]	9,8 [21.5]	10,2 [22.5]	10,2 [22.5]

Maximum Case Pressure: See case pressure seal limitation graph.

*See shaft torque ratings for limitations.

Note:

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

Maximum Inlet Pressure:

310 bar [4500 PSI]
Do not exceed Δ pressure rating (see chart above).

Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.
Do not exceed Δ pressure rating (see chart above).

Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:





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

4000 Compact Series

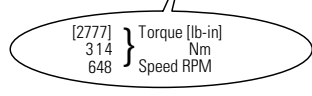
Performance Data

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

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

 Continuous
 Intermittent
 Peak
 No Operation

		160cm ³ /r [9.8 in ³ /r]																	
		ΔPressure Bar [PSI]																	
		[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
[0.25]		244	543																
	0,95	28	61																
		4	3																
[0.5]		274	554	854															
	1,9	31	63	96															
		10	8	7															
[1]		274	593	899	1210	1513	1816	2092	2361	2621	2874	3088							
	3,8	31	67	102	137	171	205	236	267	296	325	349							
		22	21	20	19	17	14	12	10	9	7	6							
[2]		301	623	940	1261	1579	1898	2197	2492	2766	3033	3270	3496	3761	4022				
	7,5	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				
[4]		305	662	1004	1354	1699	2046	2386	2725	3049	3368	3693	4016	4319	4618	4828	5022		
	15	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		
[6]		293	659	1003	1357	1705	2056	2399	2741	3074	3405	3751	4098	4417	4732	5023	5308		
	23	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		
[8]		280	656	1002	1360	1711	2066	2412	2758	3100	3442	3809	4180	4514	4846	5218	5593	5856	6108
	30	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
[10]		259	630	978	1348	1701	2061	2408	2755	3102	3450	3806	4163	4500	4835	5191	5547	5784	
	38	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	
[12]		238	604	954	1336	1692	2056	2403	2752	3105	3458	3802	4146	4485	4824	5163	5501		
	45	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		
[14]		210	577	923	1308	1665	2034	2385	2739	3092	3447	3796	4144	4487	4830				
	53	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				
[16]		182	550	893	1280	1638	2012	2367	2727	3080	3436	3789	4143	4489	4836				
	61	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				
[18]		143	514	853	1247	1601	1973	2329	2692	3045	3401	3756	4114						
	68	16	58	96	141	181	223	263	304	344	384	424	465						
		417	414	410	406	401	397	390	383	375	366	358	350						
[20]		105	478	814	1213	1564	1935	2291	2658	3010	3366	3724	4085						
	76	12	54	92	137	177	219	259	300	340	380	421	462						
		464	461	457	453	448	442	435	428	418	409	400	390						
[22]		433	762	1167	1518	1893	2252	2623	2973	3328	3682	4040							
	83	49	86	132	172	214	254	296	336	376	416	456							
		508	504	500	495	489	482	474	465	456	446	436							
[24]		387	711	1121	1472	1851	2212	2589	2937	3291	3641	3995							
	91	44	80	127	166	209	250	292	332	372	411	451							
		556	552	548	542	537	529	521	513	504	493	483							
[25]		41	77	124	163	206	247	289	329	369									
	95	580	576	572	566	560	552	544	535	526									
[30]		244	546	967	1308	1689	2045	2421	2777	3144									
	114	28	62	109	148	191	231	274	314	355									
		699	695	692	685	678	669	660	648	637									

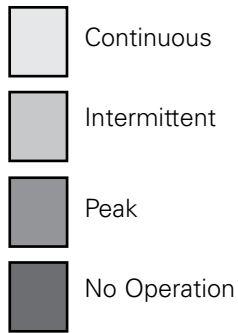


4000 Compact Series

Performance Data

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

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



200cm³/r [12.3 in³/r]
 ΔPressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260	[4000] 275	[4250] 295
[0.25]	115	504															
0.95	13	57															
[0.5]	4	3															
1.9	268	584	963	1274													
[1]	30	66	109	144													
3.8	8	7	4	3													
[2]	306	721	1104	1516	1913	2243	2397	2772									
[7.5]	35	81	125	171	216	253	271	313									
15	17	16	14	13	12	10	9	6									
[4]	402	841	1218	1647	2107	2478	2826	3238	3954	4451	4755	5127	5407	5569	5855		
[15]	45	95	138	186	238	280	319	366	447	503	537	579	611	629	662		
[23]	35	34	32	31	30	28	27	24	29	26	23	21	17	11	8		
[30]	403	896	1361	1780	2247	2649	3068	3513	3947	4367	4710	5125	5509	5880	6249	6547	6753
[38]	46	101	154	201	254	299	347	397	446	493	532	579	622	664	706	740	763
[45]	72	70	69	68	66	65	62	60	56	53	50	46	42	37	31	24	19
[53]	385	863	1354	1785	2260	2657	3087	3547	3965	4389	4793	5218	5610	6015	6408	6754	7436
[61]	44	98	153	202	255	300	349	401	448	496	542	590	634	680	724	763	840
[68]	109	107	106	104	102	100	97	93	90	86	81	77	72	66	60	52	47
[76]	368	831	1347	1790	2273	2665	3106	3581	3982		4876	5311	5712	6151	6567	6961	7334
[83]	42	94	152	202	257	301	351	405	450	498	551	600	645	695	742	786	829
[91]	147	146	144	142	140	137	134	130	127	122	117	113	108	103	98	91	83
[95]	353	822	1319	1774	2212	2642	3086	3556	3974	4410	4839	5297	5715	6147	6563		
[102]	40	93	149	200	250	299	349	402	449	498	547	598	646	695	742		
[110]	185	184	181	179	177	174	170	165	161	156	151	146	140	134	129		
[118]	339	813	1291	1758	2151	2620	3067	3530	3965	4408	4802	5283	5718	6144	6568		
[126]	38	92	146	199	243	296	346	399	448	498	543	597	646	694	742		
[134]	223	222	219	217	214	211	207	202	197	192	186	180	174	167	164		
[142]	282	762	1237	1693	2121	2601	2968	3504	3953	4368	4832	5261	5690				
[150]	32	86	140	191	240	294	335	396	447	493	546	594	643				
[158]	261	260	257	255	252	248	244	238	233	227	221	214	208				
[166]	224	712	1183	1629	2091	2581	2870	3477	3940	4328	4861	5240	5661				
[174]	25	80	134	184	236	292	324	393	445	489	549	592	640				
[182]	299	298	296	293	290	286	282	275	269	263	256	249	243				
[190]	200	667	1148	1619	2053	2520	2899	3442	3906	4337	4819	5245	5644				
[198]	23	75	130	183	232	285	328	389	441	490	544	593	638				
[206]	337	336	334	331	328	324	320	314	307	301	293	285	278				
[214]	176	623	1112	1609	2014	2458	2929	3407	3872	4347	4777	5250	5627				
[222]	20	70	126	182	228	278	331	385	437	491	540	593	636				
[230]	375	374	372	369	366	363	358	353	346	339	331	322	315				
[238]		565	1053	1530	1934	2387	2868	3347	3804	4254	4698						
[246]		64	119	173	219	270	324	378	430	481	531						
[254]		412	410	407	404	401	396	390	383	375	367						
[262]		507	994	1450	1855	2316	2806	3287	3737	4162	4618						
[270]		57	112	164	210	262	317	371	422	470	522						
[278]		449	448	446	443	439	434	427	420	412	403						
[286]		465	950	1411	1820	2276	2768	3233	3688	4116	4493						
[294]		53	107	159	206	257	313	365	417	465	508						
[302]		468	467	464	462	458	453	446	439	431	423						
[310]		259	726	1214	1645	2072	2577	2961	3443	3889	3866						
[318]		29	82	137	186	234	291	335	389	439	437						
[326]		562	563	559	555	556	550	545	536	527	521						

[2072] } Torque [lb-in]
 234 } Nm
 556 } Speed RPM

4000 Compact Series

Performance Data

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

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

	Continuous
	Intermittent
	Peak
	No Operation

250cm³/r [15.4 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[0.5]	384 43 6	833 94 5													
1.9															
[1]	438 49 14	904 102 14	1403 158 13	1887 213 12	2359 267 11	2798 316 9	3221 364 8	3657 413 7	3822 432 4	4326 489 3					
3.8															
[2]	492 56 28	1054 119 27	1563 177 26	2081 235 25	2623 296 24	3160 357 23	3717 420 21	4147 469 17	4585 518 16	5070 573 13	5470 618 9	5721 646 7	5962 674 5		
7.5															
[4]	603 68 58	1183 134 56	1771 200 55	2275 257 54	2817 318 52	3364 380 50	3895 440 47	4495 508 44	5005 565 42	5496 621 38	5982 676 35	6500 734 32	7054 797 28	7519 850 24	7941 897 17
15															
[6]	587 66 88	1159 131 86	1741 197 84	2329 263 82	2815 318 80	3369 381 77	3951 446 74	4483 506 71	5021 567 67	5555 628 63	6068 686 59	6557 741 55	7131 806 50	7641 863 45	8107 916 38
23															
[8]	571 65 118	1135 128 116	1710 193 114	2384 269 112	2813 318 110	3375 381 107	4008 453 103	4471 505 100	5038 569 96	5613 634 92	6154 695 87	6614 747 83	7209 815 78	7763 877 73	8272 935 67
30															
[10]	552 62 148	1138 129 146	1671 189 144	2304 260 142	2804 317 139	3361 380 136	3950 446 131	4452 503 127	5006 566 123	5587 631 119	6123 692 113	6612 747 109	7201 814 102		
38															
[12]	532 60 178	1140 129 177	1631 184 175	2224 251 173	2796 316 170	3347 378 166	3892 440 161	4434 501 157	4974 562 146	5561 628 141	6093 688 136	6610 747 136	7193 813 129		
45															
[14]	441 50 209	1072 121 207	1600 181 205	2207 249 202	2754 311 199	3320 375 195	3888 439 190	4433 501 185	4958 560 179	5529 625 174	6066 685 168	6590 745 162			
53															
[16]	349 39 239	1003 113 237	1568 177 235	2190 247 233	2711 306 229	3292 372 225	3884 439 220	4431 501 214	4941 558 208	5496 621 202	6039 682 195	6570 742 189			
61															
[18]	306 35 269	940 106 267	1513 171 265	2114 239 263	2653 300 259	3251 367 255	3830 433 250	4380 495 243	4904 554 236	5446 615 230	5984 676 223	6518 736 214			
68															
[20]	263 30 300	876 99 298	1458 165 296	2038 230 293	2595 293 290	3210 363 285	3777 427 280	4328 489 272	4867 550 265	5395 610 259	5928 670 251	6471 731 241			
76															
[22]		826 93 328	1414 160 326	1991 225 323	2528 286 320	3144 355 315	3709 419 309	4262 482 302	4806 543 295	5354 605 288	5915 668 279				
83															
[24]		776 88 359	1370 155 356	1945 220 354	2462 278 350	3079 348 345	3642 411 339	4196 474 332	4745 536 325	5313 600 317	5901 667 308				
91															
[25]		732 83 374	1322 149 371	1959 221 369	2426 274 365	3026 342 360	3594 406 354	4153 469 347	4696 531 340	5152 582 333					
95															
[30]		509 57 450	1082 122 449	2029 229 445	2246 254 442	2761 312 437	3358 379 430	3939 445 423	4450 503 414	4347 491 413					
114															

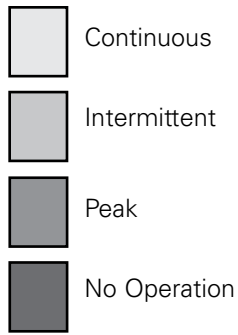
[2246]
254
442 } Torque [lb-in]
Nm
Speed RPM

4000 Compact Series

Performance Data

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



		325cm³/r [19.8 in³/r]													
		ΔPressure Bar [PSI]													
		[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
[0.5]	536	1152													
1,9	61	130													
[1]	5	4													
3,8	555	1220	1900	2559	3222	3862	4522	5061	5580	6106					
[2]	63	138	215	289	364	436	511	572	630	690					
7,5	11	10	10	9	9	8	7	5	3	3					
[4]	643	1349	2025	2712	3378	4051	4696	5335	5889	6366	6876				
15	73	152	229	306	382	458	531	603	665	719	777				
[6]	22	21	20	19	19	17	15	13	10	5	3				
23	679	1420	2140	2852	3557	4259	4947	5628	6300	6960	7596	8201	8767	9320	
[8]	77	160	242	322	402	481	559	636	712	786	858	927	991	1053	
30	45	44	43	42	40	38	36	33	30	26	23	19	14	11	
[10]	654	1400	2132	2859	3575	4281	4977	5668	6346	7021	7678	8244	8792		
38	74	158	241	323	404	484	562	640	717	793	868	931	993		
[12]	68	67	66	64	62	59	56	53	49	44	40	38	35		
45	629	1379	2125	2866	3592	4304	5007	5707	6392	7082	7760	8400			
[14]	71	156	240	324	406	486	566	645	722	800	877	949			
53	92	90	89	87	85	82	79	75	71	66	61	56			
[16]	587	1337	2082	2827	3556	4272	4976	5672	6362	7053					
61	66	151	235	319	402	483	562	641	719	797					
[18]	115	114	112	110	107	103	100	94	90	85					
68	546	1295	2040	2787	3520	4240	4944	5638	6332	7023					
[20]	62	146	230	315	398	479	559	637	715	794					
76	139	137	136	134	130	125	121	115	110	105					
[22]	489	1238	1984	2729	3467	4193	4903	5600	6293						
83	55	140	224	308	392	474	554	633	711						
[24]	162	161	159	157	153	148	143	136	131						
91	431	1182	1929	2671	3415	4145	4861	5562	6254						
[25]	49	134	218	302	386	468	549	628	707						
95	186	185	183	181	177	171	165	159	153						
[30]	360	1110	1856	2600	3343	4073	4794	5499							
114	41	125	210	294	378	460	542	621							
	210	208	206	204	200	195	189	183							
	288	1038	1784	2529	3271	4001	4726	5436							
	33	117	202	286	370	452	534	614							
	234	232	230	228	224	220	214	207							
		958	1706	2451	3194	3926	4650	5360							
		108	193	277	361	444	525	606							
		256	254	251	248	243	237	229							
		878	1628	2373	3116	3850	4574	5285							
		99	184	268	352	435	517	597							
		279	277	275	271	266	260	252							
		826	1576	2320	3063	3798	4523								
		93	178	262	346	429	511								
		291	289	287	283	277	271								
		566	1314	2056	2799	3536	4268								
		64	148	232	316	399	482								
		351	349	346	342	337	332								

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

4000 Compact Series

Performance Data

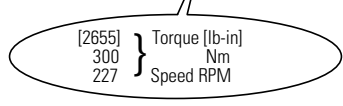
Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

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

	Continuous
	Intermittent
	Peak
	No Operation

405cm³/r [24.6 in³/r]
ΔPressure Bar [PSI]

	[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	8153
15	99	210	304	414	515	609	704	791	865	921
	35	34	32	30	28	25	23	19	16	11
[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			







4000 Compact Series

Performance Data

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

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

-  Continuous
-  Intermittent
-  Peak
-  No Operation

Flow LPM [GPM]

490cm³/r [29.8 in³/r]
ΔPressure Bar [PSI]

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

4000 Compact Series

Dimensions

Standard Mount

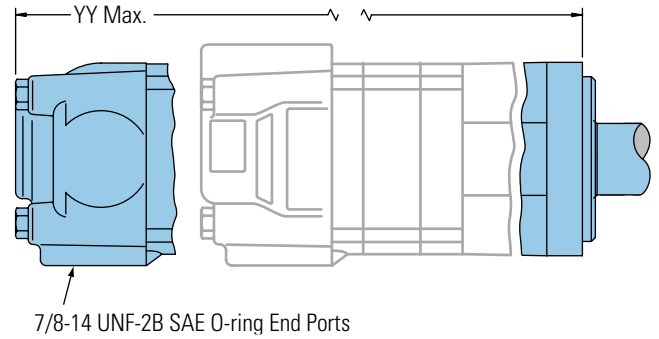
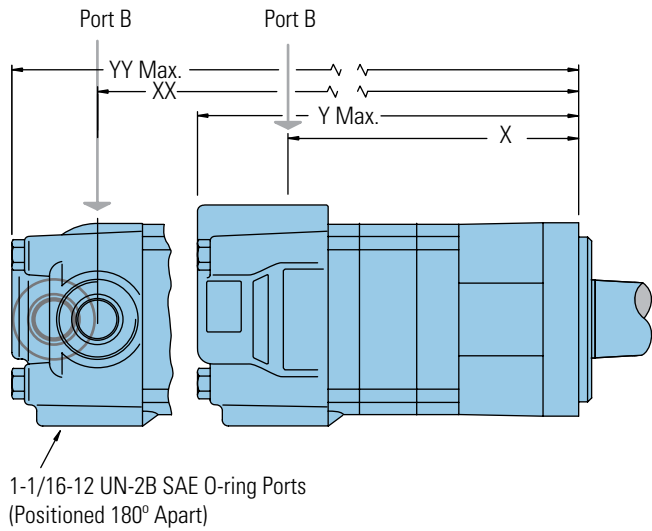
Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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

Standard Mount



C-2

STANDARD MOUNT MOTOR DIMENSIONS

Displacement	X	Y	XX	YY
cm ³ /r [in ³ /r]	mm [inch]	mm [inch]	mm [inch]	mm [inch]
160 [9.8]	154,7 [6.09]	201,9 [7.95]	157,0 [6.18]	203,3 [8.00]
200 [12.3]	163,8 [6.45]	211,1 [8.31]	166,1 [6.54]	212,3 [8.36]
250 [15.4]	175,3 [6.90]	222,5 [8.76]	177,5 [6.99]	223,8 [8.81]
325 [19.8]	191,0 [7.52]	238,5 [9.39]	193,3 [7.61]	239,8 [9.44]
405 [24.6]	208,5 [8.21]	255,8 [10.07]	210,8 [8.30]	257,0 [10.12]
490 [29.8]	208,5 [8.21]	255,8 [10.07]	210,8 [8.30]	257,0 [10.12]

4000 Compact Series

Dimensions

Wheel Mount

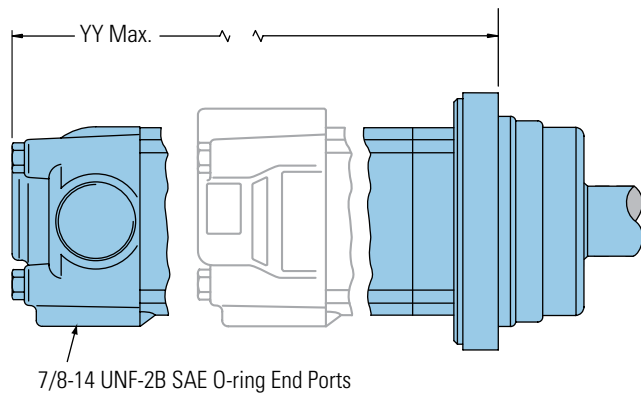
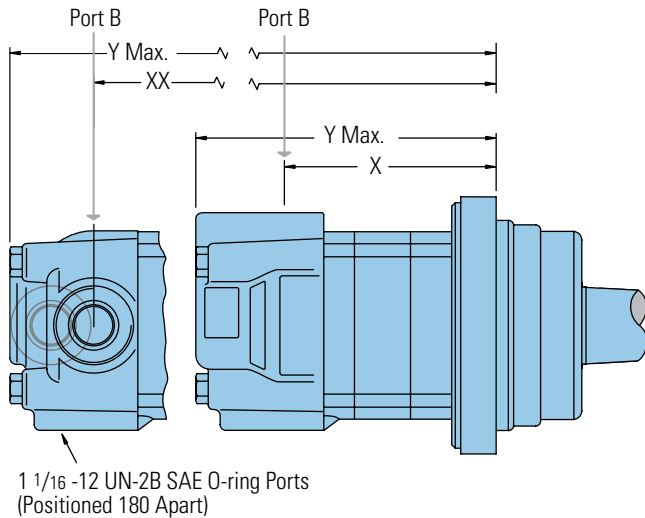
Ports

7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
 7/8 -14 UNF-2B SAE O-ring End Ports (2)
 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
 G 1/2 (BSP) Staggered Ports (2)
 G 1/4 (BSP) Case Drain Port (1) or
 Manifold Mount
 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

Port A Pressurized — CW
 Port B Pressurized — CCW

Wheel Mount



WHEEL MOUNT MOTOR DIMENSIONS

Displacement	X	Y	XX	YY
cm ³ /r [in ³ /r]	mm [inch]	mm [inch]	mm [inch]	mm [inch]
160 [9.8]	114,6 [4.51]	161,8 [6.37]	114,6 [4.51]	161,8 [6.37]
200 [12.3]	123,7 [4.87]	170,9 [6.73]	123,7 [4.87]	170,9 [6.73]
250 [15.4]	135,1 [5.32]	182,4 [7.18]	135,1 [5.32]	182,4 [7.18]
325 [19.8]	150,9 [5.94]	198,4 [7.81]	150,9 [5.94]	198,4 [7.81]
405 [24.6]	168,4 [6.63]	215,6 [8.49]	168,4 [6.63]	215,6 [8.49]
490 [29.8]	168,4 [6.63]	215,6 [8.49]	168,4 [6.63]	215,6 [8.49]

4000 Compact Series

Dimensions

Bearingless

Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

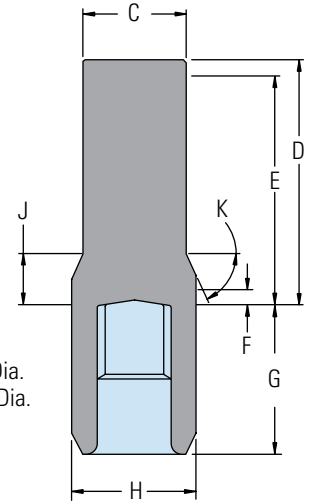
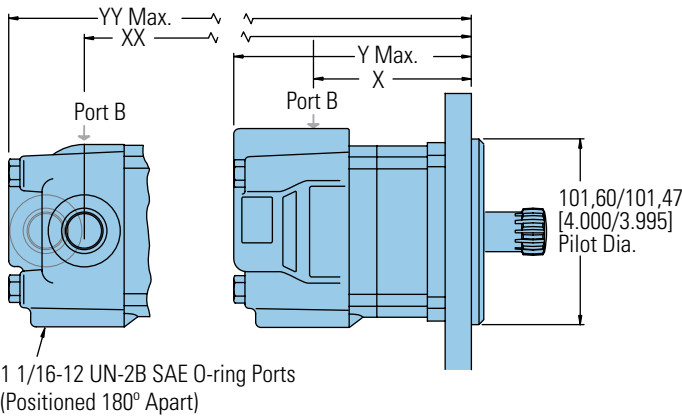
- Port A Pressurized — CW
- Port B Pressurized — CCW

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

Note:

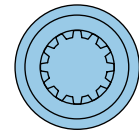
After machining blank, part must be hardened per Eaton specification.

Bearingless

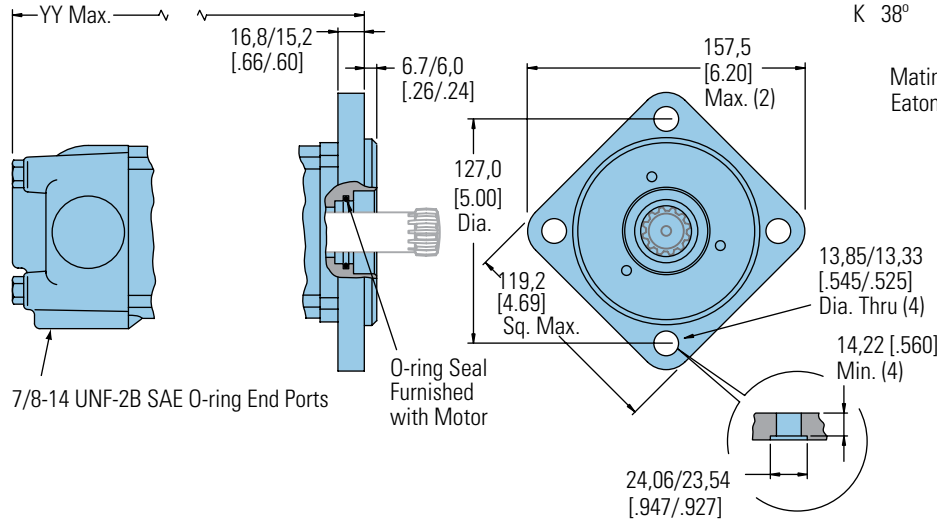


- C 47,2 [1.86] Dia.
- D 112,5 [4.43] Max.
- E 107,4 [4.23] Full Form Dia.
- F 7,4 [.29] Min. Full Form Dia.
- G 68,8 [2.71] Max.
- H 56,9 [2.24] Dia.
- J 18,29 [.720]
- K 38°

Mating Coupling Blank
Eaton Part No. 12745-003



C-2



BEARINGLESS MOTOR DIMENSIONS

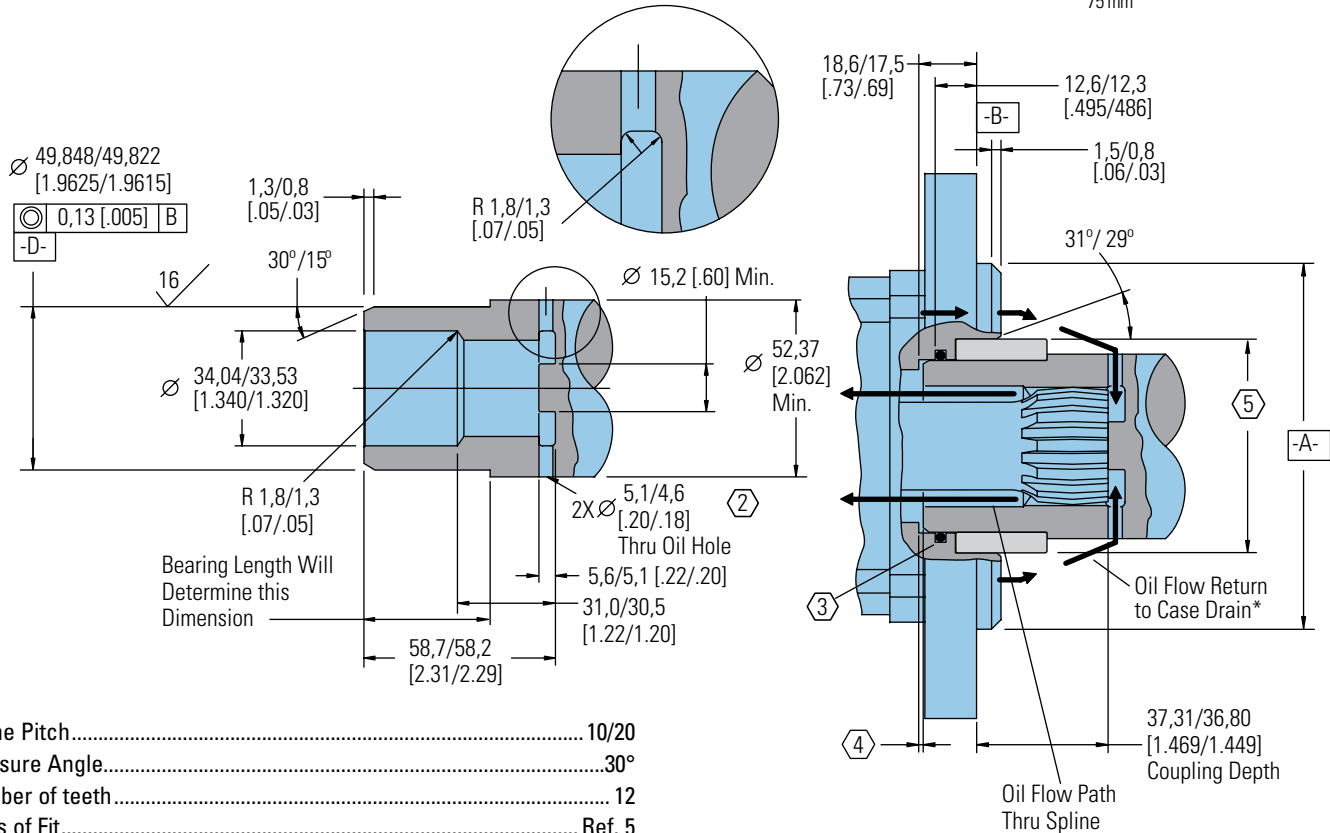
Displacement	X	Y	XX	YY
cm ³ /r [in ³ /r]	mm [inch]	mm [inch]	mm [inch]	mm [inch]
160 [9.8]	96,8 [3.81]	144,3 [5.68]	99,1 [3.90]	145,5 [5.73]
200 [12.3]	105,7 [4.16]	153,4 [6.04]	108,0 [4.25]	154,7 [6.09]
250 [15.4]	117,1 [4.61]	164,8 [6.49]	119,4 [4.70]	166,1 [6.54]
325 [19.8]	133,1 [5.24]	180,8 [7.12]	135,4 [5.33]	182,1 [7.17]
405 [24.6]	150,4 [5.92]	198,1 [7.80]	152,7 [6.01]	199,4 [7.85]
490 [29.8]	150,4 [5.92]	198,1 [7.80]	152,7 [6.01]	199,4 [7.85]

4000 Compact Series

Installation Information

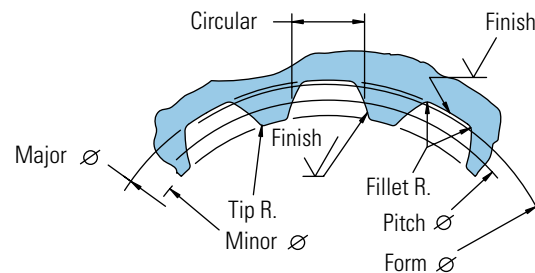
Bearingless

- 1 Internal spline in mating part to be per spline data specification. Material to be ASTM A304, 8620H vacuum degassed alloy steel carbonize to a hardness of 59-62 HRc with case depth (to 50HRc) of 0,76 - 1,02 [.030 - .040] dimensions apply after heat treat.
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.
- 4 Some means of maintaining clearance between shaft and mounting flange must be provided.
- 5 Counterbore designed to adapt to a standard sleeve bearing 50,010 - 50,040 [1.9689 - 1.9700] ID by 60,050 - 60,080 [2.3642 - 2.3653] (Oilite bronze sleeve bearing) Source: Beemer Precision Inc. www.oilite.com, 1-800-836-2340 AAM 50 mm ID - 60 mm OD Length Determined by the Customer.
Stock Bearing Lengths:
35 mm
50 mm
60 mm
70 mm
75 mm



Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 30,480000 [1.2000000] \nearrow 0,20 [.008] D
Base Diameter.....	Ref. 26,396455 [1.0392305]
Major Diameter.....	(33,43 [1.316] Max. 33,23 [1.308] Min.)
Minor Diameter.....	28,40 - 25,58 [1.118 - 1.125]
Form Diameter, Min.....	32,59 [1.283]
Fillet Radius.....	0,63 - 0,76 [.025 - .030]
Tip Radius.....	0,26 - 0,51 [.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 - .0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,045 [.1986]
Minimum Effective.....	4,995 [.1951]
Maximum Effective.....	Ref. 5,009 [.1972]
Minimum Actual.....	Ref. 4,986 [.1963]
Dimension Between Two Pins.....	Ref. 22,783 - 22,929 [.8970 - .9027]
Pin Diameter.....	5,334 [.2100] Pins to Have 3,73 [.147]

Wide Flat for Root Clearance

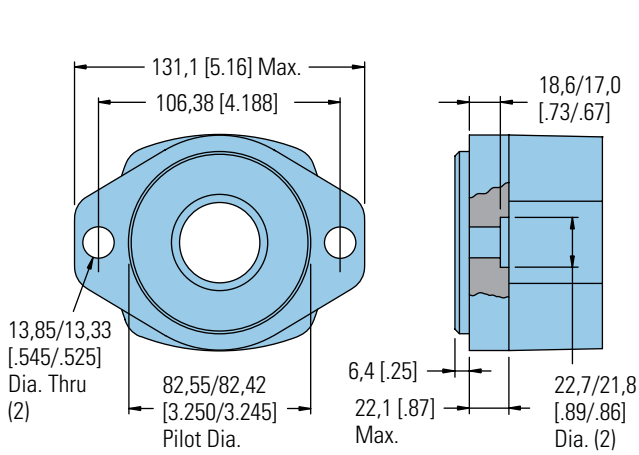


4000 Compact Series

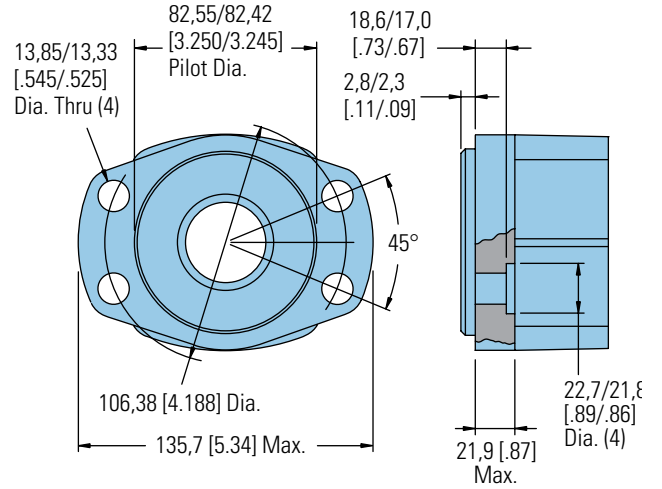
Dimensions

Mounting Options

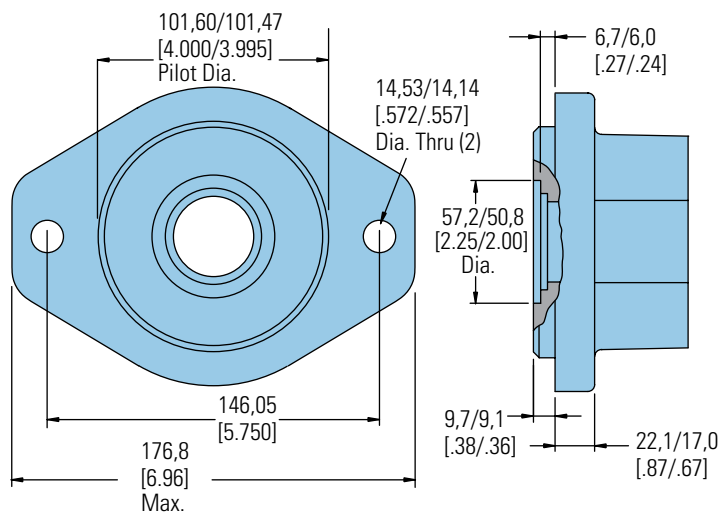
SAE A – Two Bolt (Standard Motor)



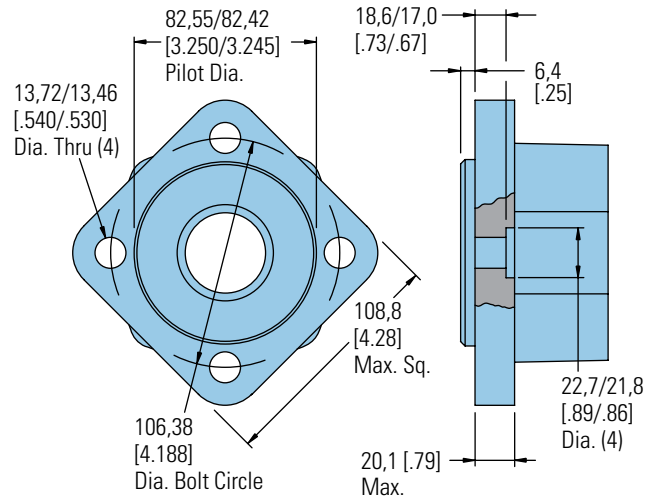
Four Bolt Magneto



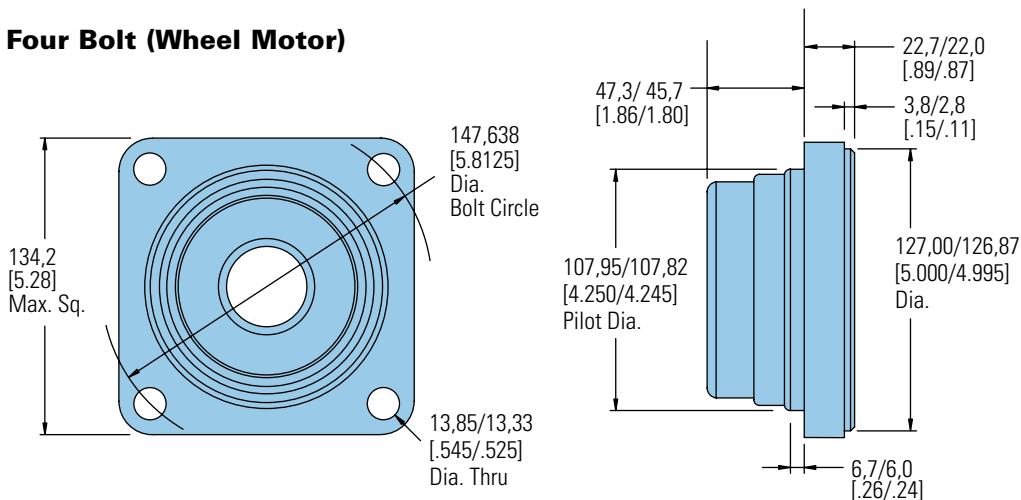
Two Bolt SAE B



Four Bolt



Four Bolt (Wheel Motor)



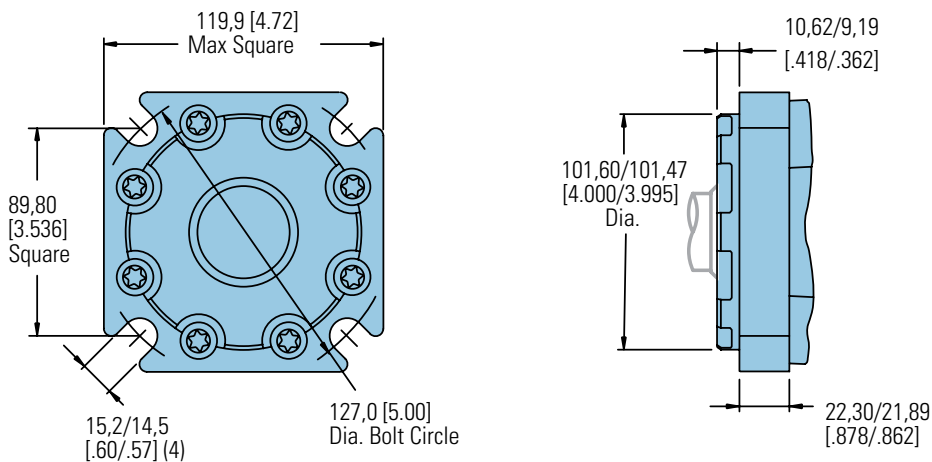
C-2

4000 Compact Series

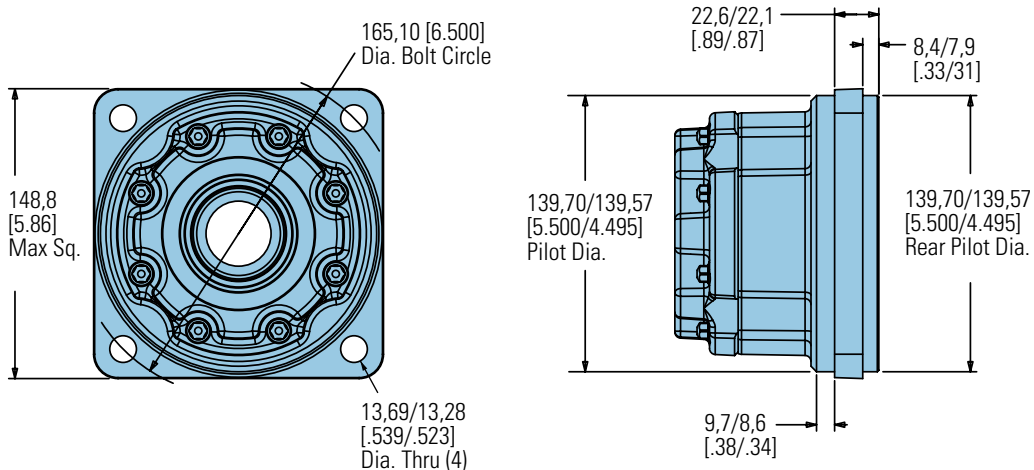
Dimensions

Mounting Options for use with Enhanced Bearings

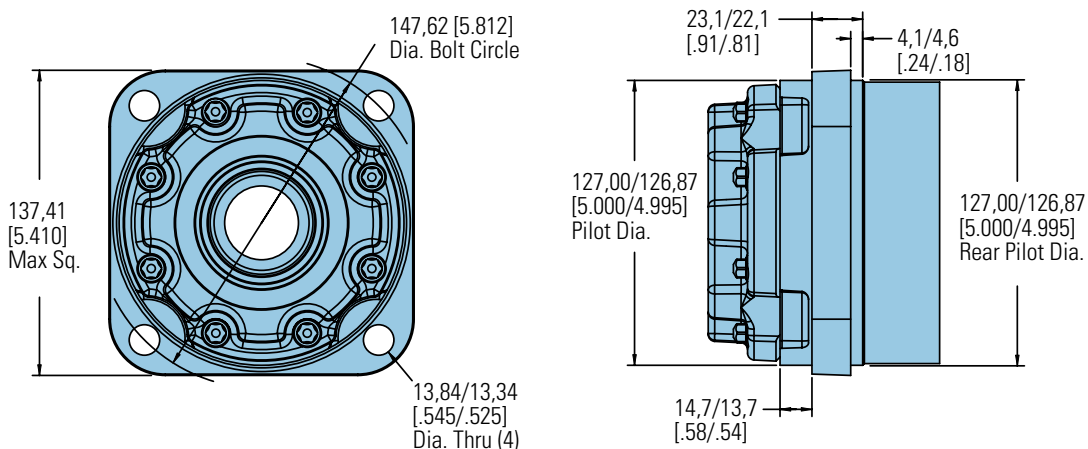
Standard Flange- Similar to SAE B type



Four Bolt (Wheel Motor)



Four Bolt (Wheel Motor- Short)

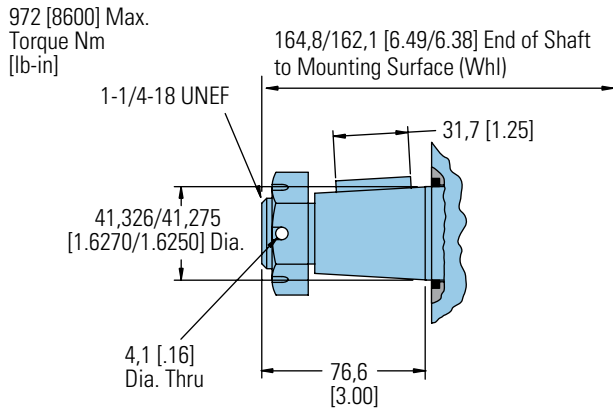


4000 Compact Series

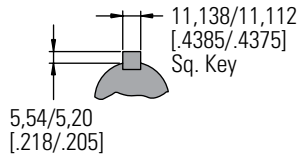
Dimensions

Shafts

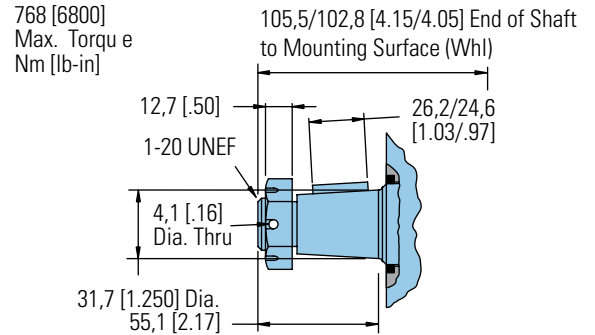
1-5/8 Inch Tapered



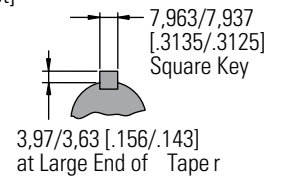
SAE J501 Standard Tapered Shaft
125,00 0,17 Taper per Meter
[1.500±.002 Taper per Foot]



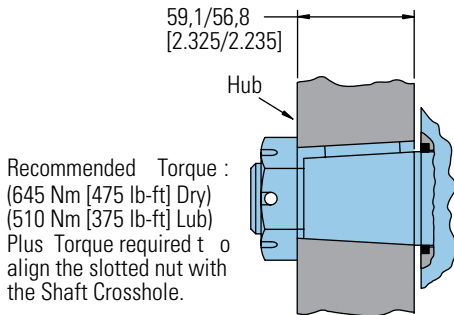
1-1/4 Inch Tapered



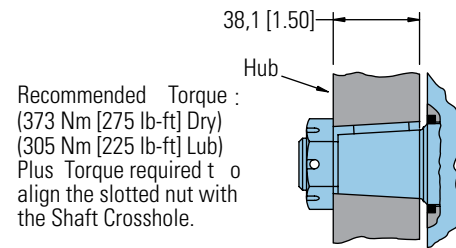
SAE J501 Standard Tapered Shaft
125,00 0,17 Taper per Meter
[1.500±.002 Taper per Foot]



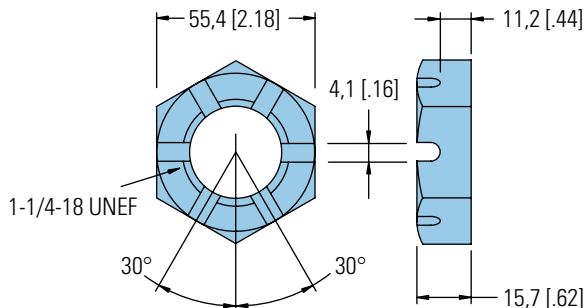
Tapered Shaft Hub Data



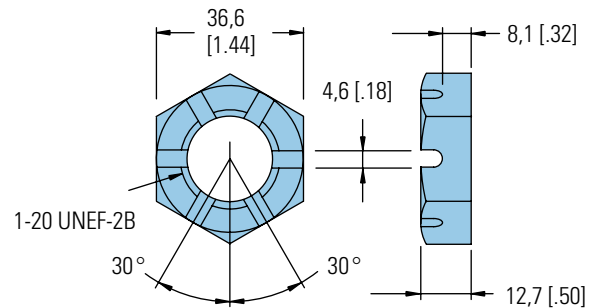
Tapered Shaft Hub Data



Slotted Hexagon Nut



Slotted Hexagon Nut

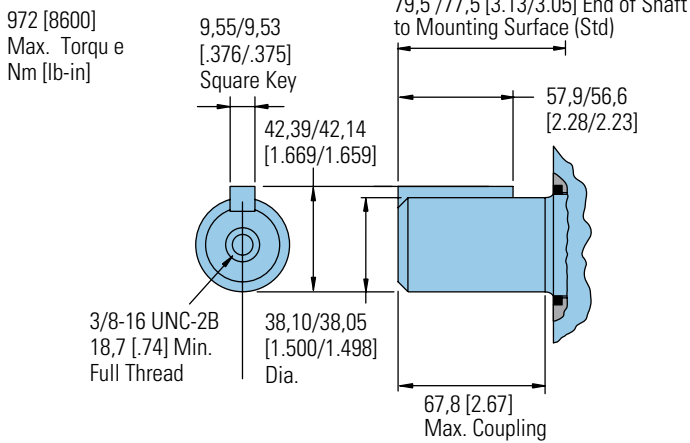


4000 Compact Series

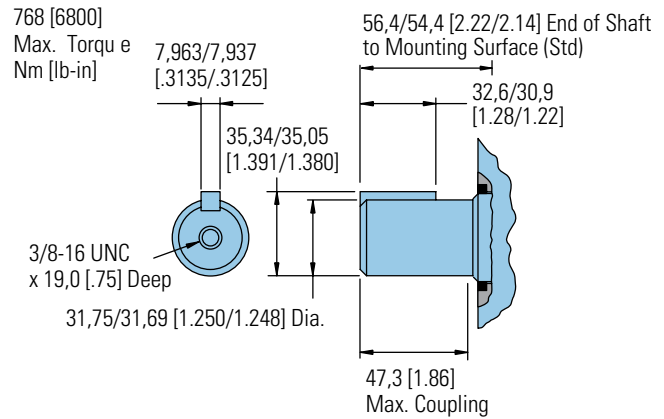
Dimensions

Shafts

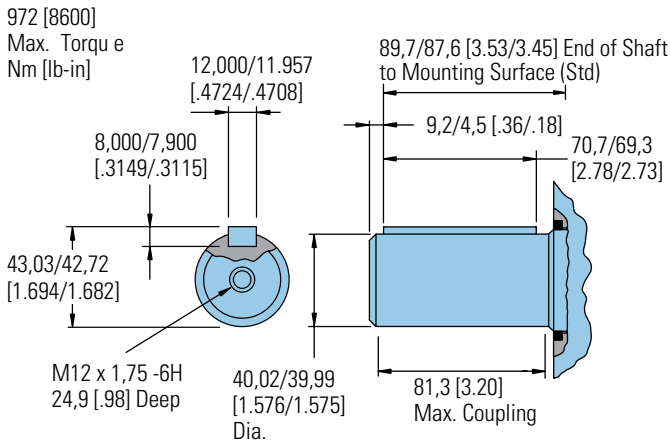
1-1/2 Inch Straight



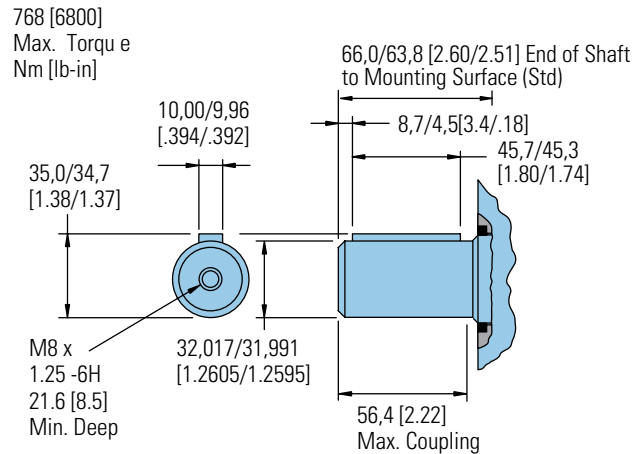
1-1/4 Inch Straight



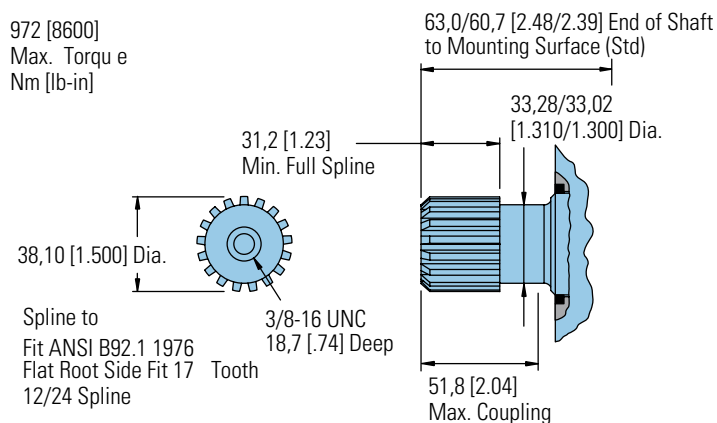
40 mm Straight



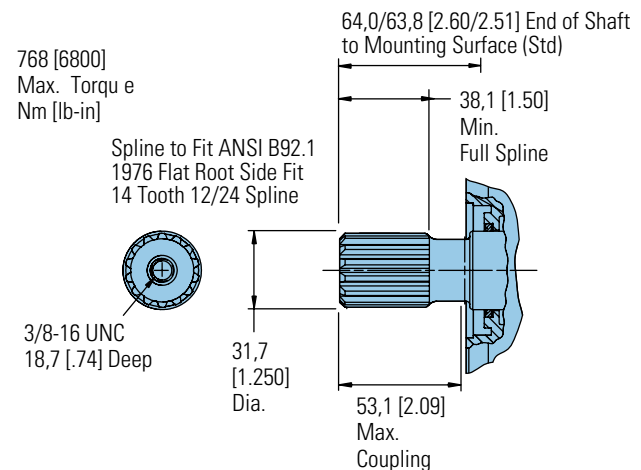
32 mm Straight



1-1/2 Inch 17 Tooth Straight



1-1/4 Inch 14 Tooth Splined



4000 Compact Series

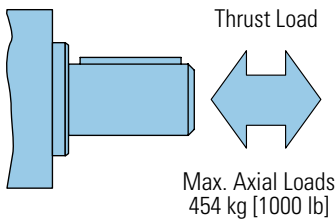
Shaft Side Load Capacity

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

Note:

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 94 kg/7 Bar [208 lb/100 PSI].

Each curve is based on B 10 bearing life (2000



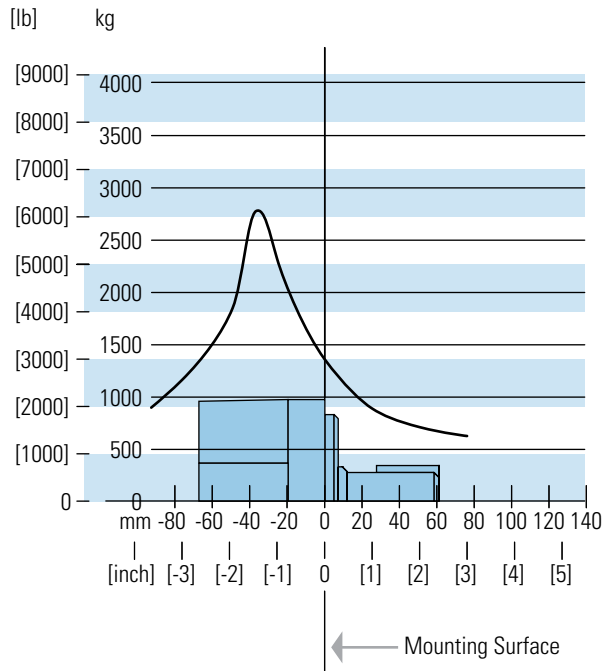
hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

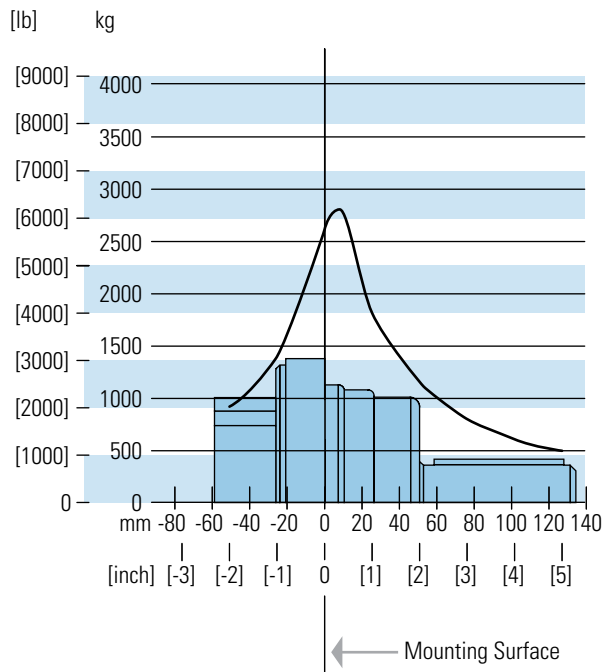
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.

Standard Mount- All shaft options 1-1/4 inch and larger



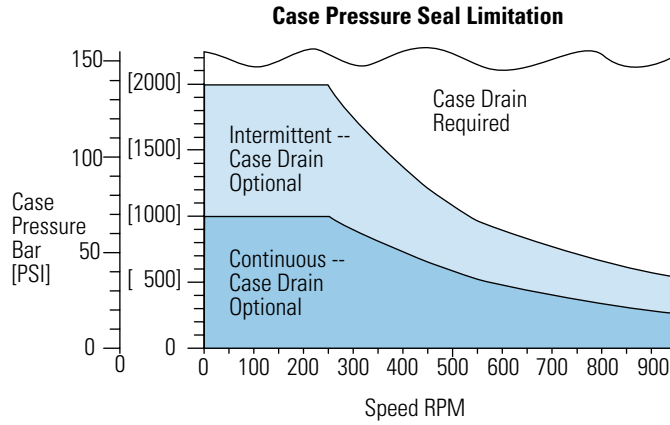
Wheel Mount- All shaft options 1-1/4 inch and larger



4000 Compact Series

Case Pressure and Case Port

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



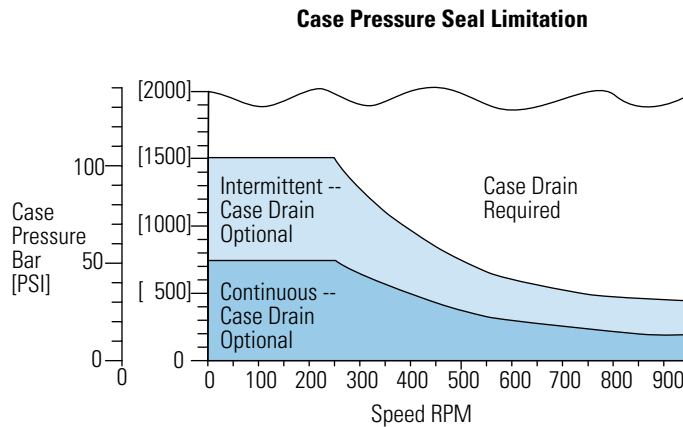
All Shaft options 1-1/4 inch and smaller.

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.



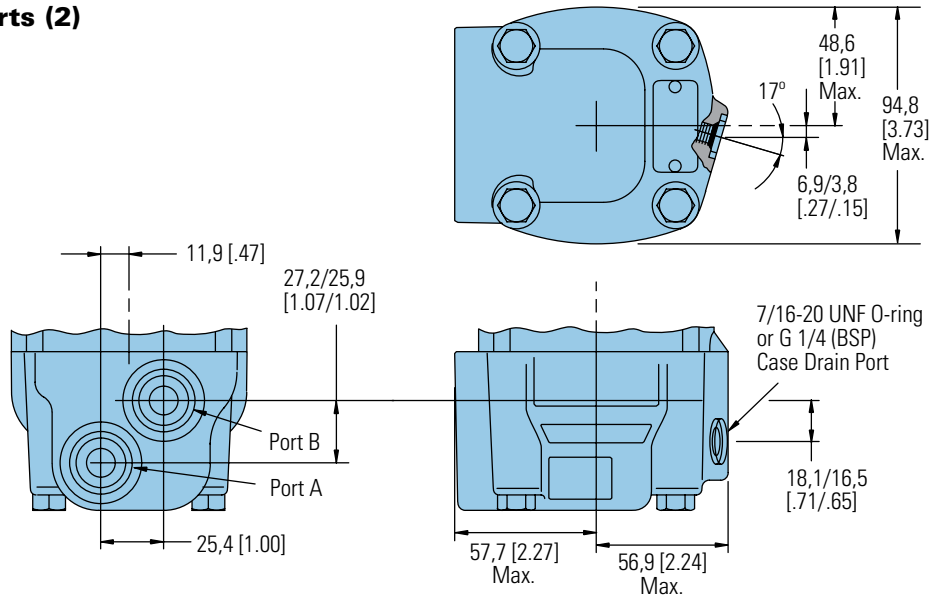
All Shaft options larger than 1-1/4 inch.

4000 Compact Series

Dimensions

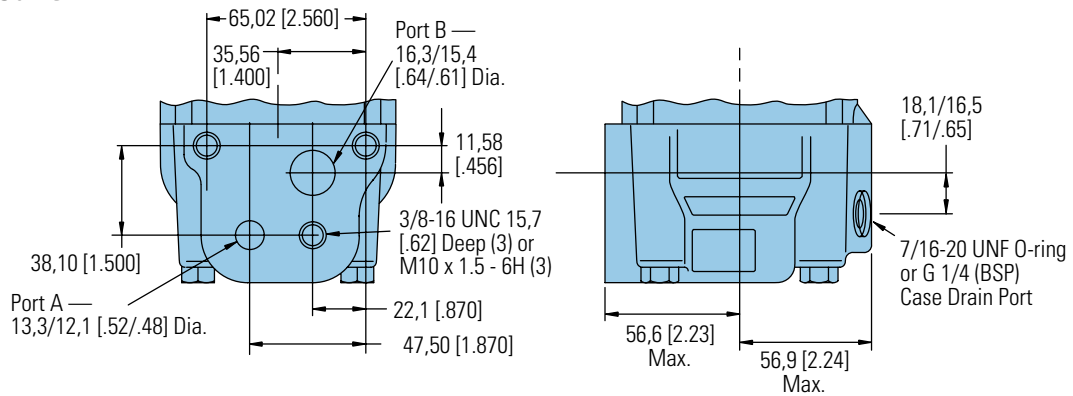
Ports

7/8-14 O-ring Ports (2) or G 1/2 (BSP) Ports (2)



C-2

Manifold Mount

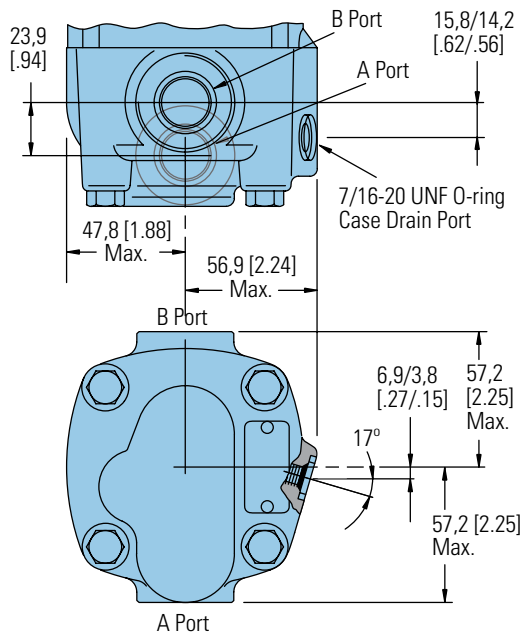


4000 Compact Series

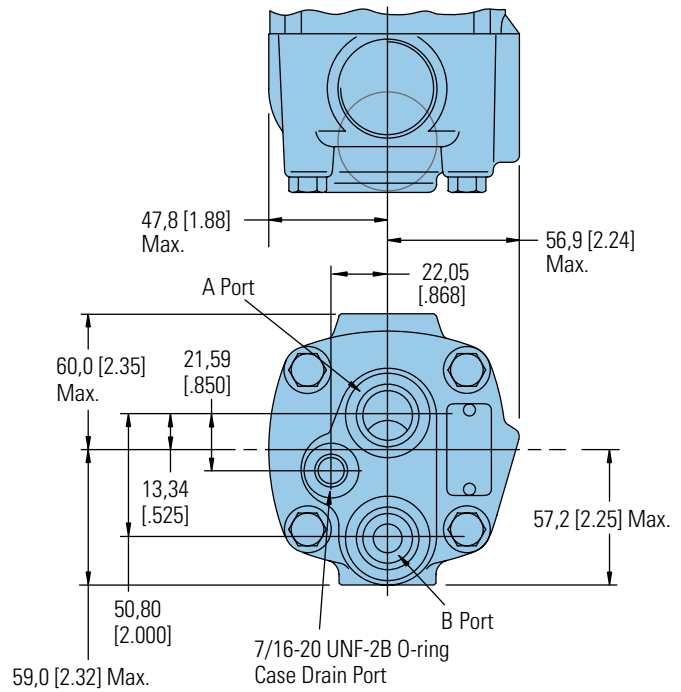
Dimensions

Ports

1-1/16-12 O-ring Ports (2) Positioned 180 Apart



7/8-14 O-ring End Ports (2)

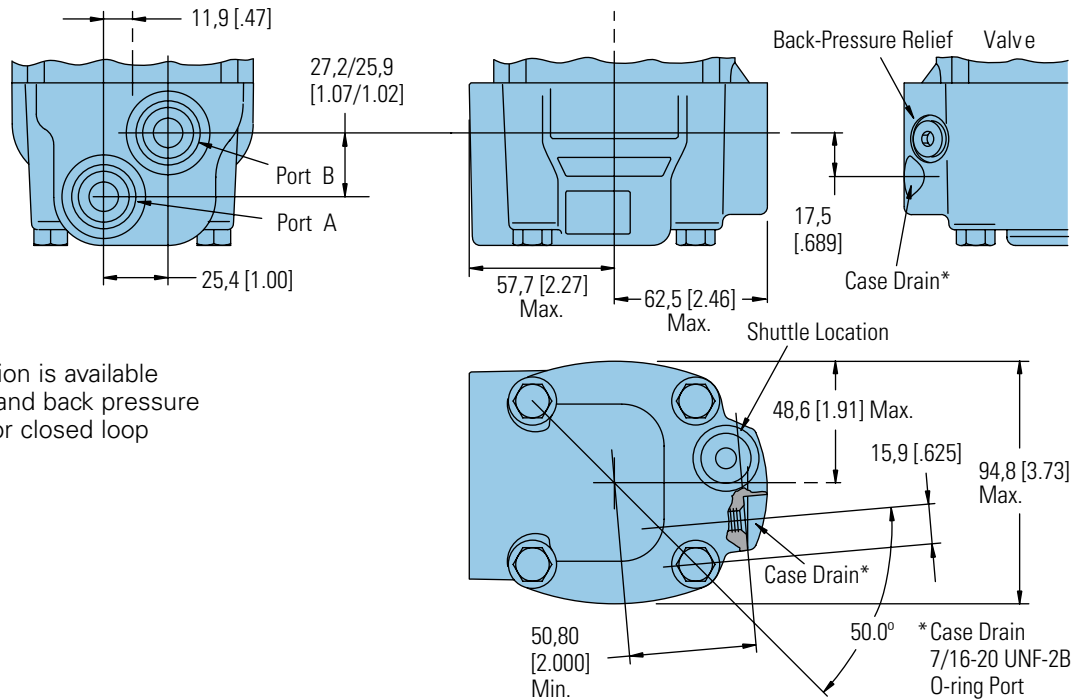


4000 Compact Series

Dimensions

Ports with Shuttle

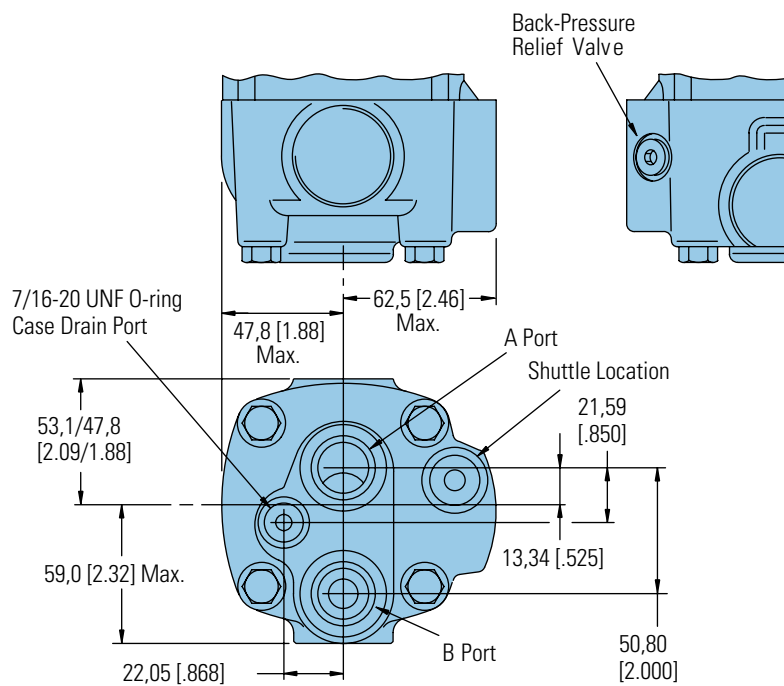
7/8-14 O-ring Ports (2) or G 1/2 (BSP) Ports (2)



This port option is available with shuttle and back pressure relief valve for closed loop applications.

C-2

7/8-14 O-ring End Ports (2)

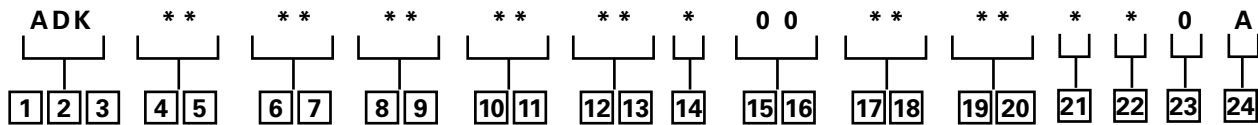


This port option is available with shuttle and back pressure relief valve for closed loop applications.

4000 Compact Series

The following 24-digit coding system has been developed to identify all of the configuration options for the 4000 Compact Series motor. Use this model code to specify a motor with the desired features. All 24 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

Model Code



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.

AE – 4 Bolt (Bearingless) 101,6 [4.00] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 127,0 [5.00] Dia. B.C.

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

AH – 4 Bolt (Standard) 82,5 [3.25] Pilot Dia. and 14,59 [.535] Dia. Mounting Holes on 106,4 [4.19] Dia. B.C.

AJ – 4 Bolt Magneto (Std.) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mtg. Holes on 106,4 [4.19] Dia. B.C. 2,79 [1.10] Pilot Length

AP – 4 Bolt (wheel compatible for Hayes Brake) 107,9 [4.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 147,6 [5.81] Dia. B.C. with Turned Down Housing to 88,9 [3.50] Dia.

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

AT – 2 Bolt (Standard) 101,6 [4.00] Pilot Dia. 13,59 [.535] Dia. Holes on 146,0 [5.75] Dia. Bolt Circle (Similar to SAE B)

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

BG* – 4 Bolt (Wheel-Short) 127,0 [5.00] Front and Rear Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 147,62 [5.812] Dia. Bolt Circle

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)

AH – 1 1/16 - 12 UN-2B O-Ring ports (Positioned 180° Apart)

AJ – .750-16 UNF-2B SAE O-ring Ports – Ports Oriented 180° to each other
BA – .875-14 UNF-2B SAE O-ring Ports – Port B Recessed 11,4 [.45] from Port A – End Ports – Cast Boss Removed

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)

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

14 – Reverse Flow Shuttle Valve with G 1/4 (BSP) Straight Thread Port (Case Drain)

14 Back-Pressure Relief Valve

0 – None

A – Set at 4,5 bar [65 PSI] (for Manual Pumps)

15, 16 Valve Options

00 – None

17, 18 Accessories

00 – None

AA – Seal Guard

AF – M12 Threaded Connector Digital Speed Sensor (Two 30 Pulse per rev. signals in quadrature)

AG – M12 Threaded Connector Digital Speed Sensor (One 60 Pulse per rev. speed signal and one directional signal)

19, 20 Special Features (Hardware)

00 – None

01 – Viton Seals

21 Special Features (Assembly)

0 – None

A – Flange Rotated 90°

B – Reverse Rotation

22 Paint/ Special Packaging

0 – No Paint, Individual Box
A – Low Gloss Black Primer, Individual Box

23 Eaton Assigned Code when Applicable

0 – None

24 Eaton Assigned Design Code

A – First Code

Feature in **bold** are preferred and allow for shorter lead time.

Delta Series

Highlights



Description

Delta series motor is a part of Char Lynn product line, which provides torques up to 11,100 lb-in. Eaton has packed this motor with many “best in class” features: the optimized geroler profile ensures smooth operation; the disc valve technology has the best performance and the bearing capacity is the highest in the industry for very demanding applications.

Delta motor is equipped with parking brake. Please refer detailed information in Delta series brake section.

Delta Series

Geroler Element	12 Displacements
Flow l/min [GPM]	75 [20] Continuous**
	115 [30] Intermittent*
Speed RPM	670 Cont.**
	837 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	275 [4000] Inter.*
Torque Nm [lb-in]	1015 [9000] Cont**.
	1253 [11,100] Inter.*

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

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

Parker is a registered trademark of Parker Intangibles LLC.

White is a trademark of White Drive Products, Inc.



Boom Lift



Sweeper



Mower

Features:

- Parking brake
- Excellent reliability with time proven Char-Lynn components
- Proven disc valve technology with the highest efficiencies in its class
- Leak resistant motor with the front bearing protecting the shaft seal
- Torque up to 11,100 lb-in intermittent duty / Flow up to 30 GPM intermittent
- 12 displacements available from 6.9 to 46 CID
- Shaft sizes up to 1-5/8 inch
- 3-1/4 inch front pilot and 5 inch rear pilot
- STC ports available

Benefits:

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

Applications:

Propel motors for

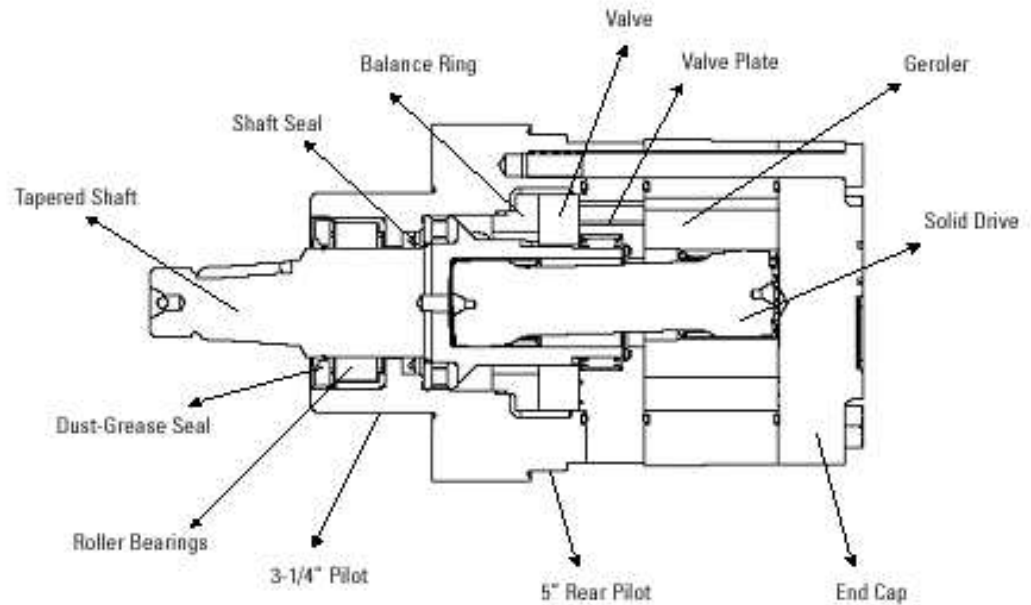
- Scissor Lift
- Boom Lift
- Mower
- Turf care equipments
- Stump grinder

Auxiliary drive application

- Marine winches
- Trenchers
- Fishing Winches
- Recycling and Refuse Equipment

Delta Series

Specifications



DELTA SERIES MOTORS

Displ. cm ³ /r (in ³ /rev)		113 [6.9]	146 [8.9]	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)	Continuous	668	519	382	323	300	252	218	192	161	140	117	100
	Intermittent	831	778	516	485	450	379	327	288	241	209	175	151
@Flow													
Flow l/min [GPM]	Continuous	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
	Intermittent	95 [25]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]
Torque [10698]	Continuous	320 [2834]	429 [3800]	554 [4904]		651 [5763]		712 [6311]	844 [7472]	933 [8260]	972 [8607]	1039 [9199]	994 [8809]
	Intermittent	985 [8721]	1222 [10824]	1202 [10644]		1253 [11100]		1232 [10910]	563 [4984]	725 [6421]	852 [7543]	930 [8236]	1087 [9629]
Pressure [10698]	Continuous	205 [3000]	205 [3000]	205 [3000]		205 [3000]		205 [3000]	205 [3000]	205 [3000]	205 [3000]	190 [2750]	170 [2500]
	Intermittent	105 [1500]	170 [2500]	155 [2250]		140 [2000]		275 [4000]	275 [4000]	275 [4000]	275 [4000]	275 [4000]	275 [4000]
Weight [10698]	Continuous	12,7 [28.0]	12,9 [28.5]	13,8 [30.5]	14,3 [31.5]	15,0 [33.0]	15,0 [33.0]		15,4 [34.0]	16,1 [35.5]	16,8 [37.0]	17,5 [38.5]	18,4 [40.5]
	kg [lb]												

Note:

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

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 no less than 70 SUS at operating temperature.

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

Per ISO cleanliness Code 4406: 20/18/13

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.

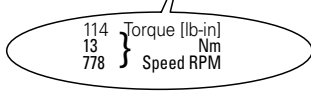
Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous
	Intermittent
	No operation

113cm³/r [6.9 in³/r]

Δ Pressure Bar [PSI]

	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	204 23 65	450 51 64	686 77 63	915 103 62	1140 129 60	1355 153 60	1593 180 59	1814 205 57	2018 228 56	2197 248 55	2349 265 56	2573 290 54	2776 313 52	2975 336 48	3182 359 49	3362 380 44
7.6	210 24 132	457 52 131	706 80 130	950 107 129	1194 135 128	1436 162 127	1677 189 126	1906 215 125	2129 240 123	2351 265 122	2571 290 120	2790 315 118	3010 340 115	3231 365 113	3454 390 112	3660 413 110
4	196 22 199	445 50 196	696 79 196	942 106 195	1186 134 193	1432 162 192	1674 189 191	1914 216 190	2144 242 189	2367 267 185	2587 292 183	2805 317 182	3027 342 180	3252 367 177	3476 392 174	3695 417 172
6	176 20 266	425 48 264	677 76 263	921 104 261	1168 132 261	1420 160 259	1666 188 257	1906 215 257	2152 243 255	2386 269 252	2616 295 250	2834 320 248	3051 344 246	3265 369 244	3481 393 241	3697 417 237
8	160 18 333	407 46 333	659 74 329	901 102 326	1149 130 324	1398 158 323	1650 186 321	1894 214 320	2134 241 318	2370 268 314	2601 294 312	2823 319 309	3044 344 306	3258 368 303	3475 390 301	3654 413 295
10	134 15 399	382 43 398	632 71 396	876 99 393	1122 127 392	1372 155 389	1621 183 387	1868 211 386	2111 238 383	2353 266 381	2589 292 377	2821 319 374	3046 344 372	3270 369 370	3479 393 367	3680 415 364
12	111 13 466	357 40 465	608 69 462	855 97 460	1102 124 457	1350 152 455	1599 181 453	1847 208 451	2090 236 449	2330 263 446	2569 290 442	2800 316 438	3024 341 436	3250 367 433	3455 390 429	3614 408 415
14	81 9 533	325 37 532	577 65 527	822 93 524	1071 121 524	1321 149 520	1572 177 517	1817 205 516	2063 233 513	2307 260 509	2549 288 506	2781 314 503	3011 340 500	3237 365 500	3436 388 496	3578 404 477
16	48 5 601	295 33 600	543 61 597	790 89 593	1036 117 591	1283 145 586	1535 173 581	1781 201 581	2027 229 577	2271 256 573	2512 284 570	2751 311 568	2984 337 568	3214 363 564	3431 387 559	3597 406 542
18	14 2 668	263 30 666	510 58 661	758 86 661	1005 113 658	1249 141 654	1499 169 652	1746 197 649	1988 224 646	2231 252 644	2474 279 640	2712 306 637	2945 332 634	3176 359 630	3395 383 628	3597 406 621
20	8	228	477	725	972	1218	1468	1712	1957	2201	2447	2686	2917	3149	3350	3523
22	26	54	82	110	138	166	193	221	249	276	303	329	355	378	398	
25	19	47	75	103	130	158	186	214	241	269	296	322	348	369	390	
30	13	48	85	122	158	195	231	267	303	339	375	410	445	480	514	
114	778	777	773	770	765	759	756	753	749	746	744	742	740	737	735	



146cm³/r [8.9 in³/r]

Δ Pressure Bar [PSI]

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

Delta Series

Performance Data

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

		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	313 35 36	732 83 35	1113 126 34	1480 167 32	1870 211 31	2249 254 30	2668 301 29	3059 345 27	3447 389 27	3822 432 26	4189 473 24	4544 513 22	4875 550 21	5194 586 18	5508 622 17	5948 671 18	
4	367 41 75	809 91 74	1228 139 72	1640 185 71	2038 230 69	2437 275 68	2844 321 67	3234 365 65	3623 409 63	4010 453 62	4398 497 61	4779 540 58	5164 583 56	5545 626 56	5917 668 54	6275 708 52	
6	365 41 112	799 90 111	1231 139 110	1654 187 109	2066 233 107	2473 279 106	2878 325 104	3270 369 102	3665 414 101	4056 458 99	4446 502 98	4833 546 96	5215 589 95	5598 632 93	5975 675 91	6347 717 89	
8	343 39 151	782 88 150	1219 138 149	1648 186 147	2069 234 146	2484 280 145	2898 327 143	3300 373 142	3702 418 140	4093 462 138	4482 506 135	4865 549 134	5237 591 133	5607 633 131	5976 675 129	6349 717 127	
10	322 36 190	759 86 188	1201 136 187	1633 184 186	2063 233 185	2483 280 182	2904 328 181	3316 374 178	3726 421 177	4125 466 174	4515 510 173	4904 554 171	5290 597 169	5672 640 168	6048 683 166	6421 725 164	
12	283 32 45	719 81 229	1158 131 226	1590 180 224	2020 228 223	2448 276 221	2868 324 220	3279 370 218	3691 417 216	4096 462 215	4492 507 212	4883 551 211	5265 594 209	5644 637 206	6015 679 205	6385 721 202	
14	238 27 53	671 76 267	1110 125 266	1538 174 262	1970 222 261	2396 271 259	2816 318 257	3228 364 255	3644 411 253	4050 457 251	4451 503 249	4846 547 246	5231 591 244	5613 634 242	5982 675 240	6357 718 238	
16	191 22 61	625 71 305	1063 120 303	1493 169 301	1923 217 300	2345 265 298	2768 312 296	3182 359 295	3596 406 293	4003 452 291	4403 497 289	4801 542 287	5191 586 285	5576 630 284	5947 671 281	6316 713 279	
18	139 16 68	567 64 342	1006 114 340	1438 162 339	1871 211 337	2299 260 335	2720 307 333	3133 354 331	3547 400 330	3956 447 328	4359 492 326	4760 537 324	5128 579 322	5492 620 321	5871 663 319	6247 705 317	
20	99 11 82	457 52 382	886 100 380	1315 148 378	1745 197 377	2168 245 375	2590 292 373	3006 339 371	3418 386 369	3822 432 366	4224 477 364	4622 522 359	5018 567 358	5418 612 356	5816 657 354	6208 701 352	
22	15 2 83	383 43 420	810 91 417	1243 140 415	1676 189 413	2096 237 411	2520 284 409	2938 332 407	3351 378 405	3759 424 403	4161 470 401	4558 515 399	4953 559 397	5339 603 395	5722 646 392	6095 688 390	
25		272 31 476	700 79 475	1131 128 474	1559 176 472	1985 224 470	2408 272 468	2823 319 466	3231 365 465	3639 411 463	4042 456 461	4443 502 459	4842 547 457	5229 590 455	5617 634 453	5992 677 450	
30		163 18 516	600 68 506	1037 117 494	1474 166 487	1902 215 484	2315 261 488	2723 307 494	3134 354 501	3536 399 506	3933 444 511	4338 490 514	4737 535 515	5125 579 516	5516 623 515	5899 666 514	

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

234cm³/r [14.3 in³/r]
 Δ Pressure Bar [PSI]

		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	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	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 55	4843 547 55	5302 599 54	5763 651 52	6213 701 51	6668 753 51	7113 803 50	7543 852 48	
6	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	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	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	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	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 585 216	5623 635 215	6057 684 214	6485 732 212	6907 780 211	7327 827 209	
16	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	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	108 12 323	614 69 323	1121 127 322	1623 183 320	2124 240 319	2620 296 317	3118 352 317	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	28 3 83	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		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		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

252cm³/r [15.4 in³/r]
ΔPressure Bar [PSI]

	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	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
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
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
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
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
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
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
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
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
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
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
25	330	330	330	328	327	324	322	320	316	314	313	314	316	318	320	320
95		425	967	1508	2042	2574	3093	3605	4110	4602	5084	5561	6028	6482	6899	7316
30		48	109	170	231	291	349	407	464	520	574	628	681	732	779	826
114		375	375	374	372	369	366	364	361	358	357	356	358	361	364	364
		179	723	1266	1800	2330	2852	3364	3868	4368	4856	5338	5811	6269	6701	7096
		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

300cm³/r [18.3 in³/r]
ΔPressure Bar [PSI]

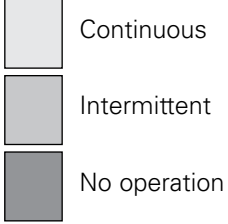
	17	34	52	69	86	103	121	138	155	172	190	207	224	241	259	276
	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
2	608	1257	1919	2553	3196	3824	4475	5087	5707	6307	6901	7472	8015	8484	8962	9413
7.6	69	142	217	288	361	432	505	574	644	712	779	844	905	958	1012	1063
4	612	1283	1940	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
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
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
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
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
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
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
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
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
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
25	278	278	278	277	274	272	269	267	265	264	263	265	269	273	275	275
95		553	1208	1851	2489	3114	3726	4335	4930	5523	6108	6670	7220	7783	8298	8777
30		62	136	209	281	352	421	489	557	624	690	753	815	879	937	991
114		316	316	316	313	310	307	303	301	299	298	298	301	306	310	312
		233	941	1539	2179	2811	3430	4028	4625	5217	5802	6385	6957	7522	8060	8565
		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

347cm³/r [21.2 in³/r]
ΔPressure Bar [PSI]

		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
	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
	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
	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
	10	550	1295	2041	2765	3488	4188	4891	5585	6264	6899	7505	8091	8672	9238	9885	10488
	38	62	146	230	312	394	473	552	631	707	779	847	913	979	1048	1116	1184
	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
	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
	16	339	1033	1774	2494	3209	3907	4605	5280	5956	6610	7243	7850	8438	9014	9582	10166
	61	38	117	200	282	362	441	520	596	672	746	818	886	953	1018	1083	1148
	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	
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	
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	
25	240	240	240	240	240	238	236	233	230	228	226	226	228	231	237	240	
95	59	141	222	304	383	461	537	611	684	755	824	890	955	1017	1076	1133	
30	272	272	272	272	272	272	269	266	263	261	259	259	261	265	270	272	
114	152	1072	1749	2434	3123	3802	4468	5114	5763	6400	7018	7633	8232	8819	9397	9966	
	17	121	197	275	353	429	504	577	651	723	792	862	929	996	1061	1126	
	327	327	327	327	327	327	323	319	315	314	313	315	319	323	327	327	



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

395cm³/r [24.1 in³/r]
ΔPressure Bar [PSI]

		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
	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
	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
	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
	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
	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
	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
	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
	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	
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	
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	
25	211	211	211	211	211	209	206	203	201	200	199	200	204	209	
95	637	1473	2296	3117	3909	4687	5434	6163	6861	7536	8192	8829	9475	10117	
30	72	166	259	352	441	529	613	696	775	851	925	997	1070	1143	
114	24	122	215	308	398	487	573	658	739	817	894	968	1042	1116	
	288	288	288	288	288	286	283	280	277	274	273	275	280	287	

Delta Series

Performance Data

Continuous
 Intermittent
 No operation

470cm³/r [28.7 in³/r]
ΔPressure Bar [PSI]

	17 250	34 500	52 750	69 1000	86 1250	103 1500	121 1750	138 2000	155 2250	172 2500	190 2750	207 3000
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
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
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
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
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
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
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
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
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
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
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
25	833	1816	2765	3680	4575	5455	6313	7133	7928	8691	9436	10165
95	94	205	312	415	517	616	713	805	895	981	1065	1149
30	491	1318	2295	3232	4142	5022	5881	6721	7522	8300	9057	9792
114	55	149	259	365	468	567	664	759	849	937	1022	1105
	241	241	241	241	241	240	237	236	233	232	227	227

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

542cm³/r [33.1 in³/r]
ΔPressure Bar [PSI]




	17 250	34 500	52 750	69 1000	86 1250	103 1500	121 1750	138 2000	155 2250	172 2500
2	1131	2304	3433	4558	5668	6725	7732	8683	9645	10457
7.6	128	260	388	515	640	759	873	980	1089	1181
4	1139	2352	3515	4638	5735	6781	7819	8809	9752	10644
15	129	266	397	524	648	766	883	994	1101	1202
6	1063	2267	3433	4549	5645	6694	7697	8675	9630	10557
23	120	256	388	514	637	756	869	979	1087	1192
8	992	2186	3354	4475	5578	6646	7665	8608	9535	10449
30	112	247	379	505	630	750	865	972	1076	1180
10	897	2090	3259	4378	5482	6555	7602	8578	9482	10343
38	101	236	368	494	619	740	858	968	1071	1168
12	807	1980	3138	4256	5365	6440	7494	8481	9403	10275
45	91	224	354	481	606	727	846	957	1062	1160
14	693	1873	3028	4138	5218	6268	7318	8304	9235	10105
53	78	211	342	467	589	708	826	937	1043	1141
16	554	1732	2882	3993	5083	6107	7118	8089	9032	9928
61	63	196	325	451	574	689	804	913	1020	1121
18	409	1582	2738	3844	4924	5952	6956	7928	8874	9772
68	46	179	309	434	556	672	785	895	1002	1103
20	355	1428	2587	3696	4767	5804	6813	7786	8732	9624
76	40	161	292	417	538	655	769	879	986	1087
22	310	1259	2412	3518	4595	5619	6618	7589	8536	9438
83	35	142	272	397	519	634	747	857	964	1065
25	958	2107	3215	4281	5310	6305	7264	8204	9110	10000
95	108	238	363	483	599	712	820	926	1029	1129
30	521	1599	2696	3769	4804	5809	6776	7705	8617	9513
114	59	181	304	425	542	656	765	870	973	1073
	209	209	209	209	208	207	207	205	205	205

Delta Series

Performance Data

649cm³/r [39.6 in³/r]
ΔPressure Bar [PSI]

		17 250	34 500	52 750	69 1000	86 1250	103 1500	121 1750	138 2000	155 2250
2		1365	2787	4156	5488	6775	7949	9102	10174	11100
	7.6	154 10	315 10	469 10	620 9	765 9	897 8	1028 7	1149 6	1253 3
4		1326	2770	4113	5400	6632	7819	8973	10030	11015
	15	150 22	313 22	464 21	610 20	749 21	883 20	1013 19	1132 19	1244 18
6		1258	2663	3998	5270	6521	7692	8774	9808	10809
	23	142 35	301 34	451 33	595 32	736 32	868 32	991 32	1107 32	1220 31
8		1154	2558	3902	5195	6455	7659	8775	9770	10708
	30	130 47	289 46	441 45	587 44	729 42	865 42	991 42	1103 43	1209 43
10		1045	2442	3787	5076	6331	7541	8691	9685	10573
	38	118 58	276 58	428 57	573 56	715 55	851 53	981 53	1093 54	1194 55
12		928	2321	3662	4939	6193	7385	8536	9577	10469
	45	105 70	262 70	413 70	558 68	699 67	834 66	964 65	1081 65	1182 66
14		740	2127	3469	4746	5989	7188	8352	9433	10439
	53	84 82	240 82	392 82	536 81	676 80	812 79	943 77	1065 76	1179 76
16		614	1990	3318	4588	5795	6942	8081	9154	10141
	61	69 93	225 93	375 93	518 93	654 92	784 91	912 90	1033 89	1145 90
18		448	1830	3158	4414	5619	6754	7853	8890	9873
	68	51 105	207 105	356 105	498 105	634 104	763 103	887 102	1004 102	1115 104
20		281	1618	2944	4198	5410	6551	7653	8689	9676
	76	32 117	183 117	332 117	474 117	611 117	740 116	864 114	981 114	1092 115
22		276	1518	2842	4099	5313	6453	7554	8596	9576
	83	31 128	171 128	321 128	463 128	600 128	728 128	853 126	970 125	1081 126
25			1079	2393	3646	4834	5969	7071	8112	9105
	95		122 146	270 146	412 146	546 146	674 146	798 145	916 144	1028 144
30			436	1747	3013	4225	5356	6454	7489	8479
	114		49 175	197 175	340 175	477 175	605 175	729 174	845 174	957 175

-  Continuous
-  Intermittent
-  No operation

8479
957
175 } Torque lb-in
Nm
Speed RPM

754cm³/r [46.0 in³/r]
ΔPressure Bar [PSI]

		17 250	34 500	52 750	69 1000	86 1250	103 1500	121 1750	138 2000
2		1561	3128	4605	6014	7422	8721	9978	10910
	7.6	176 9	353 8	520 8	679 8	838 7	985 7	1127 6	1232 5
4		1548	3142	4650	6029	7350	8605	9785	10892
	15	175 19	355 18	525 18	681 18	830 18	971 18	1105 17	1230 17
6		1470	3084	4608	6022	7346	8555	9722	10850
	23	166 30	348 29	520 28	680 27	829 27	966 27	1098 27	1225 27
8		1359	2975	4504	5925	7263	8488	9638	10694
	30	153 40	336 39	509 38	669 38	820 37	958 36	1088 37	1207 38
10		1240	2844	4364	5815	7185	8458	9603	10584
	38	140 50	321 50	493 49	656 48	811 47	955 46	1084 46	1195 47
12		1079	2686	4207	5641	7008	8248	9390	10400
	45	122 60	303 60	475 60	637 59	791 58	931 57	1060 57	1174 57
14		932	2512	4038	5477	6850	8124	9274	10286
	53	105 70	284 70	456 70	618 70	773 69	917 68	1047 67	1161 67
16		753	2328	3834	5246	6577	7831	8999	10040
	61	85 80	263 80	433 80	592 80	742 80	884 79	1016 78	1133 78
18		547	2119	3632	5024	6320	7551	8706	9721
	68	62 90	239 90	410 90	567 90	714 90	852 90	983 90	1097 90
20		310	1919	3430	4826	6126	7339	8466	9430
	76	35 100	217 100	387 100	545 100	692 100	829 100	956 100	1065 100
22		248	1666	3172	4571	5878	7102	8254	9269
	83	28 110	188 110	358 110	516 110	664 110	802 110	932 110	1046 110
25			1261	2784	4191	5504	6727	7873	8911
	95		142 126	314 126	473 126	621 126	759 126	889 126	1006 126
30			545	2055	3474	4800	6036	7175	8231
	114		62 151	232 151	392 151	542 151	681 151	810 151	929 151

Delta Series

Dimensions

Wheel Mount

Ports

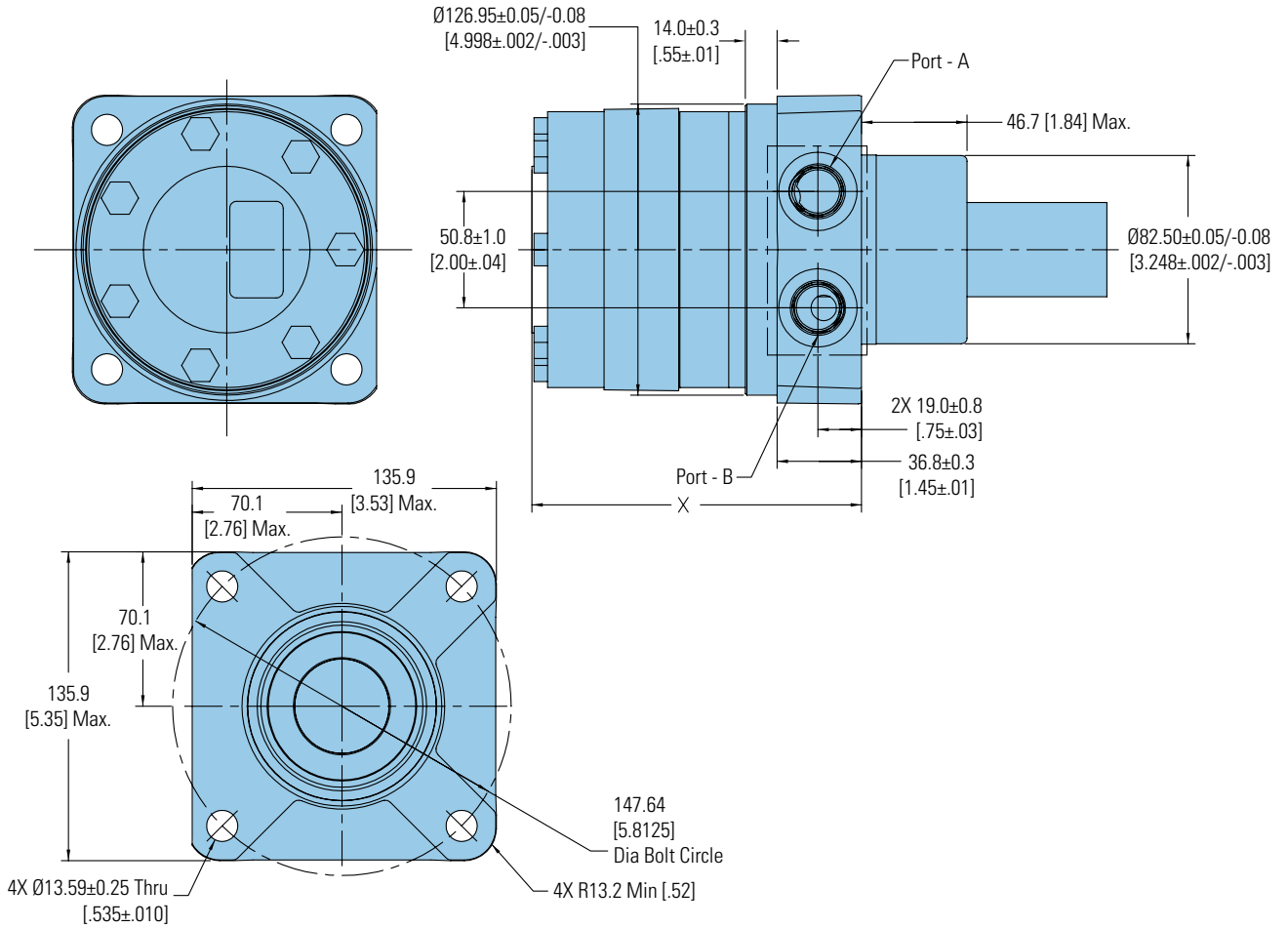
7/8 -14 UNF-2B SAE O-ring Ports

G 1/2 (BSP) Ports

Standard Rotation Viewed from Shaft End

Port A Pressurized — CCW

Port B Pressurized — CW



DISPLACEMENT CODE	X MAX	CODE	MAX
069	130.6 [5.14]	212	156.5 [6.16]
089	135.9 [5.35]	241	162.6 [6.40]
121	144.3 [5.68]	287	172.5 [6.79]
143	150.4 [5.92]	331	181.9 [7.16]
154	153.2 [6.03]	396	195.6 [7.70]
183	150.4 [5.92]	460	209.0 [8.23]

C-3

Delta Series

Dimensions

Standard Mount

Ports

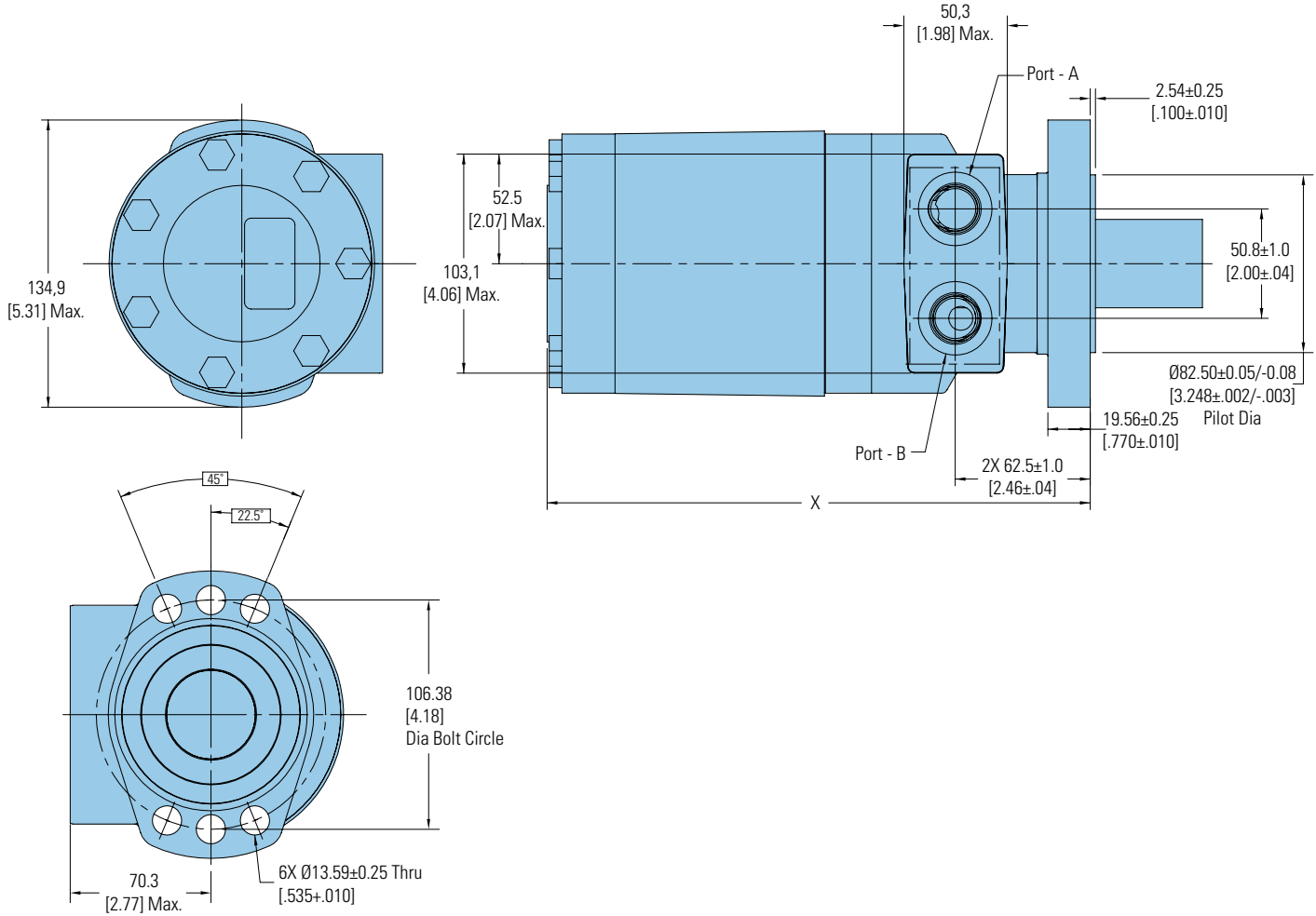
7/8 -14 UNF-2B SAE O-ring Ports

G 1/2 (BSP) Ports

Standard Rotation Viewed from Shaft End

Port A Pressurized — CCW

Port B Pressurized — CW



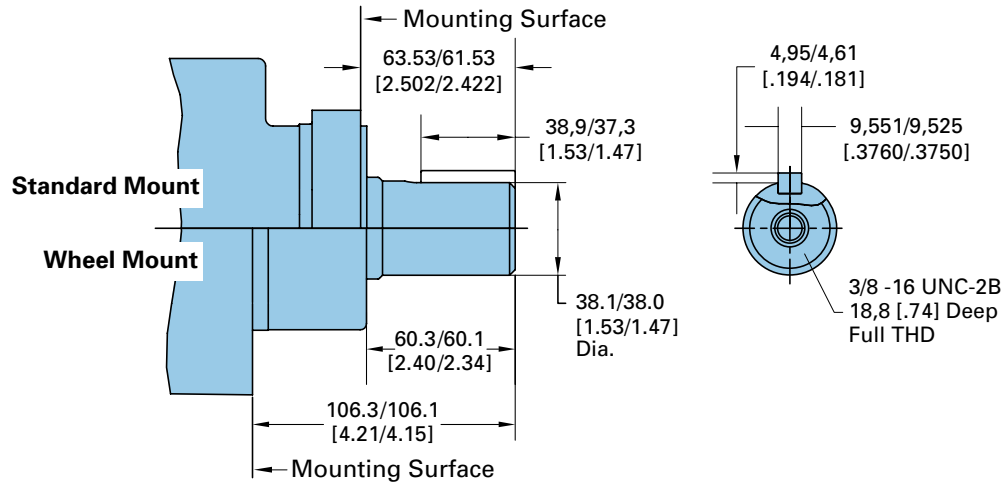
DISPLACEMENT CODE	X MAX	CODE	MAX
069	173.8 [6.84]	212	199.8 [7.87]
089	179.7 [7.08]	241	206.0 [8.11]
121	187.7 [7.39]	287	215.8 [8.50]
143	193.7 [7.63]	331	225.1 [8.86]
154	196.5 [7.74]	396	238.8 [9.40]
183	193.7 [7.63]	460	252.3 [9.93]

Delta Series

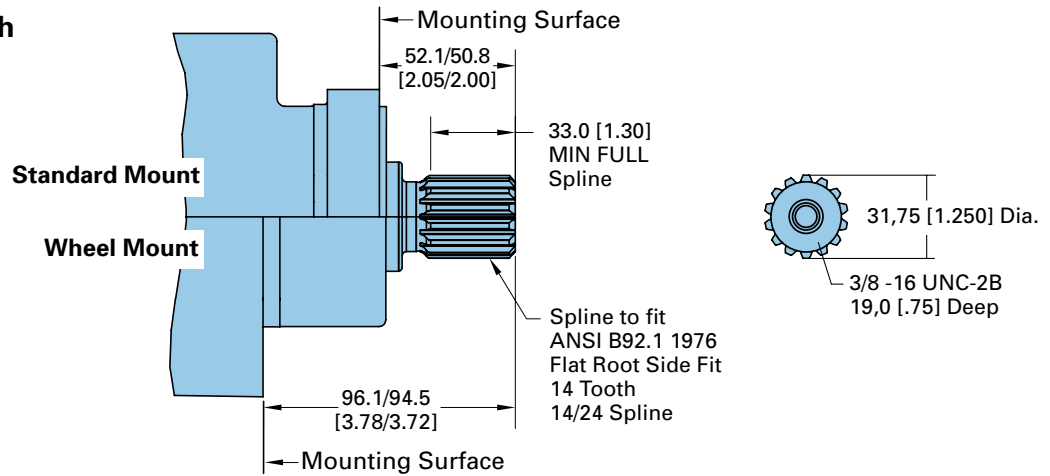
Dimensions

Shafts

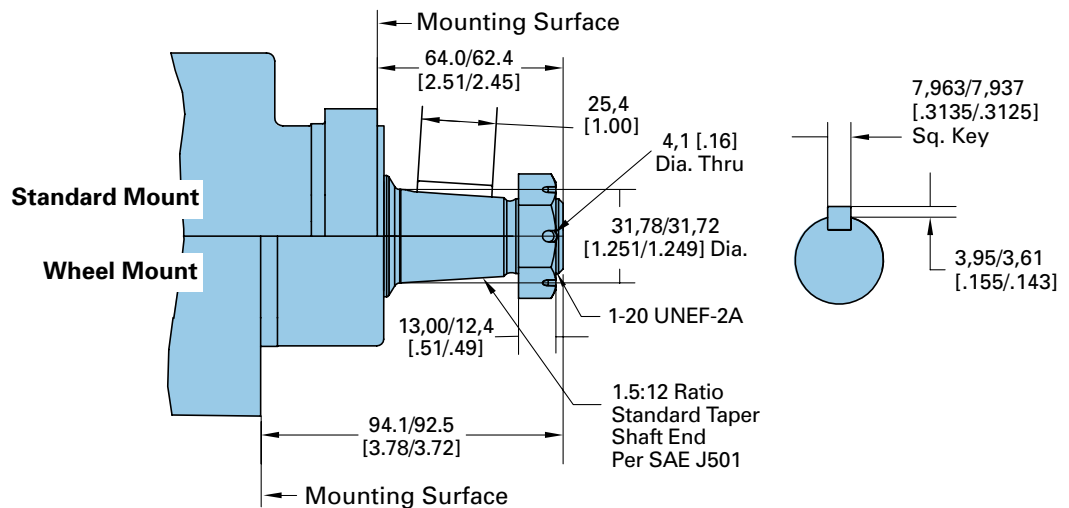
1 1/2 Inch Straight



1 1/4 Inch 14 Tooth Splined



1 1/4 Inch Tapered



Delta Series

Shaft Side Load Capacity

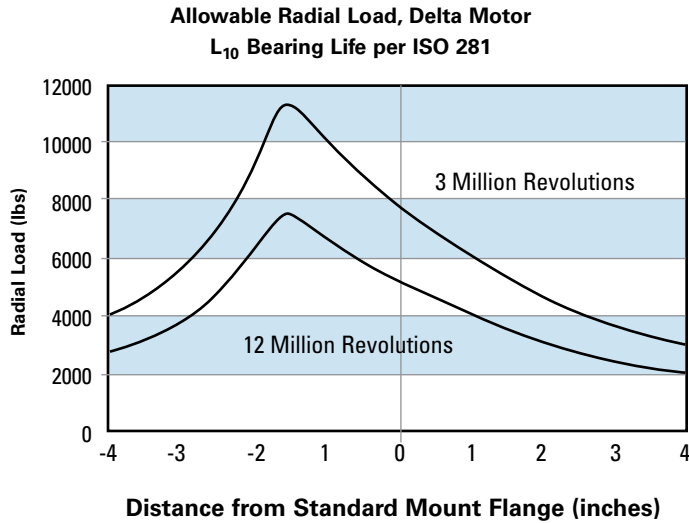
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

Each curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

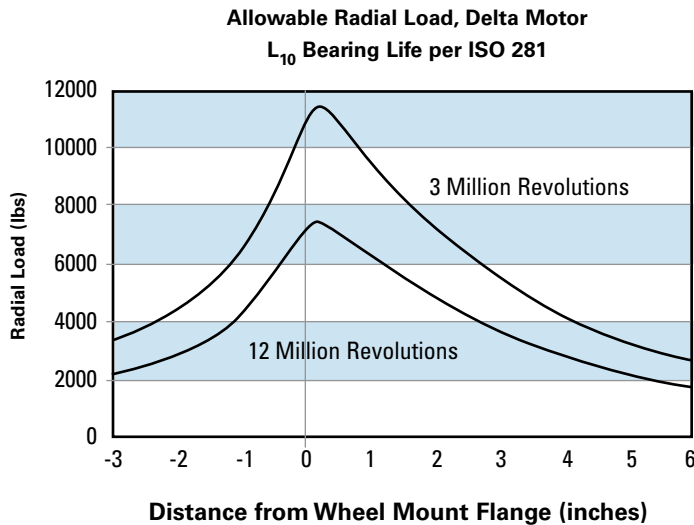
To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

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

Side Load Chart for Standard Mount



Side Load Chart for Wheel Mount



Delta Series

Product Numbers

Note:

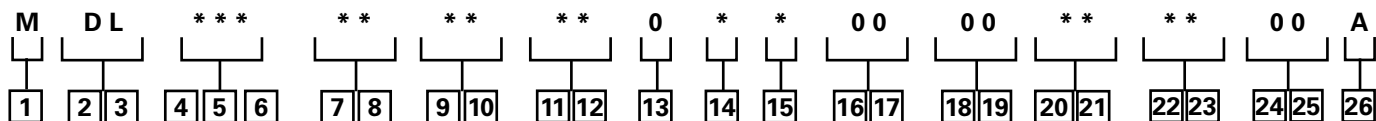
For Delta Series Motors with a configuration **Not Shown** in the charts below contact your Eaton Representative.

Mounting	Shaft	Port Size	Timing	Displacement cm^3/r [in^3/r] / Product Number					
				113 [6.9]	146 [8.9]	198 [12.1]	234 [14.3]		
Wheel Motor	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		
	Wheel Motor	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	
		Wheel Motor	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

Delta Series

Model Code

The following 26-digit coding system has been developed to identify all of the configuration options for the Delta Low Speed High Torque motor. Use this model code to specify a motor with the desired features. All 26 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1 Product

M – Motor

2, 3 Series

DL – Delta Series

4, 5, 6 Displacement cm³/r [in³/r]

069 – 113 [6.9]

089 – 146 [8.9]

121 – 198 [12.1]

143 – 234 [14.3]

154 – 252 [15.4]

183 – 300 [18.3]

212 – 347 [21.2]

241 – 395 [24.1]

287 – 470 [28.7]

331 – 542 [33.1]

396 – 649 [39.6]

460 – 754 [46.0]

7, 8 Mounting Type

AA – Wheel, 4 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes On 147.6 [5.81] Dia. Bolt Circle. 127.0 [5.00] Dia. Rear Mount Pilot

AB – Standard, 6 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes on 106.4 [4.19] Dia. Bolt Circle. .100 [2.54] Pilot Length. Sae A, Magneto

9, 10 Output Shaft

01 – 38.10 [1.500] Dia. Straight with .375-16 UNC-2B Thread, and 9.52 [.375] Sq x 25.40 [1.000] Straight Key

02 – 31.75 [1.250] Dia. .125:1 Tapered Shaft per SAE J501 with 1.000-20 UNEF-2A Threaded Shaft End and Slotted Hex Nut, 7.938 [.3125] Sq x 25.40 [1.000] Straight Key

03 – 41.30 [1.626] Dia. .125:1 Tapered Shaft per SAE J501 with 1.250-18 UNEF-2A Threaded Shaft End and Slotted Hex Nut, 11.125 [.4380] Sq x 34.04 [1.340] Straight Key

04 – 31.75 [1.250] Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30 Deg. Involute Spline with .375-16 UNC-2B Thread in End, 33.0 [1.30] Minimum Full Spline Length

05 – 38.10 [1.500] Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Deg. Involute Spline, 31.8 [1.25] Minimum Full Spline Length, with .375-16 UNC-2B Thread in End

06 – 38.10 [1.500] Dia. Tapered Shaft per SAE J501 with 1.000-20 UNEF-2A Thread in End, 7.938 [.3125] Sq x 31.75 [1.250] Key

11, 12 Ports

AA – .875-14 UNF-2B SAE O-Ring

AC – G 1/2 BSP Straight Thread

13 Pressure/Flow Option

0 – None

14 Geroler Option

0 – Standard

15 Seal Option

00 – Standard Seals

02 – Seal Guard

03 – Viton Seals

04 – Viton Shaft Seal

11 – High pressure shaft seal, slinger seal

19 – Extreme duty seal guard

16, 17 Accessories

00 – None

01 – Spring applied hydraulic release wet brake

18, 19 Special Features (Hardware)

00 – None

20, 21 Special Features (Assembly)

00 – Standard Rotation - CCW

01 – Standard Rotation - CW

22, 23 Paint/Packaging

AA - No Paint, Individual Box

AB - Low Gloss Black Primer, Individual Box

AC - Epoxy Coated (Frost Gray), 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 (2)

Feature in **bold** are preferred and allow for shorter lead time.

Delta Series with Parking Brake (184-)

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 utilizes the same Geroler, and disc valve technologies as the standard Char-Lynn motors. Therefore, 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.

Specifications

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

Features:

- Integrated, Compact, Patented Design
- Rear-mounted integrated brake with 6:1 torque advantage
- Access port for manual brake release (for overriding 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 environmentally protected and provides long life

Delta Series Parking Brake

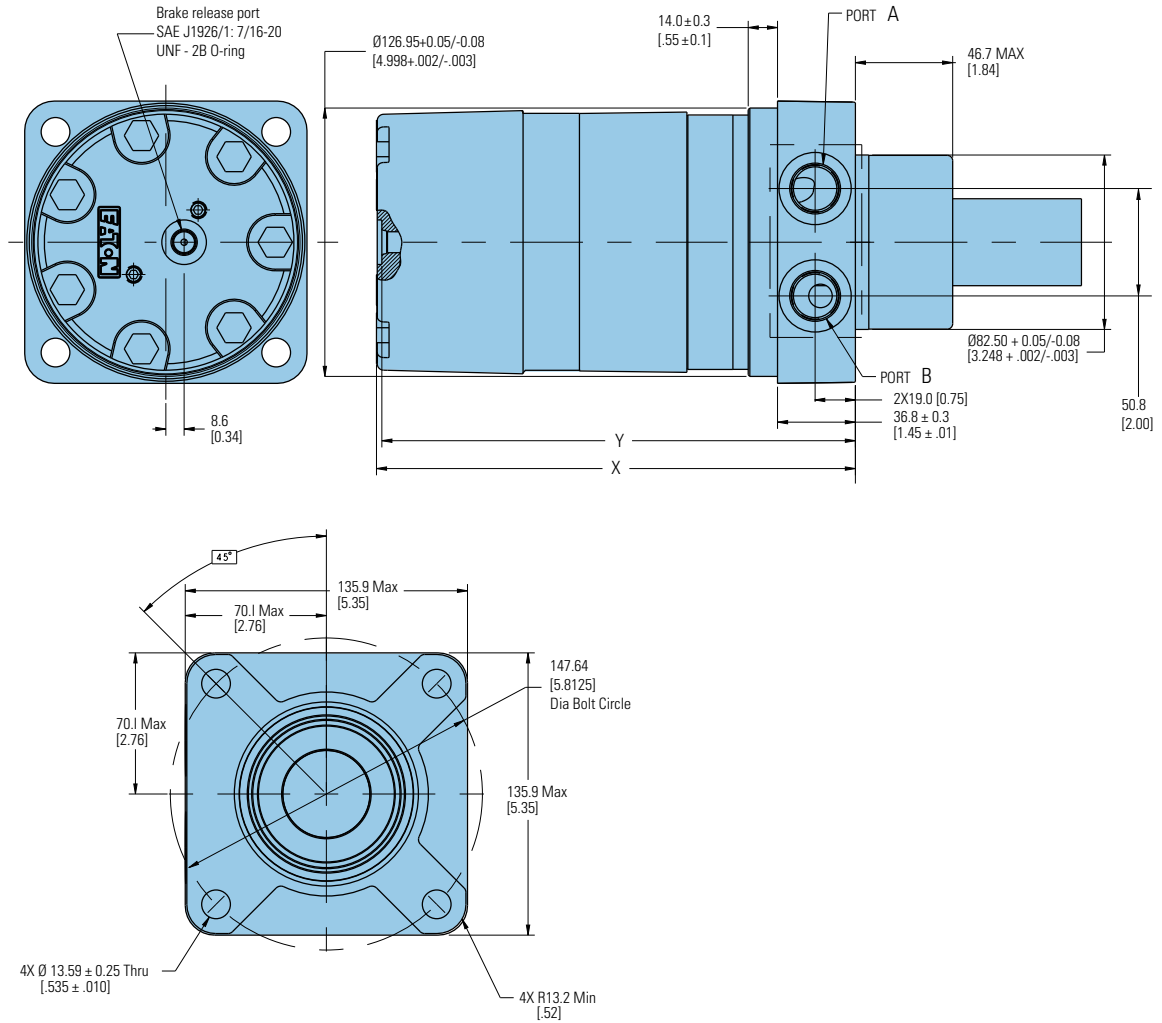
Dimensions
Wheel Mount

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



DELTA SERIES WITH PARKING BRAKE DIMENSIONS

Displacement Code	X mm [inch]	Y mm [inch]
069	190.9 [7.52]	188.4 [7.42]
089	196.3 [7.73]	193.7 [7.63]
107	201.1 [7.92]	198.6 [7.82]
121	204.6 [8.06]	202.1 [7.96]
143	210.7 [8.30]	208.2 [8.20]
154	213.5 [8.41]	211.0 [8.31]
183	214.8 [8.46]	212.3 [8.36]
212	220.9 [8.70]	218.4 [8.60]
241	227.0 [8.94]	224.5 [8.84]
287	236.9 [9.33]	234.4 [9.23]
331	246.3 [9.70]	243.8 [9.60]
396	260.0 [10.24]	257.5 [10.14]
460	273.5 [10.77]	270.9 [10.67]

Delta Series Parking Brake

Dimensions

Standard Mount

Ports

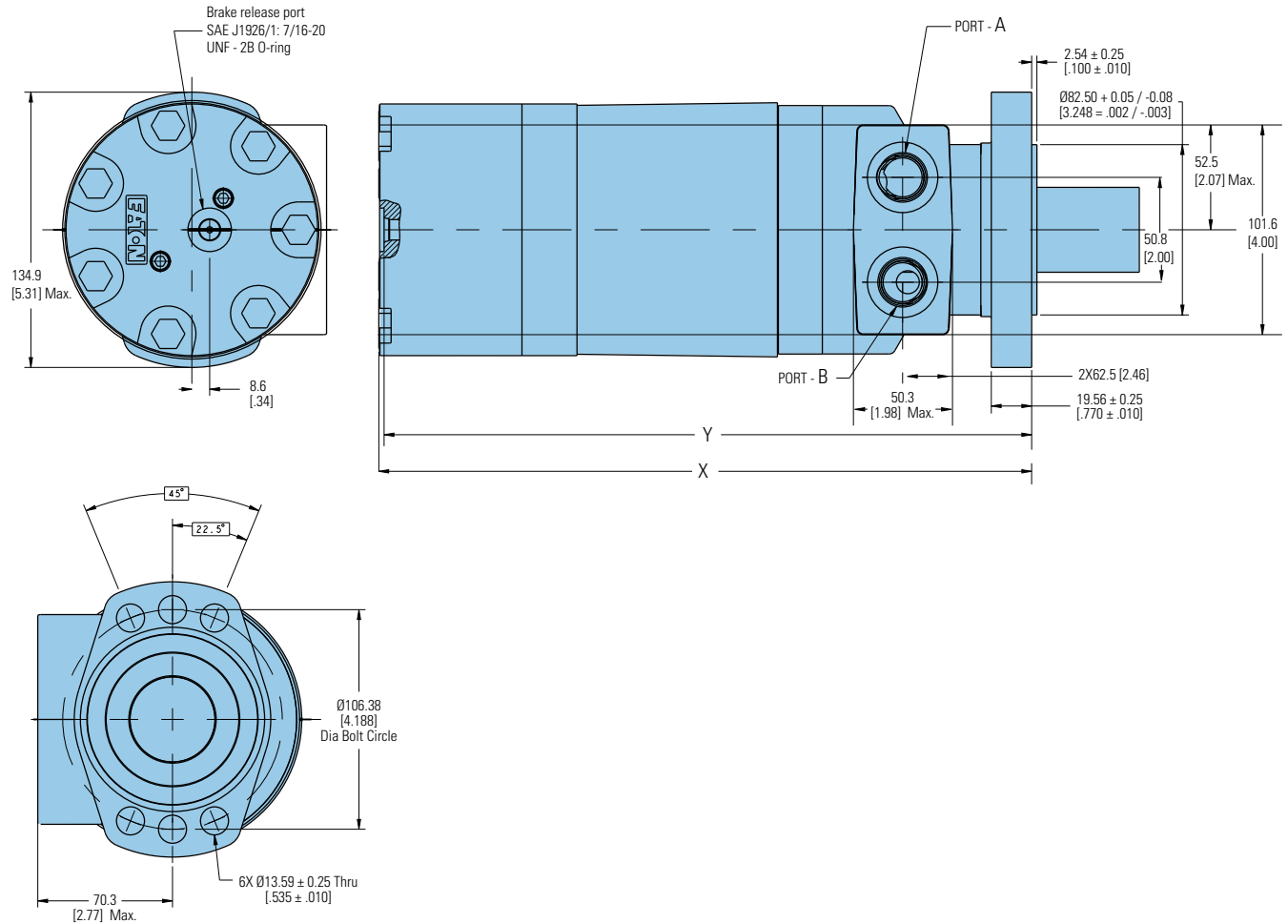
7/8 -14 UNF-2B SAE O-ring Ports

G 1/2 (BSP) Ports

Standard Rotation Viewed from Shaft End

Port A Pressurized — CCW

Port B Pressurized — CW



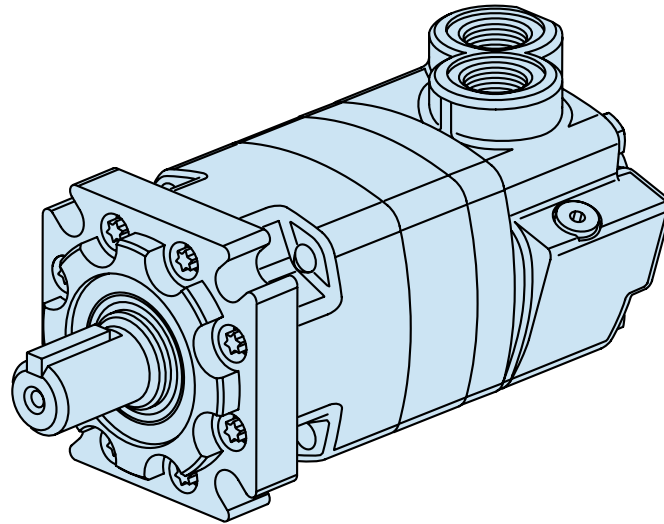
DELTA SERIES WITH PARKING BRAKE DIMENSIONS

Displacement Code	X mm [inch]	Y mm [inch]
069	235.5 [9.27]	232.1 [9.14]
089	240.9 [9.48]	237.4 [9.35]
107	245.7 [9.67]	242.2 [9.54]
121	249.3 [9.81]	245.8 [9.68]
143	255.3 [10.05]	251.9 [9.92]
154	258.1 [10.16]	254.7 [10.03]
183	259.3 [10.21]	256.0 [10.08]
212	265.4 [10.45]	262.1 [10.32]
241	271.5 [10.69]	268.1 [10.56]
287	281.4 [11.08]	278.1 [10.95]
331	290.8 [11.45]	287.5 [11.32]
396	304.5 [11.99]	301.2 [11.86]
460	318.0 [12.52]	314.6 [12.39]

Notes

4000 Series

Highlights



Features

- 10 displacements, a variety of mounting flanges and output shafts
- Reliable, proven design
- High efficiency
- Environmental protection options

Benefits

- Flexibility in designing this motor into a system
- Options that fit well into tough applications

Applications

- Mowing
- Snow Removal
- Sprayer
- Trencher
- Wood Products

Description

The 4000 Series offers up to 8600 in-lb of torque and 25 gpm (continuous ratings). This is the corner stone of the Char-Lynn line.

4000 Series Motors

Geroler Element	10 Displacements
Flow l/min [GPM]	95 [25] Continuous**
	150 [40] Intermittent*
Speed RPM	722 Cont.**
	868 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	300 [4500] Inter.*
Torque Nm [lb-in]	970 [8600] Cont.**
	1180 [10450] Inter.*

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

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

C-4



Mowing



Snow Removal



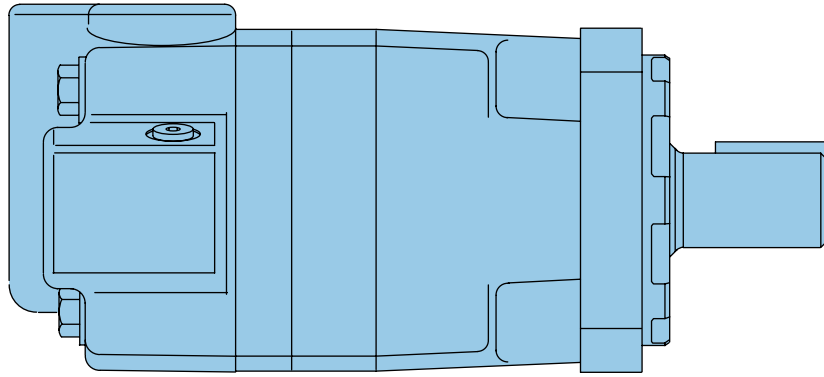
Sprayer



Trencher

4000 Series

Specifications



4000 SERIES MOTORS

Displ. cm ³ /r [in ³ /r]		110 [6.7]	130 [7.9]	160 [9.9]	205 [12.5]	245 [15.0]	280 [17.1]	310 [19.0]	395 [24.0]	495 [30.0]	625 [38.0]
Max. Speed (RPM)	Continuous	697	722	582	459	383	336	303	239	191	151
	Intermittent @ Flow	868	862	693	546	532	488	422	376	305	241
Flow l/min [GPM]	Continuous	75 [20]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]
	Intermittent	95 [25]	115 [30]	115 [30]	115 [30]	130 [35]	130 [35]	130 [35]	150 [40]	150 [40]	150 [40]
Torque* Nm [lb-in]	Continuous	320 [2850]	375 [3330]	485 [4290]	600 [5300]	705 [6240]	753 [6666]	850 [7530]	930 [8240]	945 [8375]	970 [8605]
	Intermittent	470 [4160]	560 [4940]	705 [6240]	800 [7100]	845 [7470]	957 [8471]	1065 [9420]	1185 [10470]	1170 [10350]	1180 [10450]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	190 [2750]	140 [2000]	115 [1700]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	260 [3750]	310 [4500]	260 [3750]	260 [3750]	240 [3500]	170 [2500]	140 [2000]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	295 [4250]	230 [3300]	180 [2600]
Weight kg [lb]	Standard or Wheel Mount	17.9 [39.5]	18.1 [40.0]	18.1 [40.0]	18.4 [40.5]	18.6 [41.0]	19.1 [42.0]	19.5 [43.0]	20.4 [45.0]	21.8 [48.0]	23.1 [51.0]
	Bearingless	14.1 [31.0]	14.3 [31.5]	14.1 [31.0]	14.5 [32.0]	14.7 [32.5]	15.2 [33.5]	15.6 [34.5]	16.6 [36.5]	17.9 [39.5]	19.3 [42.5]

Maximum Case Pressure: See case pressure seal limitation graph.

*See shaft torque ratings for limitations..

Note:

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

Maximum Inlet Pressure:

310 bar [4500 PSI]
Do not exceed Δ pressure rating (see chart above).

Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.
Do not exceed Δ pressure rating (see chart above).

Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

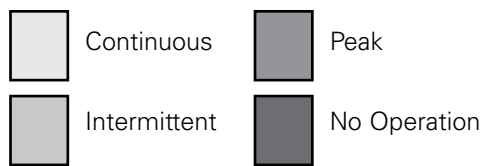
per ISO Cleanliness Code, 4406: 20/18/13

4000 Series

Performance Data

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

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

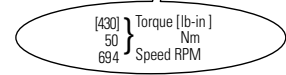


130cm³/r [7.9 in³/r]
ΔPressure Bar [PSI]

	[250] 155	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] 1.9	[310] 35 12	[510] 60 9	[1060] 120 5	[1590] 180 2						
[1] 3.8	[290] 35 30	[530] 60 28	[1080] 120 25	[1600] 180 19	[2110] 240 14	[2640] 300 13	[3060] 345 12	[3450] 390 4		
[2] 7.5	[280] 30 57	[530] 60 56	[1100] 125 53	[1620] 185 47	[2140] 240 42	[2660] 300 40	[3180] 360 38	[3600] 405 29	[4020] 455 20	[4080] 460 12
[4] 15	[260] 30 116	[520] 60 114	[1100] 125 111	[1650] 185 105	[2200] 250 100	[2700] 305 95	[3210] 365 90	[3660] 415 70	[4100] 465 50	[4560] 515 37
[6] 23	[240] 25 173	[510] 60 170	[1100] 125 167	[1650] 185 161	[2200] 250 156	[2720] 305 149	[3240] 365 142	[3710] 420 123	[4180] 470 104	[4660] 525 91
[8] 30	[230] 25 228	[510] 60 225	[1080] 120 222	[1640] 185 216	[2210] 250 210	[2740] 310 202	[3270] 370 194	[3770] 425 176	[4270] 480 158	[4750] 535 145
[10] 38	[210] 25 283	[510] 60 225	[1080] 120 278	[1640] 185 272	[2210] 250 266	[2750] 310 256	[3300] 375 246	[3820] 430 229	[4350] 490 212	[4840] 545 189
[12] 45	[200] 25 341	[500] 55 338	[1070] 120 335	[1640] 185 329	[2220] 250 323	[2750] 310 312	[3300] 375 300	[3840] 435 282	[4370] 495 263	[4870] 550 237
[14] 53	[180] 20 400	[490] 55 396	[1060] 120 392	[1640] 185 386	[2220] 250 380	[2750] 310 368	[3310] 375 355	[3860] 435 335	[4390] 495 366	[4890] 550 286
[16] 61	[160] 20 457	[490] 55 453	[1050] 120 449	[1630] 185 443	[2220] 250 437	[2760] 310 424	[3310] 375 410	[3860] 435 388	[4400] 495 366	[4920] 555 335
[18] 68	[130] 15 516	[480] 55 511	[1050] 120 506	[1630] 185 500	[2220] 250 494	[2760] 310 480	[3320] 375 465	[3870] 435 442	[4420] 500 418	[4940] 560 384
[20] 76	[110] 10 574	[470] 55 569	[1040] 120 564	[1620] 185 559	[2210] 250 551	[2760] 310 536	[3330] 375 520	[3890] 440 495	[4440] 500 470	
[22] 83	[70] 10 633	[450] 50 628	[1020] 115 624	[1610] 180 615	[2190] 245 606	[2750] 310 590	[3320] 375 573	[3880] 440 547	[4440] 500 520	
[25] 95	[50] 5 722	[430] 50 718	[1000] 115 714	[1580] 180 702	[2160] 245 690	[2720] 305 672	[3300] 375 653	[3860] 435 625	[4430] 500 595	
[30] 114		[400] 45 862	[940] 105 855	[1500] 170 842	[2080] 235 827	[2670] 300 806	[3200] 360 783	[3740] 425 749		

110cm³/r [6.7 in³/r]
ΔPressure Bar [PSI]

	[250] 155	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] 1.9	[150] 15 14	[390] 45 10	[850] 95 5	[1290] 145 2						
[1] 3.8	[170] 20 34	[440] 50 33	[900] 100 31	[1380] 155 28	[1860] 210 25	[2270] 255 22	[2680] 305 18	[3110] 350 11		
[2] 7.5	[180] 20 68	[450] 50 67	[910] 105 62	[1390] 155 56	[1860] 210 50	[2280] 260 44	[2700] 305 36	[3120] 355 28	[3450] 390 18	
[4] 15	[190] 20 138	[460] 50 136	[940] 105 123	[1400] 160 110	[1870] 210 97	[2310] 260 84	[2730] 310 70	[3140] 355 56	[3560] 400 42	[3880] 440 28
[6] 23	[200] 25 207	[470] 55 204	[960] 110 200	[1420] 160 193	[1880] 210 184	[2320] 260 174	[2760] 310 163	[3200] 360 150	[3640] 410 136	[3950] 455 121
[8] 30	[190] 20 277	[460] 50 274	[950] 105 270	[1420] 160 262	[1880] 210 253	[2340] 265 241	[2790] 315 228	[3230] 365 213	[3670] 415 196	[4010] 455 179
[10] 38	[180] 20 347	[460] 50 344	[950] 105 340	[1420] 160 331	[1890] 215 322	[2350] 265 308	[2820] 320 292	[3260] 370 274	[3700] 420 255	[4070] 460 236
[12] 45	[160] 20 417	[450] 50 414	[940] 105 410	[1420] 160 400	[1880] 210 390	[2350] 265 374	[2820] 320 355	[3260] 370 335	[3710] 420 313	[4080] 460 292
[14] 53	[140] 15 487	[440] 50 484	[930] 105 480	[1420] 160 469	[1880] 210 458	[2350] 265 440	[2830] 320 419	[3280] 370 446	[3730] 420 471	[4110] 465 348
[16] 61	[130] 15 556	[440] 50 553	[920] 105 549	[1410] 160 537	[1870] 210 525	[2350] 265 505	[2840] 320 482	[3300] 375 455	[3750] 425 428	[4120] 465 404
[18] 68	[100] 10 626	[440] 50 622	[910] 105 618	[1400] 160 606	[1870] 210 593	[2350] 265 570	[2840] 320 545	[3300] 375 516	[3770] 425 485	[4140] 465 460
[20] 76	[80] 10 697	[430] 50 694	[900] 100 690	[1370] 155 677	[1860] 210 664	[2350] 265 638	[2850] 320 611	[3320] 375 579	[3790] 430 545	[4160] 470 518
[25] 95										

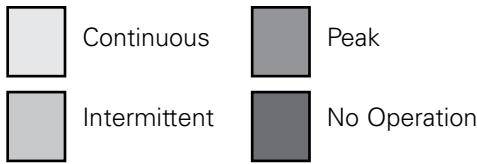


4000 Series

Performance Data

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

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

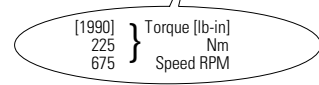


205cm³/r [17.1 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] 1.9	[400] 45 8	[810] 90 5	[1500] 170 1							
[1] 3.8	[410] 45 17	[830] 95 17	[1590] 180 16	[2220] 250 15	[2860] 325 14	[3860] 435 12	[4560] 515 11	[5390] 610 9	[5510] 625 3	
[2] 7.5	[420] 45 36	[850] 95 35	[1680] 190 34	[2410] 270 32	[3140] 355 29	[4060] 460 27	[4800] 540 25	[5420] 610 22	[6000] 680 16	[6210] 700 8
[4] 15	[430] 50 73	[870] 100 73	[1770] 200 71	[2590] 295 70	[3140] 385 68	[4260] 480 61	[5040] 570 57	[5730] 645 45	[6340] 715 35	[6740] 760 23
[6] 23	[430] 50 107	[880] 100 106	[1800] 205 105	[2620] 295 103	[3530] 400 101	[4370] 495 98	[5170] 585 90	[5900] 665 81	[6590] 745 74	[7100] 800 65
[8] 30	[410] 45 144	[870] 100 143	[1820] 205 142	[2660] 300 138	[3560] 400 136	[4410] 500 132	[5240] 590 125	[6020] 680 116	[6770] 765 109	
[10] 38	[390] 45 182	[860] 95 180	[1820] 205 179	[2700] 305 174	[3580] 405 170	[4460] 505 166	[5300] 600 160	[6110] 690 152	[6890] 780 143	
[12] 45	[350] 40 217	[850] 95 216	[1810] 205 215	[2690] 305 211	[3570] 405 202	[4440] 500 200	[5300] 600 194	[6120] 690 185		
[14] 53	[330] 35 256	[840] 95 254	[1790] 200 252	[2670] 300 248	[3560] 400 243	[4430] 500 237	[5290] 600 229	[6120] 690 219		
[16] 61	[290] 35 291	[820] 95 290	[1770] 200 289	[2650] 300 284	[3540] 400 280	[4410] 500 272	[5280] 595 264	[6120] 690 253		
[18] 68	[270] 30 329	[810] 90 327	[1750] 200 325	[2640] 300 321	[3520] 400 316	[4400] 495 308	[5270] 595 298	[6120] 690 287		
[20] 76	[230] 25 366	[800] 90 364	[1730] 195 362	[2620] 295 358	[3510] 395 353	[4380] 495 345	[5270] 595 334	[6120] 690 321		
[22] 83	[190] 20 402	[780] 90 400	[1690] 190 398	[2600] 295 394	[3500] 395 389	[4370] 495 380	[5260] 595 368			
[25] 95	[150] 15 459	[750] 85 456	[1640] 185 453	[2560] 290 448	[3480] 395 442	[4360] 495 434	[5240] 590 421			
[30] 114	[710] 80 546	[1540] 175 542	[2510] 285 537	[3350] 380 529	[4190] 475 520	[5030] 570 504				

160cm³/r [9.9 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] 1.9	[300] 35 8	[680] 75 7	[1320] 150 5	[2050] 230 3	[2750] 310 1					
[1] 3.8	[320] 35 23	[700] 80 22	[1350] 155 20	[2070] 235 19	[2780] 315 18	[3300] 375 16	[3940] 445 15	[4410] 500 8	[4950] 560 2	
[2] 7.5	[330] 35 46	[700] 80 45	[1360] 155 41	[2080] 235 40	[2790] 315 37	[3340] 375 32	[3970] 450 29	[4530] 510 27	[5090] 575 25	[5590] 630 13
[4] 15	[320] 35 93	[710] 80 92	[1400] 160 90	[2100] 240 88	[2820] 320 84	[3420] 385 76	[4020] 455 73	[4620] 520 62	[5220] 590 51	[5730] 645 35
[6] 23	[300] 35 137	[710] 80 135	[1420] 160 134	[2140] 240 131	[2850] 320 126	[3510] 395 120	[4180] 470 114	[4760] 540 90	[5340] 605 75	[5870] 665 57
[8] 30	[280] 30 184	[720] 80 182	[1450] 165 180	[2180] 245 176	[2900] 330 171	[3560] 400 163	[4230] 480 154	[4850] 550 138	[5470] 620 122	[6010] 680 100
[10] 38	[260] 30 232	[720] 80 229	[1480] 165 226	[2220] 250 221	[2950] 335 216	[3610] 410 206	[4290] 485 194	[4920] 555 182	[5560] 630 169	[6160] 695 142
[12] 45	[240] 25 277	[700] 80 274	[1450] 165 272	[2190] 245 266	[2920] 330 260	[3590] 405 250	[4280] 485 238	[4920] 555 224	[5570] 630 209	[6180] 700 182
[14] 53	[220] 25 321	[680] 75 319	[1420] 160 318	[2160] 245 311	[2890] 325 304	[3570] 405 294	[4270] 480 282	[4920] 555 266	[5580] 630 249	[6200] 700 222
[16] 61	[200] 25 366	[670] 75 364	[1400] 160 362	[2130] 240 356	[2860] 325 348	[3550] 400 338	[4260] 480 326	[4920] 555 308	[5590] 630 289	[6220] 705 262
[18] 68	[180] 20 410	[650] 75 409	[1360] 155 407	[2100] 235 401	[2830] 320 392	[3530] 400 382	[4250] 480 370	[4910] 555 350	[5600] 635 329	[6240] 705 302
[20] 76	[150] 15 460	[630] 70 458	[1340] 150 456	[2070] 235 448	[2800] 315 440	[3510] 395 429	[4240] 480 417	[4910] 555 396	[5610] 635 373	
[22] 83	[120] 15 509	[620] 70 506	[1330] 150 502	[2060] 235 494	[2790] 315 484	[3500] 395 473	[4220] 475 461	[4910] 555 438	[5600] 635 413	
[25] 95	[70] 10 582	[600] 70 578	[1320] 150 573	[2050] 230 563	[2780] 315 552	[3480] 395 540	[4210] 475 526	[4900] 555 501	[5590] 630 474	
[30] 114	[560] 65 693	[1280] 145 687	[1990] 225 675	[2700] 305 661	[3430] 390 647	[3970] 450 630	[4640] 525 600			



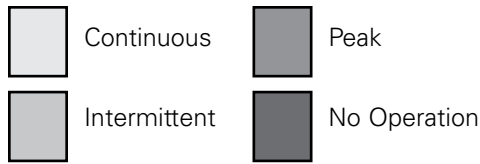
4000 Series

245cm³/r [15.0 in³/r]
ΔPressure Bar [PSI]

Performance Data

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

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



	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 15	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[.5]	[460] 50 5	[980] 110 2													
[1]	[480] 55 14	[990] 110 14	[1490] 170 14	[1990] 225 13	[2480] 280 13	[2970] 335 12	[3400] 385 12	[3830] 435 11	[4250] 480 10	[4680] 530 10	[5020] 565 4				
[2]	[500] 55 30	[1000] 115 30	[1520] 170 29	[2040] 230 29	[2540] 285 28	[3050] 345 27	[3420] 385 26	[3930] 445 24	[4440] 500 23	[4900] 555 22	[5320] 600 20	[5740] 650 18	[6160] 695 16	[6640] 750 14	[7150] 810 11
[4]	[510] 60 61	[1030] 115 61	[1560] 175 60	[2080] 235 60	[2600] 295 59	[3130] 355 59	[3630] 410 58	[4130] 465 56	[4630] 525 53	[5120] 580 49	[5570] 630 47	[6030] 680 44	[6480] 730 42	[6870] 775 39	[7340] 830 36
[6]	[510] 60 91	[1040] 120 90	[1570] 175 90	[2100] 235 89	[2620] 295 88	[3160] 355 88	[3660] 415 86	[4200] 475 83	[4710] 530 80	[5220] 590 75	[5690] 645 72	[6140] 695 70	[6620] 750 67	[7050] 815 63	[7430] 840 59
[8]	[500] 55 121	[1020] 115 121	[1560] 175 120	[2110] 240 119	[2630] 295 118	[3150] 355 117	[3680] 415 115	[4210] 475 113	[4740] 535 111	[5250] 595 106	[5720] 645 103	[6200] 700 99	[6670] 755 96	[7090] 800 91	[7470] 845 87
[10]	[470] 55 152	[1000] 115 151	[1540] 175 150	[2100] 235 148	[2620] 295 148	[3150] 355 147	[3690] 415 145	[4230] 480 143	[4770] 540 141	[5290] 600 137	[5670] 650 133	[6240] 705 129	[6710] 760 125	[7140] 805 120	
[12]	[450] 50 183	[980] 110 182	[1530] 175 180	[2080] 235 179	[2610] 295 178	[3140] 355 178	[3680] 415 176	[4220] 475 173	[4760] 540 170	[5280] 595 166	[5750] 645 161	[6230] 700 157	[6700] 755 152		
[14]	[420] 45 213	[960] 110 212	[1520] 170 211	[2060] 235 210	[2600] 295 209	[3130] 355 208	[3670] 415 206	[4200] 475 203	[4740] 535 200	[5260] 595 195	[5740] 650 190	[6220] 705 185			
[16]	[400] 45 244	[950] 105 243	[1500] 170 242	[2040] 230 241	[2580] 290 240	[3120] 355 239	[3660] 415 236	[4190] 475 232	[4730] 535 229	[5250] 595 225	[5730] 650 219	[6210] 700 213			
[18]	[380] 45 275	[930] 105 274	[1480] 165 273	[2020] 230 272	[2560] 290 270	[3110] 350 269	[3650] 415 266	[4180] 470 262	[4710] 530 259	[5230] 590 254	[5720] 645 248	[6200] 700 241			
[20]	[350] 40 305	[910] 105 305	[1460] 165 304	[2000] 225 303	[2550] 290 302	[3100] 350 300	[3640] 410 296	[4170] 470 292	[4700] 530 288	[5220] 590 283	[5710] 645 276				
[22]	[310] 35 337	[870] 100 336	[1420] 160 335	[1970] 225 334	[2500] 280 332	[3050] 345 330	[3590] 405 326	[4140] 465 323	[4680] 525 319	[5200] 590 313	[5680] 645 306				
[25]	[260] 30 383	[820] 95 382	[1380] 155 381	[1930] 220 380	[2460] 280 378	[2980] 335 376	[3540] 400 372	[4090] 465 369	[4640] 525 365	[5180] 585 357					
[30]		[680] 75 457	[1250] 140 456	[1860] 210 455	[2390] 270 453	[2900] 330 450	[3430] 390 445	[3960] 445 442	[4460] 505 437	[4950] 560 427					
[35]			[1110] 125 532	[1740] 195 531	[2270] 255 528	[2790] 315 525	[3340] 375 519	[3910] 440 515	[4400] 495 509						
[132]															

280cm³/r [17.1 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[.5]	[533] 60 4	[1074] 121 2													
[1]	[553] 62 12	[1136] 128 12	[1714] 194 12	[2287] 258 11	[2841] 321 11	[3394] 384 11	[3868] 437 10	[4389] 496 10	[4895] 553 10	[6080] 685 8	[5870] 663 6	[6811] 770 6	[7239] 818 5	[7654] 865 4	
[2]	[568] 64 26	[1146] 130 26	[1740] 197 25	[2328] 263 25	[2902] 328 24	[3461] 391 24	[3955] 447 23	[4524] 511 22	[5222] 597 21	[6300] 713 20	[6146] 694 19	[6666] 753 17	[7191] 813 15	[7749] 876 13	[8323] 940 11
[4]	[579] 65 53	[1167] 132 53	[1771] 200 52	[2374] 268 51	[2962] 335 51	[3557] 402 51	[4139] 468 50	[4712] 532 49	[5285] 597 47	[6395] 722 45	[6395] 722 44	[6946] 785 42	[7502] 848 41	[8020] 906 40	[8471] 957 38
[6]	[583] 66 79	[1177] 133 79	[1781] 201 78	[2395] 271 78	[2987] 338 77	[3601] 407 77	[4193] 474 76	[4793] 542 74	[5376] 607 72	[6559] 743 69	[6521] 737 67	[7082] 800 66	[7607] 859 65	[8097] 915 64	
[8]	[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	[6594] 741 96	[6556] 741 94	[7022] 793 92	[7518] 849 90		
[10]	[547] 62 134	[1146] 130 133	[1765] 199 133	[2395] 271 131	[2997] 339 131	[3629] 410 130	[4238] 479 129	[4837] 547 127	[5442] 615 126	[6635] 746 122	[6601] 746 119	[7022] 793 115	[7518] 849 111		
[12]	[527] 60 161	[1126] 127 160	[1745] 197 186	[2369] 268 158	[2991] 338 157	[3609] 408 157	[4228] 478 154	[4832] 546 154	[5441] 615 152	[6634] 744 148	[6586] 744 144	[6940] 784 141			
[14]	[497] 56 187	[1106] 125 187	[1730] 195 186	[2344] 265 186	[2972] 336 185	[3585] 405 184	[4213] 476 182	[4816] 544 180	[5430] 614 178	[6628] 736 174	[6511] 736 170	[6940] 784 166			
[16]	[472] 53 214	[1096] 124 214	[1715] 194 213	[2324] 263 212	[2947] 333 211	[3565] 403 210	[4203] 475 208	[4811] 544 206	[5420] 612 203	[6619] 746 199	[6519] 737 195	[6836] 777 195			
[18]	[437] 39 241	[1075] 121 241	[1690] 191 240	[2299] 260 239	[2917] 330 237	[3541] 400 236	[4188] 473 234	[4801] 542 231	[5400] 610 229	[6619] 746 224	[6519] 737 224	[6836] 777 219			
[20]	[402] 45 268	[1055] 119 268	[1669] 189 268	[2274] 257 267	[2898] 327 266	[3521] 398 264	[4178] 472 261	[4791] 541 258	[5394] 609 255	[6581] 746 249					
[22]	[366] 41 296	[1005] 114 295	[1629] 184 295	[2257] 255 294	[2856] 323 292	[3480] 393 290	[4136] 467 288	[4756] 537 285	[5205] 588 279						
[25]	[301] 34 336	[940] 106 336	[1588] 179 335	[2231] 252 334	[2825] 319 333	[3419] 386 331	[4086] 462 328	[4710] 532 325	[5205] 588 314						
[30]		[845] 96 402	[1480] 167 401	[2151] 243 400	[2759] 312 398	[3328] 376 396	[3984] 450 392	[4573] 517 389	[5021] 567 377						
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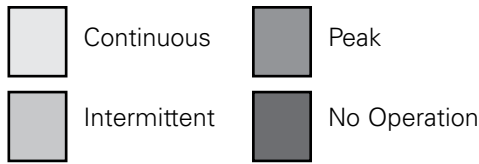


4000 Series

Performance Data

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

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

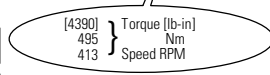


310cm³/r [19.0 in³/r] ΔPressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[5] 1.9	[600] 70 4	[1150] 130 2													
[1] 3.8	[620] 70 11	[1270] 145 11	[1920] 215 11	[2560] 290 10	[3170] 360 10	[3780] 425 10	[4290] 485 9	[4900] 555 9	[5490] 620 9	[6080] 685 8	[6670] 755 8	[7270] 820 7	[7880] 890 7	[8490] 960 6	[9080] 1025 5
[2] 7.5	[630] 70 23	[1280] 145 23	[1940] 220 22	[2590] 295 22	[3230] 365 21	[3830] 435 21	[4450] 505 20	[5070] 575 20	[5680] 640 19	[6300] 710 18	[6910] 780 18	[7530] 850 17	[8160] 920 17	[8790] 995 16	[9420] 1065 15
[4] 15	[640] 70 47	[1290] 145 47	[1960] 220 46	[2640] 300 46	[3290] 370 45	[3940] 445 45	[4600] 520 44	[5240] 590 44	[5880] 665 43	[6510] 735 42	[7150] 810 42	[7790] 880 41	[8450] 955 41	[9100] 1030 40	
[6] 23	[650] 75 71	[1300] 145 71	[1970] 225 70	[2660] 300 70	[3320] 375 69	[4000] 450 68	[4680] 530 67	[5330] 600 66	[5980] 675 66	[6630] 750 64	[7280] 825 64	[7940] 895 63			
[8] 30	[640] 70 96	[1300] 145 96	[1980] 225 95	[2670] 300 95	[3350] 380 94	[4030] 455 94	[4710] 530 93	[5360] 605 92	[6020] 680 91	[6670] 755 89	[7320] 825 88				
[10] 38	[620] 70 121	[1280] 145 120	[1970] 225 120	[2660] 300 119	[3340] 375 119	[4070] 460 118	[4740] 535 117	[5390] 610 116	[6050] 685 115	[6710] 760 115	[7370] 835 109				
[12] 45	[600] 70 145	[1260] 140 144	[1940] 220 144	[2630] 295 143	[3340] 375 142	[4040] 455 142	[4730] 535 141	[5390] 610 140	[6060] 685 139	[6720] 760 135					
[14] 53	[570] 65 169	[1240] 140 169	[1920] 215 168	[2600] 295 168	[3310] 375 167	[4000] 450 167	[4710] 530 165	[5380] 610 164	[6060] 685 163	[6730] 760 159					
[16] 61	[540] 60 193	[1230] 140 193	[1900] 215 192	[2580] 290 192	[3280] 370 190	[3970] 450 189	[4700] 530 188	[5380] 610 187	[6050] 685 185						
[18] 68	[490] 55 217	[1210] 135 217	[1880] 210 216	[2550] 290 216	[3240] 365 214	[3930] 445 213	[4680] 530 211	[5370] 605 209	[6040] 680 207						
[20] 76	[450] 50 242	[1190] 135 242	[1860] 210 242	[2520] 285 241	[3210] 360 240	[3900] 440 238	[4670] 530 236	[5360] 605 234	[6030] 680 232						
[22] 83	[420] 45 267	[1130] 130 266	[1820] 205 266	[2520] 285 265	[3180] 360 264	[3870] 440 262	[4640] 525 260	[5320] 600 258							
[25] 95	[340] 40 303	[1050] 120 303	[1780] 200 302	[2510] 285 301	[3160] 355 300	[3820] 430 299	[4590] 520 296	[5280] 595 293							
[30] 114		[1010] 115 363	[1700] 190 362	[2420] 275 360	[3100] 350 359	[3720] 420 358	[4500] 510 354	[5140] 580 351							
[35] 132			[1580] 180 422	[2360] 265 420	[2950] 335 419	[3540] 400 418	[4390] 495 413								

395cm³/r [24.0 in³/r] ΔPressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240
[5] 1.9	[700] 80 4	[1340] 150 2												
[1] 3.8	[750] 85 9	[1430] 160 9	[2110] 240 8	[2770] 315 8	[3460] 390 8	[4170] 470 7	[4890] 550 7	[5610] 635 7	[6310] 715 5	[7010] 790 4	[7700] 870 2			
[2] 7.5	[800] 90 18	[1500] 170 18	[2290] 260 17	[3030] 340 16	[3850] 435 16	[4620] 520 15	[5310] 600 15	[6000] 680 14	[6750] 765 13	[7490] 845 13	[8240] 930 12	[8990] 1015 11	[9730] 1100 10	[10470] 1185 8
[4] 15	[860] 95 38	[1630] 185 38	[2470] 280 37	[3310] 375 36	[4120] 465 36	[4900] 555 35	[5640] 635 35	[6390] 720 34	[7190] 810 34	[7990] 890 33	[8780] 990 32			
[6] 23	[860] 95 57	[1690] 190 57	[2540] 285 56	[3410] 385 55	[4180] 470 54	[4980] 565 53	[5780] 655 52	[6580] 745 50	[7400] 835 49	[8220] 930 47				
[8] 30	[840] 95 76	[1680] 190 76	[2550] 290 75	[3400] 385 74	[4260] 480 73	[5090] 575 72	[5870] 665 70	[6650] 750 68	[7480] 845 66					
[10] 38	[800] 90 95	[1680] 190 95	[2550] 290 94	[3400] 385 93	[4260] 480 92	[5100] 575 91	[5920] 670 89	[6730] 760 86	[7560] 855 84					
[12] 45	[760] 85 114	[1660] 190 114	[2520] 285 113	[3380] 380 112	[4270] 480 111	[5110] 575 110	[5900] 665 108	[6690] 755 105						
[14] 53	[740] 85 133	[1640] 185 133	[2490] 280 132	[3370] 380 131	[4260] 480 130	[5100] 575 129	[5880] 665 127	[6650] 750 124						
[16] 61	[710] 80 153	[1620] 185 153	[2460] 280 152	[3350] 380 151	[4240] 480 149	[5080] 575 147	[5840] 660 145							
[18] 68	[680] 75 172	[1600] 180 172	[2430] 275 171	[3340] 375 170	[4220] 475 168	[5060] 570 166	[5810] 655 164							
[20] 76	[610] 70 192	[1580] 180 191	[2400] 270 190	[3320] 375 189	[4210] 475 187	[5040] 570 185	[5780] 655 183							
[22] 83	[570] 65 211	[1490] 170 210	[2340] 265 209	[3220] 365 208	[4160] 470 206	[5010] 565 204	[5740] 650 201							
[25] 95	[490] 55 239	[1350] 155 238	[2250] 255 237	[3080] 350 236	[4070] 460 235	[4960] 560 233	[5700] 645 230							
[30] 114		[1080] 120 285	[1650] 185 284	[2270] 255 282	[3020] 340 281	[3850] 435 279								
[35] 132			[1520] 170 331	[2120] 240 330	[2870] 325 328	[3760] 425 325								
[40] 151				[2050] 230 376	[2790] 315 374	[3620] 410 371								

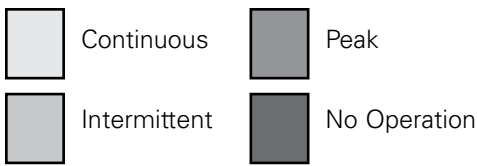


4000 Series

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 120 SUS. Actual data may vary slightly from unit to unit in production.

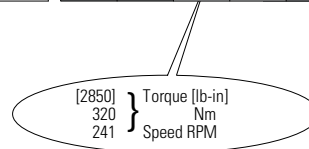


625cm³/r [38.0 in³/r]
 Δ Pressure Bar [PSI]

	[250]	[500]	[750]	[1000]	[1250]	[1500]	[1600]	[1700]	[1800]	[2000]
	15	35	50	70	85	105	100	115	125	140
[.5]	[1000]									
1.9	115									
	2									
[1]	[1080]	[2340]	[3600]	[4850]	[6100]	[7350]	[7820]	[8290]	[8760]	
3.8	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]	[10075]
7.5	125	270	415	565	715	860	915	970	1030	1140
	14	14	14	13	12	11	10	9	8	7
[4]	[1090]	[2420]	[3750]	[5175]	[6600]	[7900]	[8410]	[9000]	[9590]	[10450]
15	125	275	425	585	745	895	950	1015	1085	1180
	23	23	23	22	21	19	18	17	16	14
[6]	[1095]	[2460]	[3825]	[5220]	[6620]	[7950]	[8430]	[9110]	[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]	[925]		
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]	[8045]	[8585]			
68	110	270	430	590	750	900	960			
	108	107	107	105	104	100	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	530	700					
	181	180	179	177	176					
[35]			[3125]	[4545]						
132			355	515						
			210	208						
[40]			[2850]	[4295]						
151			320	485						
			241	239						

495cm³/r [30.0 in³/r]
 Δ Pressure Bar [PSI]

	[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]	[2250]	[2500]
	15	35	50	70	85	105	120	140	155	170
[.5]	[800]	[1750]								
1.9	90	200								
	3	1								
[1]	[880]	[1875]	[2875]	[3825]	[4775]	[5720]	[6670]	[7600]		
3.8	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]	
7.5	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]	[8455]		
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						



4000 Series

Dimensions

Standard Mount

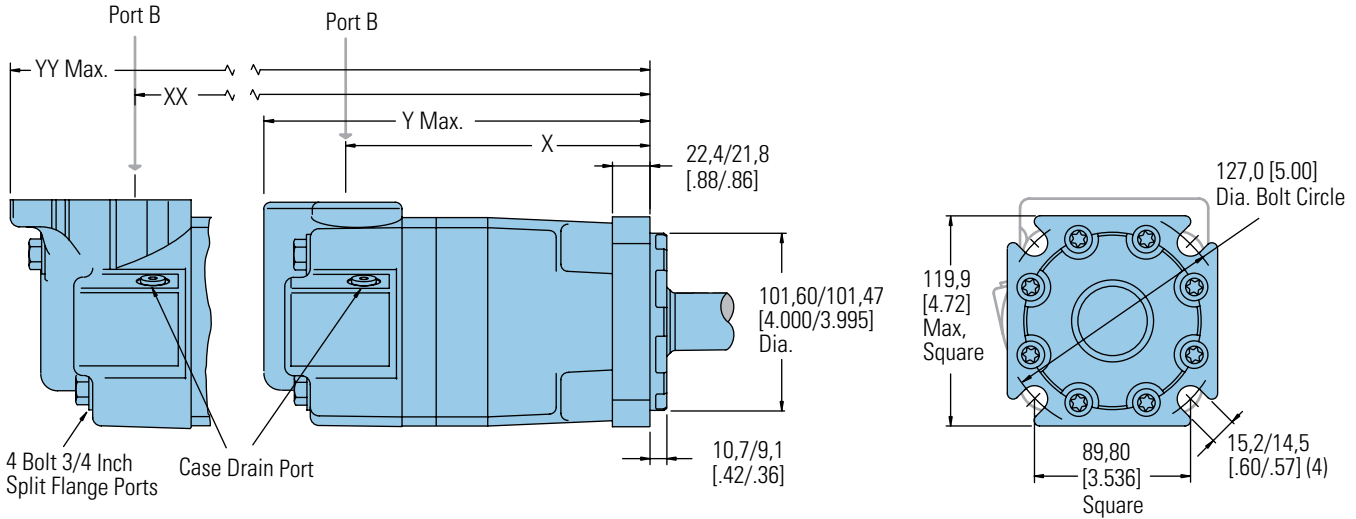
Ports

- 1 1/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 3/4 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

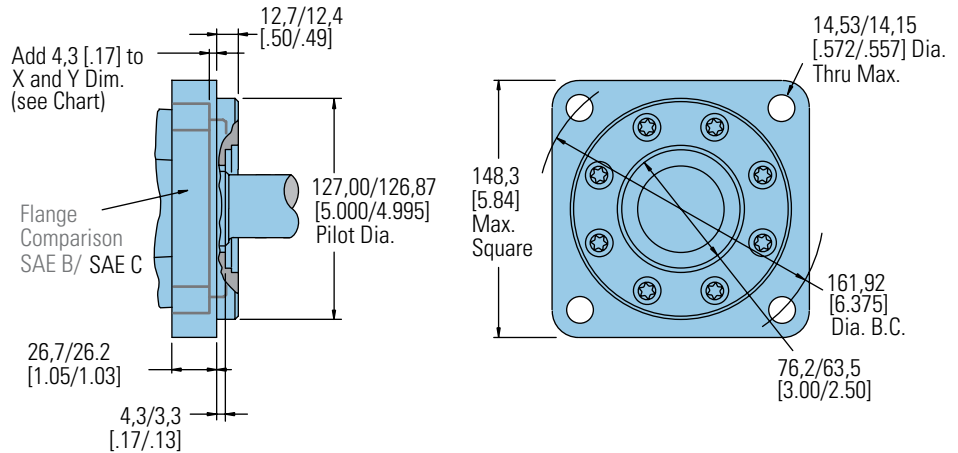
Standard Rotation Viewed from Shaft End

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

Standard Mount



SAE C Flange



STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm 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]	171,3 [6.75]	250,4 [9.86]
160 [9.9]	168,7 [6.64]	224,7 [8.85]	177,7 [7.00]	256,7 [10.11]
205 [12.5]	177,2 [6.98]	233,2 [9.18]	186,2 [7.33]	265,2 [10.44]
245 [15.0]	168,7 [6.64]	224,7 [8.85]	177,7 [7.00]	256,7 [10.11]
310 [19.0]	177,2 [6.98]	233,2 [9.18]	186,2 [7.33]	265,2 [10.44]
395 [24.0]	187,9 [7.40]	243,9 [9.60]	196,9 [7.75]	275,9 [10.86]
495 [30.0]	200,7 [7.90]	256,8 [10.11]	209,7 [8.26]	288,8 [11.37]
625 [38.0]	217,8 [8.58]	273,9 [10.78]	226,7 [8.93]	305,9 [12.04]

4000 Series

Dimensions

Wheel Mount

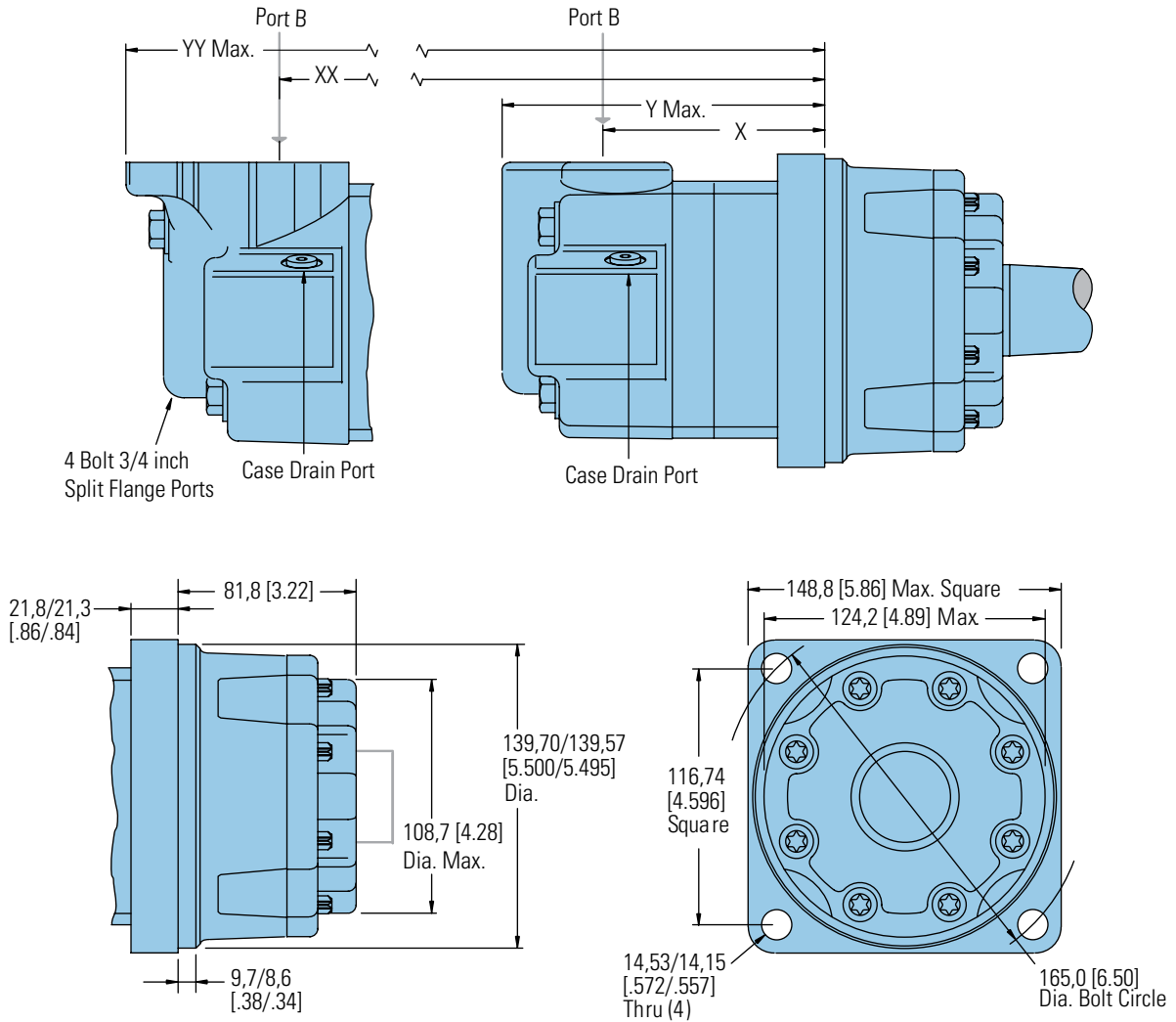
Wheel Mount

Ports

- 1 1/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 3/4 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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



WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm 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]	115,4 [4.55]	194,3 [7.65]
245 [15.0]	97,8 [3.85]	153,7 [6.05]	106,8 [4.21]	185,7 [7.31]
310 [19.0]	106,4 [4.19]	162,3 [6.39]	115,4 [4.55]	194,3 [7.65]
395 [24.0]	117,1 [4.61]	173,0 [6.81]	126,1 [4.97]	205,0 [8.07]
495 [30.0]	129,9 [5.12]	185,7 [7.31]	138,8 [5.47]	217,7 [8.57]
625 [38.0]	146,9 [5.79]	202,9 [7.99]	156,0 [6.14]	235,0 [9.25]

C-4

4000 Series

Dimensions

Bearingless

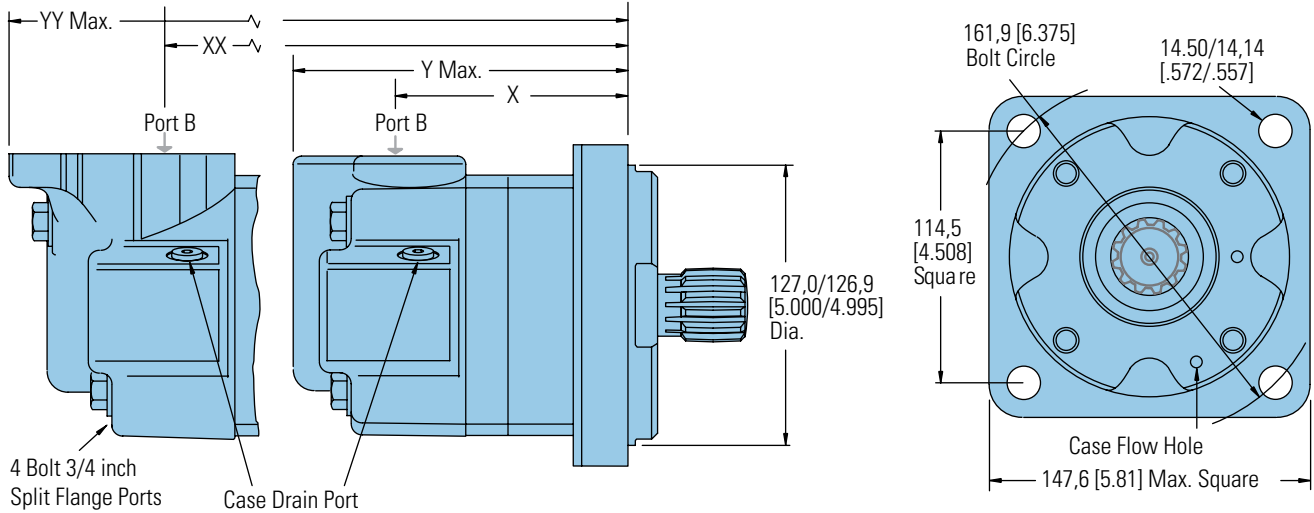
Bearingless

Ports

1 1/16 -12 UN-2B SAE O-ring Staggered Ports (2)
 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
 4 Bolt 3/4 inch Split Flange Ports (2)
 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
 G 3/4 (BSP) Staggered Ports (2)
 G 1/4 (BSP) Case Drain Port (1)

Standard Rotation Viewed from Shaft End

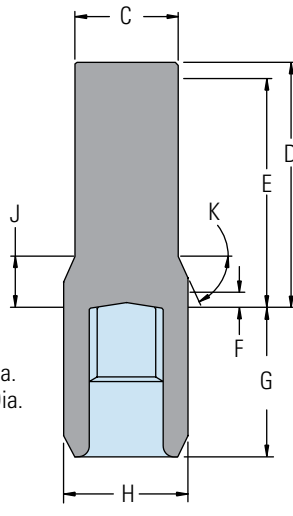
Port A Pressurized — CW
 Port B Pressurized — CCW



For 4000 Series Bearingless Motor application information contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

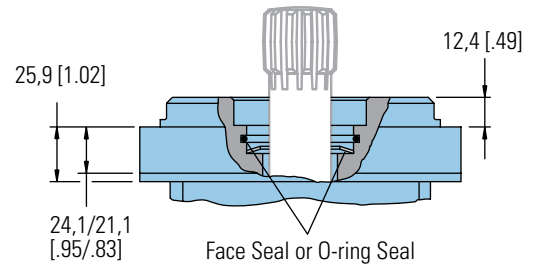
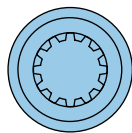
Note:

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



- C 47,2 [1.86] Dia.
- D 112,5 [4.43] Max.
- E 107,4 [4.23] Full Form Dia.
- F 7,4 [.29] Min. Full Form Dia.
- G 68,8 [2.71] Max.
- H 56,9 [2.24] Dia.
- J 18,29 [.720]
- K 38°

Mating Coupling Blank
 Eaton Part No. 12745-003



BEARINGLESS MOTOR DIMENSIONS

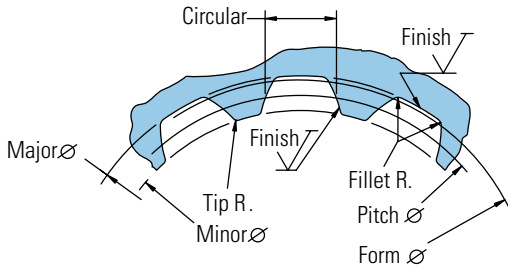
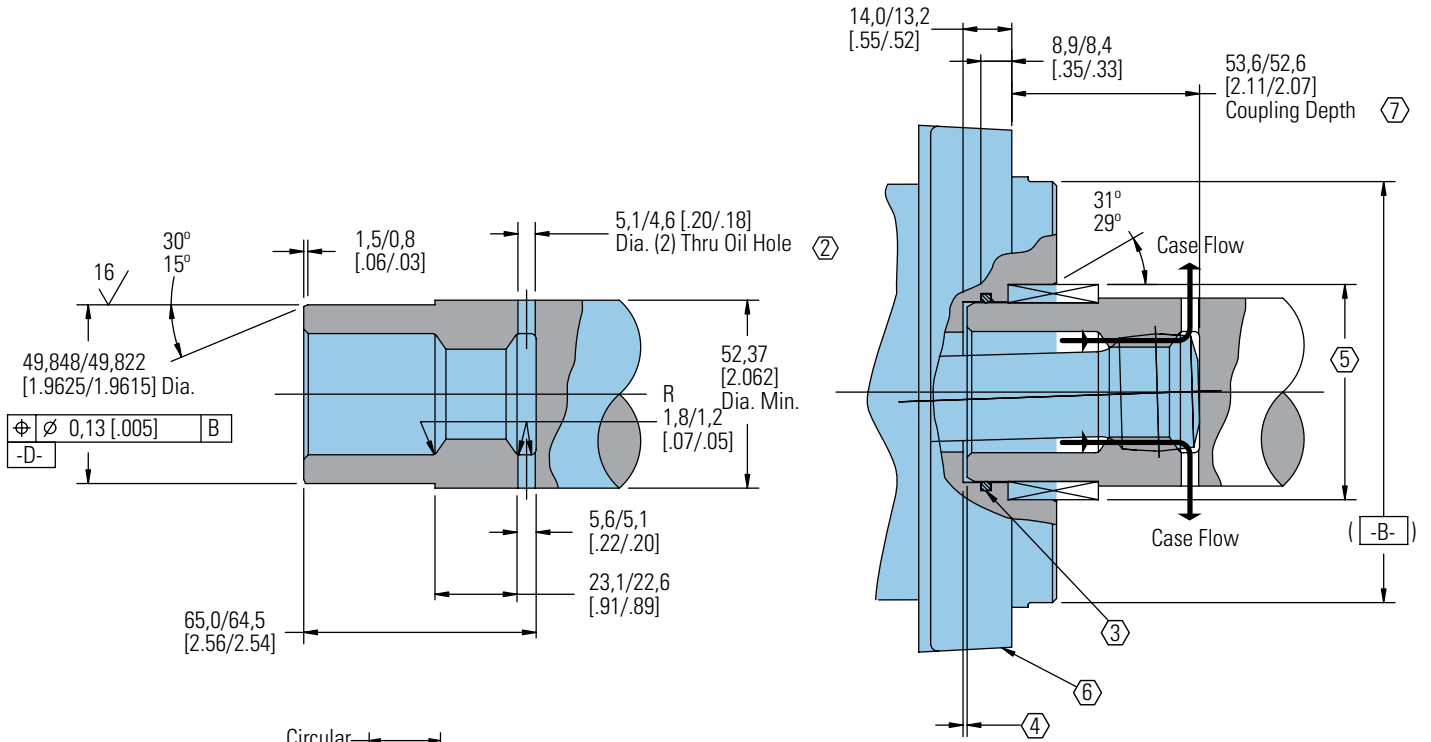
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
110 [6.7]	91,0 [3.58]	146,8 [5.78]	100,1 [3.94]	178,8 [7.04]
130 [7.9]	95,0 [3.74]	150,8 [5.94]	104,1 [4.10]	182,9 [7.20]
160 [9.9]	101,4 [4.00]	157,1 [6.19]	110,5 [4.35]	189,2 [7.45]
205 [12.5]	109,9 [4.33]	165,7 [6.52]	118,9 [4.68]	197,6 [7.78]
245 [15.0]	101,4 [4.00]	157,1 [6.19]	110,5 [4.35]	189,2 [7.45]
310 [19.0]	109,9 [4.33]	165,7 [6.52]	118,9 [4.68]	197,6 [7.78]
395 [24.0]	120,6 [4.75]	176,3 [6.94]	129,5 [5.10]	208,3 [8.20]
495 [30.0]	133,5 [5.26]	189,2 [7.45]	142,5 [5.61]	221,2 [8.71]
625 [38.0]	150,5 [5.93]	206,3 [8.12]	159,5 [6.28]	238,3 [9.38]

4000 Series

Installation Information

Bearingless

- 1 Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0,076 - 1,27 [.030 - .050] (dimensions apply after heat treat).
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.
- 4 Some means of maintaining clearance between shaft and mounting flange must be provided.
- 5 Counterbore designed to adapt to a standard sleeve bearing 50,010 - 50,040 [1.9689 - 1.9700] ID by 60,050 - 60,080 [2.3642 - 2.3653] (Oilite bronze sleeve bearing).
- 6 Similar to SAE "C" Four Bolt Flange.
- 7 52,8 [2.08] Max. dimension to be maintained when assembling shipping and installing unit to insure valve drive engagement with valve (this is required on displacement code number 24 only).



Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 30,480000 [1.2000000] $\begin{matrix} \nearrow \\ \searrow \end{matrix}$ 0,20 [.008] D
Base Diameter.....	Ref. 26,396455 [1.0392305]
Major Diameter.....	33,43 [1.316] Max. 33,23 [1.308] Min.
Min. Minor Diameter.....	28,40 - 28,58 [1.118 - 1.125]
Form Diameter, Min.....	32,59 [1.283]
Fillet Radius.....	0,63 - 0,76 [.025 - .030]
Tip Radius.....	0,26 - 0,51 [.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+ .0000 - .0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,045 [1.986]
Minimum Effective.....	4,995 [1.951]
Maximum Effective.....	Ref. 5,009 [1.972]
Minimum Actual.....	Ref. 4,986 [1.963]
Dimension Between Two Pins.....	Ref. 22,783 - 22,929 [.8970 - .9027]
Pin Diameter.....	5,334 [.2100] Pins to Have 3,73 [.147]
	Wide Flat for Root Clearance

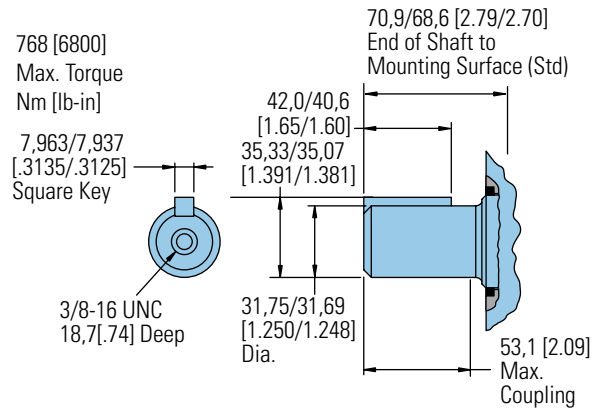
C-4

4000 Series

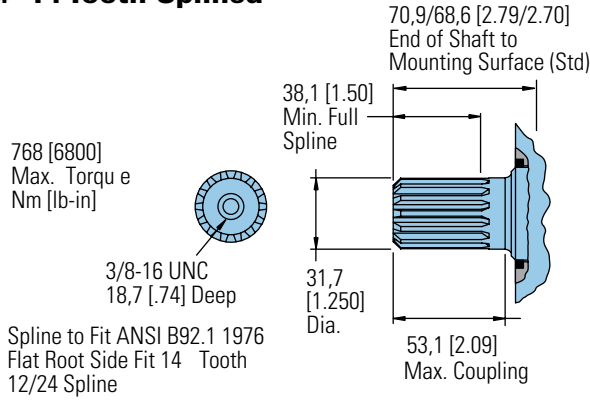
Dimensions

Shafts

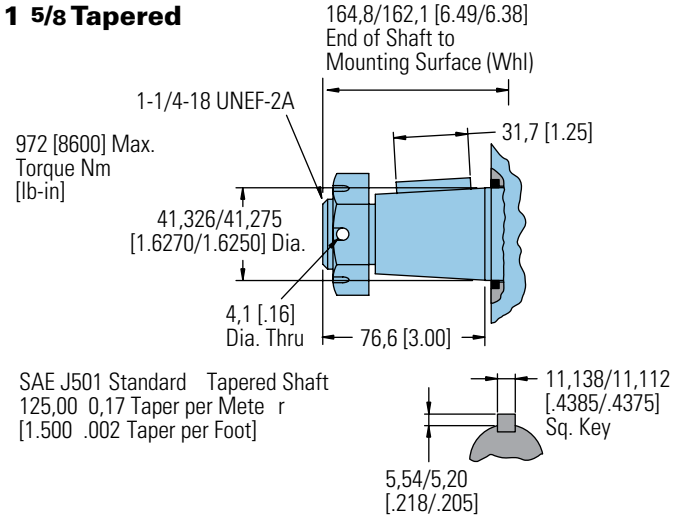
1 1/4 Inch Straight



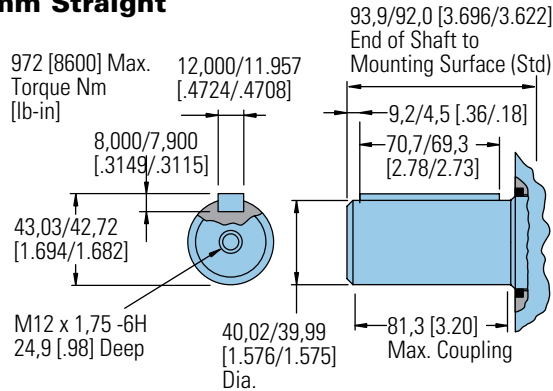
1 1/4 -14 Tooth Splined



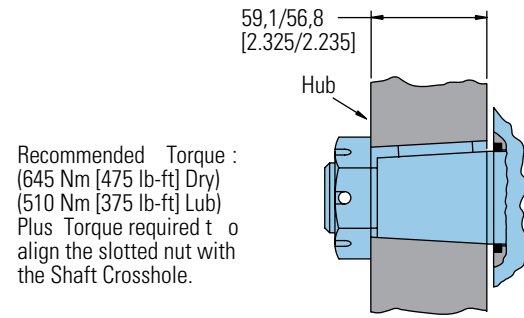
1 5/8 Tapered



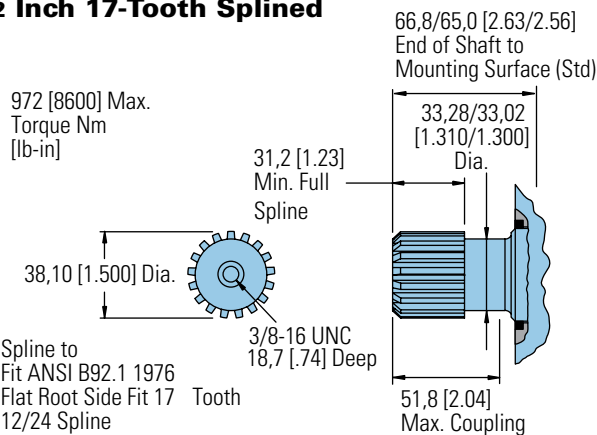
40 mm Straight



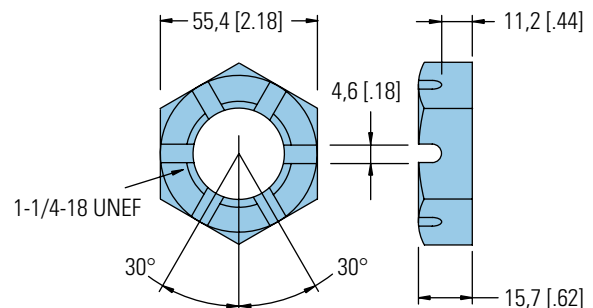
Tapered Shaft Hub Data



1 1/2 Inch 17-Tooth Splined



Slotted Hexagon Nut



4000 Series

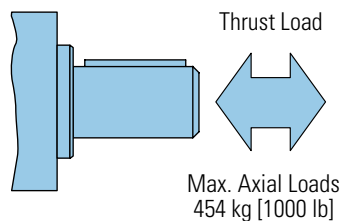
Shaft Side Load Capacity

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

Note:

Case pressure will increase the allowable Inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 94 kg/7 Bar [208 lb/100 PSI].

Each curve is based on



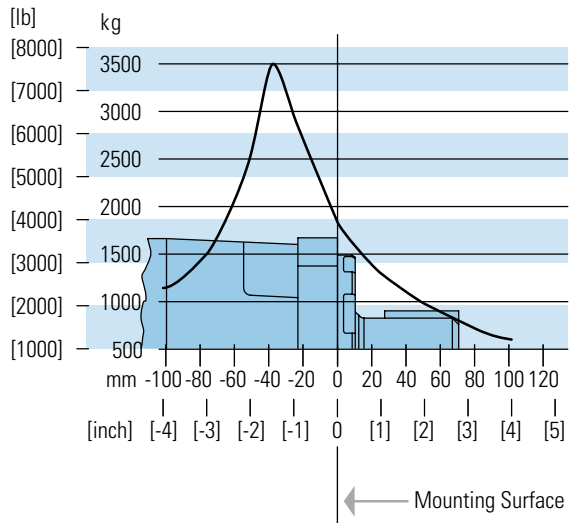
B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

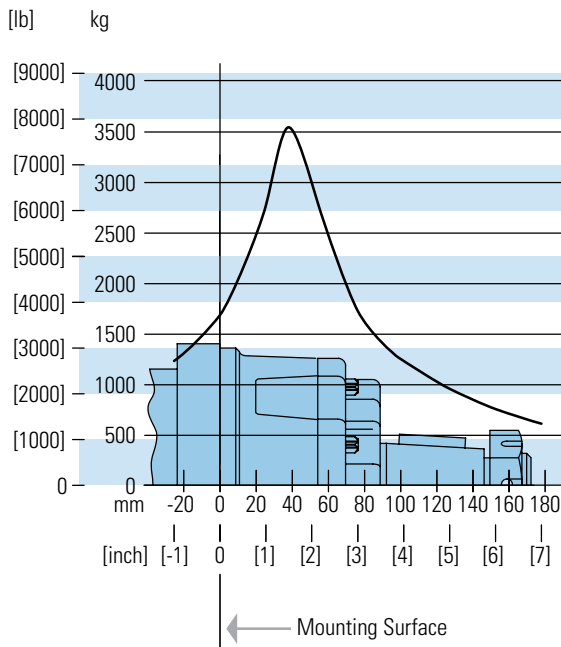
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

Standard Motor
Straight and Splined Shafts



Wheel Motor Tapered Shaft



4000 Series

Case Pressure and Case Port

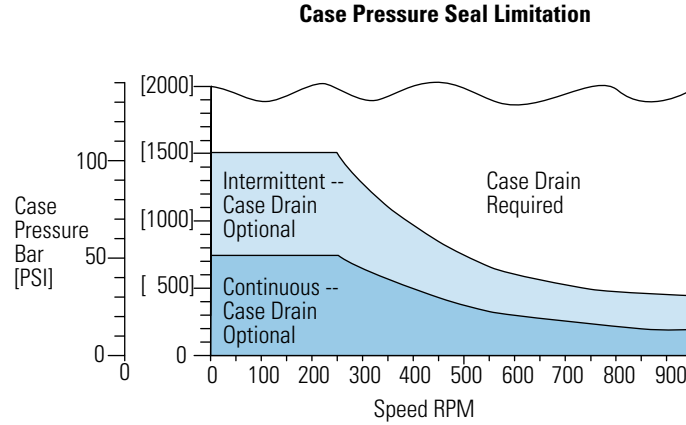
Char-Lynn 4000 Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine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

Case Porting Advantage

Contamination Control — flushing the motor case.

Cooler Motor — exiting oil draws motor heat away.

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

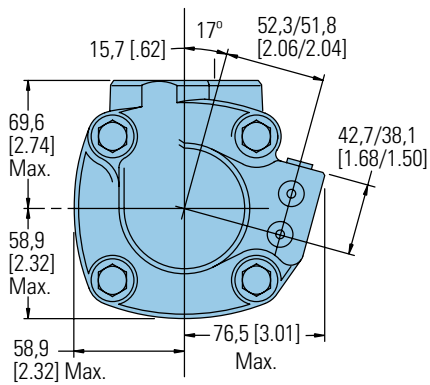
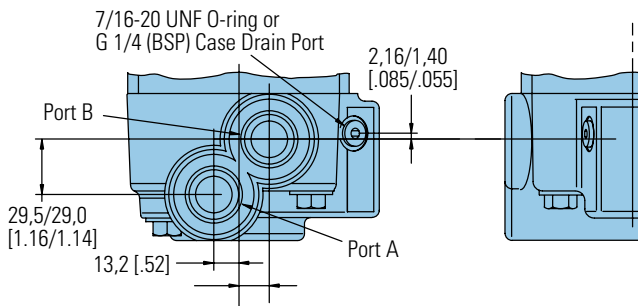


4000 Series

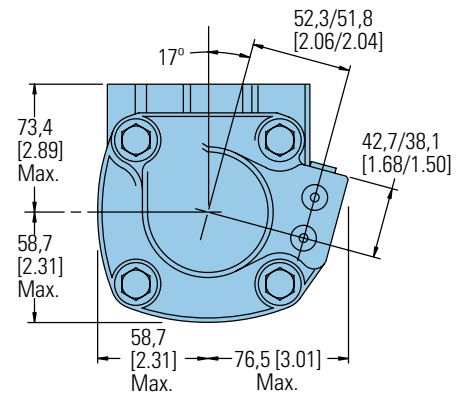
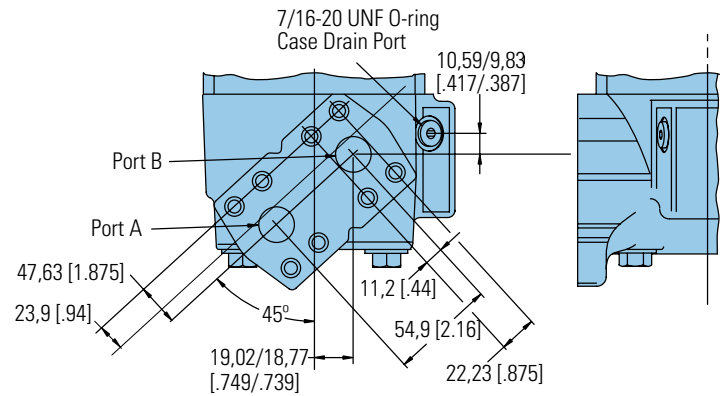
Dimensions

Ports

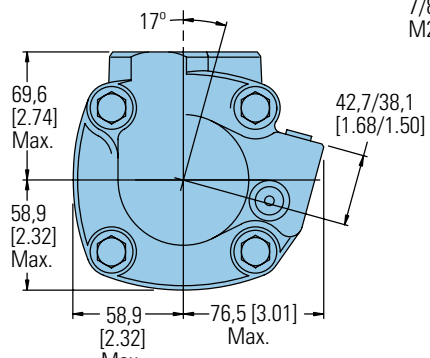
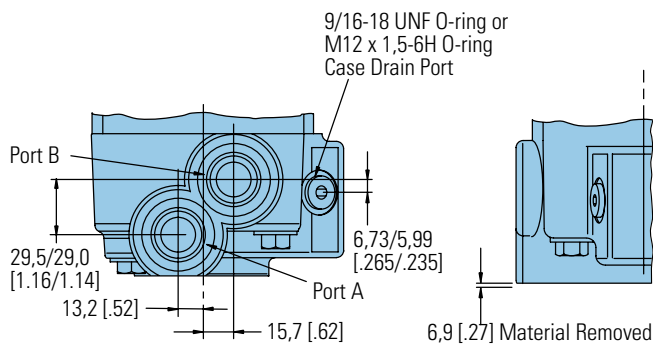
1-1/16-12 O-ring Ports (2) or G 3/4 (BSP) Ports (2)



4 Bolt 3/4 Inch Split Flange Ports to Fit SAE J518 c (2)



7/8-14 O-ring Ports (2) or M22 x 1,5-6H Ports (2)



C-4

4000 Series

Product Numbers

Note:

For 4000 Series Motors with a configuration **Not Shown** in the charts below: Use model code number system on the next page to specify product in detail.

Use digit prefix —109-, 110-, or 111- plus four digit number from charts for complete product number— Example 111-1057.

Orders will not be accepted without three digit prefix.

MOUNTING		SHAFT	PORT SIZEDISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER									
			110 [6.7]	130 [7.9]	160 [9.9]	205 [12.5]	245 [15.0]	280* [17.1]	310 [19.0]	395 [24.0]	495 [30.0]	625 [38.0]
Standard SAE B-Mount	1 1/4 Inch Straight	1 1/16 O-ring	109-1100	-1101	-1102	-1103	-1104	-1094	-1105	-1106	-1212	-1215
		3/4 inch Split Flange	109-1001	-1054	-1002	-1003	-1055	—	-1056	-1057	—	—
	1 5/8 Inch Tapered	1 1/16 O-ring	109-1107	-1108	-1109	-1110	-1111	—	-1112	-1113	-1479	-1455
		3/4 inch Split Flange	109-1006	-1058	-1007	-1008	-1059	—	-1402	-1061	—	—
	1 1/4 Inch 14 T Splined	1 1/16 O-ring	109-1114	-1115	-1116	-1117	-1118	—	-1119	-1120	—	—
		3/4 inch Split Flange	109-1011	-1062	-1012	-1013	-1063	—	-1064	-1065	—	—
Standard SAE C-Mount	40 mm Straight	G 3/4 (BSP)	109-1184	-1185	-1227	-1224	-1225	—	-1189	-1190	—	—
	1 1/4 Inch 17 T Splined	G 3/4 (BSP)	109-1191	-1192	-1193	-1194	-1195	—	-1196	-1197	—	—
Wheel Motor	1 1/4 Inch Straight	1 1/16 O-ring	110-1074	-1075	-1076	-1077	-1078	—	-1079	-1080	—	-1122
		3/4 inch Split Flange	110-1001	-1040	-1002	-1003	-1041	—	-1042	-1043	—	—
	40 mm Straight	G 3/4 (BSP)	110-1108	-1109	-1110	-1111	-1112	—	-1113	-1125	—	—
	1 5/8 Inch Tapered	1 1/16 O-ring	110-1081	-1082	-1083	-1084	-1085	—	-1086	-1087	1116	-1117
		3/4 inch Split Flange	110-1006	-1044	-1007	-1008	-1045	—	-1046	-1047	—	—
	1 1/4 Inch 14 T Splined	1 1/16 O-ring	110-1088	-1089	-1090	-1091	-1092	—	-1093	-1094	—	—
		3/4 inch Split Flange	110-1011	-1048	-1012	-1013	-1049	—	-1050	-1051	—	—
	Bearingless	1 1/4 Inch Straight	1 1/16 O-ring	111-1033	-1034	-1035	-1036	-1037	—	-1038	-1039	-1062
3/4 inch Split Flange			111-1044	-1015	-1045	-1046	-1016	—	-1017	-1018	—	—
40 mm Straight		G 3/4 (BSP)	111-1052	-1053	-1054	-1055	-1056	—	-1057	-1058	—	—

* New Release

111-1057

4000 Series

Model Code

The following 30-digit coding system has been developed to identify all of the configuration options for the 4000 Series motor. Use this model code to specify a motor with the desired features. All 30 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

M	0	4	***	**	**	**	**	*	**	*	*	**	**	**	**	**	**	*											
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
04 - 4000 Series

4, **5**, **6** Displacement
cm³/r [in³/r]

067 - 109.8 cm³/r [6.70 in³/r]
080 - 130.3 cm³/r [7.95 in³/r]
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

AA - Bearingless, 4 Bolt: 127.00 [5.000] Pilot Dia. 14.27 [.562] Dia. Holes on 161.92 [6.375] Dia. Bolt Circle

AB - Standard, 4 Bolt: 101.60 [4.000] Pilot Dia. 14.7 [.58] Slots on 127.00 [5.000] Dia. Bolt Circle. (SAE B)

AC - Wheel, 4 Bolt: 139.70 [5.500] Pilot Dia. 14.27 [.562] Dia. Holes on 165.10 [6.500] Dia. Bolt Circle.

AD - Wheel, 4 Bolt: 127.00 [5.000] Pilot Dia. .500-13 UNC-2B Threaded Holes on 147.62 [5.812] Dia. Bolt circle.

AF - Standard, 4 Bolt: 127.00 [5.000] Pilot Dia. 14.27 [.562] Dia. Holes on 161.92 [6.375] Dia. Bolt Circle. (SAE C)

AH - Standard: ISO Flange 125 B4hw (ISO 3019/2) 124.97 [4.920] Pilot Dia. 14.27 [.562] Dia. Holes on 160.00 [6.299] Dia. Bolt Circle

AP - Wheel, 4 Bolt: 160.0 [6.30] Pilot Dia. with 5.8 [.23] Pilot Length and 18.00 [.709] Dia Holes on 200.00 [7.874] Bolt Circle (ISO Compatible)

9, **10** Output Shaft

00 - None (Bearingless)

01 - 31.75 [1.250] Dia. Straight With .375-16UNC-2B Thread, 53.1 [2.09] Max Coupling Length, 7.938 [.3125] Sq x 41.27 [1.625] Straight Key

02 - 41.28 [1.625] Dia. Tapered with 11.112 [.4375] Sq x 31.75 [1.250] Straight Key, 1.250-18UNEF-2A Thread with Slotted Hex Nut

03 - 31.75 [1.250] Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline, 38.1 [1.50] Minimum Full Spline Length with .375-16UNC-2B Thread

10 - 38.10 [1.500] Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30°. Involute Spline, 31.2 [1.23] Minimum Full Spline Length, with .375-16 UNC-2B Thread in End

11 - 40.00 [1.575] Dia. Straight with M12 x 1.75-6H Thread, 7.955 [.3132] x 11.979 [.4716] Wide X 69.98 [2.755] Straight Key

21 - 40.00 [1.575] Dia. 10:1 Tapered Shaft per ISO R775 with .750-16 UNF-2B Threaded in End, 12W x 8H 70L [.472W x .313H x 2.76L] Key

22 - None (Bearingless) European Spline

25 - 42.00 [1.654] Dia. 10:1 Tapered Shaft per ISO R775 with .750-16 UNF-2B Thread in End, 12W x 8H X 63L [.472W X .313H X 2.48L] Key

11, **12** Ports

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

AB - 1.0625-12 UN-2B SAE O-Ring Ports - Staggered Ports

AC - G 3/4 Ports - Staggered Ports

AD - 19.05 [.750] 4 Bolt Split Flange Staggered Ports Standard Pressure Series (Code 61)

AE - M22 X 1.5-6H O-Ring Port - Staggered Ports

AG - 12.70 [.500] Dia. Manifold Ports

AJ - Dash 12 Stc Type II+ (Snap to Connect) Ports - Staggered Ports

13, **14** Case Flow Options

00 - None

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

10 - Dash 6 Stc Type II + (Snap to Connect) Port

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

19 Seal Option

00 - Standard Seals

02 - Seal Guard

03 - Viton Seals

04 - Viton Shaft Seal

11 - High pressure shaft seal, slinger seal

19 - Extreme duty seal guard

20, **21** Accessories

00 - None

AC - M 12 Threaded Connector, Long Body Digital Speed and Direction Pickup (Two 36 Pulse Signals in Quadrature per Revolution Pin 1=Power Supply, Pin 2=Output Signal 1, Pin 3=Common, Pin 4=Output Signal 2)

AD - M 12 Threaded Connector, Digital Speed And Direction Pickup (One 72 Pulse per Rev Speed Signal and One Directional Signal (Pin 1=Power, Pin 2=Direction, Pin 2=Common, Pin 4=Speed)

22, **23** Special Features (Hardware)

00 - None

17 - Low Noise Valve Plate

24, **25** Special Features (Assembly)

00 - None

26, **27** Paint/Packaging

00 - No Paint, Individual Box

AA - Low Gloss Black Primer, Individual Box

AB - Epoxy Coated (Frost Gray), Individual Box

28, **29** Customer Identification

00 - None

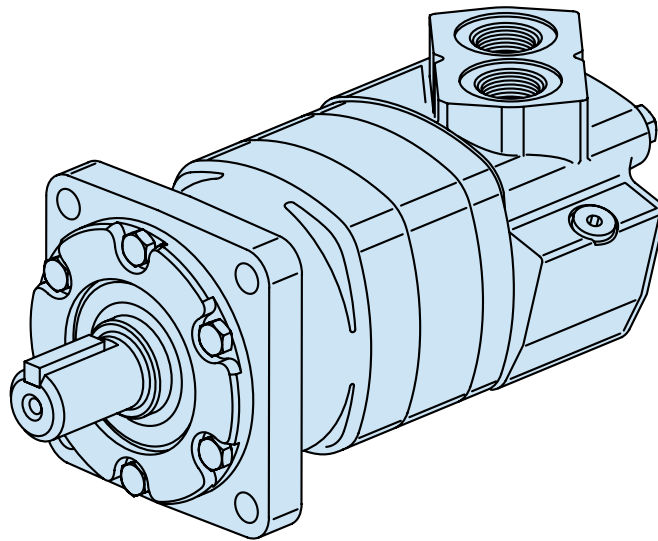
30 Design Code

F - Sixth

Feature in **bold** are preferred and allow for shorter lead time.

6000 Series

Highlights



Features

- 9 displacements available
- Presents a multitude of options that make this motor very “smart” and flexible to apply

Benefits

- Very tough motor for demanding applications
- Can be used in a multitude of industries
- Very easy/flexible to integrate in a system

Applications

- Mobile equipment
- Snow Removal, mowing
- Spayer, trencher
- Wood products

Description

With torque up to 15,000 in-lb and 40 gpm continuous, this motor is packed with power operates very smoothly.

Specifications

Geroler Element	9 Displacements
Flow l/min [GPM]	150 [40] Continuous** 225 [60] Intermittent*
Speed RPM	775 Cont.** 866 Inter.*
Pressure bar [PSI]	200 [3000] Cont.** 300 [4500] Inter.*
Torque Nm [lb-in]	1685 [14920] Cont.** 1875 [16580] Inter.*

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

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

C-5



Mowing



Snow Removal



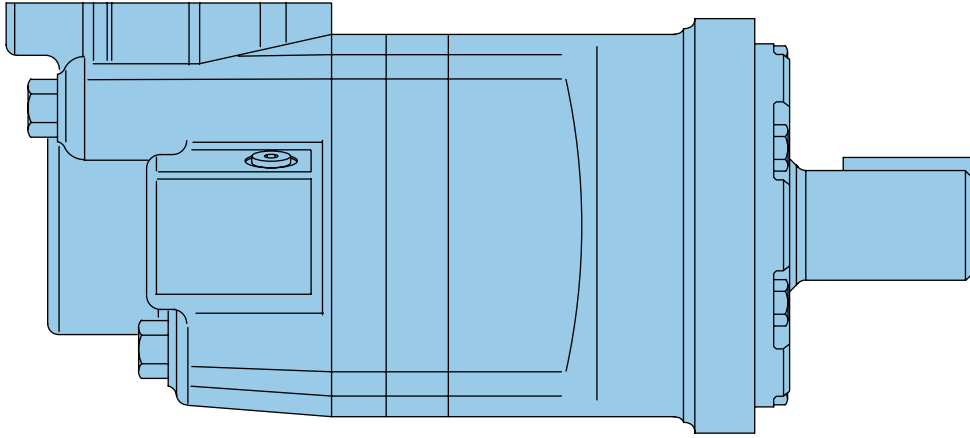
Sprayer



Trencher

6000 Series

Specifications



6000 SERIES MOTORS

Displ. cm ³ /r [in ³ /r]		195 [11.9]	245 [15.0]	310 [19.0]	390 [23.9]	490 [30.0]	625 [38.0]	735 [45.0]	805 [49.0]	985 [60.0]
Max. Speed (RPM)	Continuous	775	615	485	387	307	241	203	187	153
	Intermittent	866	834	698	570	454	355	303	280	230
@ Flow										
Flow l/min [GPM]	Continuous	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]
	Intermittent	170 [45]	210 [55]	225 [60]	225 [60]	225 [60]	225 [60]	225 [60]	225 [60]	225 [60]
Torque* Nm [lb-in]	Continuous	575 [5100]	735 [6510]	930 [8230]	1155 [10230]	1445 [12800]	1480 [13100]	1378 [12192]	1582 [14004]	1685 [14920]
	Intermittent	860 [7620]	1100 [9740]	1355 [11990]	1635 [14490]	1885 [16670]	1898 [16800]	1699 [15040]	1850 [16377]	1875 [16580]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	170 [2500]	140 [2000]	140 [2000]	140 [2000]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	310 [4500]	275 [4000]	221 [3200]	170 [2500]	170 [2500]	140 [2000]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	240 [3500]	205 [3000]	170 [2500]	170 [2250]
Weight kg [lb]	Standard or Wheel Mount	24,9 [55.0]	25,2 [55.5]	25,6 [56.5]	26,3 [58.0]	27,0 [59.5]	27,9 [61.5]	28,6 [63.0]	29 [64.0]	30,4 [67.0]
	Bearingless	20,2 [44.5]	20,4 [45.0]	20,9 [46.0]	21,5 [47.5]	22,2 [49.0]	23,1 [51.0]	28,3 [52.5]	28,8 [53.5]	30,2 [56.5]

Maximum Case Pressure: See case pressure seal limitation graph.

*See shaft torque ratings for limitations..

Note:

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

Maximum Inlet Pressure:

310 bar [4500 PSI]
Do not exceed Δ pressure rating (see chart above).

Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.
Do not exceed Δ pressure rating (see chart above).

Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:





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

6000 Series

Performance Data

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

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

	Continuous		Peak
	Intermittent		No Operation

195cm³/r [11.9 in³/r]

ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] 1.9	[280] 30 9	[650] 75 7	[1450] 165 5	[2290] 260 2						
[2] 7.5	[290] 35 38	[680] 75 37	[1500] 170 35	[2340] 265 34	[3100] 350 30	[3880] 440 26	[4140] 470 18			
[4] 15	[300] 35 77	[710] 80 76	[1500] 175 74	[2390] 270 72	[3200] 365 66	[4030] 455 62	[4600] 520 46	[5200] 590 32	[5790] 655 18	
[8] 30	[310] 35 154	[740] 85 153	[1590] 180 148	[2450] 275 144	[3280] 370 131	[4120] 465 119	[4810] 545 116	[5530] 625 99	[6250] 705 83	[6900] 780 65
[12] 45	[320] 35 232	[750] 85 230	[1610] 180 225	[2480] 280 221	[3330] 375 212	[4190] 475 203	[4990] 565 186	[5810] 655 167	[6630] 750 148	[7320] 825 118
[16] 61	[300] 35 309	[730] 80 307	[1600] 180 303	[2470] 280 300	[3340] 375 291	[4210] 475 283	[5090] 575 258	[5900] 665 236	[6710] 760 214	[7470] 845 181
[20] 76	[270] 30 387	[720] 80 384	[1590] 180 379	[2460] 280 374	[3350] 380 365	[4240] 480 356	[5100] 575 332	[5950] 670 306	[6800] 770 280	[7620] 860 247
[24] 91	[240] 25 465	[700] 80 462	[1570] 175 456	[2440] 275 450	[3330] 375 440	[4220] 475 429	[5080] 575 413	[5940] 670 388	[6810] 770 363	
[28] 106	[190] 20 542	[660] 75 539	[1530] 175 532	[2400] 270 526	[3300] 375 514	[4200] 475 502	[5060] 570 476	[5940] 670 448	[6810] 770 421	
[32] 121	[160] 20 620	[630] 70 617	[1500] 170 609	[2370] 270 602	[3270] 370 589	[4160] 470 576	[5040] 570 542	[5920] 670 511	[6790] 765 480	
[36] 136	[120] 15 697	[620] 70 692	[1480] 165 683	[2350] 265 674	[3240] 365 659	[4130] 465 645	[5000] 565 601	[5880] 665 564	[6760] 765 527	
[40] 151	[80] 10 775	[610] 70 770	[1450] 165 759	[2320] 260 749	[3210] 365 733	[4100] 465 718	[4960] 560 666	[5840] 660 624		
[45] 170		[590] 65 866	[1410] 160 854	[2280] 260 843	[3170] 360 825	[4060] 460 808	[4920] 555 749	[5790] 655 702		

245cm³/r [15.0 in³/r]

ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1000] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] 1.9	[430] 50 7	[860] 95 4	[1890] 215 1							
[2] 7.5	[440] 50 30	[900] 100 29	[1940] 220 26	[2990] 340 24	[3960] 445 21	[4920] 555 17	[5040] 570 11	[5930] 670 6		
[4] 15	[460] 50 61	[940] 105 60	[2000] 225 56	[3060] 345 54	[4080] 460 48	[5090] 575 42	[5680] 640 39	[6630] 750 30	[7570] 855 12	[8520] 965 6
[8] 30	[470] 55 122	[960] 110 120	[2060] 235 116	[3150] 355 113	[4210] 475 104	[5260] 595 95	[6180] 700 81	[7100] 800 67	[8020] 905 53	[9020] 1020 37
[12] 45	[480] 55 183	[970] 110 182	[2080] 235 178	[3180] 360 174	[4270] 480 165	[5360] 605 157	[6390] 720 141	[7420] 840 125	[8450] 955 109	[9510] 1075 92
[16] 61	[450] 50 245	[960] 110 244	[2070] 235 240	[3180] 360 236	[4290] 485 228	[5420] 610 221	[6480] 730 202	[7490] 845 184	[8480] 960 165	[9540] 1180 145
[20] 76	[420] 45 307	[940] 105 306	[2050] 230 301	[3160] 355 297	[4290] 485 287	[5440] 615 277	[6510] 735 257	[7580] 855 238	[8660] 980 218	[9740] 1100 197
[24] 91	[380] 45 368	[920] 105 365	[2020] 230 361	[3120] 355 358	[4260] 480 348	[5400] 610 338	[6490] 735 316	[7590] 860 294	[8680] 980 271	
[28] 106	[330] 35 430	[870] 100 426	[1980] 225 421	[3100] 350 416	[4240] 480 404	[5380] 610 376	[6480] 730 358	[7580] 855 340	[8670] 980 322	
[32] 121	[290] 35 491	[800] 90 489	[1920] 215 481	[3050] 345 475	[4170] 470 461	[5290] 600 448	[6410] 725 423	[7520] 850 398	[8640] 975 373	
[36] 136	[250] 30 556	[730] 80 549	[1850] 210 543	[2980] 335 537	[4060] 460 524	[5150] 580 509	[6300] 710 482	[7440] 840 456		
[40] 151	[200] 25 615	[690] 80 612	[1790] 200 606	[2940] 330 599	[4010] 455 585	[5130] 580 570	[6190] 700 540	[7100] 800 510		
[45] 170		[570] 65 688	[1760] 200 682	[2860] 325 674	[3960] 445 658	[5070] 575 641	[6080] 685 608	[6990] 755 574		
[50] 189			[1720] 195 758	[2800] 315 749	[3890] 440 731	[4920] 555 712	[5940] 670 676			
[55] 208			[1670] 190 834	[2740] 310 824	[3820] 430 804	[4890] 550 783	[5880] 665 744			

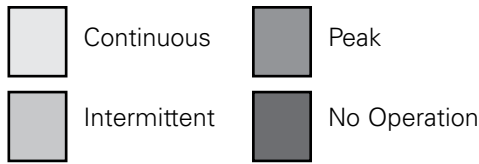
[5790]
655
702 } Torque [lb-in]
Nm
Speed RPM

6000 Series

Performance Data

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

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

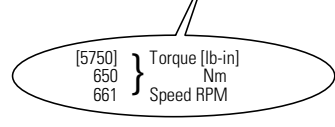


310cm³/r [19.0 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] 1.9	[530] 60 6	[1120] 125 4	[2440] 275 1							
[2] 7.5	[540] 60 24	[1150] 130 23	[2460] 280 22	[3620] 410 20	[4780] 540 17	[5690] 645 14	[6670] 755 10	[7780] 880 4		
[4] 15	[550] 60 48	[1180] 135 47	[2560] 290 45	[3800] 430 42	[5030] 570 38	[6050] 685 32	[7070] 800 24	[8260] 935 17	[9070] 1025 10	[9530] 1075 3
[8] 30	[560] 65 96	[1250] 140 95	[2650] 300 91	[3970] 450 87	[5280] 595 81	[6480] 730 73	[7710] 870 64	[8740] 985 55	[9770] 1105 46	[10990] 1240 35
[12] 45	[570] 65 144	[1260] 140 143	[2690] 305 140	[4050] 460 135	[5420] 610 129	[6730] 760 121	[8040] 910 111	[9260] 1045 99	[10490] 1185 88	[11800] 1335 76
[16] 61	[540] 60 193	[1230] 140 192	[2660] 300 188	[4060] 460 184	[5450] 615 178	[6800] 770 167	[8150] 920 156	[9400] 1060 141	[10660] 1205 126	[11990] 1355 109
[20] 76	[510] 60 242	[1200] 135 241	[2630] 295 236	[4040] 455 232	[5450] 615 226	[6820] 770 216	[8190] 925 201	[9520] 1075 184	[10840] 1225 167	
[24] 91	[480] 55 290	[1160] 130 289	[260] 295 282	[4020] 455 279	[5440] 615 273	[6840] 775 260	[8230] 930 248	[9560] 1080 232	[10900] 1230 215	
[28] 106	[420] 45 339	[1130] 130 336	[2570] 290 333	[3990] 450 328	[5420] 610 320	[6820] 770 308	[8220] 930 295	[9520] 1075 276	[10840] 1225 257	
[32] 121	[360] 40 388	[1100] 125 384	[2510] 285 381	[3920] 445 375	[5330] 600 368	[6750] 765 354	[8170] 920 341	[9440] 1065 320		
[36] 136	[300] 35 436	[1060] 120 430	[2440] 275 421	[3830] 435 416	[5220] 590 410	[6660] 750 396	[8100] 915 383	[9330] 1055 360		
[40] 151	[270] 30 485	[1020] 115 478	[2400] 270 466	[3780] 425 461	[5150] 580 456	[6580] 745 441	[8020] 905 427	[9220] 1040 403		
[50] 189		[982] 110 597	[2180] 245 582	[3420] 385 576	[4660] 525 570	[6050] 685 551	[7440] 840 534			
[60] 227			[1960] 220 698	[3250] 365 691	[4540] 515 684	[5750] 650 661	[7080] 800 641			

390cm³/r [23.9 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[1] 3.8	[760] 85 4	[1570] 175 2	[3230] 365 1							
[2] 7.5	[780] 90 19	[1610] 180 18	[3270] 370 17	[4910] 555 16	[6440] 730 14	[7760] 875 12	[9080] 1025 9	[10590] 1195 4		
[4] 15	[800] 90 38	[1640] 185 38	[3300] 375 37	[4970] 560 35	[6570] 740 33	[8160] 920 29	[9570] 1080 22	[11270] 1275 14	[12120] 1370 5	[14490] 1635 1
[8] 30	[810] 90 77	[1650] 185 76	[3370] 380 74	[5080] 575 72	[6740] 760 68	[8430] 950 65	[10050] 1135 55	[11620] 1315 45	[12880] 1455 33	[14480] 1635 21
[12] 45	[800] 90 115	[1620] 185 115	[3390] 385 112	[5130] 580 109	[6810] 770 105	[8520] 965 100	[10190] 1150 91	[11860] 1340 81	[13640] 1540 79	
[16] 61	[750] 85 154	[1600] 180 154	[3380] 380 151	[5120] 580 147	[6820] 770 143	[8560] 965 132	[10230] 1155 126	[11920] 1345 116		
[20] 76	[680] 75 193	[1580] 180 193	[3360] 380 189	[5120] 580 187	[6840] 775 182	[8590] 970 175	[10280] 1160 162	[11980] 1355 152		
[24] 91	[620] 70 232	[1520] 170 230	[3280] 370 229	[5060] 570 225	[6780] 765 220	[8530] 965 212	[10240] 1155 204			
[28] 106	[570] 65 270	[1460] 165 268	[3210] 365 266	[5000] 565 261	[6730] 760 256	[8480] 960 248	[10200] 1150 236			
[32] 121	[530] 60 309	[1420] 160 306	[3140] 355 304	[4930] 555 299	[6640] 750 292	[8380] 945 282	[10120] 1145 269			
[36] 136	[450] 50 348	[1370] 155 346	[3010] 340 340	[4840] 545 336	[6500] 730 329	[8250] 930 317	[10000] 1130 301			
[40] 151	[380] 45 387	[1320] 150 386	[2880] 325 380	[4740] 535 375	[6460] 730 368	[8120] 915 359				
[50] 189		[1140] 130 482	[2650] 300 475	[4540] 515 469	[6440] 730 460	[8050] 910 449				
[60] 227			[2460] 280 570	[4430] 500 562	[6360] 720 552	[7860] 890 538				

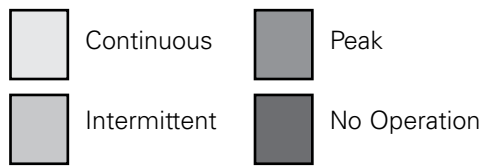


6000 Series

Performance Data

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

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



490cm³/r [30.0 in³/r]
 ΔPressure Bar [PSI]

[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275
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Flow LPM [GPM]

[1] 3,8	[1010] 115 7	[1200] 235 7	[4260] 480 5	[6140] 695 3				
[2] 7,5	[1020] 115 15	[2110] 240 14	[4270] 480 13	[6280] 710 12	[8350] 945 11	[10420] 1175 8	[12140] 1370 3	
[4] 15	[1030] 115 30	[2100] 235 30	[4280] 485 29	[6410] 725 28	[8500] 960 27	[10590] 1195 25	[12500] 1410 21	[14580] 1645 17
[8] 30	[1020] 115 60	[2090] 235 60	[4290] 485 59	[6490] 735 57	[8620] 975 54	[10740] 1215 51	[12800] 1445 45	[14930] 1685 38
[12] 45	[1000] 115 91	[2080] 235 91	[4290] 485 89	[6500] 735 87	[8650] 975 84	[10800] 1220 79	[12890] 1455 71	
[16] 61	[110] 960 122	[2060] 235 122	[4260] 480 121	[6480] 730 118	[8650] 975 114	[10820] 1220 109	[12900] 1460 100	
[20] 76	[900] 100 153	[1980] 225 152	[4180] 470 150	[6420] 725 147	[8620] 975 144	[10820] 1220 139		
[24] 91	[850] 95 184	[1930] 220 184	[4150] 470 181	[6390] 720 180	[8580] 970 176	[10770] 1215 171		
[28] 106	[740] 85 215	[1840] 210 214	[4070] 460 211	[6290] 710 208	[8500] 960 204	[10720] 1210 198		
[32] 121	[690] 80 245	[1710] 195 244	[3970] 450 241	[6190] 700 237	[8420] 950 232	[10660] 1205 226		
[36] 136	[670] 75 276	[1560] 175 275	[3860] 435 272	[6080] 685 265	[8340] 940 260	[10420] 1175 255		
[40] 151	[570] 65 307	[1400] 160 306	[3750] 425 303	[5970] 675 295	[8140] 920 290	[10180] 1150 284		
[50] 189		[1140] 130 382	[3240] 365 379	[5220] 590 369	[7620] 860 362			
[60] 227			[2860] 325 454	[4860] 550 442	[7140] 805 435			



625cm³/r [38.0 in³/r]
 ΔPressure Bar [PSI]

[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3200] 221
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Flow LPM [GPM]

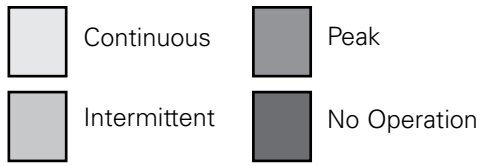
[1] 3,8	[1060] 120 5	[2205] 250 5	[4515] 510 4	[6690] 755 2			
[2] 7,5	[1090] 125 12	[2300] 260 12	[4720] 535 13	[7025] 795 10	[9360] 1060 6		
[4] 15	[1145] 130 24	[2450] 275 24	[5052] 570 24	[7520] 850 21	[9410] 1065 16	[12700] 1434 13	
[8] 30	[1195] 135 45	[2600] 295 45	[5350] 605 44	[8195] 925 42	[11220] 1270 37	[13100] 1480 35	[15800] 1785 32
[12] 45	[1200] 135 72	[2600] 295 72	[5390] 610 71	[8145] 920 68	[11770] 1330 64	[13000] 1469 60	[15700] 1774 56
[16] 61	[1120] 125 94	[2530] 285 94	[5340] 605 92	[8105] 915 89	[11740] 1325 85	[13000] 1469 83	
[20] 76	[1050] 120 120	[2465] 280 119	[5285] 595 117	[8080] 915 115	[11725] 1325 110		
[24] 91	[950] 105 144	[2365] 265 143	[5180] 585 140	[7990] 905 138	[11705] 1320 132		
[28] 106	[855] 95 169	[2255] 255 168	[5080] 575 165	[7915] 895 162	[11640] 1315 156		
[32] 121	[730] 80 193	[2140] 240 192	[4960] 560 188	[7775] 880 185	[11505] 1300 179		
[36] 136	[555] 65 217	[1965] 220 216	[4780] 540 213	[7585] 855 210			
[40] 151	[380] 45 241	[1790] 200 240	[4600] 520 238	[7395] 835 236			
[50] 189			[4180] 470 296	[6985] 790 290			
[60] 227			[3800] 430 353	[6600] 745 345			

6000 Series

Performance Data

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

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



735cm³/r [45.0 in³/r]

ΔPressure Bar [PSI]

[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170
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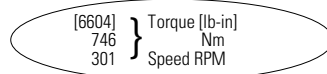
Flow LPM [GPM]	[1] 3,8	[1311] 148 4	[2775] 314 4	[4200] 475 3	[5480] 619 3	[7000] 791 2													
	[2] 7,5	[1340] 151 10	[2856] 323 10	[4535] 512 10	[5809] 656 10	[7551] 853 9	[8685] 981 7	[10182] 1150 6	[11121] 1257 5										
	[4] 15	[1253] 142 20	[2854] 322 20	[4363] 493 19	[5813] 657 18	[7272] 822 17	[8714] 985 16	[10135] 1145 14	[11537] 1303 13	[12970] 1465 11	[15040] 1699 11								
	[8] 30	[1290] 146 40	[2889] 326 39	[4540] 513 38	[6130] 693 38	[7703] 870 37	[9202] 1040 37	[10666] 1205 35	[12192] 1378 33	[13713] 1549 32									
	[12] 45	[1277] 144 61	[2821] 319 60	[4528] 512 59	[6180] 698 58	[7795] 881 57	[9338] 1055 56	[10877] 1229 54	[12419] 1403 52										
	[16] 61	[1196] 135 82	[2753] 311 80	[4478] 506 79	[6148] 695 78	[7768] 878 77	[9376] 1059 76	[10984] 1241 74											
	[20] 76	[1092] 123 102	[2794] 316 101	[4320] 488 101	[6021] 680 99	[7697] 870 97	[9311] 1052 96	[10907] 1232 93											
	[24] 91	[1206] 136 123	[2556] 289 122	[4162] 470 120	[5871] 663 119	[7564] 855 118	[9289] 1049 116												
	[28] 106	[1083] 122 145	[2338] 264 142	[4040] 456 141	[5666] 640 139	[7365] 832 137	[9022] 1019 135												
	[32] 121	[950] 107 163	[2110] 238 162	[3795] 429 162	[5457] 617 159	[7122] 805 159	[8828] 997 156												
	[36] 136	[726] 82 184	[1845] 208 183	[3517] 397 182	[5223] 590 181	[6853] 774 179													
	[40] 151	[515] 58 203	[2227] 252 202	[3270] 369 202	[4965] 561 201	[6672] 754 199													
	[50] 189			[3869] 437 254	[4148] 469 252	[5850] 661 250													
	[60] 227				[4856] 549 303	[6604] 746 301													

805cm³/r [49.0 in³/r]

ΔPressure Bar [PSI]

[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170
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Flow LPM [GPM]	[1] 3,8	[1455] 164 4	[3100] 350 4	[4680] 529 2	[6031] 681 2	[7799] 881 1													
	[2] 7,5	[1483] 168 9	[3173] 359 9	[5121] 579 9	[6432] 727 8	[8510] 961 7	[9633] 1088 6	[11319] 1279 5	[12127] 1370 5										
	[4] 15	[1547] 175 19	[3331] 376 19	[5292] 598 18	[6744] 762 17	[8714] 984 16	[10075] 1138 15	[11352] 1283 14	[12539] 1417 12	[14564] 1645 11	[16377] 1850 10								
	[8] 30	[1599] 181 35	[3473] 392 35	[5415] 612 34	[7039] 795 33	[8934] 1009 32	[10629] 1201 31	[11842] 1338 29	[14004] 1582 29	[15441] 1745 28									
	[12] 45	[1599] 181 56	[3469] 392 56	[5415] 612 55	[7093] 801 53	[9024] 1020 53	[10658] 1204 52	[12283] 1388 50	[13726] 1551 50										
	[16] 61	[1543] 174 73	[3395] 384 73	[5357] 605 72	[7032] 794 70	[8983] 1015 69	[10640] 1202 68	[12010] 1357 67											
	[20] 76	[1457] 165 93	[3312] 374 92	[5292] 598 91	[6968] 787 89	[8943] 1010 88	[10583] 1196 87	[12146] 1372 86											
	[24] 91	[1352] 153 112	[3183] 360 112	[5088] 575 111	[6811] 769 110	[8812] 996 108	[10411] 1176 106												
	[28] 106	[1213] 137 131	[3055] 345 131	[5047] 570 131	[6713] 758 129	[8681] 981 128	[10411] 1176 127												
	[32] 121	[1075] 121 150	[2907] 328 149	[4884] 552 149	[6546] 740 146	[8395] 949 145	[10060] 1137 144												
	[36] 136	[823] 93 168	[2692] 304 168	[4663] 527 168	[6320] 714 167	[8118] 917 165													
	[40] 151	[592] 67 187	[2477] 280 186	[4426] 500 186	[6085] 688 185	[7832] 885 184													
	[50] 189		[2730] 308 234	[4214] 476 233	[5849] 661 231	[7603] 859 230													
	[60] 227			[3806] 430 280	[5459] 617 277	[7407] 837 275													







6000 Series

Performance Data

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

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

	Continuous		Peak
	Intermittent		No Operation

		985cm ³ /r [60.0 in ³ /r] ΔPressure Bar [PSI]							
		[250]	[500]	[750]	[1000]	[1250]	[1500]	[1750]	[2000]
		15	35	50	70	85	105	120	140
Flow LPM [GPM]	[1] 3.8	[1890] 215 3	[4110] 465 3	[5730] 645 2	[7640] 865 2	[9550] 1080 1			
	[2] 7.5	[1910] 215 8	[4140] 470 8	[6270] 710 7	[8300] 940 7	[10420] 1175 6	[12500] 1410 5	[13860] 1565 4	[14920] 1685 3
	[4] 15	[1980] 225 15	[4290] 485 15	[6480] 775 15	[8540] 965 14	[10670] 1205 14	[12800] 1445 13	[13900] 1570 13	[15850] 1790 12
	[8] 30	[2030] 230 30	[4400] 495 30	[6630] 750 30	[8790] 995 29	[10940] 1235 28	[13090] 1480 27	[14500] 1640 26	[16580] 1875 25
	[12] 45	[2020] 230 45	[4390] 495 45	[6630] 750 45	[8860] 1000 44	[11050] 1250 43	[13240] 1495 42	[15040] 1700 41	
	[16] 61	[2010] 225 61	[4320] 490 61	[6560] 740 61	[8790] 995 60	[11000] 1245 59	[13260] 1500 58		
	[20] 76	[1910] 215 77	[4220] 475 77	[6480] 730 76	[8720] 985 76	[10950] 1235 75	[13160] 1485 74		
	[24] 91	[1810] 205 92	[4060] 460 92	[6230] 705 92	[8500] 960 91	[10790] 1220 90	[12990] 1470 89		
	[28] 106	[1620] 185 107	[3920] 445 107	[6180] 700 107	[8420] 950 106	[10630] 1200 105	[12820] 1450 103		
	[32] 121	[1480] 165 123	[3740] 425 123	[5980] 675 122	[8200] 925 121	[10280] 1160 120			
	[36] 136	[1140] 130 138	[3490] 395 138	[5710] 645 138	[7930] 895 137	[9940] 1125 135			
	[40] 151	[850] 95 153	[3240] 365 153	[5420] 610 152	[7640] 865 151	[9590] 1085 150			
	[50] 189		[2960] 325 191	[5160] 585 190	[7350] 830 189	[9310] 1050 188			
	[60] 227			[4660] 525 230	[7160] 810 229	[9070] 1025 226			

[7160]
810
229 } Torque [lb-in]
Nm
Speed RPM

6000 Series

Dimensions

Standard Mount

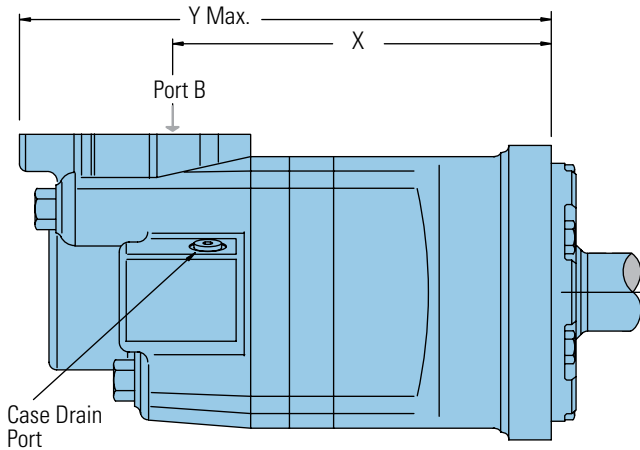
Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

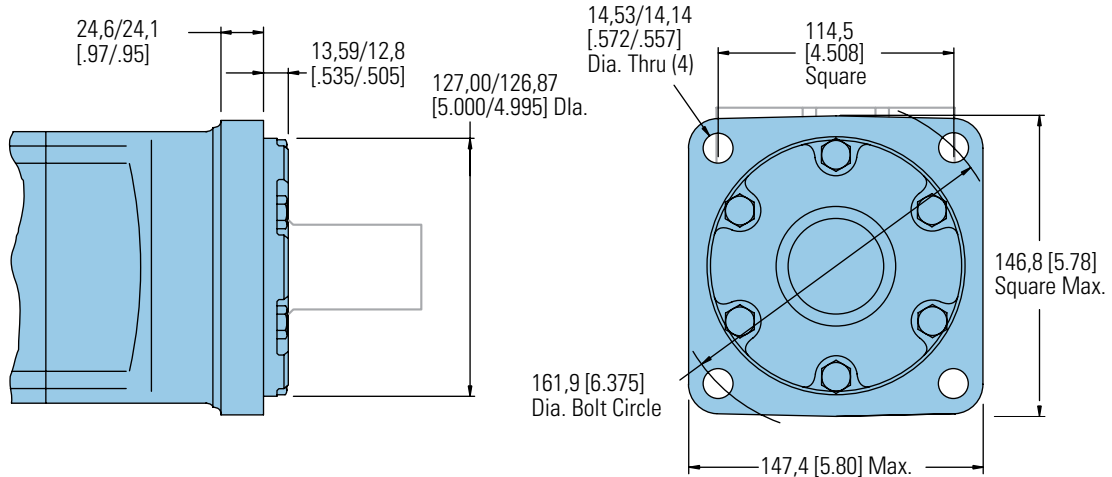
Standard Rotation Viewed from Shaft End

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

Standard Mount



Standard SAE CC Flange



STANDARD MOTOR MOUNT DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
195 [11.9]	187,5 [7.38]	270,0 [10.63]
245 [15.0]	193,0 [7.60]	275,6 [10.85]
310 [19.0]	200,4 [7.89]	283,0 [11.14]
390 [23.9]	209,0 [8.23]	291,6 [11.48]
490 [30.0]	220,2 [8.67]	302,8 [11.92]
625 [38.0]	235,0 [9.25]	317,5 [12.50]
985 [60.0]	274,6 [10.81]	357,1 [14.06]

6000 Series

Dimensions

Wheel Mount

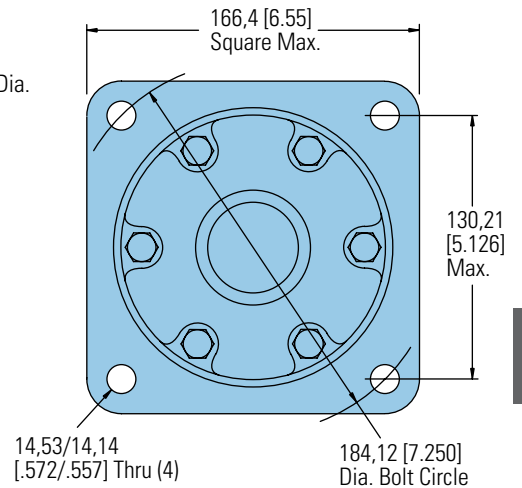
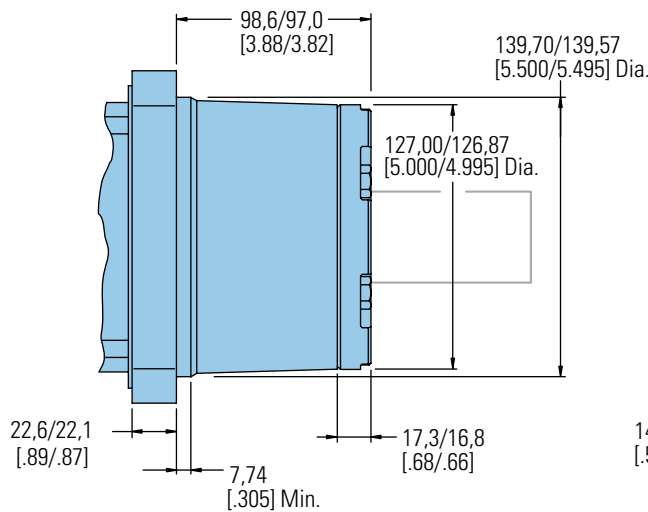
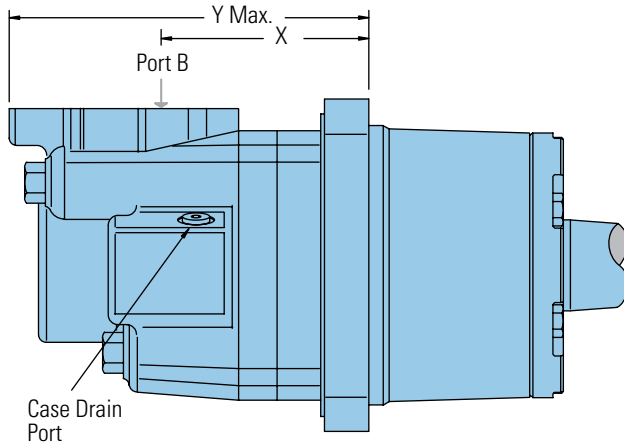
Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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

Wheel Mount



C-5

WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
195 [11.9]	102,6 [4.04]	185,2 [7.29]
245 [15.0]	108,2 [4.26]	190,8 [7.51]
310 [19.0]	115,6 [4.55]	198,1 [7.80]
390 [23.9]	124,5 [4.90]	207,1 [8.15]
490 [30.0]	135,4 [5.33]	217,9 [8.58]
625 [38.0]	150,1 [5.91]	232,7 [9.16]
985 [60.0]	189,7 [7.47]	272,5 [10.73]

6000 Series

Dimensions

Global Mount (ISO)

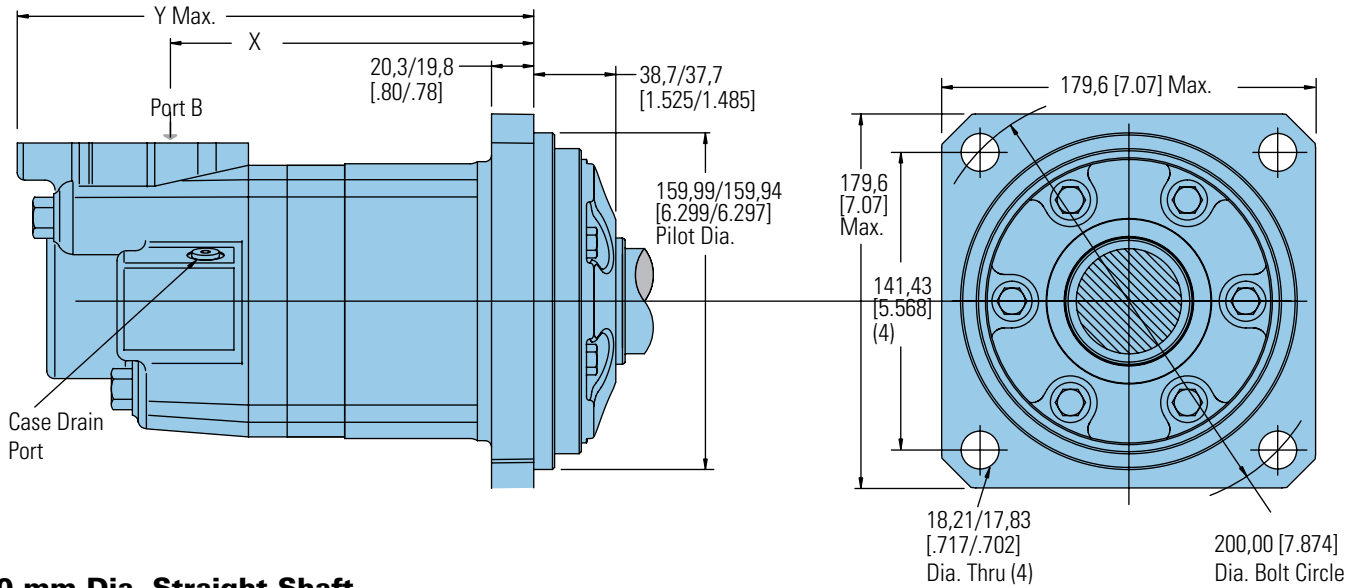
Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

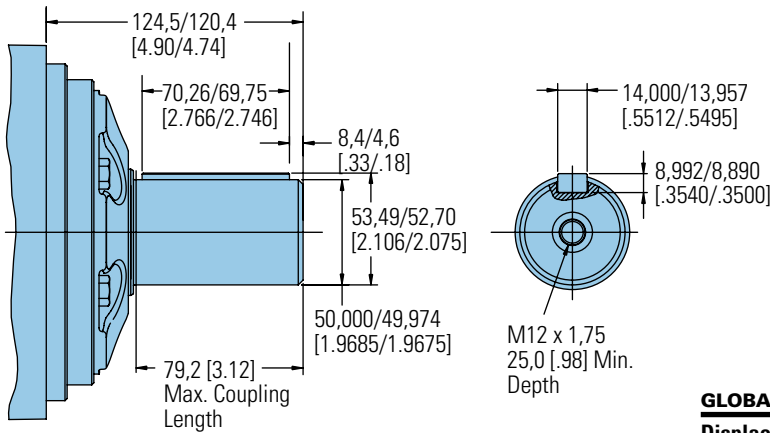
Standard Rotation Viewed from Shaft End

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

Global Mount (ISO)



50 mm Dia. Straight Shaft



GLOBAL MOUNT MOTOR DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
310 [19.0]	182,4 [7.18]	264,9 [10.43]
390 [24.0]	191,0 [7.52]	273,6 [10.77]
490 [30.0]	202,2 [7.96]	284,7 [11.21]
625 [38.0]	216,9 [8.54]	299,5 [11.79]
800 [45.0]	229,4 [9.03]	312,2 [12.29]
800 [49.0]	236,7 [9.32]	319,3 [12.57]
985 [60.0]	256,5 [10.10]	339,1 [13.35]

6000 Series

Dimensions

Bearingless

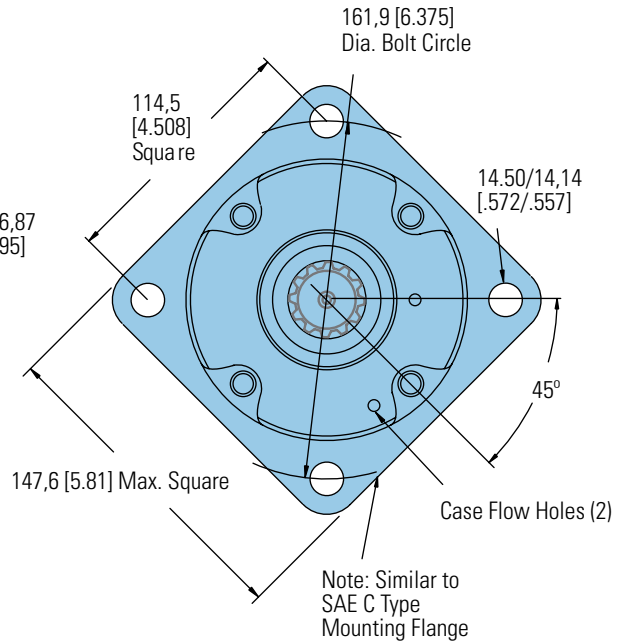
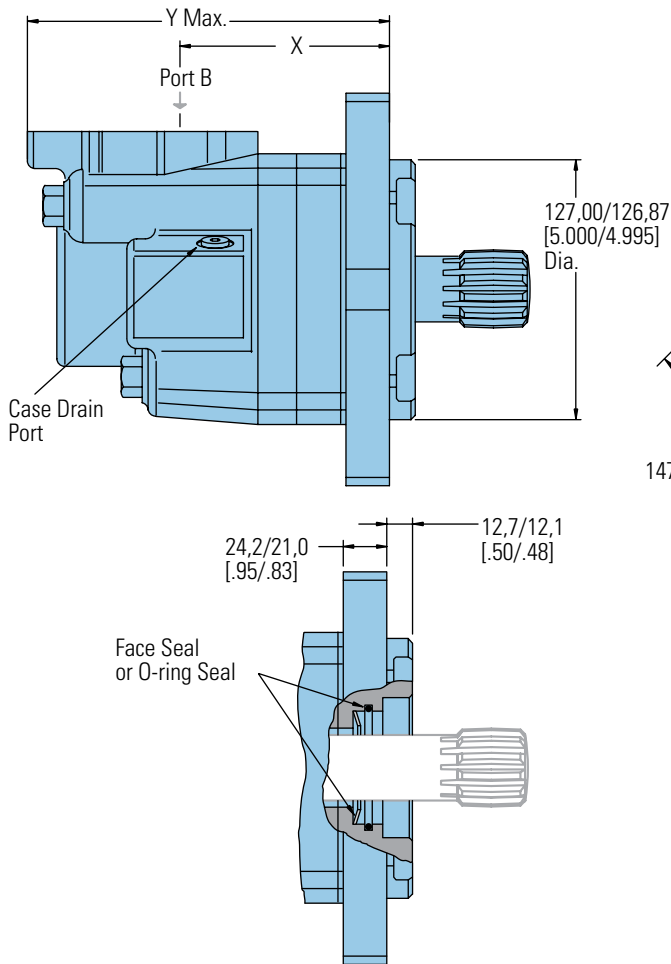
Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

Bearingless

Standard Rotation Viewed from Shaft End

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

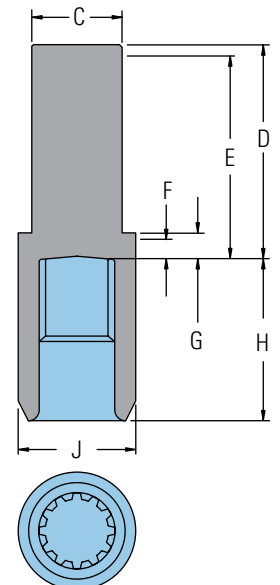


For 6000 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

Note:

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

- C 47,2 [1.86] Dia.
- D 111,5 [4.39] Max.
- E 106,4 [4.19] Full Form Dia.
- F 6,9 [.27] Min. Full Form Dia.
- G 10,2 [.40] Min.
- H 86,1 [3.39] Max.
- J 66,5 [2.62] Dia.



Mating Coupling Blank
Eaton Part No. 12778-002

BEARINGLESS MOTOR DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
195 [11.9]	105,4 [4.15]	188,0 [7.40]
245 [15.0]	111,0 [4.37]	193,5 [7.62]
310 [19.0]	118,4 [4.66]	200,9 [7.91]
390 [23.9]	127,3 [5.01]	209,6 [8.25]
490 [30.0]	138,2 [5.44]	220,7 [8.69]
625 [38.0]	152,9 [6.02]	235,5 [9.27]
985 [60.0]	192,8 [7.59]	275,1 [10.83]

C-5

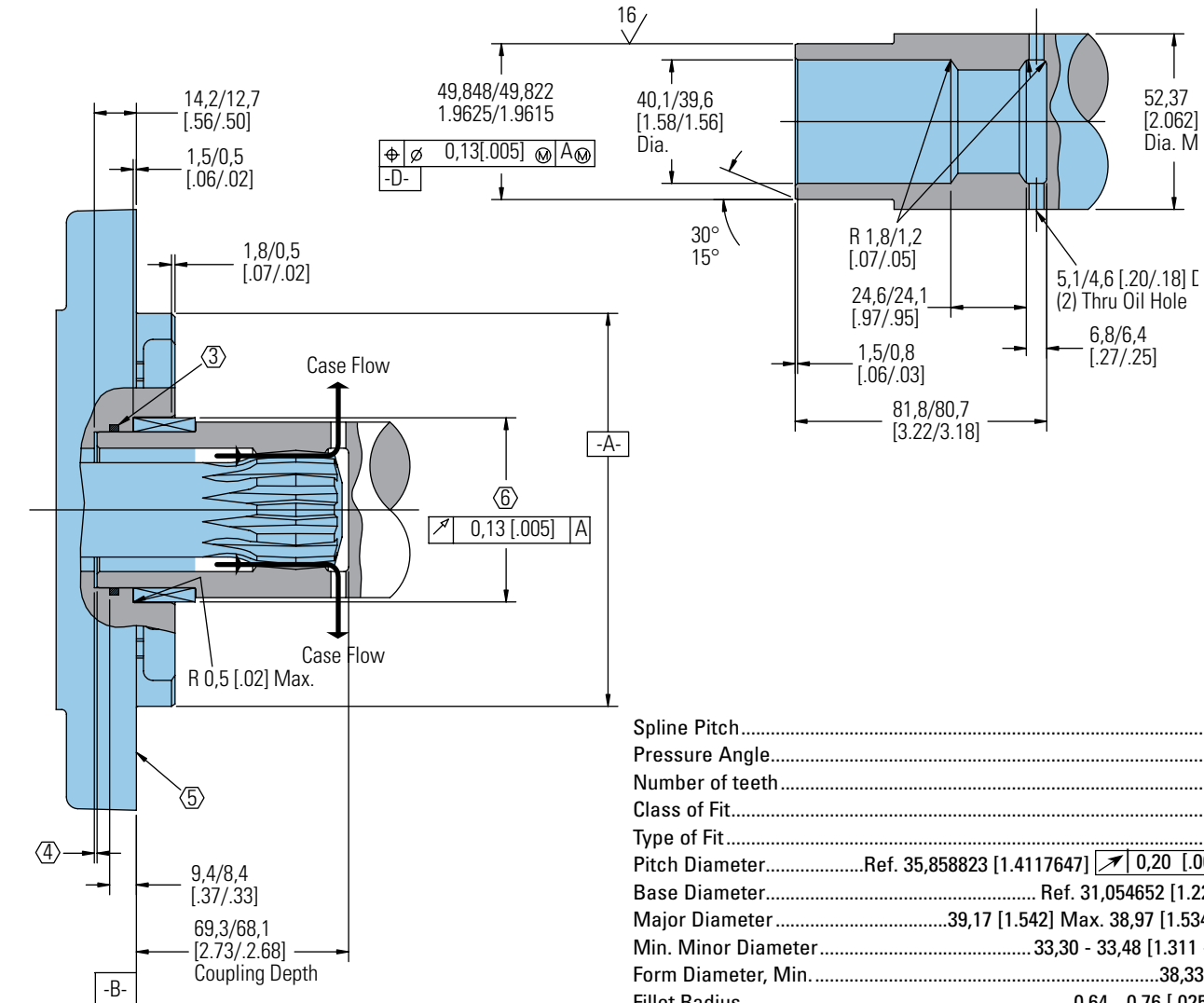
6000 Series

Installation Information

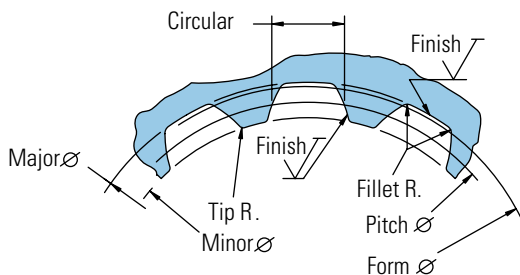
Bearingless

- 1 Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0,076 - 1,02 [.030 - .040] (dimensions apply after heat treat).
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.

- 4 Some means of maintaining clearance between shaft and mounting flange must be provided.
- 5 Similar to SAE "C" Four Bolt Flange..
- 6 Counterbore designed to adapt to a standard sleeve bearing 50,010 - 50,038 [1.9689 - 1.9700] ID by 60,051 - 60,079 [2.3642 - 2.3653] O.D. (Oilite bronze sleeve bearing).



Spline Pitch.....	8.5/17
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 35,858823 [1.4117647] $\begin{matrix} \nearrow & 0,20 & [.008] \\ \square & & \square \end{matrix}$ D
Base Diameter.....	Ref. 31,054652 [1.2226241]
Major Diameter.....	39,17 [1.542] Max. 38,97 [1.534] Min..
Min. Minor Diameter.....	33,30 - 33,48 [1.311 - 1.318]
Form Diameter, Min.....	38,33 [1.509]
Fillet Radius.....	0,64 - 0,76 [.025 - .030]
Tip Radius.....	0,25 - 0,51 [.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 -0.0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,898 [.2322]
Minimum Effective.....	5,804 [.2285]
Maximum Effective.....	Ref. 5,857 [.2306]
Minimum Actual.....	Ref. 5,834 [.2297]
Dimension Between Two Pins.....	Ref. 26,929 - 27,084 [1.0602 - 1.0663]
Pin Diameter.....	6,223 [.2450] Pins to Have 4,0 [.160]
	Wide Flat for Root Clearance

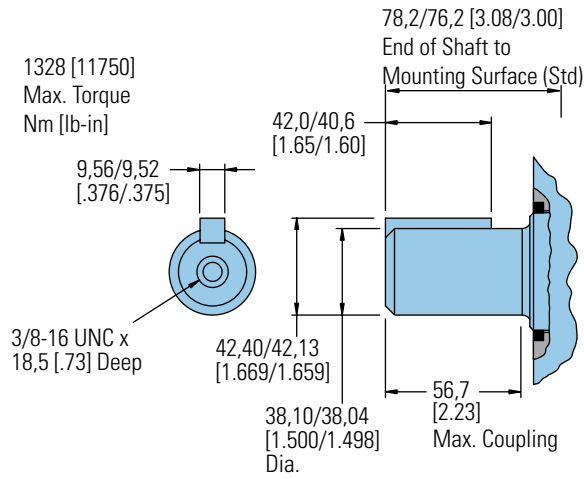


6000 Series

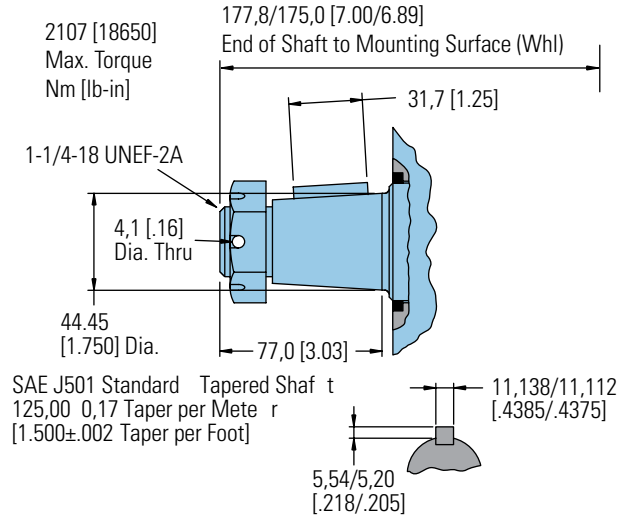
Dimensions

Shafts Splined

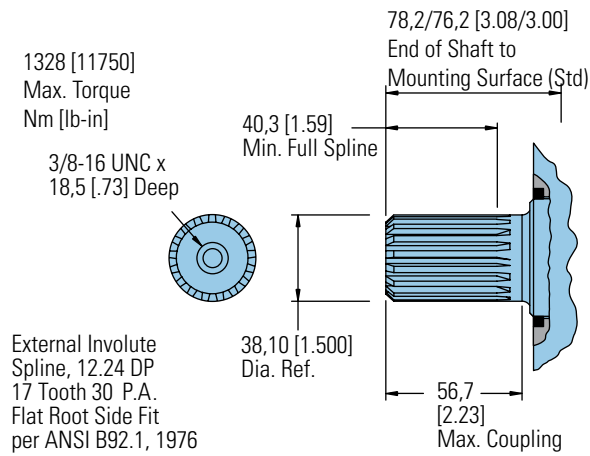
1 1/2 Inch Straight



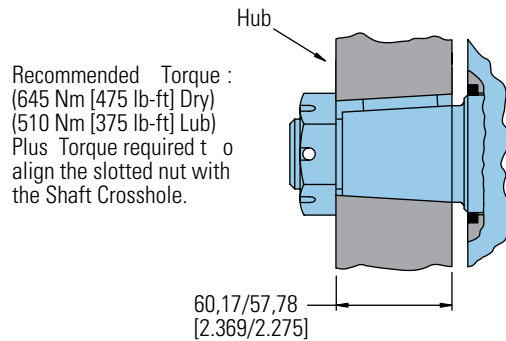
1 3/4 Inch Tapered



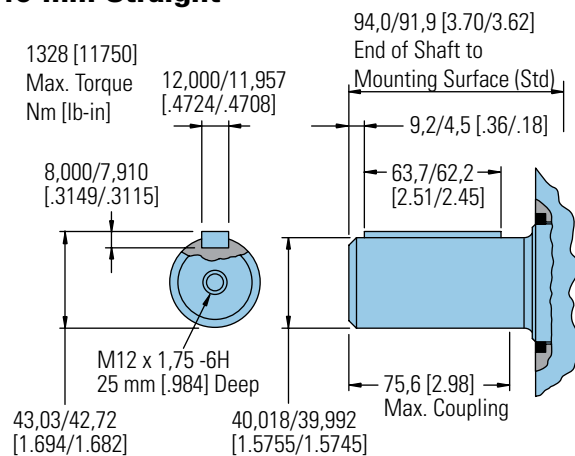
1 1/2 Inch 17 Tooth Splined



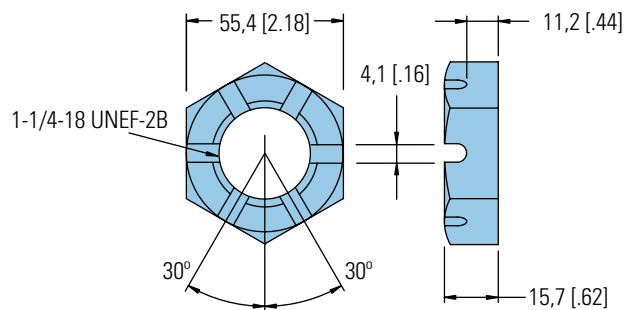
Tapered Shaft Hub Data



40 mm Straight



Slotted Hexagon Nut



6000 Series

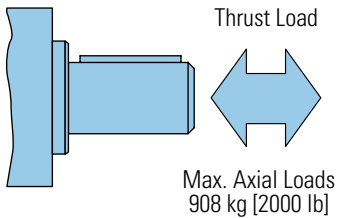
Shaft Side Load Capacity

These curves indicate the radial load capacity on the motor shaft(s) at various locations with an external thrust load of 454 kg [1000 lb]. The maximum allowable thrust load is 908 kg [2000 lb].

Note:

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 109 kg/7 Bar [241 lb/100 PSI].

Each curve is based on



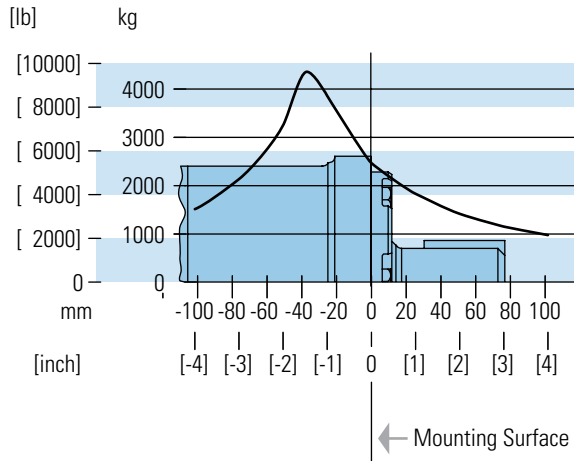
B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

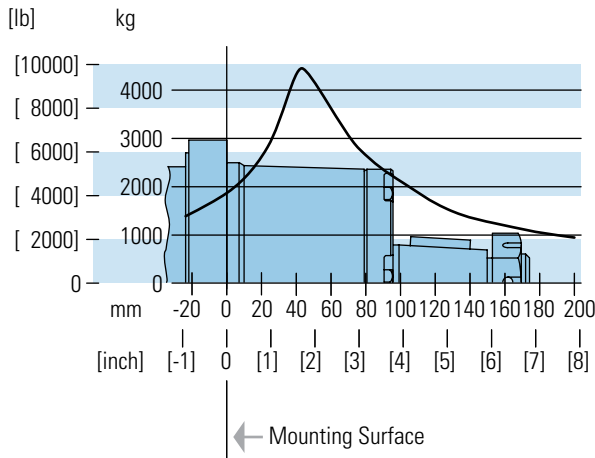
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

Standard Motor
Straight and Splined Shafts



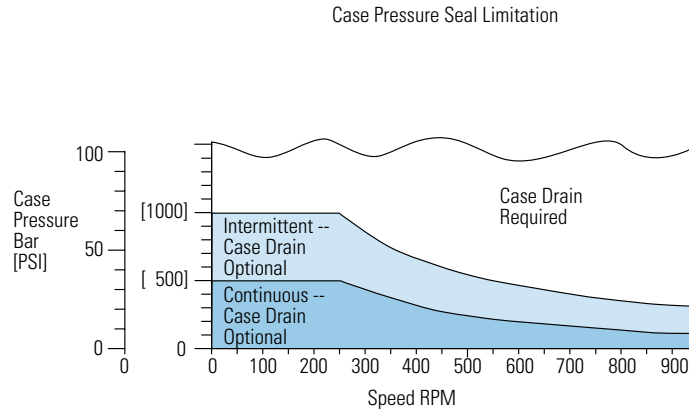
Wheel Motor Tapered Shaft



6000 Series

Case Pressure and Case Port

Char-Lynn 6000 Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation chart.



Case Porting Advantage

Contamination Control — flushing the motor case.

Cooler Motor — exiting oil draws motor heat away.

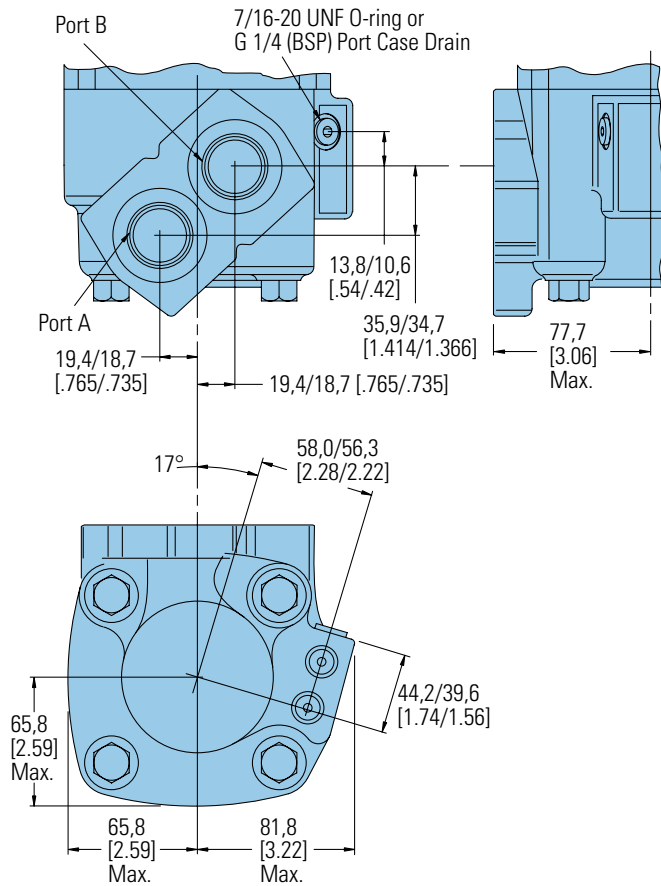
Extend Motor Seal Life — maintain low case pressure with a preset restriction in the case drain line.

6000 Series

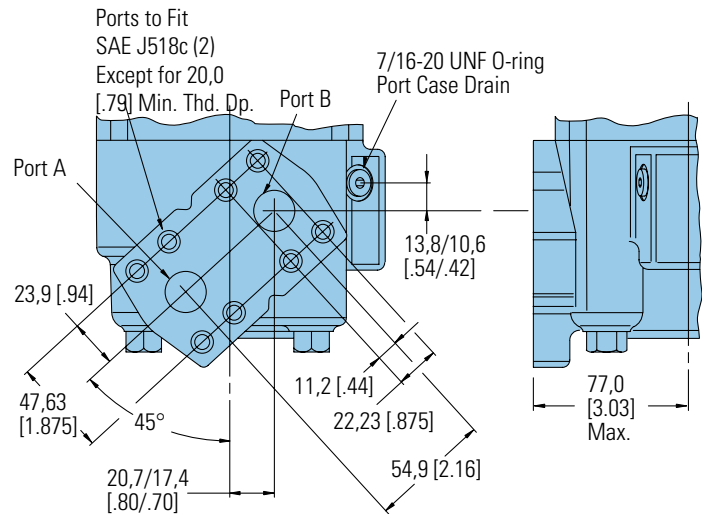
Dimensions

Ports

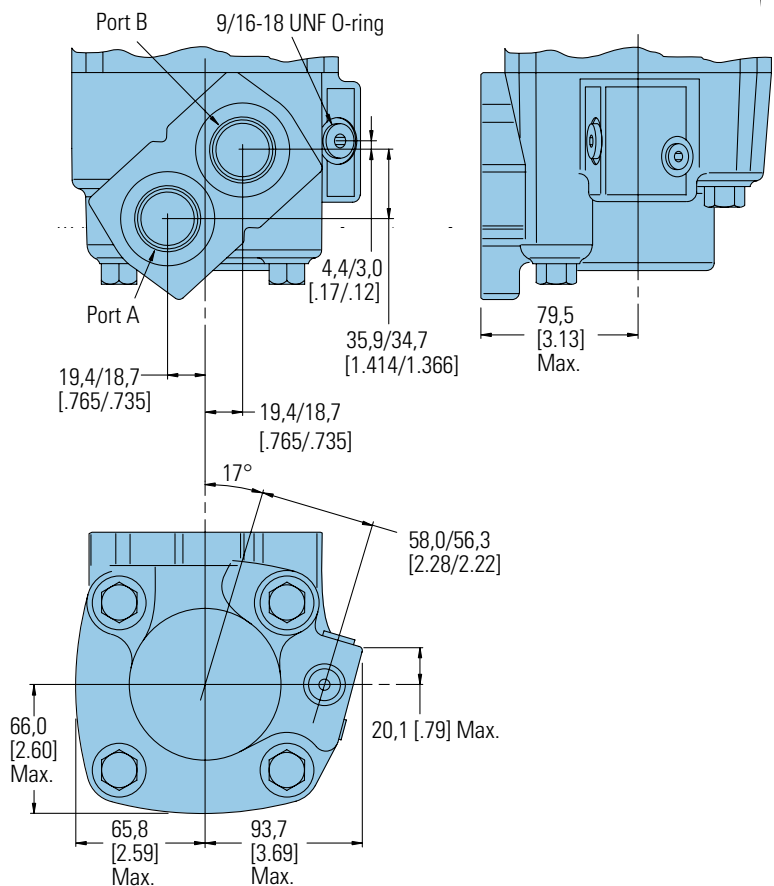
1 5/16 -12 O-ring Ports (2) or G 1 (BSP) Ports (2)



4 Bolt 3/4 Inch Split Flange



1 5/16 -12 O-ring Ports (2) with Shuttle



6000 Series

Product Numbers

Note:

For 6000 Series Motors with a configuration **Not Shown** in the charts above: Use model code number system on the next page to specify product in detail.

Use digit prefix — 112-, 113-, or 114 - plus four digit number from charts for complete product number— Example 114-1047.

Orders will not be accepted without three digit prefix.

MOUNTING	SHAFT	PORT SIZE	DISPL. cm 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 17 T Splined	1 5/16 O-ring	112-1058	-1059	-1060	-1061	-1062	-1109	1163	—	-1063
		G 1 (BSP)	112-1088	-1089	-1090	-1091	-1092	—	—	—	-1093
Wheel Motor	40 mm Straight	G 1 (BSP)	113-1082	-1083	-1084	-1085	-1086	-1100	—	—	-1087
	1-3/4 Inch Tapered	1 5/16 O-ring	113-1070	-1071	-1072	-1073	-1074	-1093	—	—	-1075
Bearingless		1 5/16 O-ring	114-1031	-1032	-1033	-1034	-1035	-1055	—	—	-1036
	G 1 (BSP)	114-1043	-1044	-1045	-1046	-1047	—	—	—	-1048	

*New release

114-1047

Mounting Type - Standard (Code H), 4 Bolt:

- 160,0 [6.30] Pilot Dia.
- 18,01 [.709] Dia. Mounting Holes
- 200,0 [7.87] Dia. Bolt Circle

Output Shaft - Straight (Code 21)

Ports - G1 (BSP) Staggered G 1/4 Case Drain (Code C)

Paint - Low Gloss Black (Code A)

Use digit prefix — 112- plus four digit number from charts for complete product number— Example 112-1215.

Orders will not be accepted without three digit prefix.

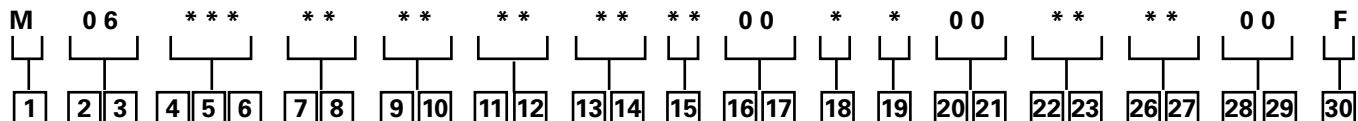
MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER						
			310 [19.0]	390 [23.9]	490 [30.0]	625 [38.0]	735 [45.0]	805 [49.0]	985 [60.0]
Standard	50 mm Straight	G 1 (BSP)	112-1217	-1218	-1215	-1216	-1247	-1219	-1220

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. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1 Product
M – Motor

2, 3 Series
06 – 6000 Series

4, 5, 6 Displacement
cm³/r [in³/r]

- 120 – 195.8 [11.95]
- 150 – 246.5 [15.04]
- 190 – 312.0 [19.04]
- 239 – 391.7 [23.90]
- 300 – 491.4 [29.99]
- 381 – 624.2 [38.09]
- 450 – 737.4 [45.00]
- 490 – 803.4 [49.03]
- 600 – 982.7 [59.97]

7, 8 Mounting Type

- AA** – Bearingless, 4 Bolt: 127,0 [5.00] Pilot Dia. and 14,35 [.565] Dia. Holes 162,0 [6.38] Dia. Bolt Circle
- 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.
- AC** – Wheel, 4 Bolt 139,7 [5.50] Pilot Dia. and 14,35 [.565] Dia. Holes on 184,2 [7.25] Dia. Bolt Circle
- AD – Standard, 4 Bolt, (SAE D): 152,4 [6.00] Pilot Dia. 15,24 [.600] Dia. Holes on 228,6 [9.00] Dia. Bolt Circle (SAE D) with O-Ring Groove to Accept ARP-163 O-Ring
- AH – Standard, 4 Bolt: 10.0 [6.30] Pilot Dia. 18,01 [.709] Dia. Holes on 200.0 [7.87] Dia. Bolt Circle.
- 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] Dia. Holes on 200.0 [7.874] Dia. Bolt Circle (ISO Compatible)

9, 10 Output Shaft Description

- 00 – None (Bearingless)
- 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
- 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
- 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
- 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
- 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
- 15 – 60mm Dia. 10:1 Tapered Shaft per ISO R775 with M42 x 3-6H Threaded Shaft End, 16W x 10H x 32L [1.630W x .394H x 1.26L] Key
- 16 – 53,98 [2.125] Dia. Flat Root Side Fit, 16 Tooth, 8/16 DP 30 Deg. Involute Spline with M12 x 1.75-6H Thread in End, 55,9 [2.20] Min Full Spline

11, 12 Port Description

- AA – 1,3125-12 UN-2B SAE O-Ring Ports–Staggered Ports
- AB – SAE 19.05 [.750] Dia. 4-Bolt Split Flange - Staggered Ports
- AC – G 1 Staggered Ports
- AG – .750-16 UNF-2B SAE O-ring Ports - Staggered

13, 14 Case Flow

- 02 – .4375-20 UNF-2B SAE O-Ring Port With Check Valve
- 03 – G 1/4 BSP Straight Thread Port with Check Valve
- 06 – .5625-18 UNF-2B SAE O-Ring Port with Shuttle Valve
- 10 – .750-16 UNF-2B SAE O-ring Ports, External Lubrication Circuit Requires Case Drain must be Connected, .063 Shuttle Flow Orifice

15 Low Pressure Relief

- 0 – None
- A – Set at 4.5 [65 lbf/in²]
- B – Set at 15.2 [220 lbf/in²]

16, 17 Pressure/Flow Option

- 00 – None

18 Geroler Option

- 0 – Standard
- 2 – Tight Fitting

19 Seal Option

- 0 – Standard
- 00 – Standard Seals
- 02 – Seal Guard
- 03 – Viton Seals
- 04 – Viton Shaft Seal
- 11 – High pressure shaft seal, slinger seal
- 19 – Extreme duty seal guard

20, 21 Accessories

- 00 – None

22, 23 Special Features (Hardware)

- 00 – None
- 01 – Non-Masked Nameplate
- 02 – Non-Masked Nameplate, Low Noise Valve Plate
- 03 – Low Noise Valve Plate

24, 25 Special Features (Assembly)

- 00 – None
- AA – Reverse Rotation

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

28, 29 Customer ID

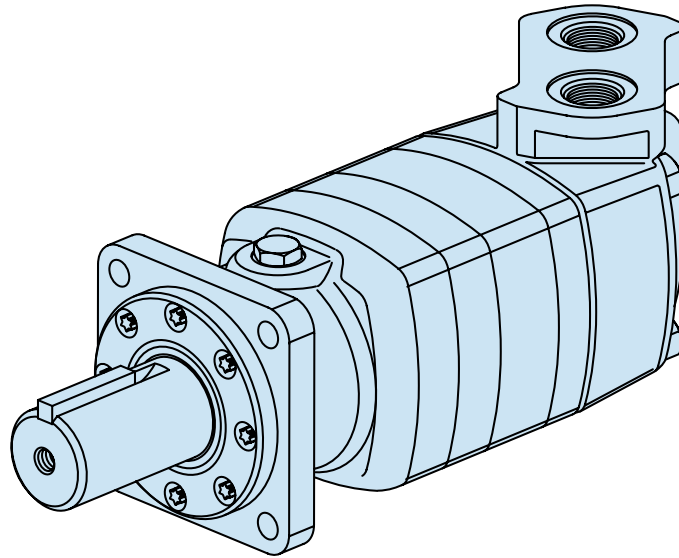
- 00 – None

30 Design Code
F – Sixth

Feature in bold are preferred and allow for shorter lead time

10,000 Series

Highlights



Features

- High torque and flow
- Many options like 2 speed and speed sensors make this motor “smart”
- Low pressure loss even in higher flows

Benefits

- High power density for demanding mobile and industrial applications
- Many options to draw from

Applications

- Boring
- Industrial
- Metal Forming
- Port Equipment
- Saw Mill

Description

This is the biggest disc valve motor of our line with up to 45 GPM and 24,000 in-lb of torque in continuous mode, this motor is powerful and yet provides good efficiency.

Specifications

Geroler Element	4 Displacements
Flow l/min [GPM]	170 [45] Continuous**
	265 [70] Intermittent*
Speed RPM	501 Cont.**
	784 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	270 [4000] Inter.*
Torque Nm [lb-in]	2700 [23910] Cont.**
	3440 [30460] Inter.*

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

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



Boring



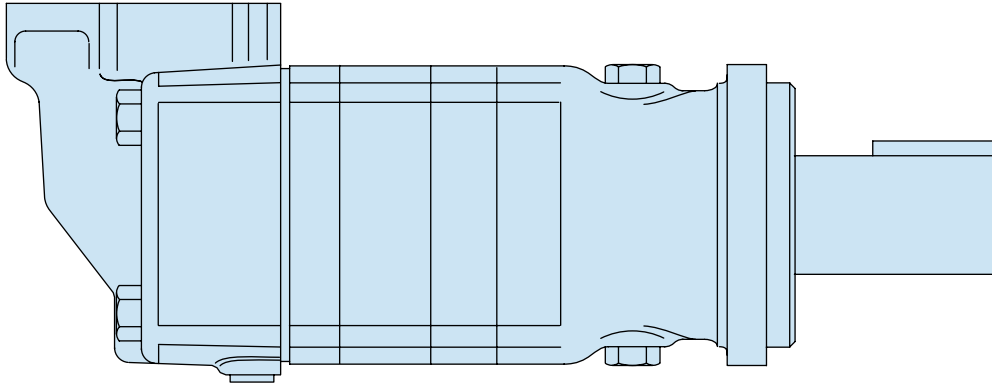
Metal Forming



Port Equipment

10,000 Series

Specifications



10,000 SERIES MOTORS

Displ. cm ³ /r [in ³ /r]		345 [21.0]	480 [29.3]	665 [40.6]	940 [57.4]
Max. Speed (RPM) @ Flow	Continuous	501	354	254	179
	Intermittent	784	552	396	279
Flow l/min [GPM]	Continuous	170 [45]	170 [45]	170 [45]	170 [45]
	Intermittent	265 [70]	265 [70]	265 [70]	265 [70]
Torque* Nm [lb-in]	Continuous	1040 [9220]	1475 [13050]	2085 [18450]	2700 [23910]
	Intermittent	1390 [12310]	1965 [17410]	2610 [23080]	3440 [30460]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	190 [2750]
	Intermittent	275 [4000]	275 [4000]	260 [3750]	240 [3500]
	Peak	275 [4000]	275 [4000]	275 [4000]	260 [3750]
Weight kg [lb]	Standard or Wheel Mount	43,5 [96.0]	45,4 [100.0]	46,3 [100.0]	47,2 [104.0]
	Bearingless	31,3 [69.0]	33,1 [73.0]	33,1 [73.0]	34,9 [77.0]

*See shaft torque ratings for limitations..

Note:

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

Maximum Inlet Pressure:

275 bar [4000 PSI]
Do not exceed Δ pressure rating (see chart above).

Maximum Return Pressure:

275 bar [4000 PSI] with case drain line installed.
Do not exceed Δ pressure rating (see chart above).

Maximum Case Pressure:

20 bar [300 PSI]

Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

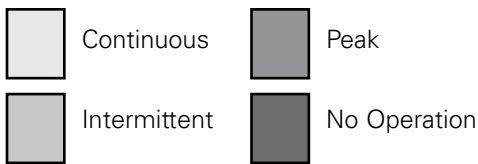
per ISO Cleanliness Code, 4406: 20/18/13

10,000 Series

Performance Data

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

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

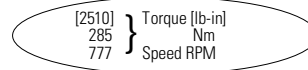


480cm³/r [29.3 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275
[1] 3.8	[760] 85 6	[1540] 175 5	[3120] 355 4	[4640] 525 2					
[2] 7.5	[1040] 120 15	[2140] 240 13	[4320] 490 11	[6500] 735 8	[8690] 980 5	[10870] 1230 2			
[4] 15	[1040] 120 31	[2130] 240 29	[4310] 485 27	[6490] 735 24	[8680] 980 21	[10860] 1225 18	[13050] 1475 16	[15230] 1720 13	[17410] 1965 10
[8] 30	[1020] 115 62	[2110] 240 61	[4290] 485 58	[6480] 730 55	[8660] 980 53	[10840] 1225 50	[13030] 1470 47	[15210] 1720 44	[17390] 1965 42
[12] 45	[990] 110 94	[2080] 235 93	[4270] 480 90	[6450] 730 87	[8630] 975 84	[10820] 1220 81	[13000] 1470 78	[15180] 1715 75	[17370] 1965 73
[16] 61	[960] 110 125	[2060] 235 124	[4240] 480 122	[6420] 725 119	[8600] 970 116	[10790] 1220 113	[12970] 1465 110	[15150] 1710 107	[17340] 1960 104
[20] 76	[930] 105 157	[2020] 230 156	[4200] 475 154	[6390] 720 150	[8570] 970 147	[10750] 1215 144	[12940] 1460 141	[15120] 1710 138	[17300] 1955 135
[24] 91	[890] 100 189	[1980] 225 188	[4170] 470 185	[6350] 715 182	[8530] 965 179	[10720] 1210 175	[12900] 1460 172	[15080] 1705 169	
[28] 106	[850] 95 221	[1940] 220 220	[4130] 465 217	[6310] 715 214	[8490] 960 210	[10680] 1205 207	[12860] 1455 203	[15040] 1700 200	
[32] 121	[810] 90 252	[1900] 215 251	[4080] 460 249	[6270] 710 245	[8450] 955 242	[10630] 1200 238	[12820] 1450 235	[15000] 1695 231	
[36] 136	[760] 85 282	[1850] 210 281	[4040] 455 280	[6220] 705 277	[8400] 950 273	[10590] 1195 270	[12770] 1445 266		
[40] 151	[710] 80 318	[1800] 205 316	[3990] 450 312	[6170] 695 308	[8350] 945 305	[10540] 1190 301	[12720] 1440 297		
[45] 170	[647] 75 354	[1740] 195 353	[3920] 445 351	[6110] 690 348	[8290] 935 344	[10470] 1185 340	[12660] 1430 336		
[60] 227	[430] 50 474	[1520] 170 473	[3710] 420 471	[5890] 665 467	[8070] 910 462	[10260] 1160 458	[12440] 1405 454		
[70] 265		[1360] 155 552	[3540] 400 550	[5730] 645 546	[7910] 895 541	[10100] 1140 536	[12280] 1385 532		

345cm³/r [21.0 in³/r]
ΔPressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275
[1] 3.8	[600] 70 3	[1310] 150 1							
[2] 7.5	[740] 85 21	[1510] 170 19	[3050] 345 15	[4600] 520 11	[6140] 695 8	[7680] 865 4			
[4] 15	[730] 80 43	[1500] 170 41	[3040] 345 37	[4590] 520 33	[6140] 695 30	[7680] 870 26	[9220] 1040 22	[10770] 1215 18	[12310] 1390 14
[8] 30	[720] 80 87	[1490] 170 86	[3030] 340 82	[4580] 515 78	[6120] 690 74	[7670] 865 70	[9210] 1040 66	[10750] 1215 62	[12300] 1390 58
[12] 45	[700] 80 131	[1470] 165 130	[3020] 340 127	[4560] 515 123	[6100] 690 118	[7650] 865 114	[9190] 1040 110	[10740] 1215 106	[12280] 1385 102
[16] 61	[680] 75 176	[1450] 165 175	[3000] 340 172	[4540] 515 167	[6080] 685 163	[7630] 860 158	[9170] 1035 154	[10720] 1210 149	[12260] 1385 145
[20] 76	[660] 75 221	[1430] 160 220	[2970] 335 217	[4520] 510 212	[6060] 685 207	[7600] 860 202	[9150] 1035 198	[10690] 1210 193	[12230] 1380 189
[24] 91	[630] 70 266	[1400] 160 265	[2950] 335 261	[4490] 505 256	[6030] 680 252	[7580] 855 246	[9120] 1030 242	[10660] 1205 237	[12210] 1380 232
[28] 106	[600] 70 310	[1370] 155 309	[2920] 330 306	[4460] 505 301	[6000] 680 296	[7550] 855 291	[9090] 1025 286	[10640] 1200 280	[12180] 1375 275
[32] 121	[570] 65 356	[1340] 150 355	[2890] 325 351	[4430] 500 346	[5970] 675 340	[7520] 850 335	[9060] 1025 329	[10610] 1200 324	[12150] 1370 319
[36] 136	[540] 60 400	[1310] 150 399	[2850] 320 396	[4400] 495 390	[5940] 670 384	[7480] 845 379	[9030] 1020 373	[10570] 1195 368	[12120] 1370 362
[40] 151	[500] 55 445	[1270] 145 444	[2820] 320 441	[4360] 495 435	[5910] 670 429	[7450] 845 423	[8990] 1015 417	[10540] 1190 412	
[45] 170	[460] 50 501	[1220] 140 500	[2760] 310 498	[4300] 485 492	[5840] 660 486	[7380] 835 480	[8910] 1005 473	[10450] 1180 467	
[60] 227		[1080] 130 668	[2620] 295 665	[4160] 470 658	[5710] 645 651	[7250] 820 644	[8800] 995 637		
[70] 265		[960] 110 784	[2510] 285 777	[4050] 460 769	[5590] 630 761	[7140] 805 754	[8680] 980 746		

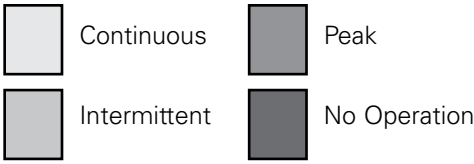


10,000 Series

Performance Data

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

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



665cm³/r [40.6 in³/r]

ΔPressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[1] 3.8	[1470] 165 4	[3010] 340 3	[4550] 515 3	[6100] 690 2	[7630] 860 1										
[2] 7.5	[1480] 165 10	[3020] 340 9	[4560] 515 8	[6110] 690 7	[7650] 865 7	[9200] 1040 6	[10740] 1215 5	[12280] 1385 4	[13830] 1565 3	[15370] 1735 2	[16910] 1910 1				
[4] 15	[1470] 165 22	[3010] 340 21	[4550] 515 20	[6100] 690 19	[7640] 865 18	[9190] 1040 17	[10730] 1210 16	[12270] 1385 15	[13820] 1560 14	[15360] 1735 13	[16900] 1910 12	[18450] 2085 11	[19990] 2260 10	[21540] 2435 9	[23080] 2610 8
[8] 30	[1440] 165 44	[2980] 335 43	[4530] 510 42	[6070] 685 41	[7610] 860 40	[9160] 1035 39	[10700] 1210 38	[12250] 1385 37	[13790] 1560 36	[15330] 1730 35	[16880] 1905 34	[18420] 2080 33	[19960] 2255 32	[21510] 2430 31	[23050] 2605 30
[12] 45	[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
[16] 61	[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	[21440] 2420 76	
[20] 76	[1310] 150 112	[2860] 315 111	[4400] 495 110	[5940] 670 109	[7490] 845 108	[9030] 1020 107	[10580] 1195 106	[12120] 1370 105	[13660] 1545 104	[15210] 1720 103	[16750] 1890 102	[18300] 2070 101	[19840] 2240 99		
[24] 91	[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] 1720 125	[16700] 1890 124	[18240] 2060 123			
[28] 106	[1200] 135 157	[2750] 310 156	[4290] 485 155	[5840] 660 154	[7380] 835 153	[8920] 1010 151	[10470] 1185 150	[12010] 1355 149	[13550] 1530 148	[15100] 1705 147	[16640] 1880 146				
[32] 121	[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 171	[15040] 1700 169	[16580] 1875 168				
[36] 136	[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 189				
[40] 151	[1010] 115 225	[2550] 290 224	[4100] 465 222	[5640] 635 221	[7180] 810 220	[8730] 985 219	[10270] 1160 217	[11810] 1355 216	[13360] 1500 215	[14900] 1675 214	[16440] 1850 212				
[45] 170	[920] 105 254	[2460] 280 252	[4000] 450 251	[5550] 625 249	[7090] 800 248	[8630] 975 247	[10180] 1150 245	[11720] 1325 244	[13260] 1500 243	[14810] 1675 242					
[60] 227	[610] 70 338	[2150] 245 336	[3700] 420 335	[5240] 590 334	[6780] 765 332	[8330] 940 331	[9870] 1115 329	[11420] 1290 328	[12960] 1465 327						
[70] 265	[380] 45 396	[1930] 220 393	[3470] 390 391	[5010] 565 390	[6560] 740 388	[8100] 915 387	[9640] 1090 385	[11190] 1265 384							



940cm³/r [57.4 in³/r]

ΔPressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240
[1] 3.8	[2080] 235 3	[4260] 480 2	[6440] 730 1											
[2] 7.5	[2090] 235 7	[4270] 480 6	[6450] 730 5	[8640] 975 5	[10820] 1220 4	[13000] 1470 3	[15190] 1715 2	[17370] 1965 1						
[4] 15	[2080] 235 15	[4260] 480 14	[6440] 730 13	[8620] 975 13	[10810] 1220 12	[12990] 1470 11	[15170] 1715 10	[17360] 1960 9	[19540] 2210 8	[21720] 2455 7	[23910] 2700 6	[26090] 2950 5	[28270] 3195 4	[30460] 3440 4
[8] 30	[2040] 230 31	[4220] 475 30	[6400] 725 29	[8590] 970 28	[10770] 1215 28	[12950] 1465 27	[15140] 1710 26	[17320] 1955 25	[19500] 2200 24	[21690] 2450 23	[23870] 2695 22			
[12] 45	[1990] 225 47	[4170] 470 46	[6350] 715 45	[8540] 965 44	[10720] 1210 43	[12900] 1460 43	[15090] 1705 42	[17270] 1950 41	[19450] 2200 40	[21640] 2445 39				
[16] 61	[1930] 220 63	[4110] 465 62	[6290] 710 61	[8480] 960 60	[10660] 1205 59	[12840] 1450 58	[15030] 1700 57	[17210] 1945 56	[19390] 2190 55					
[20] 76	[1860] 210 79	[4040] 455 78	[6220] 705 77	[8410] 950 76	[10590] 1195 75	[12770] 1445 74	[14960] 1690 73	[17140] 1935 72	[19320] 2185 72					
[24] 91	[1780] 200 95	[3970] 450 94	[6150] 695 93	[8330] 940 92	[10520] 1190 91	[12700] 1435 90	[14880] 1680 89	[17070] 1930 88						
[28] 106	[1700] 190 111	[3890] 440 110	[6070] 685 109	[8250] 930 108	[10440] 1180 107	[12620] 1425 106	[14800] 1675 105	[16990] 1920 104						
[32] 121	[1620] 185 127	[3800] 430 126	[5980] 675 125	[8160] 920 124	[10350] 1170 123	[12530] 1415 122	[14720] 1665 121							
[36] 136	[1520] 170 143	[3710] 420 142	[5890] 665 141	[8070] 910 140	[10260] 1160 139	[12440] 1405 138	[14620] 1650 137							
[40] 151	[1420] 160 159	[3610] 410 158	[5790] 655 157	[7970] 900 156	[10160] 1150 155	[12340] 1395 154	[14520] 1640 153							
[45] 170	[1290] 145 179	[3480] 395 178	[5660] 640 177	[7840] 885 176	[10020] 1130 174	[12210] 1380 173	[14400] 1625 173							
[60] 227	[860] 95 239	[3040] 345 238	[5230] 590 236	[7410] 835 235	[9600] 1085 234	[11780] 1330 233								
[70] 265	[540] 60 279	[2720] 305 278	[4910] 555 276	[7090] 800 275	[9270] 1045 274	[11460] 1295 273								

10,000 Series

Dimensions

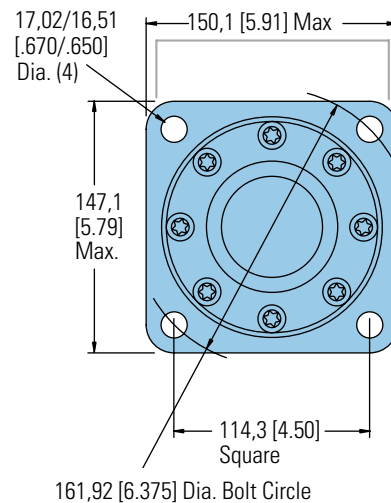
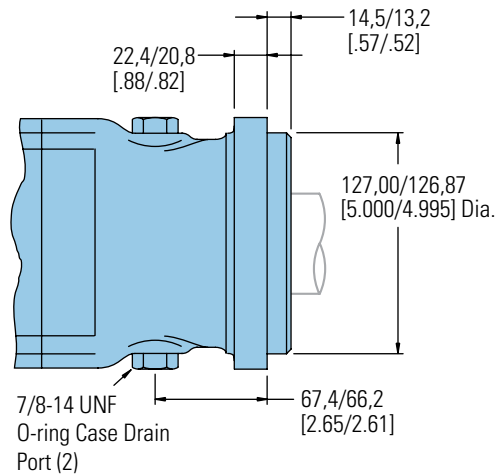
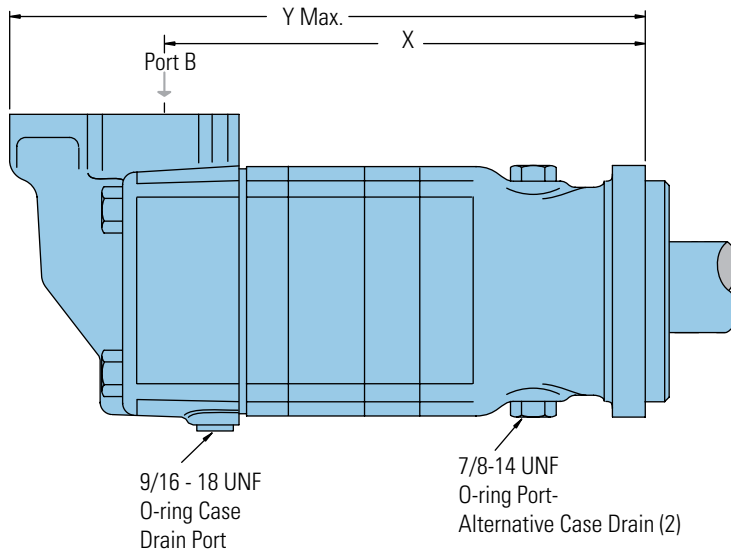
Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 1 1/4 inch Split Flange Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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

Standard Mount



STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
345 [21.0]	282,4 [11.12]	380,7 [14.99]
480 [29.2]	295,1 [11.62]	393,4 [15.49]
665 [40.6]	295,1 [11.62]	393,4 [15.49]
940 [57.4]	313,4 [12.34]	411,7 [16.21]

C-6

10,000 Series

Dimensions

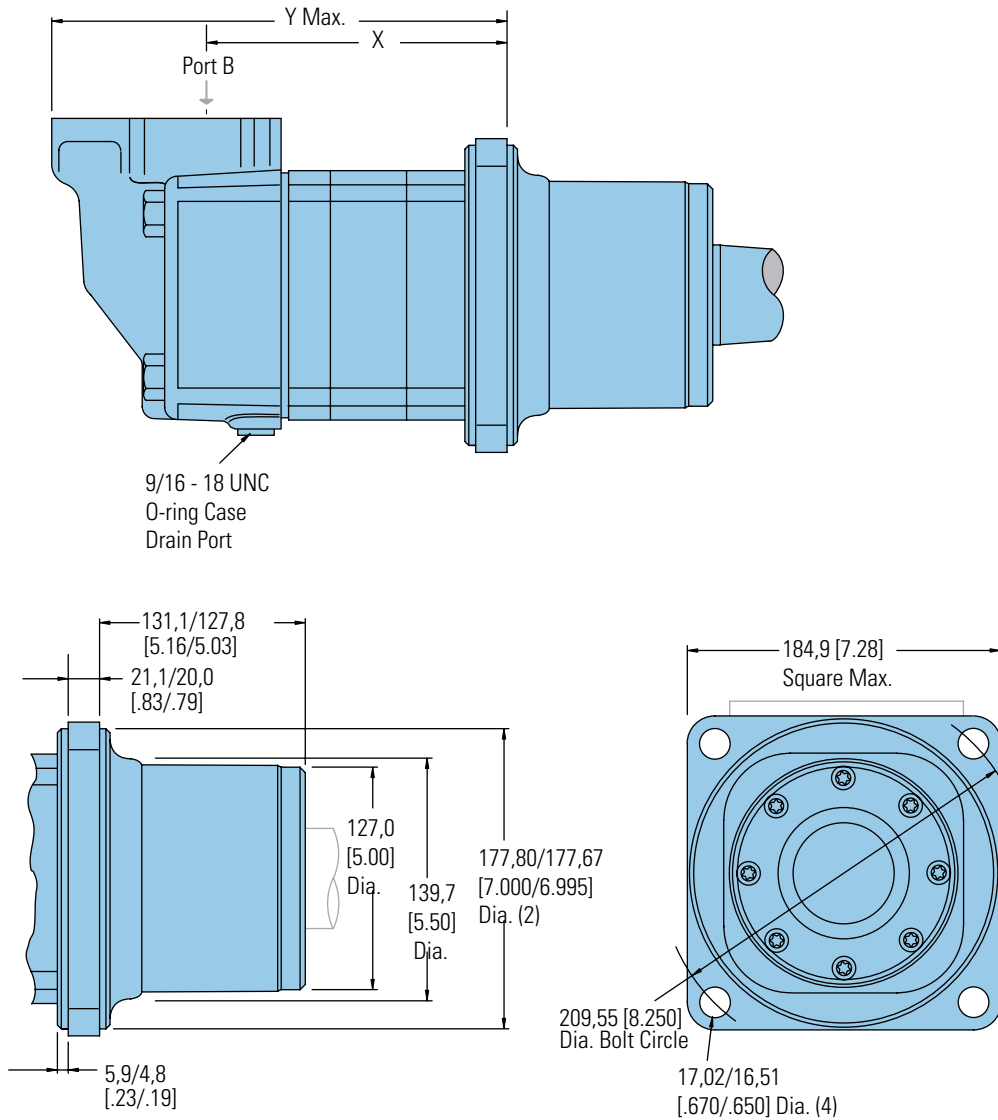
Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 1 1/4 inch Split Flange Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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

Wheel Mount



WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm 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]
665 [40.6]	179,6 [7.07]	278,6 [10.97]
940 [57.4]	197,8 [7.79]	297,2 [11.70]

10,000 Series

Dimensions

Bearingless

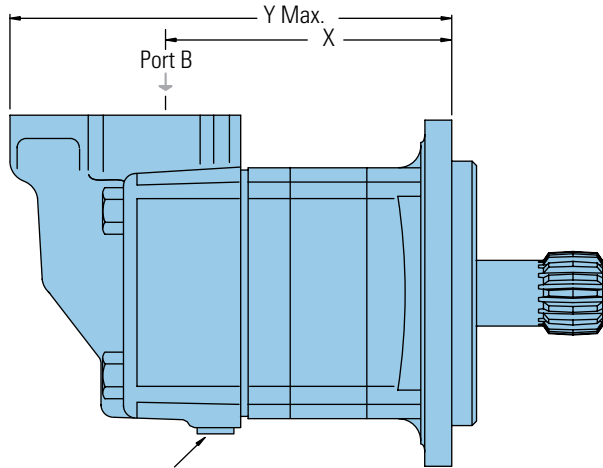
Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 1 1/4 inch Split Flange Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)

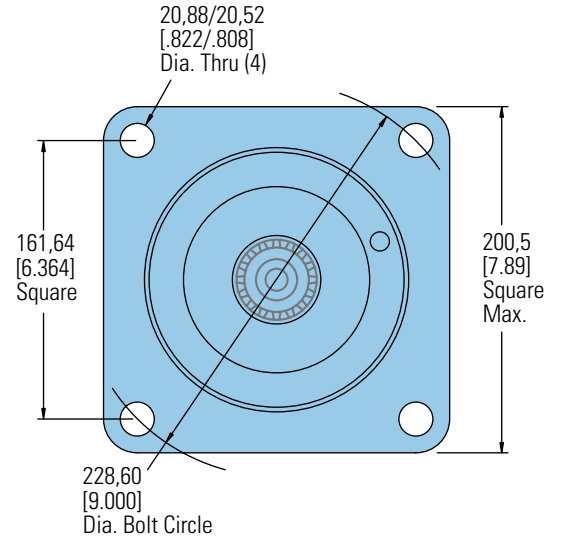
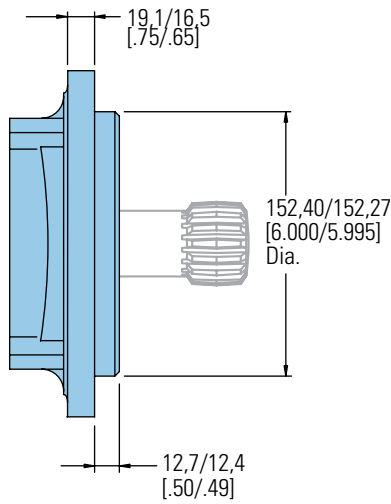
Standard Rotation Viewed from Shaft End

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

Bearingless



9/16 - 18 UNF
O-ring Case
Drain Port



BEARINGLESS MOTOR DIMENSIONS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
345 [21.0]	158,0 [6.22]	256.3 [10.09]
480 [29.2]	170,7 [6.72]	269,0 [10.59]
665 [40.6]	170,7 [6.72]	269,0 [10.59]
940 [57.4]	189,0 [7.44]	287,5 [11.32]

Mating Coupling Blank

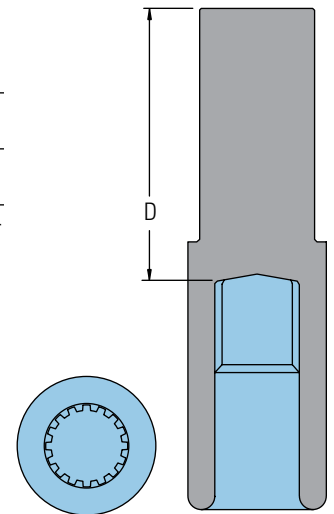
Dimension D mm [inch]
Eaton Part No.

13280-001	133,6/128,5 [5.26/5.06]
13280-002	156,0/150,9 [6.14/5.94]

For 10,000 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

Note:

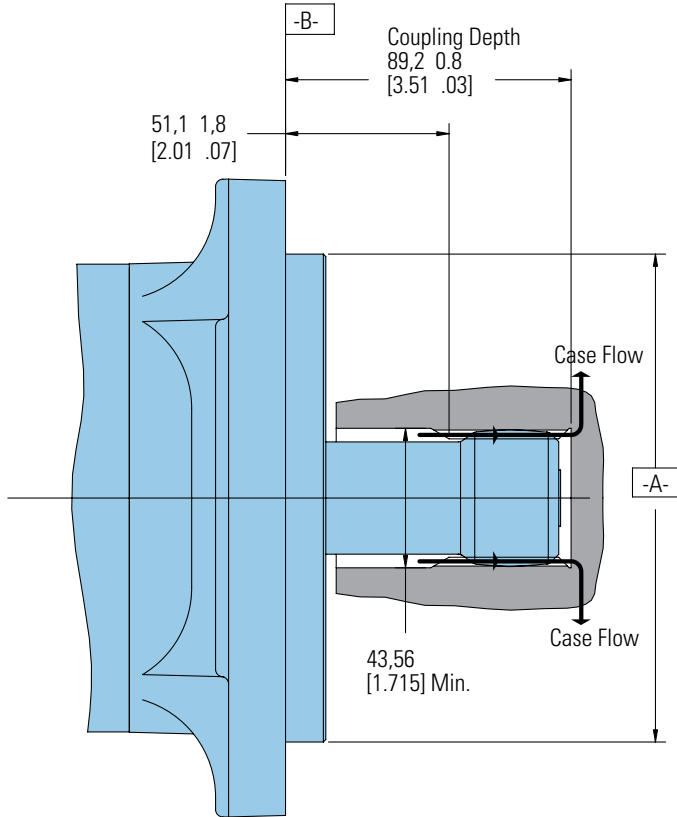
After machining blank, part must be hardened per Eaton specification.



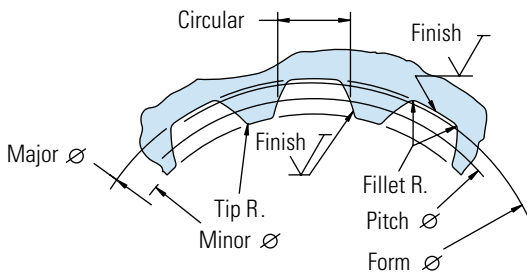
10,000 Series

Installation Information

Bearingless



1 Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRC with case depth (to 50HRC) of 0,076 - 1,02 [.030 - .040] (dimensions apply after heat treat).



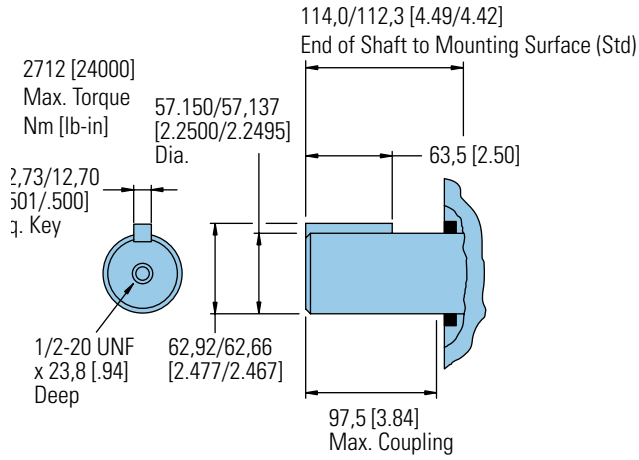
Spline Pitch.....	10/20
Pressure Angle.....	.30°
Number of teeth.....	16
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter	Ref. 40,640000 [1.600000] $\text{Ⓢ} 0,25 [0.010] D$
Base Diameter.....	Ref. 35,195272 [1.3856406]
Major Diameter.....	43,56 [1.715] Max. 43,18 [1.700] Min.
Min. Minor Diameter.....	36,83 - 37,08 [1.450 - 1.460]
Form Diameter, Min.....	42,47 [1.672]
Fillet Radius.....	0,64 - 0,76 [0.025 - .030]
Tip Radius.....	0,25 - 0,51 [0.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,028 [+0.0000 - .0011]
Total Index Variation	0,041 [.0016]
Lead Variation	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	4,105 [.1616]
Minimum Effective	3,995 [.1573]
Maximum Effective	Ref. 4,056 [.1597]
Minimum Actual	Ref. 4,018 [.1582]
Dimension Between Two Pins.....	Ref. 26,929 - 27,084 [1.0602 - 1.0663]
Pin Diameter	Ref. 34,272 - 34,450 [1.3493 - 1.3563]
	Wide Flat for Root Clearance

10,000 Series

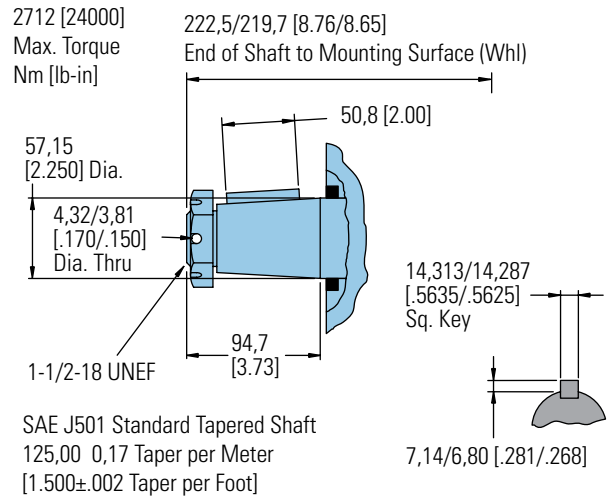
Dimensions

Shafts

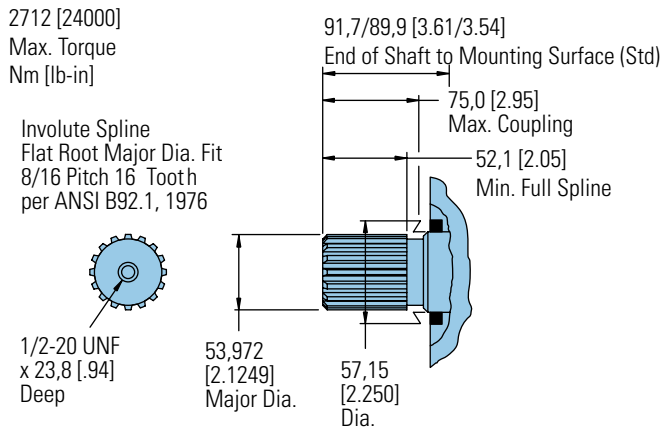
2 1/4 Inch Straight



2 1/4 Inch Tapered

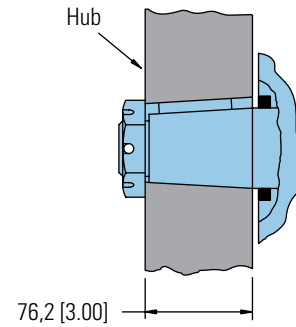


2 1/8 Inch 16 Tooth Splined

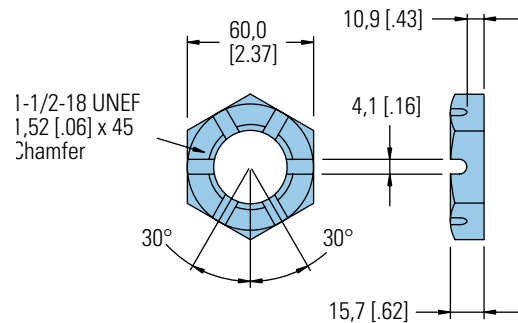


Tapered Shaft Hub Data

Recommended Torque:
(1150 Nm [850 lb-ft] Dry)
(880 Nm [650 lb-ft] Lub)
Plus Torque required to
align the slotted nut with
the Shaft Crosshole.



Slotted Hexagon Nut



10,000 Series

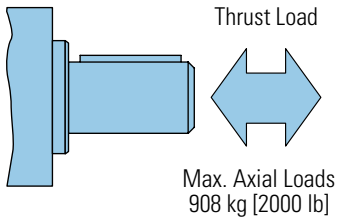
Side Shaft Load Capacity

These curves indicate the radial load capacity on the motor shaft at various locations with an external thrust load of 454 kg [1000 lb]. The maximum allowable thrust load is 908 kg [2000 lb].

Note:

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 200 kg/7 Bar [441 lb/100 PSI].

Each curve is based on

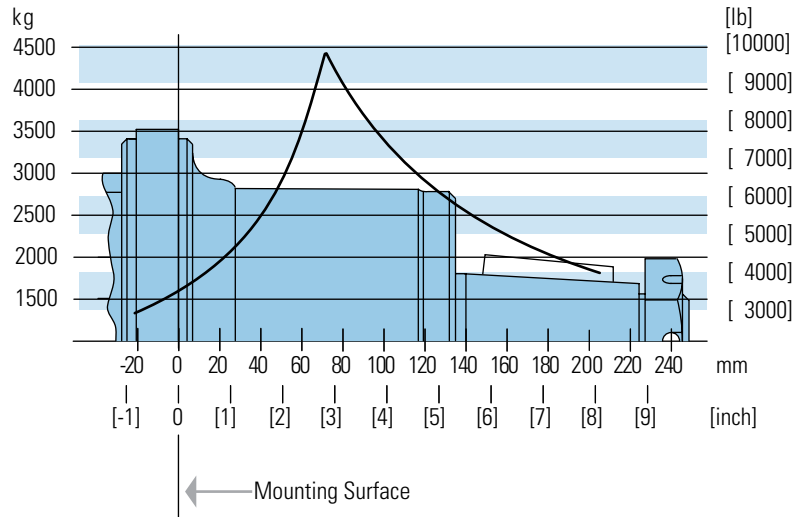
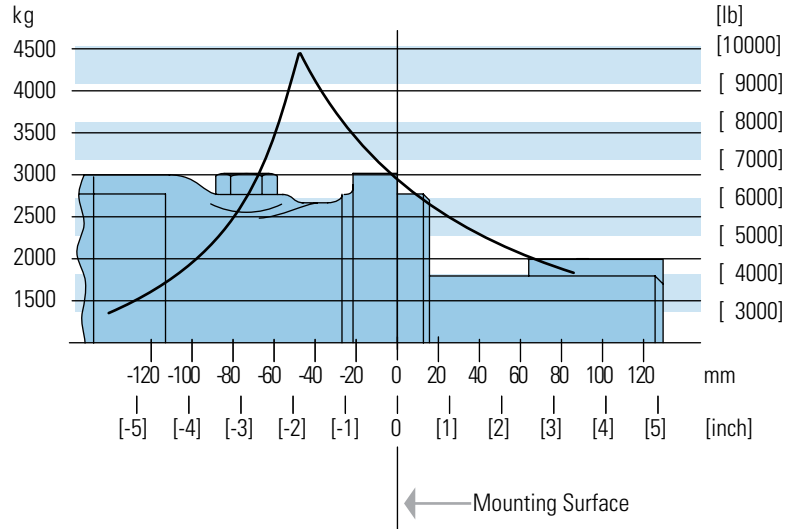


B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

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

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

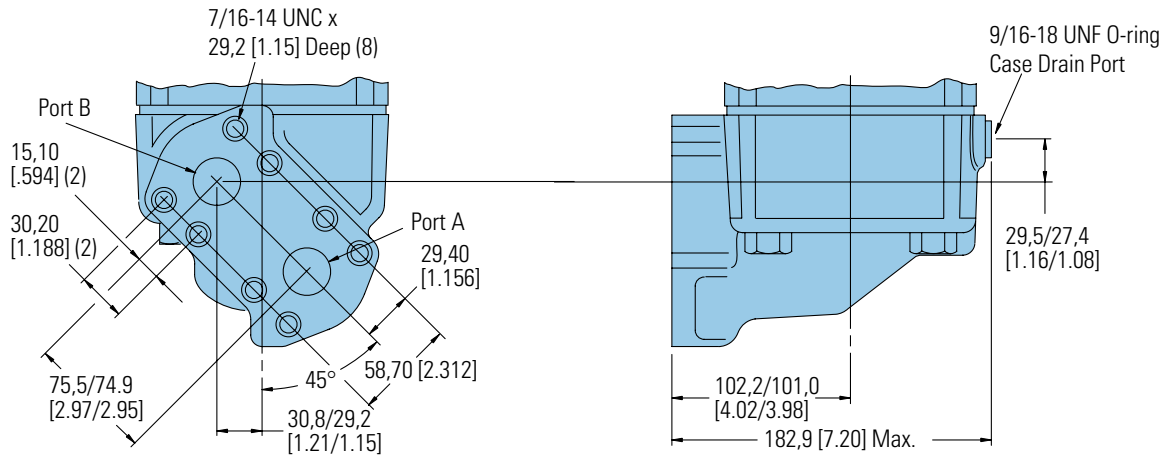


10,000 Series

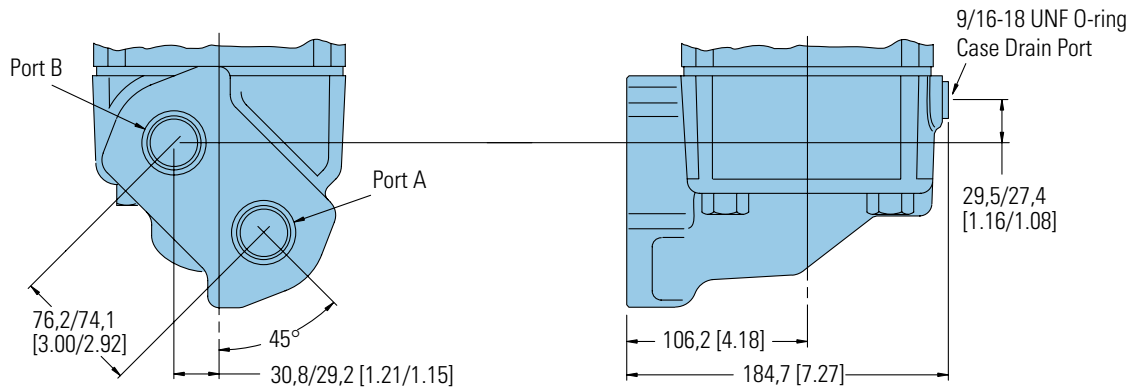
Dimensions

Ports

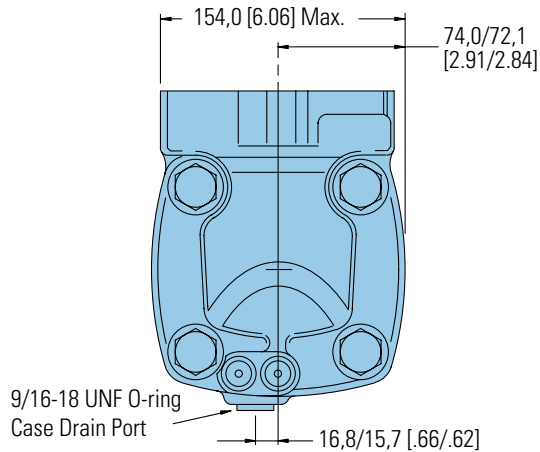
1 1/4 Inch Split Flange Ports (2)



1 5/16 -12 O-ring Ports (2)



End View Common Dimensions



10,000 Series

Product Numbers

Note:

For 10,000 Series Motors with a configuration **Not Shown** in the chart below: Use model code number system on the next page to specify product in detail.

Use digit prefix — 119-, 120-, or 121 - plus four digit number from charts for complete product number— Example 121-1014.

Orders will not be accepted without three digit prefix.

MOUNTING	SHAFT	PORT SIZE	DISPL. cm 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	-1046	-1047
	2 1/4 Inch Tapered	1 5/16 O-ring	119-1036	-1037	-1038	-1039
		1 1/4 inch Split Flange	119-1048	-1049	-1050	-1051
Wheel Motor	2 1/4 Inch Straight	1 5/16 O-ring	120-1005	-1006	-1007	-1008
		1 1/4 inch Split Flange	120-1017	-1018	-1019	-1020
	2 1/8 Inch 16 T Splined	1 5/16 O-ring	120-1009	-1010	-1011	-1012
		1 1/4 inch Split Flange	120-1021	-1022	-1023	-1024
	2 1/4 Inch Tapered	1 5/16 O-ring	120-1013	-1014	-1015	-1016
		1 1/4 inch Split Flange	120-1025	-1026	-1027	-1028
Bearingless		1 5/16 O-ring	121-1007	-1008	-1009	-1010
		1 1/4 inch Split Flange	121-1011	-1012	-1013	-1014

121-1014

10,000 Series

Model Code

The following 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. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

M	1	0	***	**	**	**	**	**	*	00	*	*	**	00	**	**	00	*											
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
10 – 10,000 Series

4, **5**, **6** Displacement
cm³/r [in³/r]

210 – 343.8 [20.98]
293 – 479.5 [29.26]
406 – 665.3 [40.60]
574 – 940.8 [57.41]

7, **8** Mounting
Description

AA – Standard, 4 Bolt: 127,0 [5.00] Pilot Dia. 16,76 [.660] Dia. Holes on 161,92 [6.375] Dia. Bolt Circle

AB – Wheel, 4 Bolt: 16,76 [.660] Dia. Holes on 209,55 [8.250] Dia. Bolt Circle

AC – Bearingless, 4 Bolt: 152,4 [6.00] Pilot Dia. 20,70 [.815] Holes on 228,60 [9.00] Dia. Bolt Circle

9, **10** Output Shaft
Description

00 – None (Bearingless)

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

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

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

11, **12** Ports

AA – 1.3125 -12 UN O-Ring Staggered Ports

AB – 31,75 [1.250] Dia. 4 Bolt Split Flange Staggered Ports with .4375-15 UNC-2B Tapped Mounting Holes

13, **14** Case Flow Options
01 – .5625-18 UNF-2B Case Drain SAE O-Ring Port

15 Low Pressure Relief
0 – None

16, **17** Pressure/Flow
Option
00 – None

18 Geroler Option
0 – Standard
1 - Free Running

19 Seal Option

00 – Standard Seals

02 – Seal Guard

03 – Viton Seals

04 – Viton Shaft Seal

11 – High pressure shaft seal, slinger seal

19 – Extreme duty seal guard

20, **21** Accessories

00 – None

22, **23** Special Features
(Hardware)

00 – None

24, **25** Special Features
(Assembly)

00 – None

AA – Reverse Rotation

26, **27** Paint / Packaging

00 – None

AA – Low Gloss Black Primer

28, **29** Customer
Identification

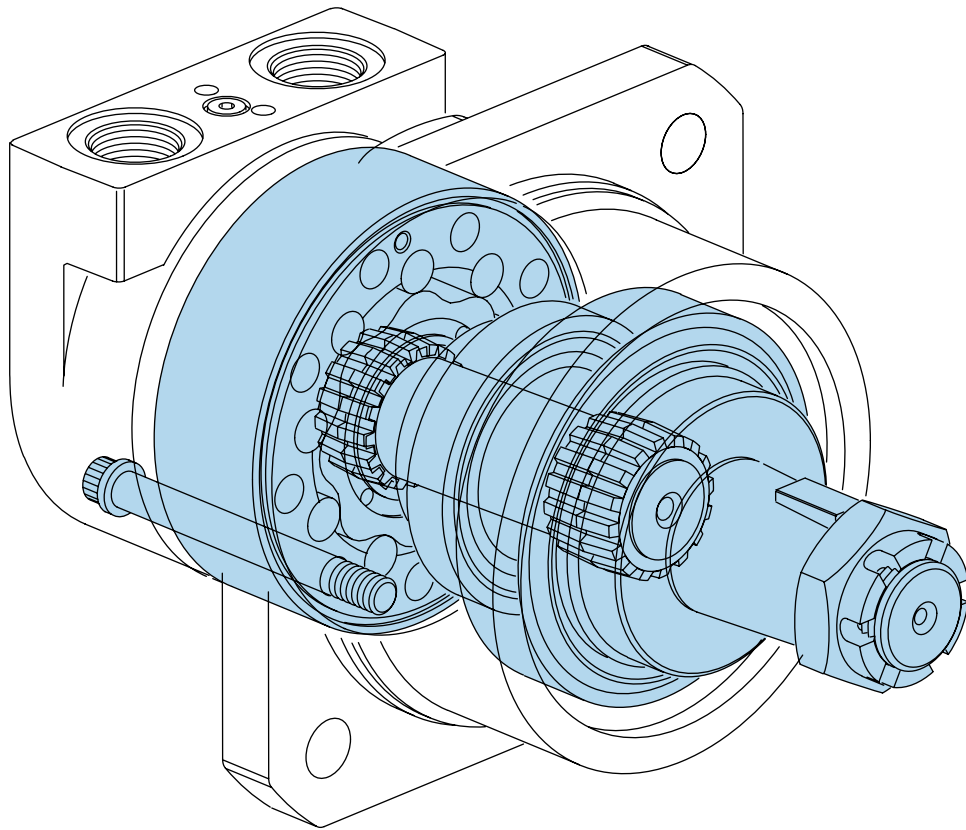
00 – None

30 Design Code

C – Third (Standard and Wheel Mounts)

D – Fourth (Bearingless Mount)

Feature in **bold** are preferred and allow for shorter lead time.



The next step in the evolution of low speed high torque (LSHT) hydraulic motors.

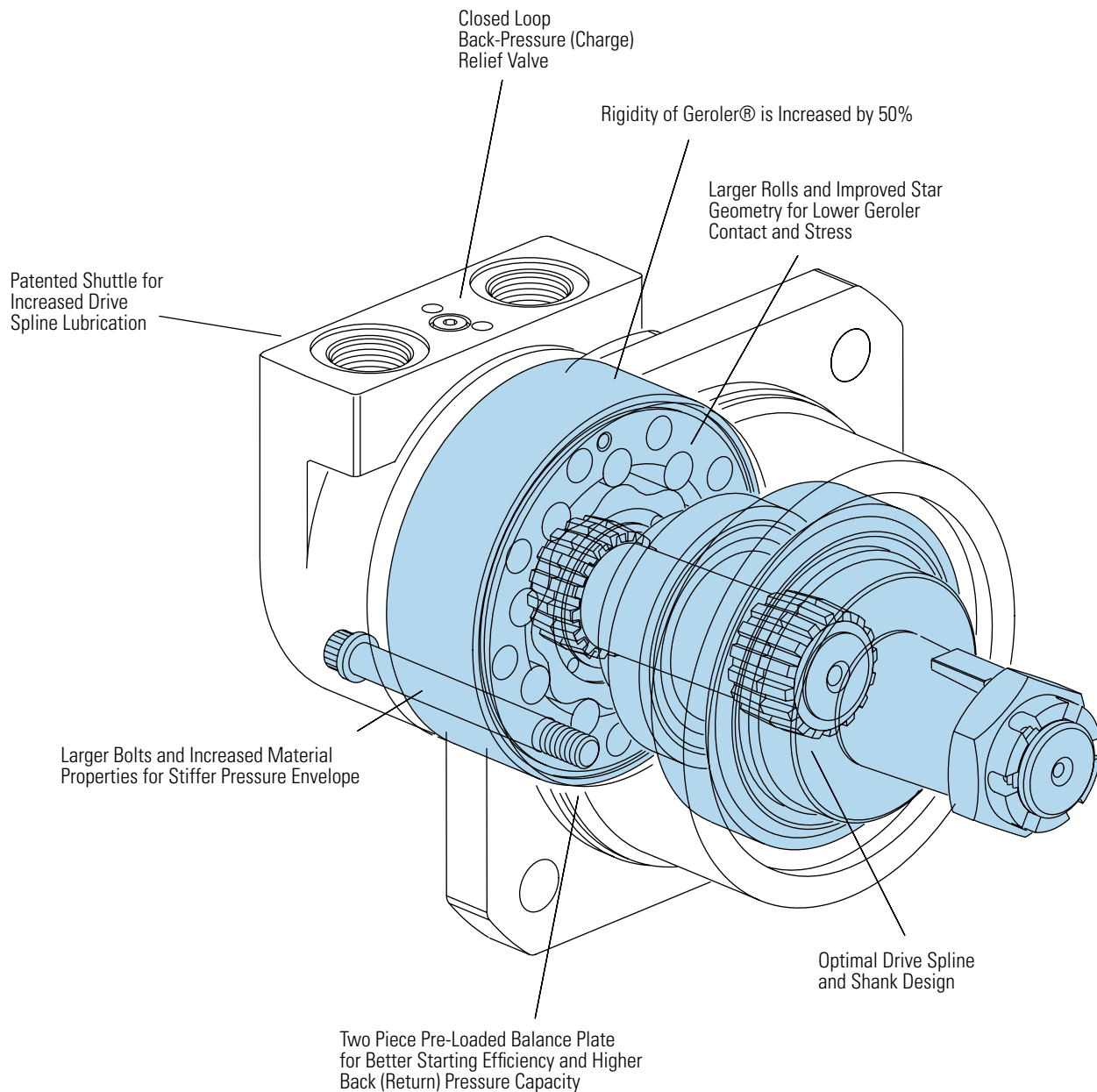
VIS Motors

Highlights

Product Description

The VIS (Valve-in-Star) Motors are the next step in the evolution of the low speed high torque (LSHT) hydraulic motors. The VIS design provides design advantages over other types of LSHT hydraulic motor valving resulting in a more compact package with better efficiency and higher pressure capability. These improvements have shown significant packaging and performance advantages in applications such as skid steer loaders, mini excavators, trenchers and logging equipment.

VIS motors are primarily intended for use in closed loop circuit applications. Consult your Eaton representative for assistance on open loop circuit applications.



Features, Benefits, and Applications

Features

- Patented VIS Geroler technology
- Simplified design - only three moving components:
 - geroler star
 - drive
 - output shaft
- Pressure-balance Geroler - improves efficiency
- Shuttle valve option for reliable internal drive lubrication
- Variety of optional features

Benefits

- Extremely compact powerful package
- Highest output torque in its class
- High efficiency
- Reduced system temperatures
- High horsepower density
- Design flexibility
- Reliable and dependable performance

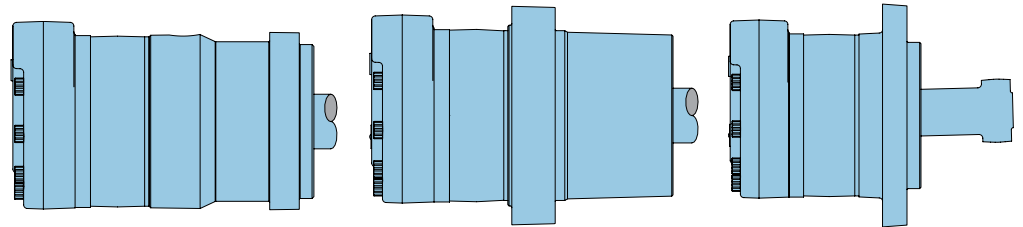
Applications

- Skid steer loaders
- Sprayers
- Underground boring equipment
- Forestry equipment
- Irrigation reels
- Grinders/Mixers
- Material handling equipment
- Augers and skid steer attachments
- Large turf care equipment

Design Features

Eaton hydraulic motors provide design flexibility. All VIS motors are available with various configurations consisting of:

- Displacement (Geroler)
- Output Shaft
- No Shaft (Bearingless Motor)
- Port Configuration
- Mounting Flange
- Park brake
- Other Special Features



Standard Motor

The standard motor mounting flange is located as close to the output shaft as possible. This type of mounting supports the motor close to the shaft load. This mounting flange is also compatible with many standard gear boxes.

Wheel Motor

The wheel motor mounting flange is located near the center of the motor which permits part or all of the motor to be located inside the wheel or roller hub. In traction drive applications, loads can be positioned over the motor bearings for best bearing life. This wheel motor mounting flange provides design flexibility in many applications.

Bearingless Motor

The bearingless motor has the same drive components as the standard and wheel motors with the exception that the motor is assembled without the output shaft, bearings and bearing housing. The bearingless motor is especially suited for applications such as gear boxes, winch drives, reel and roll drives. Bearingless motor applications must be designed with a bearing supported internal spline to mate with the bearingless motor drive. Product designs using these hydraulic motors provide considerable cost savings.

D-1

D-2

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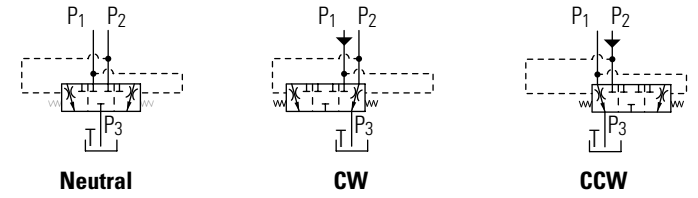
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Typical Hydraulic Circuit

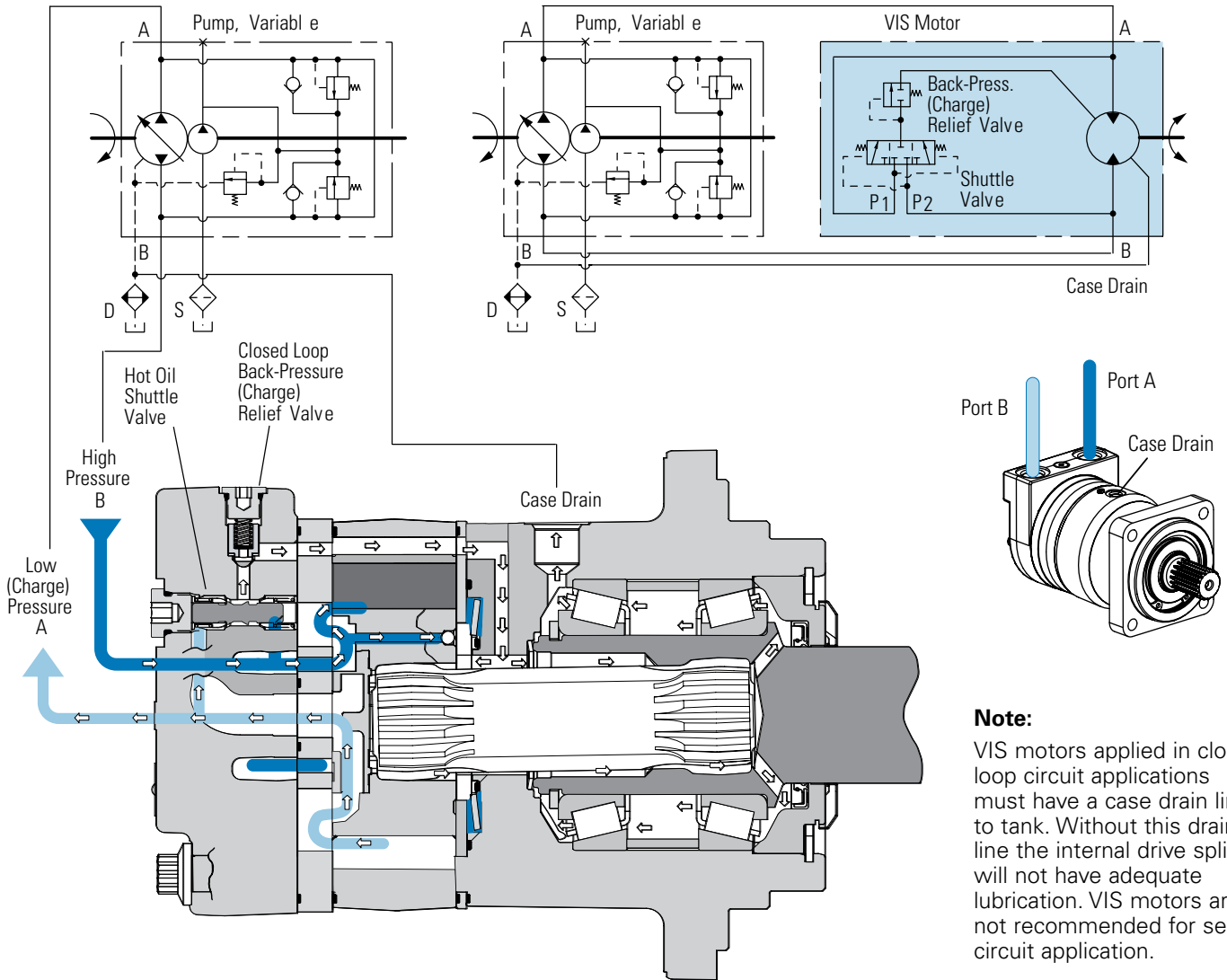
VIS 40 and 45 Series

Shuttle Valve, Two Way (Closed Center) –

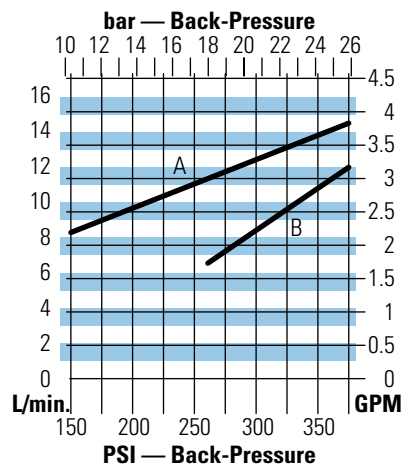
Schematic Diagrams



Closed Loop Circuit



VIS 40 and 45 Motors Shuttle Flow Charts



- A**
4,5 bar [65 PSI] @ 60° C [140° F]
Δ Between Back-Pressure and Case Pressure (Typical Data)
- B**
15,2 bar [220 PSI] @ 60° C [140° F]
Δ Between Back-Pressure and Case Pressure (Typical Data)

Due to Machining Tolerances, Flow May be More or Less

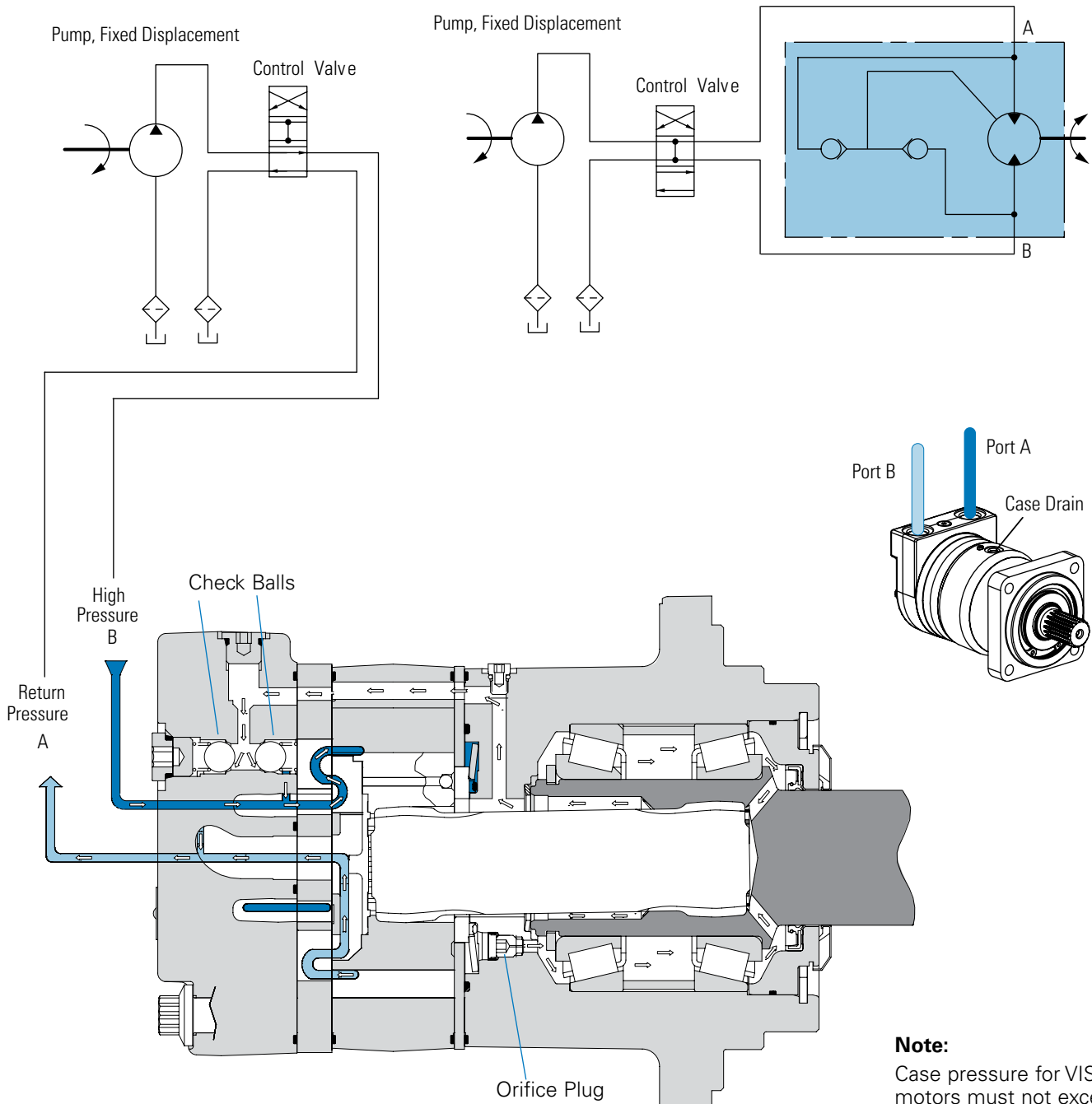
Note: VIS motors applied in closed loop circuit applications must have a case drain line to tank. Without this drain line the internal drive spline will not have adequate lubrication. VIS motors are not recommended for series circuit application.

D-1
D-2

Typical Hydraulic Circuit

VIS 40 and
45 Series

Open Loop Circuit



Note:

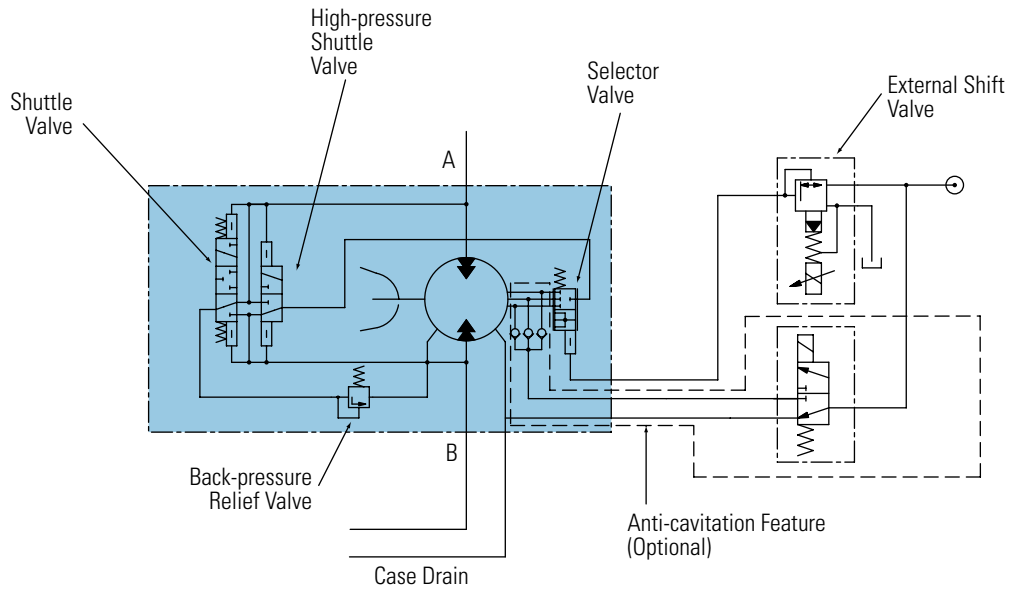
Case pressure for VIS motors must not exceed 50 psi. With an "Open Loop Option" VIS motor, a case drain is not required, except if the return pressure is greater than 50 psi.

Typical Hydraulic Circuit

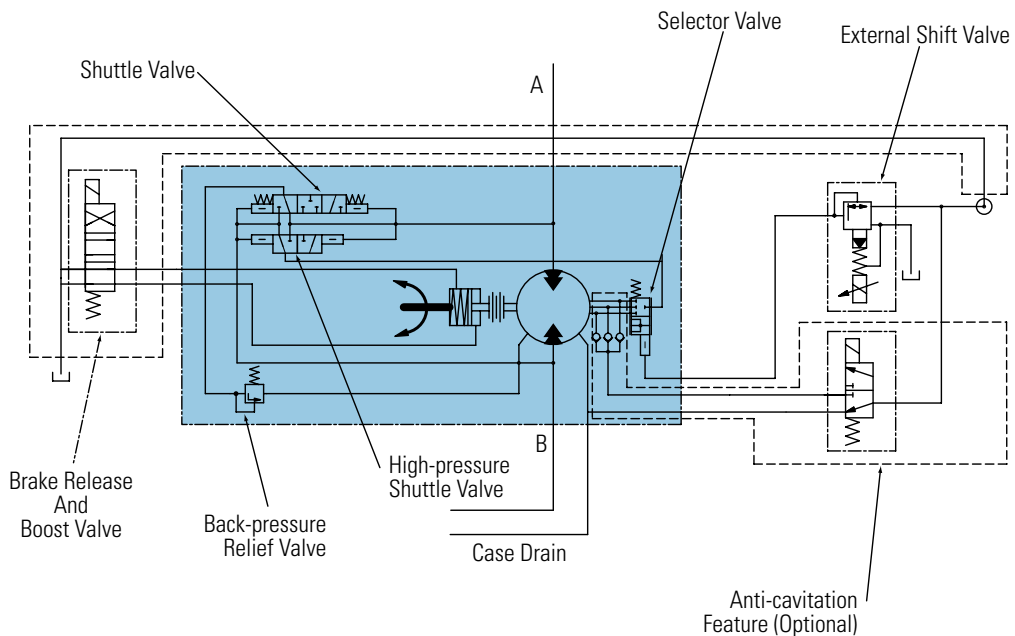
VIS 40 and

45 Series

Two-speed Circuit



Two-Speed Brake Motor Circuit



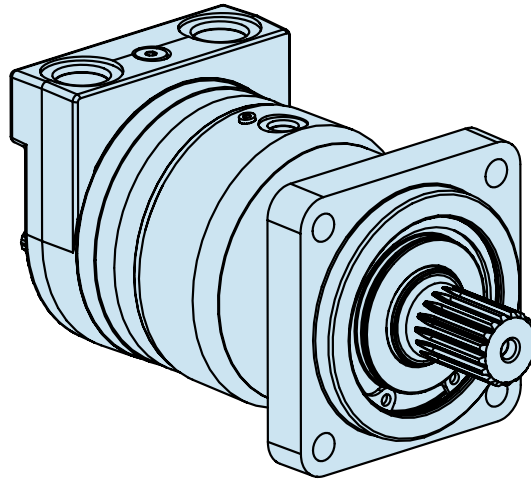
D-1

D-2

Notes

VIS 40 Series

Highlights



Features

- Patented VIS Geroler technology
- Three moving components: (Geroler, star, drive, and output shaft)
- Maximized drive strength in compact package size
- Compact package size similar to VIS 30 Series.
- Two-piece pre-loaded pressure balance plate
- Variety of optional features including two-speed option, brake packages, and case flow solutions for both closed-loop and open-loop applications.

Description

The VIS 40 Series is the newest addition to the VIS product line. The VIS 40 is very close in size to the VIS 30, but with increased drive train strength, it has even greater torque capability. Maximum continuous output torque capability is rated to 2531 Nm [22,400 lb-in] with a displacement range from 505cc to 940cc per revolution. VIS 40 motors can be run up to 151 LPM [40 GPM] with pressure capability up to 310 bar (4500 PSI). The motor utilizes patented VIS technology with improved high-strength Geroler, optimized drive geometry, and two-piece pre-loaded balance plate for increased starting efficiency, reduced leakage and higher back pressure capacity. A wide variety of options are available including two-speed option, brake options and case flow options for both closed-loop and open loop applications.

Specifications

Geroler Element	8 Displacements
Flow l/min [GPM]	151 [40] Continuous 170 [45] Intermittent
Speed	Up to 454 RPM
Pressure bar [PSI]	310 [4500] Cont. 345 [5000] Inter. 380 [5500] Peak.
Torque Nm [lb - in]	2531 [22400] Cont. 3165 [28000] Inter.

Benefits

- Extremely compact powerful package
- Increased torque capability
- Greatest horsepower density in the VIS motor line
- High efficiency
- Quiet, smooth operation
- Reliable, trouble-free performance
- Design Flexibility

Applications

- Skid Steer Loaders and Attachments
- Snow Removal Equipment
- Trenchers
- Grapples
- Rough Terrain Forklifts
- Wood Processing – Saw Mills & Chippers
- Metal Forming
- Entertainment / Amusement Rides
- Industrial Processing
- Harvesters



Skid Steer



Trencher



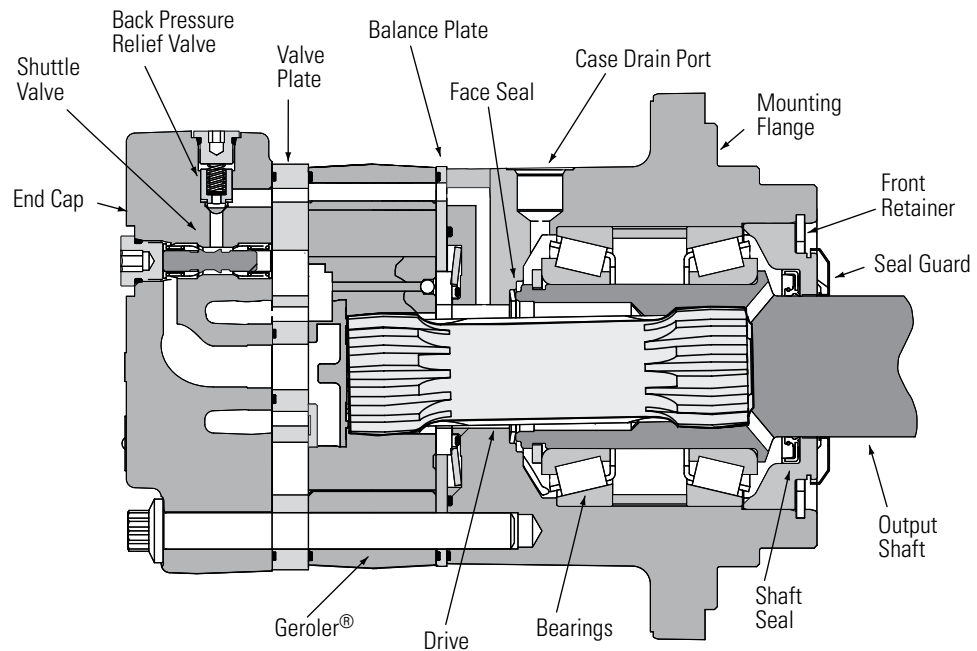
Digger



Port Equipment

VIS 40 Series

Specifications



SPECIFICATION DATA – VIS 40 MOTORS

Displ. cm ³ /r [in ³ /r]		325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Max. Speed (RPM) @ Flow	Continuous	440	357	279	244	221	204	177	148
	Intermittent	454	368	293	257	233	215	187	148
Flow l/min [GPM]	Continuous	151 [40]	151 [40]	151 [40]	151 [40]	151 [40]	151 [40]	151 [40]	151 [40]
	Intermittent	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]
Torque Nm [lb - in]	Continuous	1445 [12789]	1781 [15760]	2240 [19829]	2531 [22400]	2531 [22400]	2531 [22400]	2531 [22400]	2531 [22400]
	Intermittent	1986 [17421]	1597 [14137]	2746 [21919]	2815 [24918]	3165 [28000]	3165 [28000]	3165 [28000]	3165 [28000]
Pressure Δ bar [Δ PSI]	Continuous	310 [4500]	310 [4500]	310 [4500]	279 [4040]	254 [3686]	235 [3389]	208 [3012]	171 [2489]
	Intermittent	345 [5000]	345 [5000]	345 [5000]	309 [4486]	315 [4574]	290 [4212]	254 [3682]	214 [3100]
	Peak	380 [5500]	380 [5500]	380 [5500]	380 [5500]	380 [5500]	380 [5500]	300 [4355]	250 [3621]
Weight kg [lb]	Standard or Wheel Mount	28,5 [62.9]	29,1 [64.2]	29,9 [66.0]	30,5 [67.2]	31,4 [68.2]	31,4 [69.2]	32,2 [71.0]	33,4 [73.6]
	Bearingless	16,3 [36.0]	16,9 [37.3]	17,7 [39.1]	18,3 [40.3]	18,7 [41.3]	19,2 [42.3]	20,0 [44.1]	21,2 [46.7]
Weight kg [lb]	Two-speed Standard or Wheel Mount	32,1 [70.8]	32,7 [72.1]	33,5 [73.9]	34,1 [75.1]	34,5 [76.1]	35,0 [77.1]	35,8 [78.9]	37,0 [81.5]
	Two-speed Bearingless	19,9 [43.9]	20,5 [45.2]	21,3 [47.0]	21,9 [48.2]	22,3 [49.2]	22,8 [50.2]	23,6 [52]	24,8 [54.6]

A simultaneous maximum torque and maximum speed NOT recommended.

Note:

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

Maximum Inlet Pressure:

400 bar [5800 PSI]
Do Not Exceed A Pressure Rating (for displacement size see chart above).

Return Pressure (Back-Pressure):

Minimum – 3,5 bar [50 PSI]
Maximum – 21 bar [300 PSI]

Note:

Return (back-pressure) must be 3,5 bar [50 PSI] greater than the case pressure, except with open loop circuit.

Δ Pressure:

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

Case Pressure:

Minimum – No Pressure
Maximum – 3,5 bar [50 PSI]

Note:

The case must be full when the motor is operating. A case drain is recommended.

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

Per ISO Cleanliness Code, 4406: 20/18/13

Shuttle:

Standard

Back-Pressure Relief Valve:




Required for closed loop circuit.

VIS 40 Series

Performance Data

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

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

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

325 cm³/r [19.8 in³/r]

Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	668	1399	2834	4251	5583	6924	8258	9528	10387	11637	12659	
	75	158	320	480	631	782	933	1076	1174	1315	1430	
15	46	46	46	44	43	43	42	42	39	37	36	
	680	1419	2867	4303	5711	7126	8530	9876	11269	12460	13782	14840
8	77	160	324	486	645	805	964	1116	1273	1408	1557	1677
	93	91	90	87	85	84	83	81	78	74	70	66
12	647	1412	2879	4340	5768	7195	8619	10010	11360	12672	14029	15246
	73	160	325	490	652	813	974	1131	1284	1432	1585	1723
45	139	137	133	132	129	129	129	127	126	124	113	109
	690	1420	2852	4316	5741	7191	8621	10014	11412	12736	14081	15435
16	78	160	322	488	649	812	974	1131	1289	1439	1591	1744
	186	184	181	179	174	170	168	168	166	161	154	151
20	657	1250	2774	4407	5695	7170	8741	9952	11392	12789	14137	15339
	74	141	313	498	643	810	988	1124	1287	1445	1597	1733
76	233	229	226	223	217	214	211	209	208	203	200	197
	544	1266	2814	4154	5858	7220	8518	9936	11269	12654	14037	15334
25	61	143	318	469	662	816	962	1123	1273	1430	1586	1732
	291	287	283	280	277	269	266	264	260	256	254	248
95	146	1177	2605	3968	5401	6882	8315	9678	11092	12536	13960	15321
	16	133	294	448	610	778	939	1094	1253	1416	1577	1731
114	341	345	340	336	333	325	323	320	316	312	307	303
	114	1144	2532	3960	5322	6768	8232	9589	11019	12228	13298	15023
35	13	129	286	447	601	765	930	1083	1245	1382	1503	1697
	396	402	396	392	387	378	377	372	369	363	353	354
132	92	557	2047	3574	5032	6507	7944	9282	10687	12112	13439	14938
	10	63	231	404	569	735	898	1049	1207	1368	1518	1688
151	454	452	440	433	430	429	430	428	425	420	413	408

400 cm³/r [24.4 in³/r]

Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	823	1724	3493	5239	6880	8532	10177	11741	12800	14340	15600	
	93	195	395	592	777	964	1150	1327	1446	1620	1763	
15	37	37	37	36	35	35	34	34	32	30	29	
	838	1749	3533	5302	7038	8781	10511	12171	13887	15354	16983	18288
8	95	198	399	599	795	992	1188	1375	1569	1735	1919	2066
	75	74	73	71	69	68	67	66	63	60	57	53
30	797	1740	3548	5349	7108	8866	10622	12335	13999	15616	17289	18788
	90	197	401	604	803	1002	1200	1394	1582	1764	1953	2123
45	113	111	108	107	105	105	105	103	102	101	92	88
	850	1750	3515	5319	7074	8862	10624	12341	14063	15695	17353	19021
16	96	198	397	601	799	1001	1200	1394	1589	1773	1961	2149
	151	149	147	145	141	138	136	136	135	131	125	123
61	810	1540	3419	5431	7018	8836	10771	12264	14039	15760	17421	18902
	92	174	386	614	793	998	1217	1386	1586	1781	1968	2136
76	189	186	183	181	176	174	171	170	169	165	163	160
	670	1560	3467	5118	7219	8897	10497	12244	13887	15594	17299	18896
25	76	176	392	578	816	1005	1186	1383	1569	1762	1954	2135
	236	233	230	227	225	218	216	215	211	208	206	202
95	180	1450	3210	4890	6656	8480	10246	11927	13669	15448	17203	18881
	20	164	363	552	752	958	1158	1348	1544	1745	1944	2133
114	277	280	276	273	270	264	262	259	256	253	250	246
	140	1410	3120	4880	6559	8341	10144	11817	13579	15068	16388	18514
35	16	159	353	551	741	942	1146	1335	1534	1702	1852	2092
	321	326	321	318	314	307	306	302	299	295	287	287
132	113	687	2522	4405	6201	8019	9789	11438	13170	14926	16561	18409
	13	78	285	498	701	906	1106	1292	1488	1686	1871	2080
151	368	367	357	352	349	348	349	347	345	341	335	331

6201 } Torque [lb-in]
701 } Nm
349 } Speed RPM




VIS 40 Series

505 cm³/r [30.7 in³/r]
 Δ Pressure Bar [PSI]

Performance Data

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

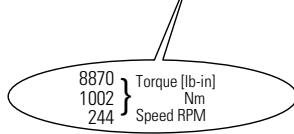
Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

Flow LPM [GPM]	Δ Pressure Bar [PSI]											
	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	4500 310	5000 345	5500 380
4	1035	2169	4395	6592	8656	10735	12804	14773	16105	18043	19628	
15	117	245	497	745	978	1213	1447	1669	1820	2039	2218	
8	1055	2200	4445	6671	8855	11049	13225	15313	17473	19319	21368	23010
30	119	249	502	754	1000	1248	1494	1730	1974	2183	2414	2600
12	1003	2190	4464	6730	8944	11155	13364	15520	17614	19648	21753	23640
45	113	247	504	760	1011	1260	1510	1754	1990	2220	2458	2671
16	1069	2202	4422	6692	8901	11150	13367	15527	17694	19747	21833	23932
61	121	249	500	756	1006	1260	1510	1754	1999	2231	2467	2704
20	1019	1938	4301	6833	8830	11117	13552	15431	17663	19829	21919	23783
76	115	219	486	772	998	1256	1531	1743	1996	2240	2476	2687
25	843	1963	4363	6440	9083	11194	13207	15406	17473	19620	21765	23775
95	95	222	493	728	1026	1265	1492	1741	1974	2217	2459	2686
30	226	1824	4039	6153	8375	10670	12892	15006	17199	19437	21645	23756
114	26	206	456	695	946	1206	1457	1695	1943	2196	2446	2684
35	176	1774	3926	6140	8252	10494	12763	14868	17086	18959	20619	23294
132	20	200	444	694	932	1186	1442	1680	1930	2142	2330	2632
40	142	864	3174	5542	7803	10089	12317	14391	16570	18779	20837	23162
151	16	98	359	626	882	1140	1392	1626	1872	2122	2354	2617
	293	292	284	279	277	277	277	276	274	271	267	263

570cm³/r [34.9 in³/r]
 Δ Pressure Bar [PSI]

Flow LPM [GPM]	Δ Pressure Bar [PSI]											
	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	4500 310	5000 345	5500 380
4	1177	2466	4996	7494	9841	12204	14556	16794	18308	20511	22313	
15	133	279	564	847	1112	1379	1645	1897	2069	2317	2521	
8	1199	2501	5053	7584	10067	12560	15034	17408	19864	21962	24292	26158
30	135	283	571	857	1137	1419	1699	1967	2244	2481	2745	2955
12	1140	2489	5074	7650	10167	12681	15193	17644	20024	22336	24729	26874
45	129	281	573	864	1149	1433	1717	1993	2262	2524	2794	3036
16	1216	2503	5027	7608	10119	12675	15195	17652	20115	22449	24820	27206
61	137	283	568	860	1143	1432	1717	1994	2273	2536	2804	3074
20	1159	2203	4890	7768	10038	12638	15407	17542	20080	22542	24918	27037
76	131	249	552	878	1134	1428	1741	1982	2269	2547	2815	3055
25	958	2231	4960	7321	10325	12725	15014	17513	19863	22305	24743	27027
95	108	252	560	827	1167	1438	1696	1979	2244	2520	2796	3054
30	257	2074	4591	6994	9520	12130	14656	17059	19552	22096	24606	27006
114	29	234	519	790	1076	1370	1656	1927	2209	2496	2780	3051
35	200	2017	4463	6980	9381	11930	14509	16902	19423	21553	23440	26481
132	23	228	504	789	1060	1348	1639	1910	2195	2435	2648	2992
40	162	983	3608	6300	8870	11469	14002	16360	18837	21348	23688	2633
151	18	111	408	712	1002	1296	1582	1848	2128	2412	2676	2975
	257	257	249	246	244	243	244	243	241	238	234	232



VIS 40 Series




630 cm³/r [38.5 in³/r]

Δ Pressure Bar [PSI]

Performance Data

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

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

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

Flow LPM [GPM]	630 cm ³ /r [38.5 in ³ /r]											
	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	4500 310	5000 345	5500 380
4	1298	2720	5511	8267	10856	13463	16058	18526	20197	22627	24615	
15	147	307	623	934	1227	1521	1814	2093	2282	2556	2781	
8	1323	2759	5575	8366	11105	13856	16585	19204	21913	24227	26797	28856
15	149	312	630	945	1255	1565	1874	2170	2476	2737	3028	3260
30	48	47	46	45	44	43	42	42	40	38	36	34
12	1257	2746	5598	8439	11216	13990	16760	19464	22089	24640	27279	29646
15	142	310	632	954	1267	1581	1894	2199	2496	2784	3082	3350
45	72	70	68	68	67	67	67	65	65	64	58	56
16	1341	2761	5546	8393	11163	13982	16763	19472	22190	24765	27381	30012
15	152	312	627	948	1261	1580	1894	2200	2507	2798	3094	3391
61	96	94	93	92	89	87	86	86	86	83	79	78
20	1278	2430	5394	8569	11073	13942	16996	19352	22151	24867	27488	29825
15	144	275	609	968	1251	1575	1920	2186	2503	2810	3106	3370
76	120	118	116	115	112	110	108	108	107	104	103	102
25	1057	2461	5471	8076	11390	14038	16563	19320	21912	24605	27295	29815
15	119	278	618	912	1287	1586	1871	2183	2476	2780	3084	3369
95	150	148	146	144	143	138	137	136	134	132	130	128
30	283	2288	5065	7716	10502	13381	16167	18819	21569	24375	27145	29792
15	32	258	572	872	1187	1512	1827	2126	2437	2754	3067	3366
114	175	177	175	173	171	167	166	164	163	160	158	156
35	221	2225	4923	7700	10349	13160	16006	18646	21427	23776	25858	29212
15	25	251	556	870	1169	1487	1808	2107	2421	2686	2922	3301
132	204	207	203	202	199	194	194	191	190	187	182	182
40	178	1084	3980	6950	9785	12652	15446	18048	20780	23551	26132	29047
15	20	122	450	785	1106	1430	1745	2039	2348	2661	2952	3282
151	233	233	226	223	221	221	221	220	219	216	213	210

685 cm³/r [41.7 in³/r]

Δ Pressure Bar [PSI]

Flow LPM [GPM]	685 cm ³ /r [41.7 in ³ /r]											
	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	4500 310	5000 345	5500 380
4	1406	2947	5969	8954	11758	14582	17392	20066	21875	24507	26661	
15	159	333	674	1012	1328	1647	1965	2267	2472	2769	3012	
8	1433	2989	6038	9062	12028	15007	17964	20800	23734	26241	29025	31254
15	162	338	682	1024	1359	1696	2030	2350	2682	2965	3279	3531
30	44	43	43	42	40	40	39	39	37	35	33	31
12	1362	2974	6063	9141	12148	15152	18153	21082	23925	26688	29547	32110
15	154	336	685	1033	1373	1712	2051	2382	2703	3015	3338	3628
45	66	65	63	63	61	61	61	60	60	59	54	52
16	1453	2991	6007	9090	12090	15145	18156	21091	24034	26823	29656	32506
15	164	338	679	1027	1366	1711	2051	2383	2715	3031	3351	3673
61	88	87	86	85	83	81	80	80	79	77	73	72
20	1384	2632	5842	9281	11994	15100	18408	20960	23992	26934	29773	32304
15	156	297	660	1049	1355	1706	2080	2368	2711	3043	3364	3650
76	111	109	107	106	103	102	100	99	99	96	95	94
25	1145	2666	5926	8748	12337	15205	17939	20926	23733	26650	29563	32293
15	129	301	670	988	1394	1718	2027	2364	2681	3011	3340	3649
95	138	136	135	133	132	128	126	126	124	122	120	118
30	307	2478	5486	8357	11375	14493	17511	20383	23361	26401	29401	32268
15	35	280	620	944	1285	1637	1978	2303	2639	2983	3322	3646
114	162	164	161	160	158	154	153	152	150	148	146	144
35	239	2410	5332	8340	11209	14254	17337	20196	23207	25752	28007	31640
15	27	272	602	942	1266	1610	1959	2282	2622	2910	3164	3575
132	188	191	188	186	184	179	179	177	175	172	168	168
40	193	1174	4311	7527	10598	13704	16730	19548	22507	25508	28304	31461
15	22	133	487	850	1197	1548	1890	2209	2543	2882	3198	3555
151	215	215	209	206	204	204	204	203	202	199	196	194

10598 } Torque [lb-in]
1197 } Nm
204 } Speed RPM




VIS 40 Series

785 cm³/r [48.0 in³/r]
 Δ Pressure Bar [PSI]

Performance Data

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

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

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

Flow LPM [GPM]	785 cm ³ /r [48.0 in ³ /r]											
	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	4500 310	5000 345	
4	1618	3392	6871	10306	13535	16784	20020	23097	25180	28210	30689	
	183	383	776	1164	1529	1896	2262	2610	2845	3187	3467	
	15	19	19	19	18	18	18	17	17	16	15	15
8	1649	3440	6950	10431	13845	17275	20678	23942	27320	30205	33410	
	186	389	785	1178	1564	1952	2336	2705	3087	3413	3775	
	30	38	38	37	36	35	35	34	34	32	31	29
12	1568	3423	6979	10522	13984	17441	20895	24267	27540	30720	34011	
	177	387	789	1189	1580	1971	2361	2742	3112	3471	3843	
	45	57	56	55	54	53	53	53	52	52	51	47
16	1672	3443	6914	10464	13917	17433	20899	24277	27665	30876	34137	
	189	389	781	1182	1572	1970	2361	2743	3126	3488	3857	
	61	77	76	75	74	72	70	69	69	69	67	64
20	1593	3030	6725	10683	13805	17382	21190	24127	27617	31003	34271	
	180	342	760	1207	1560	1964	2394	2726	3120	3503	3872	
	76	96	95	93	92	89	88	87	86	84	83	
25	1318	3069	6821	10069	14201	17502	20649	24087	27319	30677	34030	
	149	347	771	1138	1604	1977	2333	2721	3087	3466	3845	
	95	120	118	117	115	114	111	110	109	107	106	105
30	353	2852	6315	9620	13094	16683	20157	23463	26891	30390	33843	
	40	322	713	1087	1479	1885	2277	2651	3038	3434	3824	
	114	141	142	140	139	137	134	133	132	130	129	127
35	275	2774	6138	9600	12903	16408	19956	23247	26714	29643	32238	
	31	313	693	1085	1458	1854	2255	2627	3018	3349	3642	
	132	163	166	163	162	160	156	155	154	152	150	146
40	222	1351	4962	8665	12200	15774	19257	22501	25908	29362	32580	
	25	153	561	979	1378	1782	2176	2542	2927	3317	3681	
	151	187	187	181	179	177	177	177	175	173	170	

940 cm³/r [57.4 in³/r]
 Δ Pressure Bar [PSI]

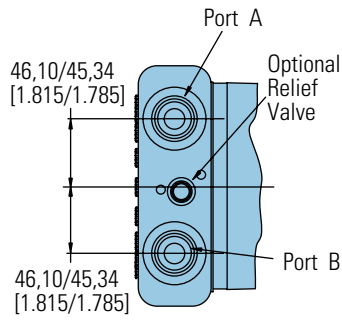
Flow LPM [GPM]	940 cm ³ /r [57.4 in ³ /r]									
	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	
4	1935	4056	8216	12325	16185	20071	23940	27620	30111	
	219	458	928	1393	1829	2268	2705	3121	3402	
	15	16	16	16	15	15	14	14	14	14
8	1972	4114	8311	12473	16557	20658	24727	28631	32670	
	223	465	939	1409	1871	2334	2794	3235	3691	
	30	32	31	31	30	29	29	28	28	27
12	1875	4094	8346	12582	16722	20857	24987	29019	32933	
	212	463	943	1422	1889	2357	2823	3279	3721	
	45	48	47	46	45	45	45	45	44	43
16	2000	4117	8268	12513	16642	20846	24992	29032	33083	
	226	465	934	1414	1880	2355	2824	3280	3738	
	61	64	63	62	62	60	59	58	58	57
20	1905	3623	8042	12776	16509	20786	25339	28851	33025	
	215	409	909	1443	1865	2348	2863	3260	3731	
	76	80	79	78	77	75	74	73	72	72
25	1576	3670	8157	12041	16982	20929	24693	28804	32669	
	178	415	922	1360	1919	2365	2790	3254	3691	
	95	100	99	98	96	96	93	92	91	90
30	423	3411	7551	11504	15658	19950	24104	28057	32157	
	48	385	853	1300	1769	2254	2723	3170	3633	
	114	118	119	117	116	115	112	111	110	109
35	329	3317	7340	11480	15429	19621	23864	27799	31945	
	37	375	829	1297	1743	2217	2696	3141	3609	
	132	137	139	136	135	133	130	130	128	127
40	266	1616	5934	10361	14589	18863	23029	26907	30982	
	30	183	670	1171	1648	2131	2602	3040	3500	
	151	156	156	152	149	148	148	148	148	147

5934 } Torque [lb-in]
 670 } Nm
 152 } Speed RPM

VIS 40 Series

Dimensions

Standard and Wheel Mount
– SAE



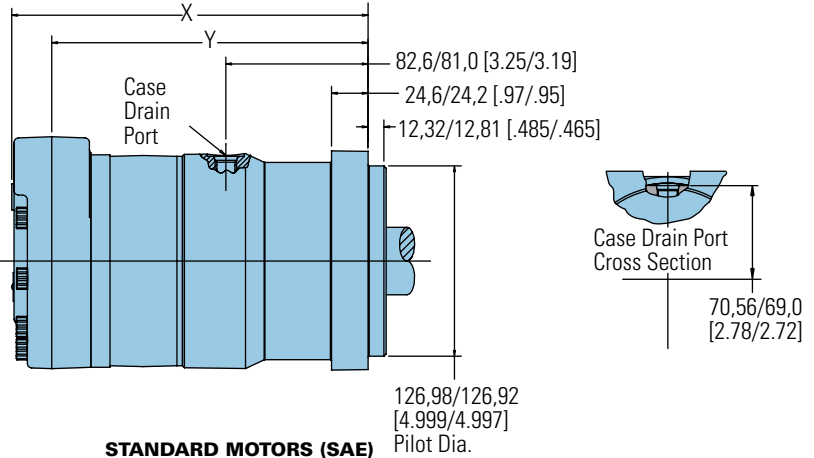
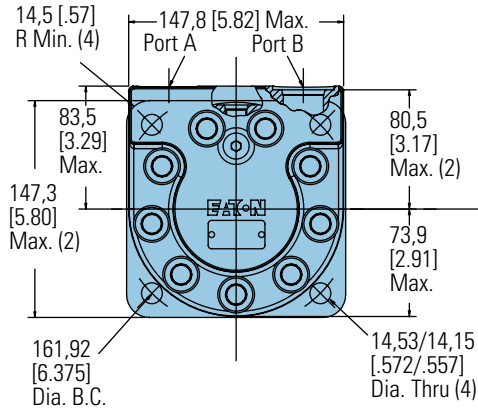
Ports

- 1–1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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

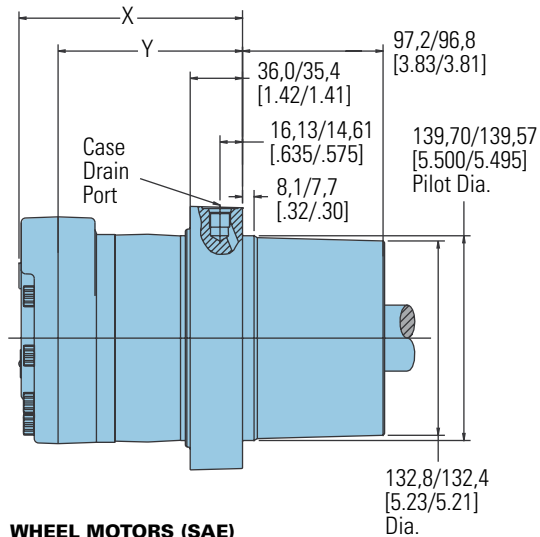
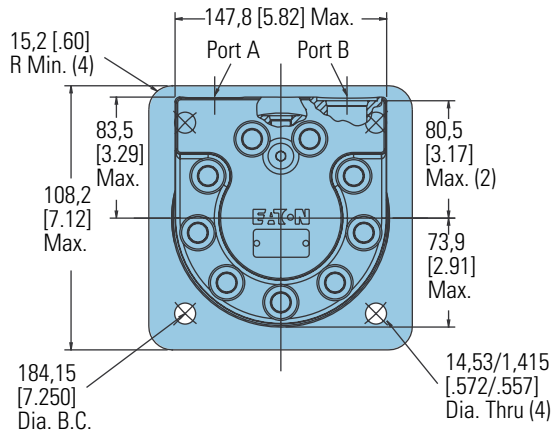
Standard Motors (SAE)



STANDARD MOTORS (SAE)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
325 [19.8]	223,5 [8.80]	195,3 [7.69]
400 [24.4]	230,4 [9.07]	201,9 [7.95]
505 [30.7]	239,3 [9.42]	211,1 [8.31]
570 [34.9]	245,4 [9.66]	217,2 [8.55]
630 [38.5]	250,7 [9.87]	222,5 [8.76]
685 [41.7]	255,3 [10.05]	227,1 [8.94]
785 [48.0]	264,7 [10.42]	236,2 [9.30]
940 [57.4]	278,4 [10.96]	249,9 [9.84]

Wheel Motors (SAE)



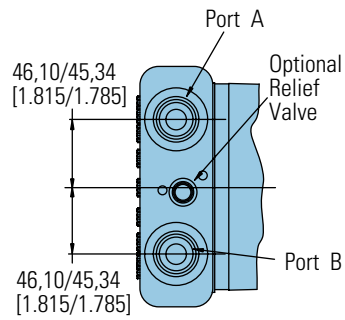
WHEEL MOTORS (SAE)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
325 [19.8]	138,7 [5.46]	110,5 [4.35]
400 [24.4]	145,5 [5.73]	117,1 [4.61]
505 [30.7]	154,4 [6.08]	126,2 [4.97]
570 [34.9]	160,5 [6.32]	132,3 [5.21]
630 [38.5]	165,9 [6.53]	137,7 [5.42]
685 [41.7]	170,4 [6.71]	142,2 [5.60]
785 [48.0]	179,8 [7.08]	151,4 [5.96]
940 [57.4]	193,5 [7.62]	165,1 [6.50]

VIS 40 Series

Dimensions

Oversize Flange
224,0 [8.82] B.C.

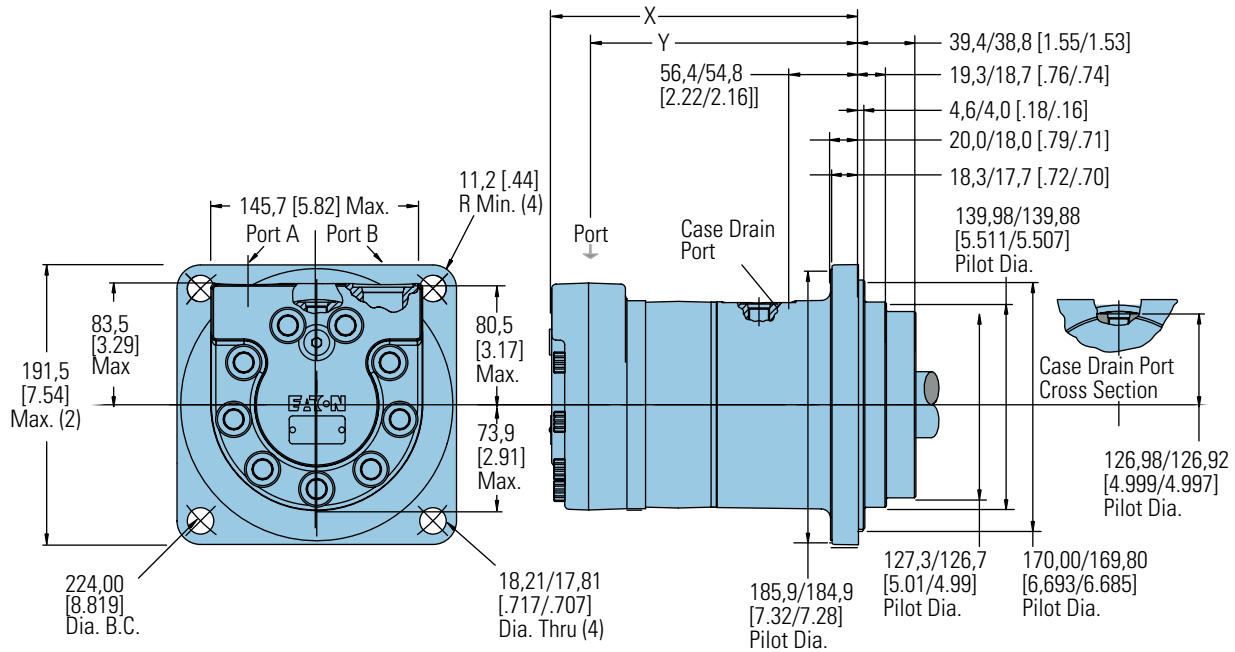


Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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



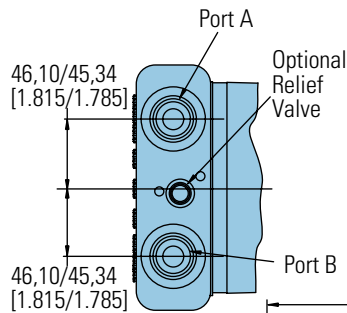
STANDARD MOTORS (OVERSIZE)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
325 [19.8]	196,6 [7.74]	168,1 [6.62]
400 [24.4]	203,2 [8.00]	175,0 [6.89]
505 [30.7]	181,4 [8.36]	183,9 [7.24]
570 [34.9]	187,4 [8.60]	190,2 [7.49]
630 [38.5]	192,5 [8.81]	195,3 [7.69]
685 [41.7]	197,6 [8.99]	199,9 [7.87]
785 [48.0]	206,8 [9.35]	209,3 [8.24]
940 [57.4]	220,5 [9.89]	223,0 [8.78]

VIS 40 Series

Dimensions

Standard and Wheel Mount
– ISO



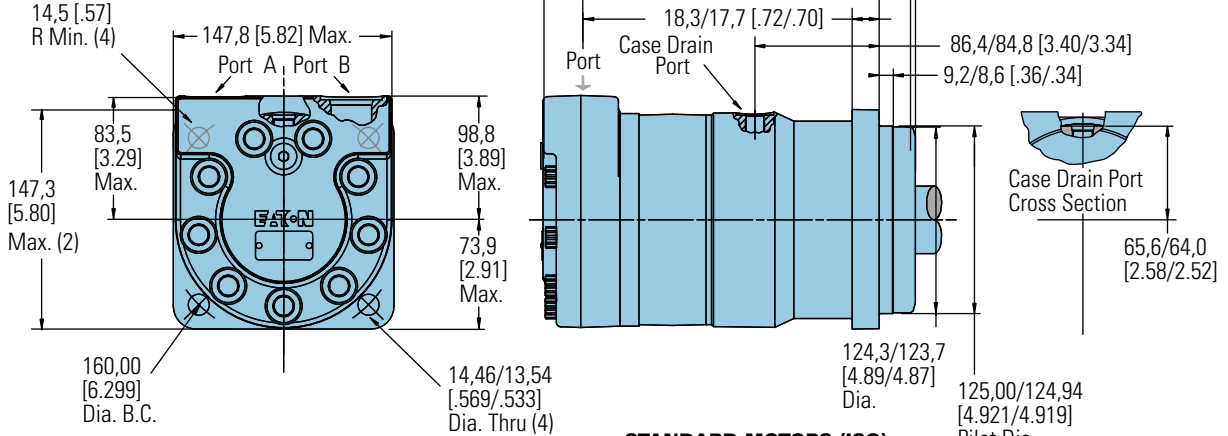
Ports

- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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

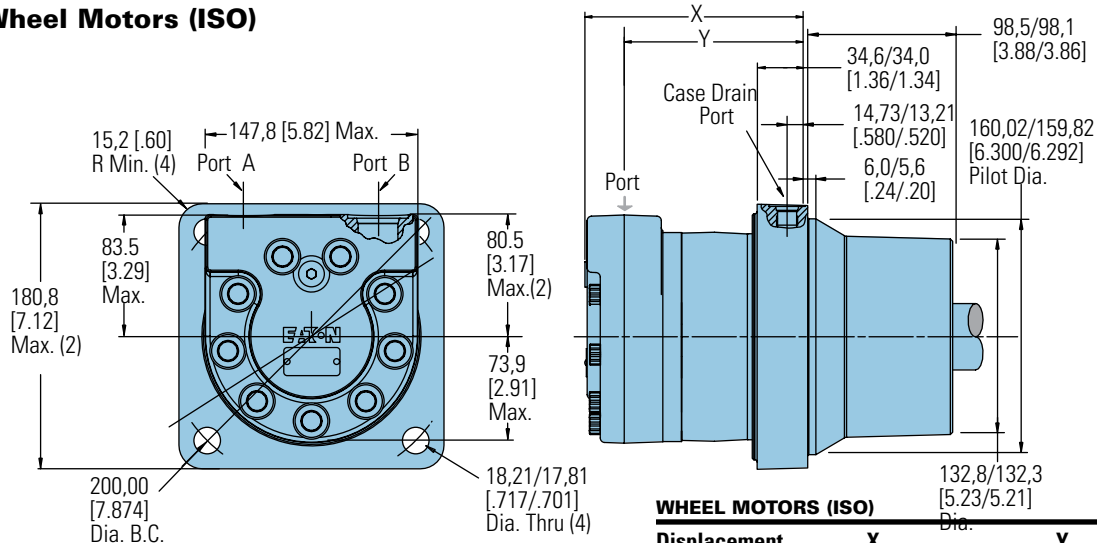
Standard Motors (ISO)



STANDARD MOTORS (ISO)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
325 [19.8]	211,6 [8.33]	183,1 [7.21]
400 [24.4]	218,2 [8.59]	190,0 [7.48]
505 [30.7]	227,3 [8.95]	198,9 [7.83]
570 [34.9]	233,4 [9.19]	205,2 [8.08]
630 [38.5]	238,8 [9.40]	210,3 [8.28]
685 [41.7]	243,3 [9.58]	214,9 [8.46]
785 [48.0]	252,5 [9.94]	224,3 [8.83]
940 [57.4]	266,2 [10.48]	238,0 [9.37]

Wheel Motors (ISO)



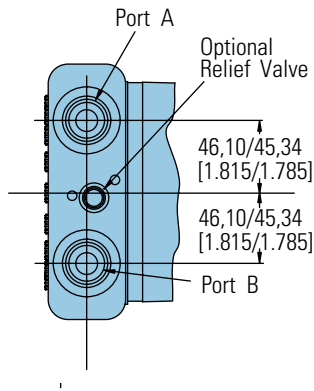
WHEEL MOTORS (ISO)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
325 [19.8]	137,4 [5.41]	109,0 [4.29]
400 [24.4]	144,0 [5.67]	115,8 [4.56]
505 [30.7]	153,2 [6.03]	124,7 [4.91]
570 [34.9]	159,3 [6.27]	131,1 [5.16]
630 [38.5]	164,6 [6.48]	136,1 [5.36]
685 [41.7]	169,2 [6.66]	140,7 [5.54]
785 [48.0]	178,3 [7.02]	150,1 [5.91]
940 [57.4]	192,0 [7.56]	163,8 [6.45]

VIS 40 Series

Dimensions

Bearingless

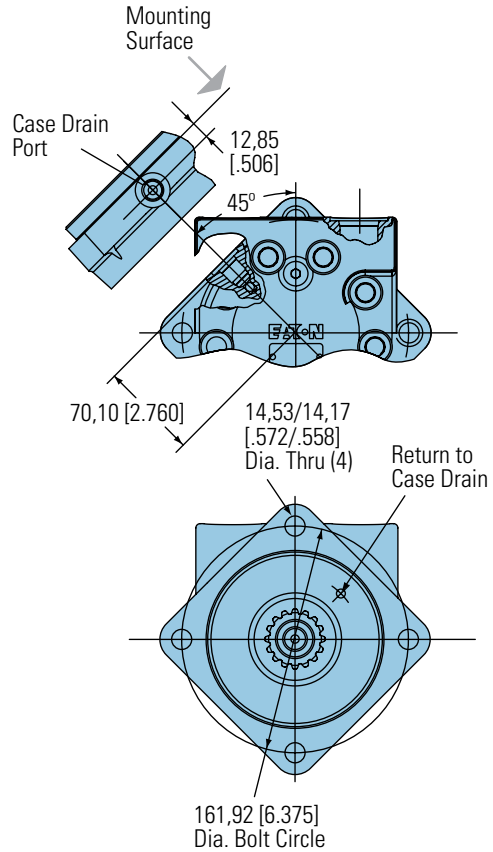
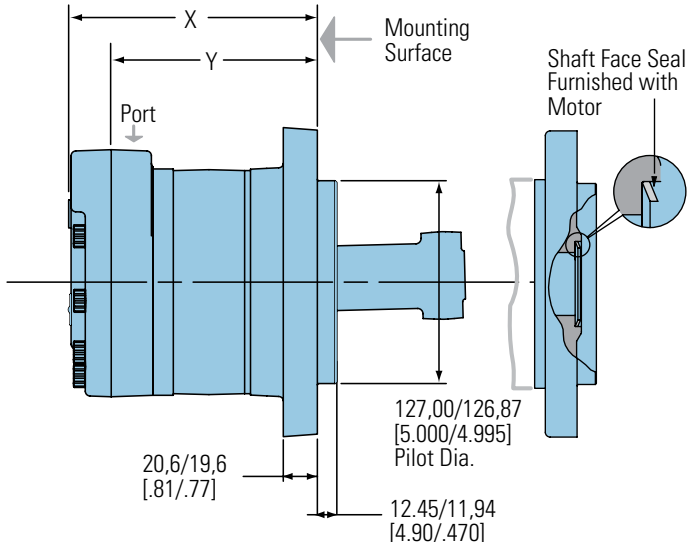


Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or
- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

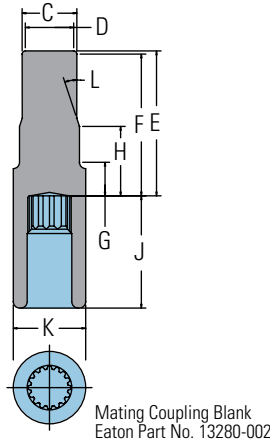
Standard Rotation Viewed from Drive End

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



For VIS 40 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

C	59,94	[2.36]	Dia.
D	49,00	[1.93]	Dia.
E	155,86	[6.14]	Max.
F	150,88	[5.94]	Min.
			Full Form Dia.
G	26,92	[1.06]	
H	33,30	[1.21]	
J	106,43	[4.19]	
			Full Form Dia.
K	72,64	[2.86]	
L	15		

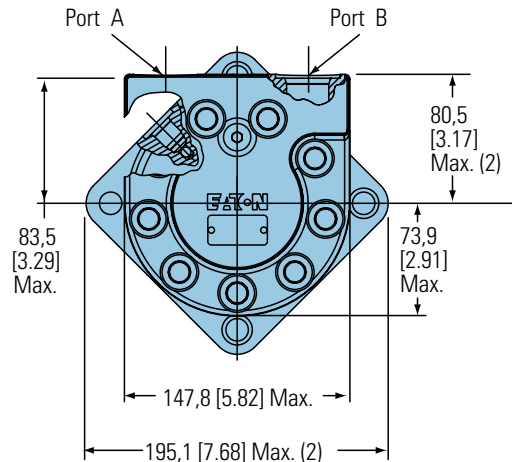


Note:

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

BEARINGLESS MOTORS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
325 [19.8]	141,2 [5.56]	113,3 [4.46]
400 [24.4]	148,1 [5.83]	120,1 [4.73]
505 [30.7]	157,2 [6.19]	129,0 [5.08]
570 [34.9]	163,3 [6.43]	135,1 [5.32]
630 [38.5]	168,4 [6.63]	140,5 [5.53]
685 [41.7]	173,2 [6.82]	145,3 [5.72]
785 [48.0]	182,2 [7.18]	154,4 [6.08]
940 [57.4]	196,1 [7.72]	168,1 [6.62]

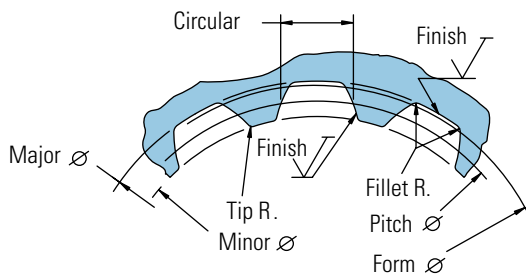
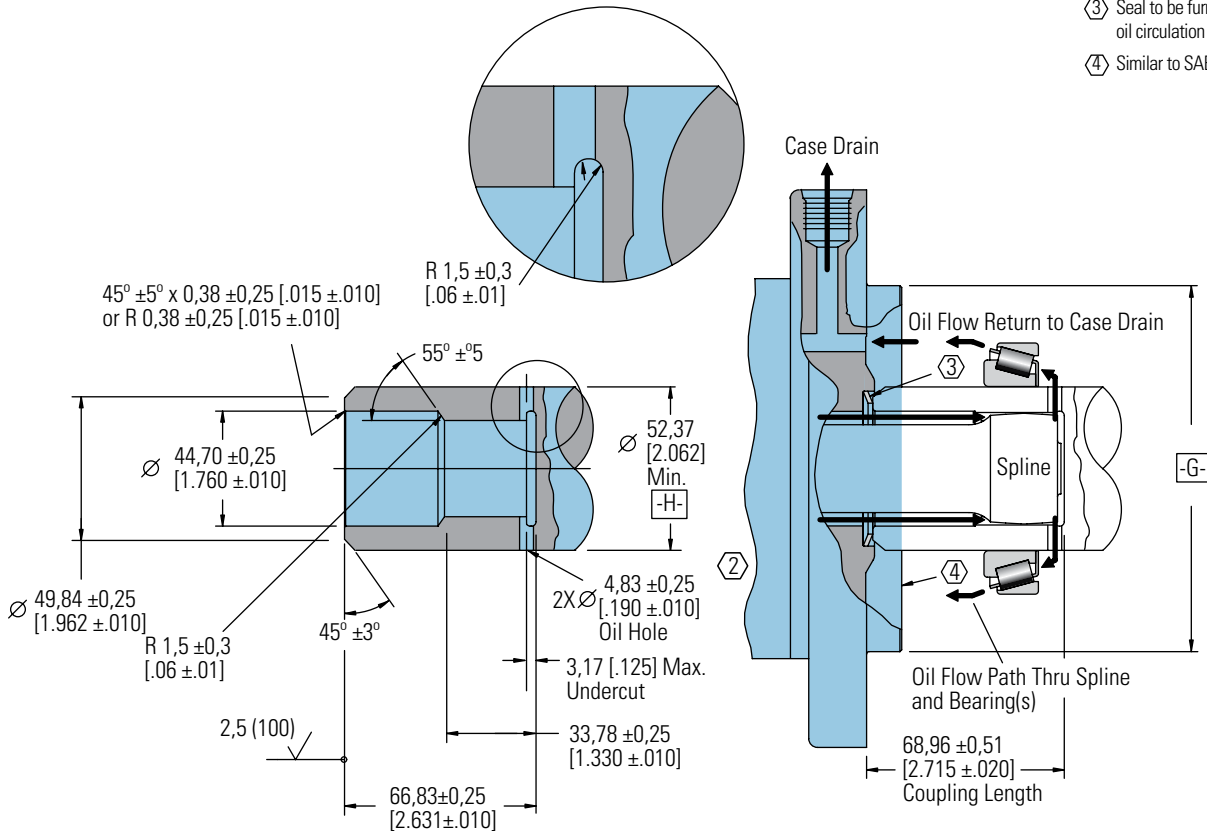


VIS 40 Series

Installation Information

Bearingless

- 1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 60-64 HRC with case depth (to 50HRC) of 0,076 -1,27 [.030 -.050]. Dimensions apply after heat treat.
- ② Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- ③ Seal to be furnished with motor for proper oil circulation thru splines.
- ④ Similar to SAE "C" Four Bolt Flange.



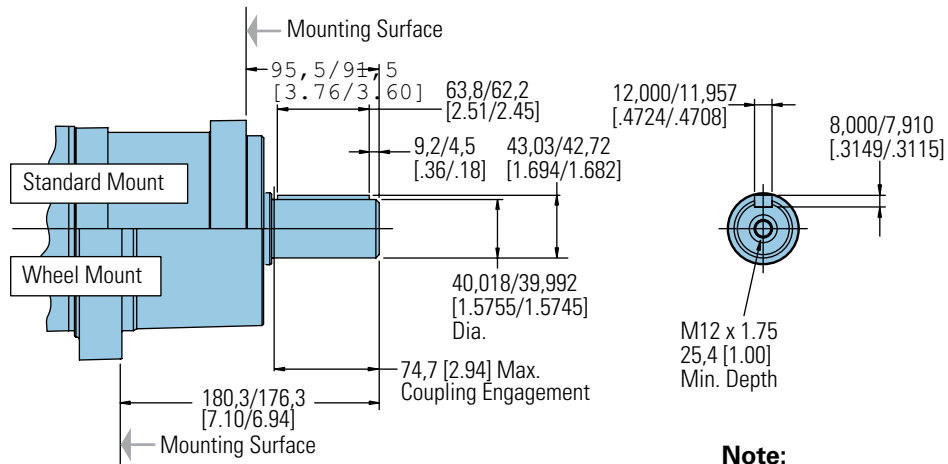
Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	16
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 40,640000 [1.6000000] $\text{Ⓢ} \text{0,20} \text{ [0.008] H}$
Base Diameter.....	Ref. 35,195272 [1.3856406]
Major Diameter.....	43,56 [1.715] Max. 43,18 [1.700]
Min. Minor Diameter.....	36,83 -37,08 [1.450 -1.460]
Form Diameter, Min.....	42,47 [1.672]
Fillet Radius.....	0,64 -0,76 [.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.....	0,040 [0.016]
Lead Variation.....	0,013 [0.0005]
Circular Space Width:	
Maximum Actual.....	4,105 [1.6116]
Minimum Effective.....	3,995 [1.573]
Maximum Effective.....	Ref. 4,056 [1.597]
Minimum Actual.....	Ref. 4,081 [1.582]
Dimension Between Two Pins.....	Ref. 34,272 -34,450 [1.3493 -1.3563]
Pin Diameter.....	4,389 [1.728]

VIS 40 Series

Dimensions Shafts

SAE

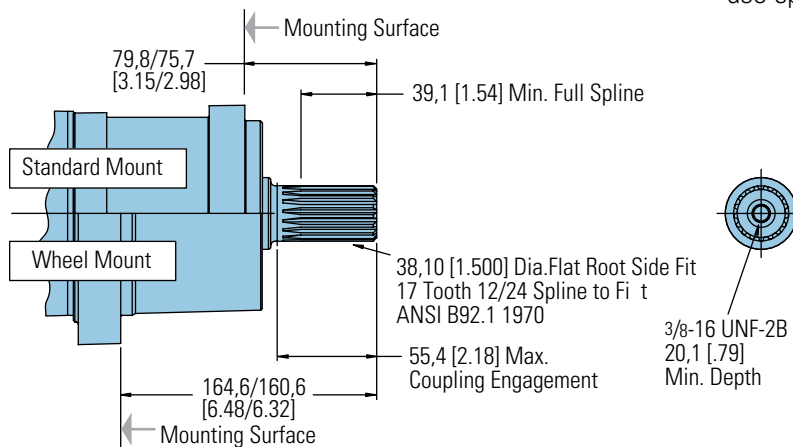
40 mm Straight



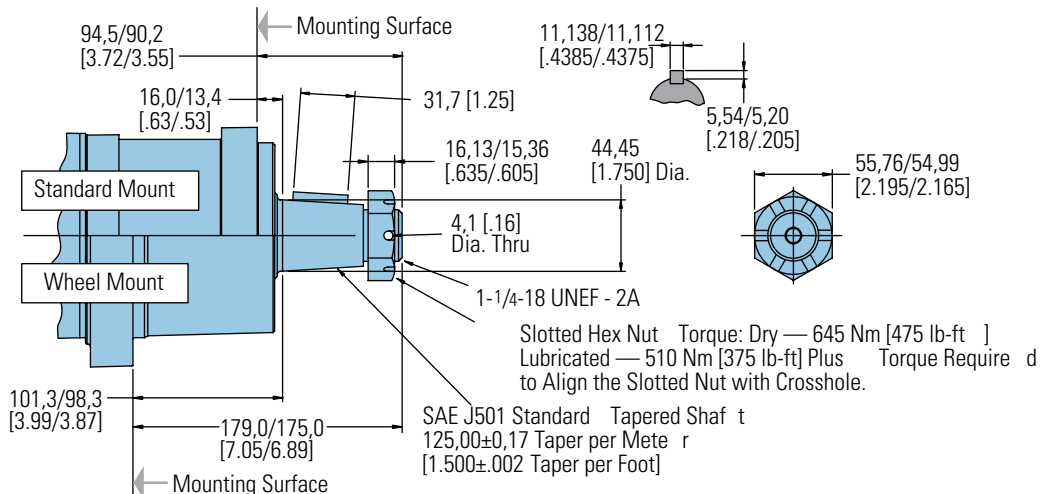
Note:

For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

1-1/2 Inch 17 Tooth Splined



1-3/4 Inch Tapered



VIS 40 Series

Side Load Capacity

SAE

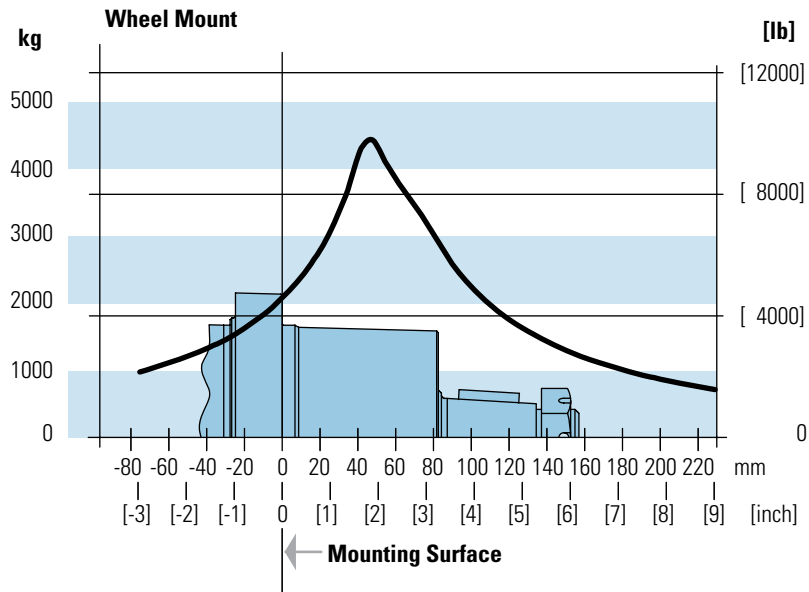
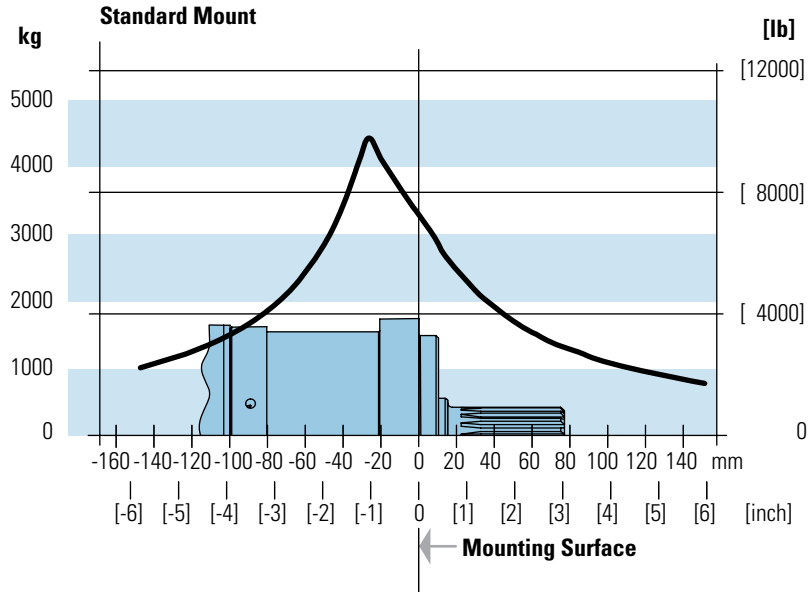
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

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

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.

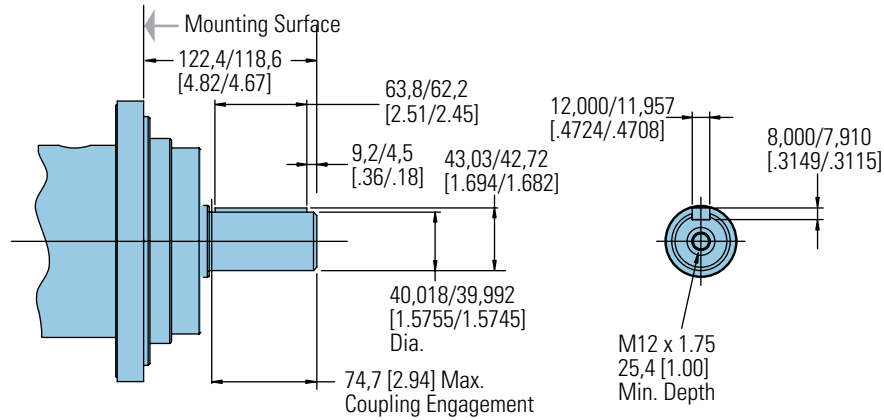


VIS 40 Series

Dimensions Shafts

Oversize Flange
224,0 [8.82] B.C.

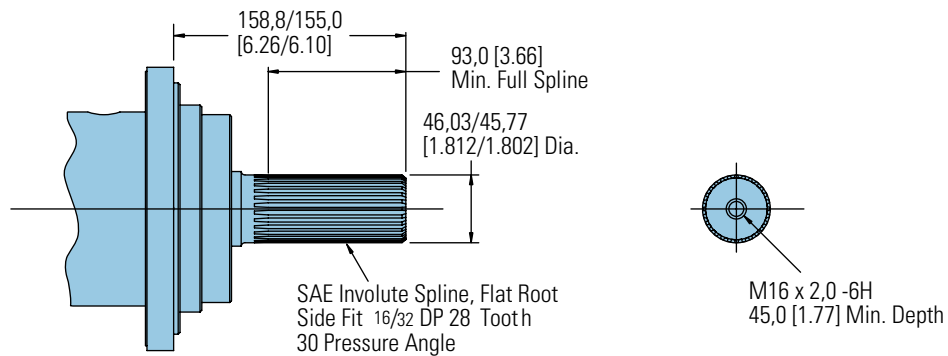
40 mm Straight



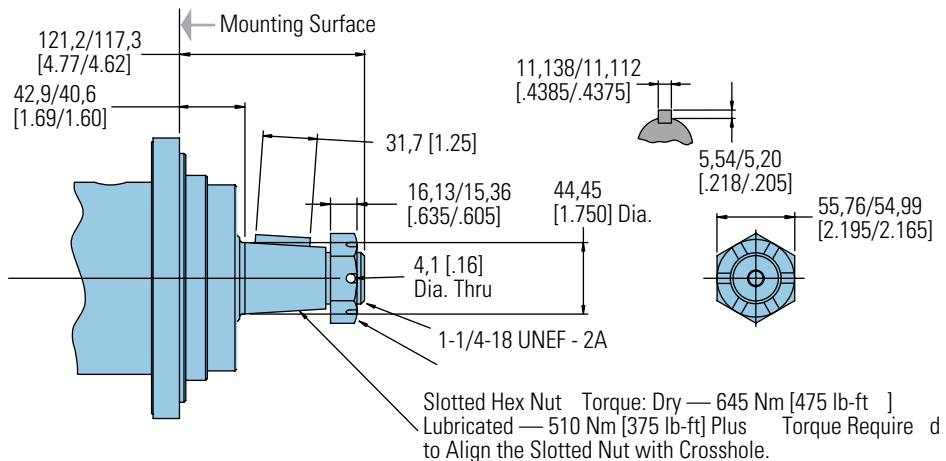
Note:

For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

46 mm 28 Tooth Splined



1-3/4 Inch Tapered



SAE J501 Standard Tapered Shaft
125,00±0,17 Taper per Meter
[1.500±.002 Taper per Foot]

VIS 40 Series

Side Load Capacity

Oversize Flange
224,0 [8.82] B.C.

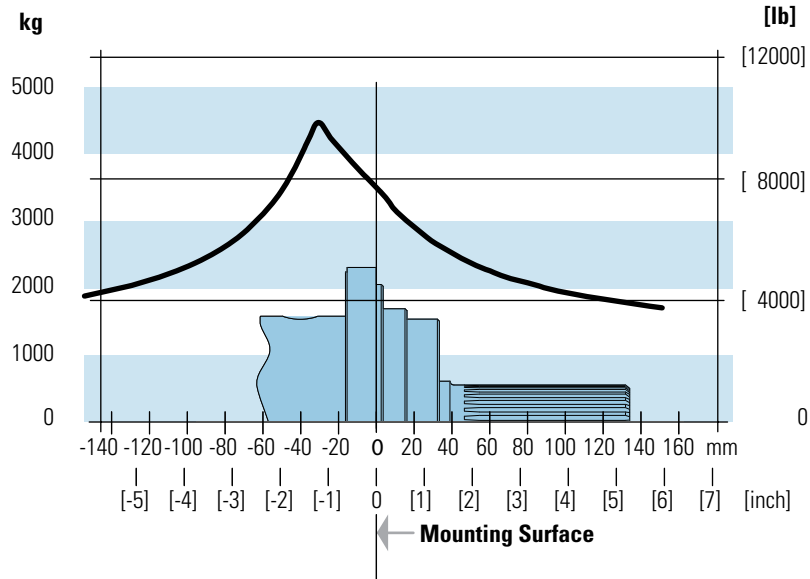
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

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

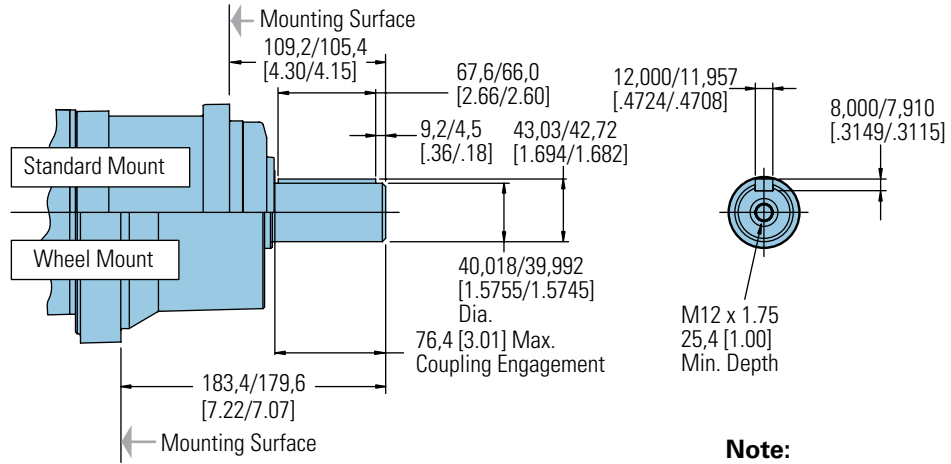
For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.



VIS 40 Series

Dimensions
Shafts
ISO

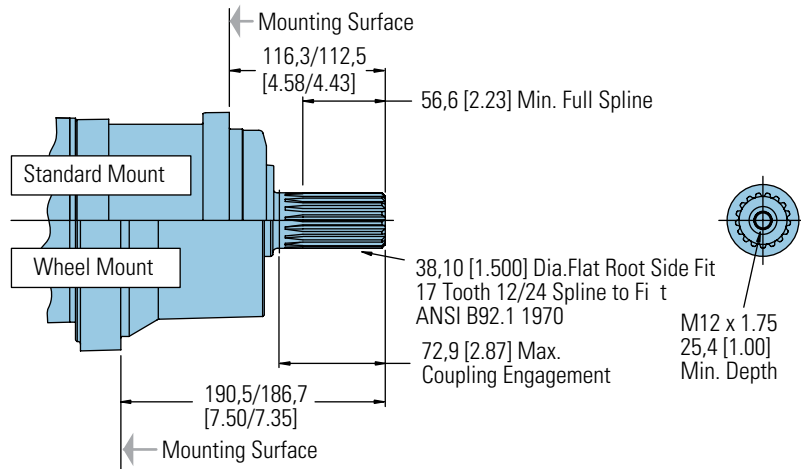
40 mm Straight



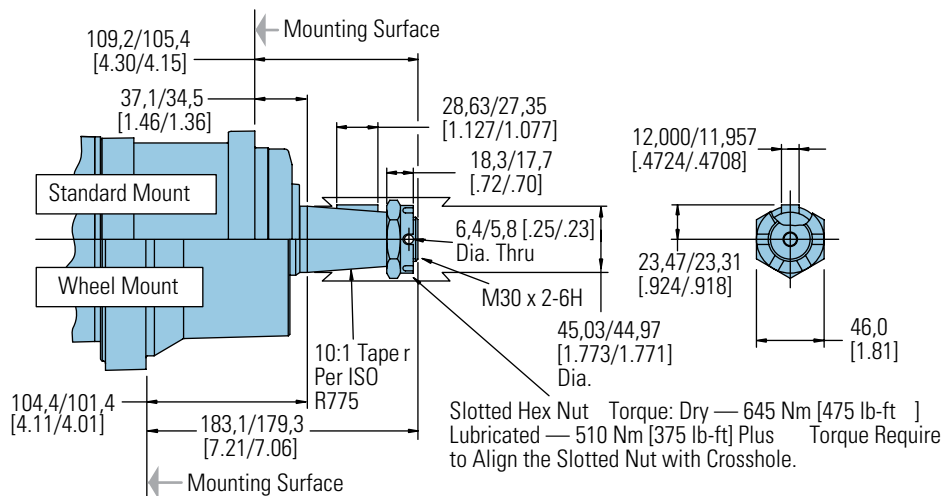
Note:

For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

38,1 mm [1-1/2 inch] 17 Tooth Splined



45 mm Tapered



VIS 40 Series

Side Load Capacity

ISO

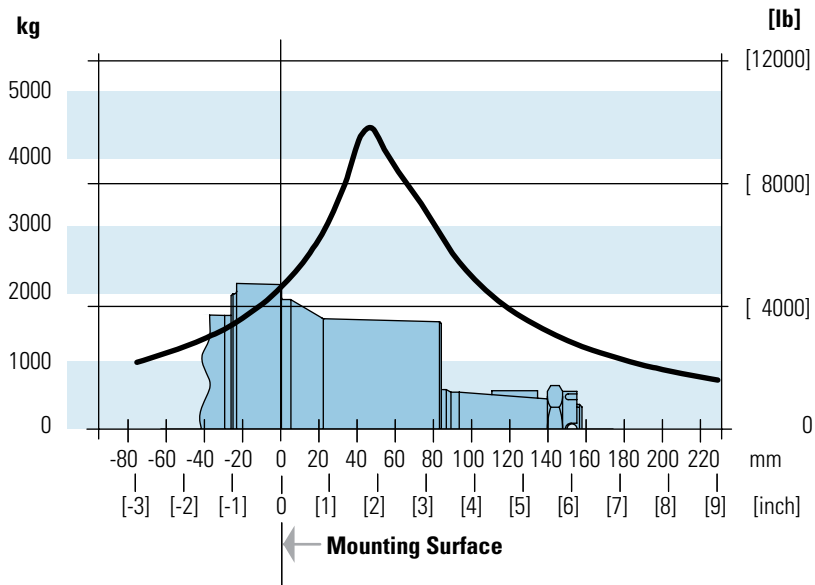
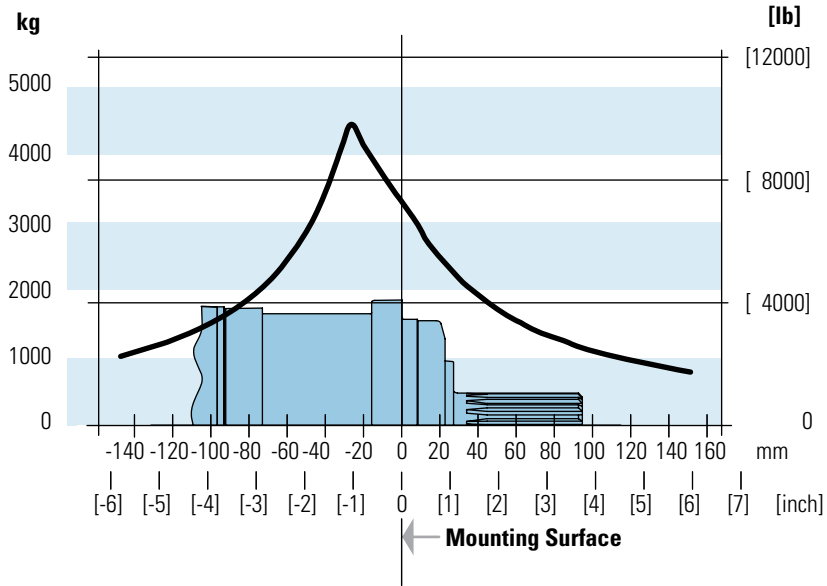
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

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

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.



VIS 40 Series

Product Numbers

Closed Loop

Use digit prefix — 168-, 177-, or 180- plus four digit number from charts for complete product number— Example: 168-0018.

Orders will not be accepted without three digit prefix.

SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER								
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]	
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0220	-0218	-0032	-0022	-0033	-0034	-0035	-0036	
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0221	—	-0024	-0026	-0037	-0038	-0039	-0040	
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	-0041	-0042	-0043	-0044	-0045	-0046	
Wheel	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	-0007	-0008	-0009	-0010	-0011	-0012	
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	-0013	-0014	-0015	-0016	-0017	-0018	
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	180-0088	-0019	-0020	-0021	-0022	-0023	-0024	
Bearingless		1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	-0015	-0016	-0017	-0018	-0019	-0020	

168-0018

Oversize

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER								
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]	
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	177-0047	-0048	—	—	—	—	
	46 mm 28 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	177-0053	-0054	—	—	—	—	
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	177-0059	-0060	—	—	—	—	

ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER								
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]	
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0065	-0066	-0067	-0068	-0069	-0070	
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	177-0223	-0224	-0071	-0072	-0073	-0074	-0075	-0076	
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0077	-0078	-0079	-0080	-0081	-0082	
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0025	-0026	-0027	-0028	-0029	-0030	
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0031	-0032	-0033	-0034	-0035	-0036	
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0037	-0038	-0039	-0040	-0041	-0042	
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0021	-0022	-0023	-0024	-0025	-0026	

168-0024

Note:

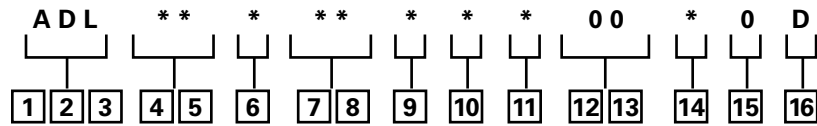
The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 4,5 bar [65 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

VIS 40 Series

Model Code

The following 16 - digit coding system has been developed to identify all of the configuration options for the VIS 40 motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1, 2, 3 Product Series

ADL – VIS 40 Motor

4, 5 Displacement

cm³/r [in³/r]

- 20** – 325 [19.8]
- 24** – 400 [24.4]
- 31** – 505 [30.7]
- 35** – 570 [34.9]
- 38** – 630 [38.5]
- 42** – 685 [41.7]
- 48** – 785 [48.0]
- 57** – 940 [57.4]

6 Mounting Type

- A** – 4 Bolt Bearingless
127,00 [5.000] Pilot Dia. with 12,19 [.480] Pilot Length and 14,35 [.565] Dia holes on 161,92 [6.375] Dia. Bolt Circle
- B** – 4 Bolt Wheel Mount
160,00 [6.3] Pilot Dia. With 5,8 [.23] Pilot Length and 18,00 [.709] Dia. Holes on 200,00 [7.874] Dia. Bolt Circle (ISO Compatible)
- C** – 4 Bolt Oversize Flange
185,4 [7.30] Rear Pilot Dia., 169,90 [6.689], 139,93 [5.509], 127,0 [5.00] Dia (Front Pilots) and 18,01 [.709] Dia. Holes on 224,00 [8.819] Dia. Bolt Circle
- F** – 4 Bolt Standard Mount (SAE CC)
127,00 [5.000] Pilot Dia. With 12,2 [.48] Pilot Length and 14,32 [.564] Dia. Holes on 161,92 [6.375] Dia. Bolt Circle
- G** – 4 Bolt Wheel Mount
139,7 [5.50] Pilot Dia. with 7,9 [.31] Pilot Length and 14,32 [.564] Dia. Holes on 184,15 [7.250] Dia. Bolt Circle (SAE Compatible)
- H** – 4 Bolt Standard Mount
125,00 [4.92] Pilot Dia. with 8,9 [.35] Pilot Length and 14,00 [.551] Dia. Holes on

- 160,00 [6.299] Dia. Bolt Circle (ISO Compatible)
- M** – Standard, 4 Bolt: 169,75 [6.683] Pilot Dia. with 4,3 [.17] Pilot Length and M16 X 2 -6H Threaded Holes on 224,00 [8.819] Dia. Bolt Circle (To be selected for Brake Option)

7, 8 Output Shaft

- 00** – None (Bearingless)
- 01** – 45 mm Dia. 10:1 Tapered Shaft Per ISO R775 with M30 x 2- 6H Threaded Shaft End, 12W x 8H x 28L [.472W x .313H x 1.102L] Key
- 02** – 1-3/4 inch Dia. .125:1 Tapered Shaft Per SAE J 501 with 1 1/4 - 18 UNEF - 2A Threaded Shaft End, 11,11 [.4375] Square x 31,8 [1.25] Straight Key
- 04** – 46 mm Dia. Flat Root Side Fit, 28 Tooth, 16/32 DP 30 Degree Involute Spline, 93,0 [3.66] Minimum Full Spline with M16 X 2,0-6H Thread in End
- 07** – 40 mm Dia. Straight Shaft with M12 x 1,75 - 6H Thread in End, 12W x 8H x 63L [.472W x .313H x 2.480L] Key (SAE Compatible)
- 08** – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Degree Involute Spline, 39,1 [1.54] Minimum Full Spline with 3/8-16 UNC - 2B Thread in End (SAE Compatible)

- 09** – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Degree Involute Spline, 56,6 [2.23] Minimum Full Spline with M12 x 1.75 - 6H Thread in End (ISO Compatible)
- 10** – 40 mm Dia. Straight Shaft with M12 x 1,75 - 6H Thread in End, 12W x 8H x 67L [.472W x .313H x 2.630L] Key (ISO Compatible)

9 Ports

- A** – 1-1/16-12 UN-2B Size 12 O-ring Port, Accepts Fittings for SAE J1926
- B** – G 3/4 (BSP) Straight Thread Port

10 Case Flow Options

- A** – Shuttle Valve with 9/16-18 UNF-2B, Size 6 O-ring Port Case Drain, Accepts Fittings for SAE J1926
- B** – Shuttle Valve with G 1/4 (BSP) Straight Thread Port Case Drain
- C** – Check valve with leakage orifice, no case drain (for Open Loop only)

11 Back-Pressure Relief

- 0** – None (for Open Loop Only)
- 1** – Set at 4,5 bar [65 PSI] (for Manual Pumps)
- 2** – Set at 15,2 bar [220 PSI] (for Servo Pumps)
- 4** – Set at 15,2 bar [300 PSI] (for high charge Servo Pumps)

12, 13 Special Features

- 00** – None
- 08** – Spring Applied Hydraulic Release Wet Brake with Brake Capacity of 20,000 lbf-in Static and 150 lbf/in² release pressure

14 Paint/ Special Packaging

- 0** – Primer, Individual Box
- A** – Low Gloss Black Primer, Individual Box
- B** – No Paint, Bulk Box Option
- C** – Low Gloss Black Primer, Bulk Box Option

15 Eaton Assigned Code when Applicable

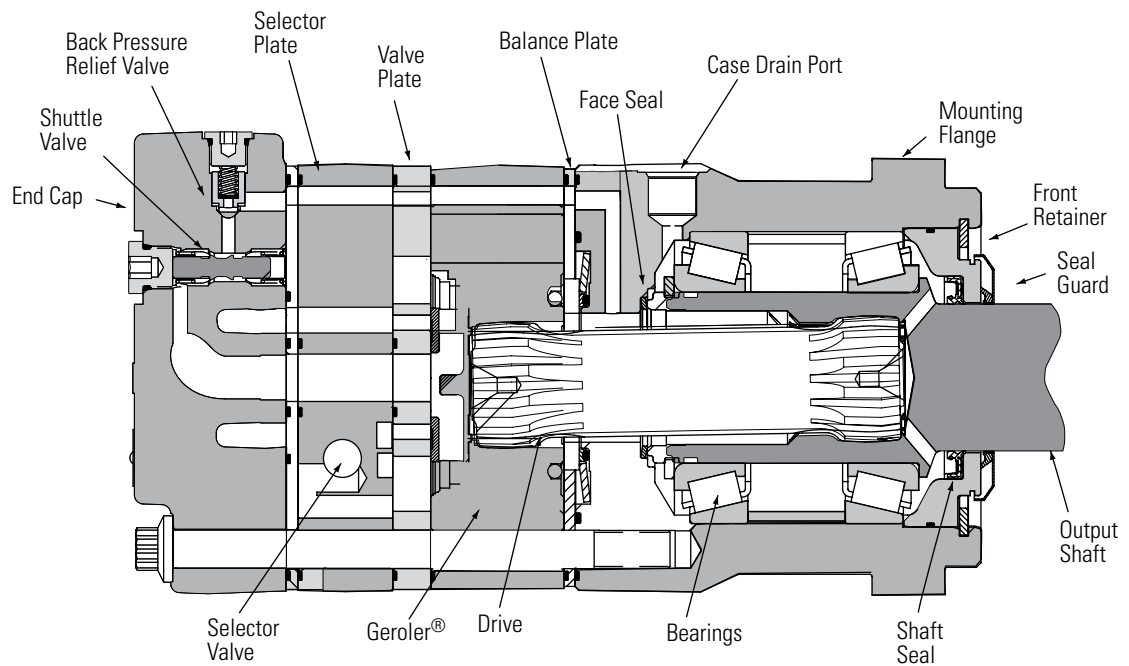
- 0** – Assigned Code

16 Eaton Assigned Design Code

- D** – Assigned Design Code

VIS 40 Series Two-speed

Specifications



VIS 40 Series motors are available with an integral two-speed feature that allows the operator to shift the motor between low speed high torque (LSHT) mode and high speed low torque (HSLT) mode.

In the LSHT mode, output torque and rotation speed values are equal to those of the conventional VIS 40 motor. In the HSLT mode motor displacement is reduced by one third, resulting in a fifty percent increase in rotation speed and a torque output reduction of one third.

The VIS 40 two-speed motor is bidirectional. It will function with equal shaft output in either rotation

direction (CW or CCW) in both LSHT and HSLT modes. Shift on the fly technology allows full-power operation throughout the full duration of the shift.

Changing between modes is accomplished by changing the displacement in a ratio of 1 to 1.5. An external two-position three-way control valve is required for shifting pressure to the pilot port between low pressure (LSHT mode) and pilot signal pressure (HSLT mode).

An integral selector valve shifts the motor from LSHT mode to HSLT mode. Initially, low pressure is supplied to the pilot port. The selector valve is biased to LSHT mode by a return spring. When pilot signal pressure is supplied to the

pilot port and 3,5 Δ bar [50 PSI] is reached, the selector valve overcomes return spring force and the shifts the spool to select HSLT mode.

Oil on the opposite side of the spool is drained to tank via the drain port. The pressure difference between the pilot port and drain port must be maintained to keep the motor in the high speed mode. When pilot pressure is removed from the pilot port, the pressure in the pilot end of the spool valve is relieved and drained back through the control valve and the return spring forces the spool valve to LSHT position.

Pilot pressure may come from any source that will provide uninterrupted pressure during the high-speed mode operation. Allowable pilot pressure must be at least 3,5 Δ bar [50 PSI] and may be as high as full operating pressure of the motor.

All VIS 40 Series two-speed motors are equipped with a return line shuttle for closed circuit applications as standard equipment. All options available on the conventional VIS 40 are also available on VIS 40 two-speed motors.

Performance Data

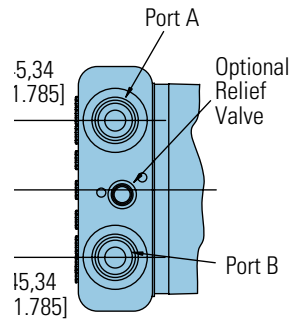
In the LSHT mode, torque and speed values are equal to those of the conventional VIS 40 motor. In the HSLT mode, rotation speed is increased by fifty percent and torque output is reduced by one third. The VIS 40 two-speed motor will function with equal shaft output in either rotation direction (CW or CCW) in both LSHT and HSLT modes.

VIS 40 Series

Two-speed

Dimensions

Standard and Wheel Mount
– SAE



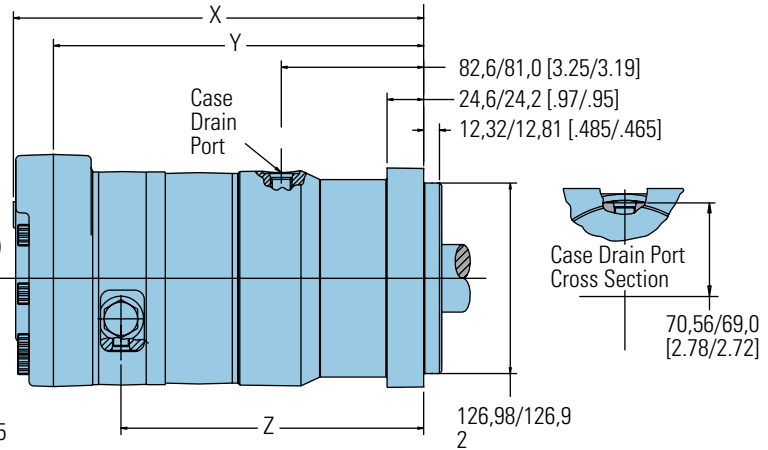
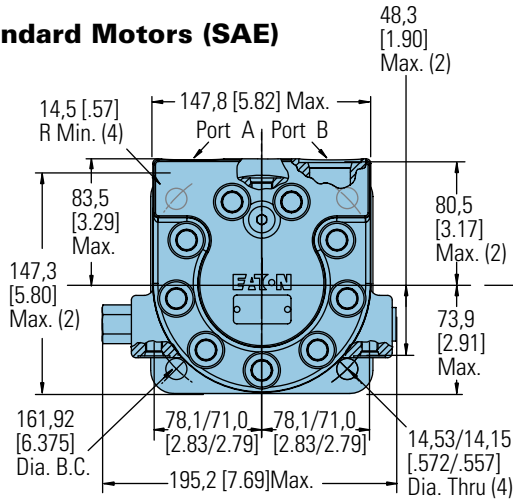
Ports

- 1–1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

Standard Rotation Viewed from Shaft End

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

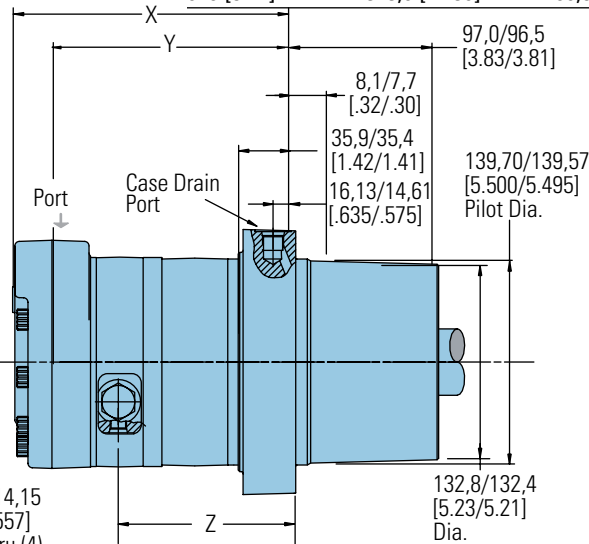
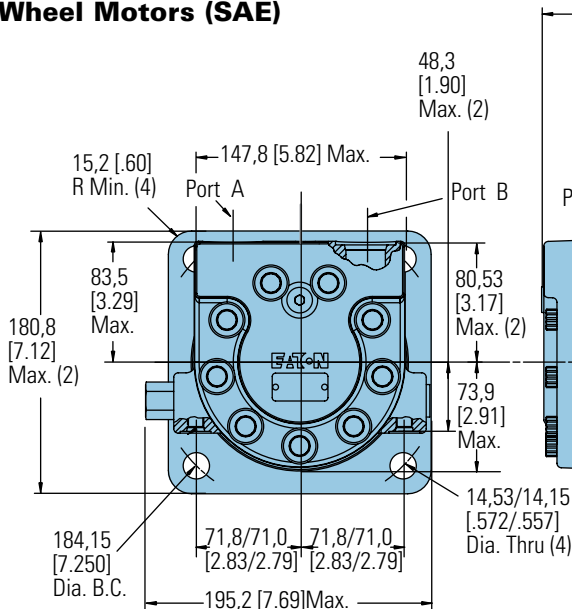
Standard Motors (SAE)



STANDARD MOTORS (SAE)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	259,3 [10.21]	231,4 [9.11]	186,2 [7.33]
400 [24.4]	265,9 [10.47]	238,0 [9.37]	193,0 [7.60]
505 [30.7]	275,1 [10.83]	246,9 [9.72]	201,7 [7.94]
570 [34.9]	281,2 [11.07]	253,0 [9.96]	208,0 [8.19]
630 [38.5]	286,3 [11.27]	258,3 [10.17]	213,4 [8.40]
685 [41.7]	290,8 [11.45]	262,9 [10.35]	217,7 [8.57]
785 [48.0]	300,2 [11.82]	272,3 [10.72]	227,3 [8.95]
940 [57.4]	313,9 [12.36]	286,0 [11.26]	241,0 [9.49]

Wheel Motors (SAE)



WHEEL MOTORS (SAE)

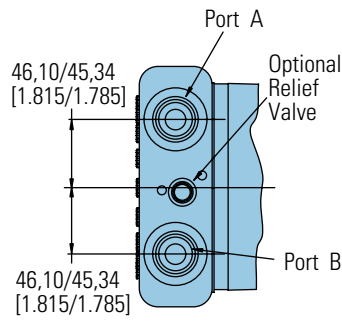
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	174,5 [6.87]	146,6 [5.77]	101,3 [3.99]
400 [24.4]	181,1 [7.13]	153,2 [6.03]	108,2 [4.26]
505 [30.7]	190,2 [7.49]	162,1 [6.38]	116,8 [4.60]
570 [34.9]	196,3 [7.73]	168,1 [6.62]	123,2 [4.85]
630 [38.5]	201,4 [7.93]	173,5 [6.83]	128,5 [5.06]
685 [41.7]	206,0 [8.11]	178,1 [7.01]	132,8 [5.23]
785 [48.0]	215,4 [8.48]	187,5 [7.38]	142,5 [5.61]
940 [57.4]	229,1 [9.02]	201,2 [7.92]	156,2 [6.15]

VIS 40 Series

Two-speed

Dimensions

Oversize Flange
224,0 [8.82] B.C.

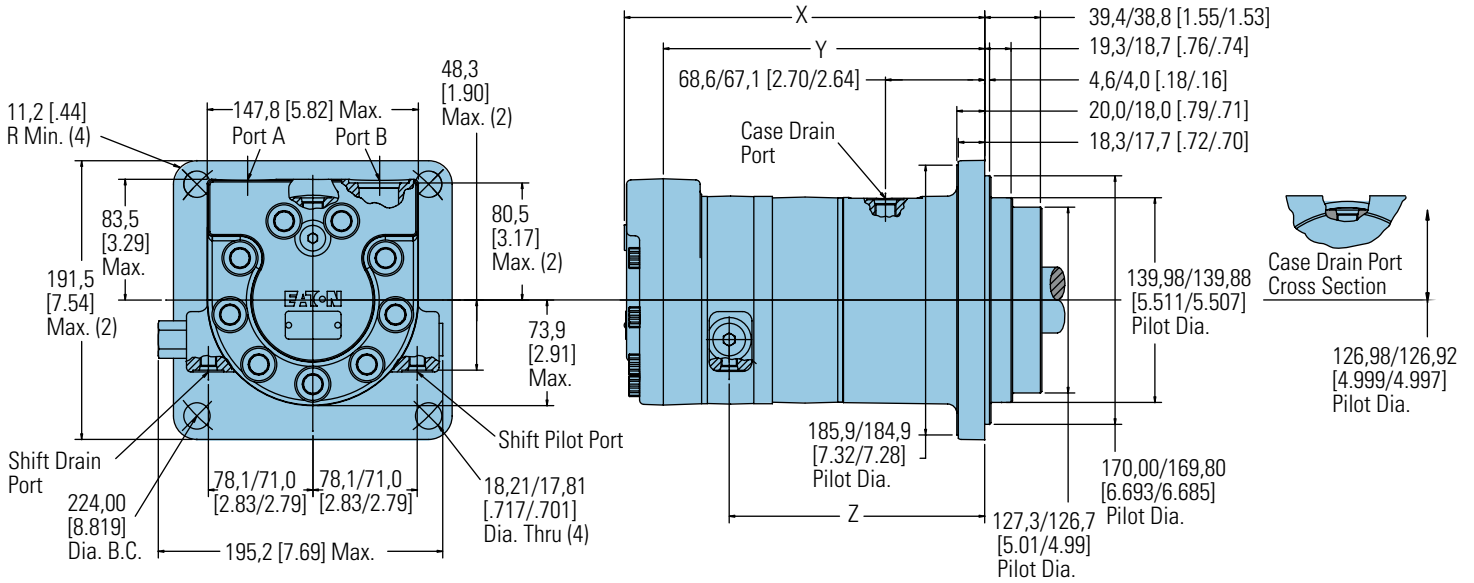


Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

Standard Rotation Viewed from Shaft End

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



OVERSIZE MOTORS

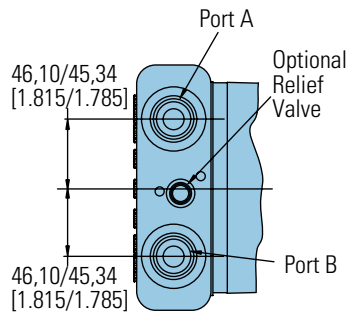
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	232,4 [9.15]	204,0 [8.03]	159,0 [6.26]
400 [24.4]	239,3 [9.42]	210,6 [8.29]	165,6 [6.52]
505 [30.7]	248,2 [9.77]	220,0 [8.66]	174,8 [6.88]
570 [34.9]	254,3 [10.01]	226,1 [8.90]	181,1 [7.13]
630 [38.5]	259,3 [10.21]	231,4 [9.11]	186,4 [7.34]
685 [41.7]	263,9 [10.39]	236,0 [9.29]	190,8 [7.51]
785 [48.0]	273,1 [10.75]	245,1 [9.65]	200,2 [7.88]
940 [57.4]	286,8 [11.29]	258,8 [10.19]	213,9 [8.42]

VIS 40 Series

Two-speed

Dimensions

Standard and Wheel Mount
– ISO



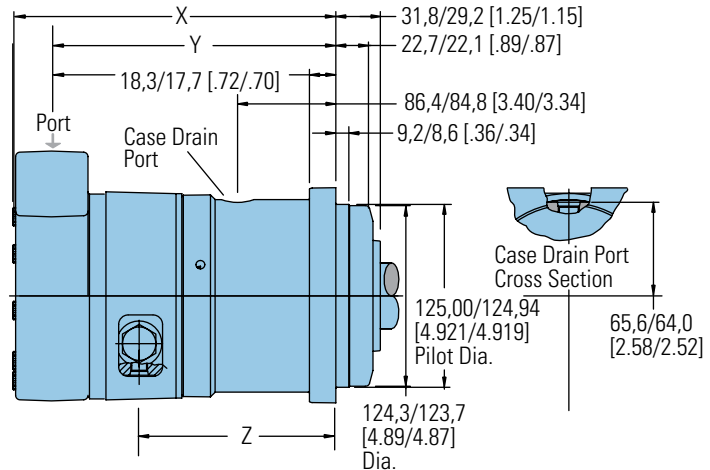
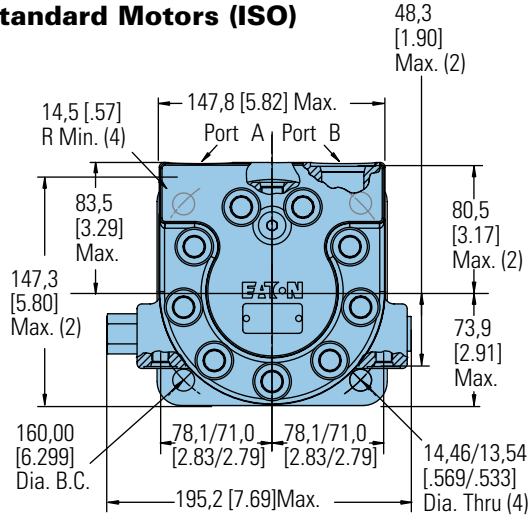
Ports

- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

Standard Rotation Viewed from Shaft End

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

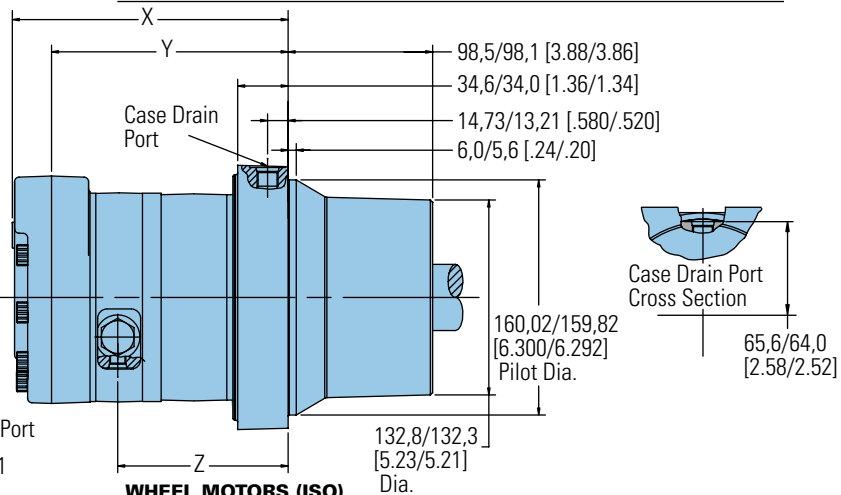
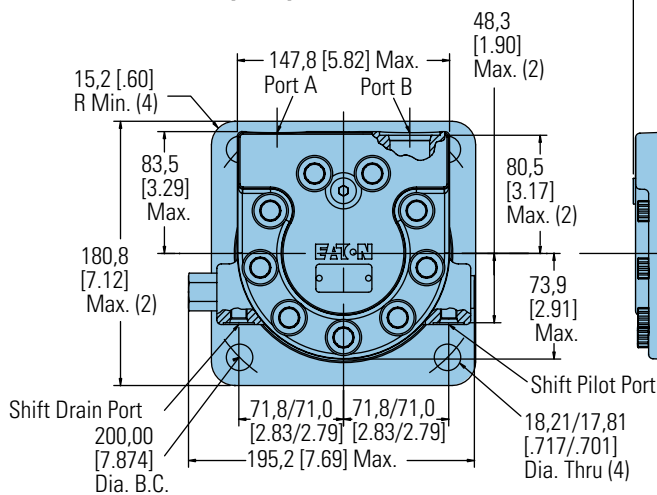
Standard Motors (ISO)



STANDARD MOTORS (ISO)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	247,4 [9.74]	219,5 [8.64]	174,2 [6.86]
400 [24.4]	253,7 [9.99]	225,8 [8.89]	180,8 [7.12]
505 [30.7]	263,1 [10.36]	235,0 [9.25]	189,7 [7.47]
570 [34.9]	269,2 [10.60]	241,0 [9.49]	196,1 [7.72]
630 [38.5]	274,3 [10.80]	246,4 [9.70]	201,4 [7.93]
685 [41.7]	278,9 [10.98]	251,0 [9.88]	205,7 [8.10]
785 [48.0]	288,0 [11.34]	260,1 [10.24]	215,1 [8.47]
940 [57.4]	301,8 [11.88]	273,8 [10.78]	228,9 [9.01]

Wheel Motors (ISO)



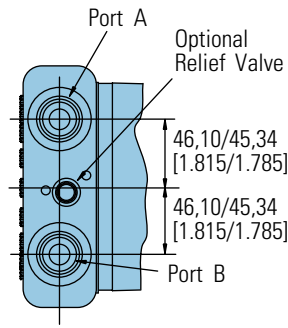
WHEEL MOTORS (ISO)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	173,2 [6.82]	145,3 [5.72]	100,1 [3.94]
400 [24.4]	179,6 [7.07]	151,6 [5.97]	106,7 [4.20]
505 [30.7]	189,0 [7.44]	160,8 [6.33]	115,6 [4.55]
570 [34.9]	195,1 [7.68]	166,9 [6.57]	121,9 [4.80]
630 [38.5]	200,2 [7.88]	172,2 [6.78]	127,3 [5.01]
685 [41.7]	204,7 [8.06]	176,8 [6.96]	131,6 [5.18]
785 [48.0]	213,9 [8.42]	185,9 [7.32]	141,0 [5.55]
940 [57.4]	227,6 [8.96]	199,6 [7.86]	154,7 [6.09]

VIS 40 Series

Two-speed

Dimensions
Bearingless

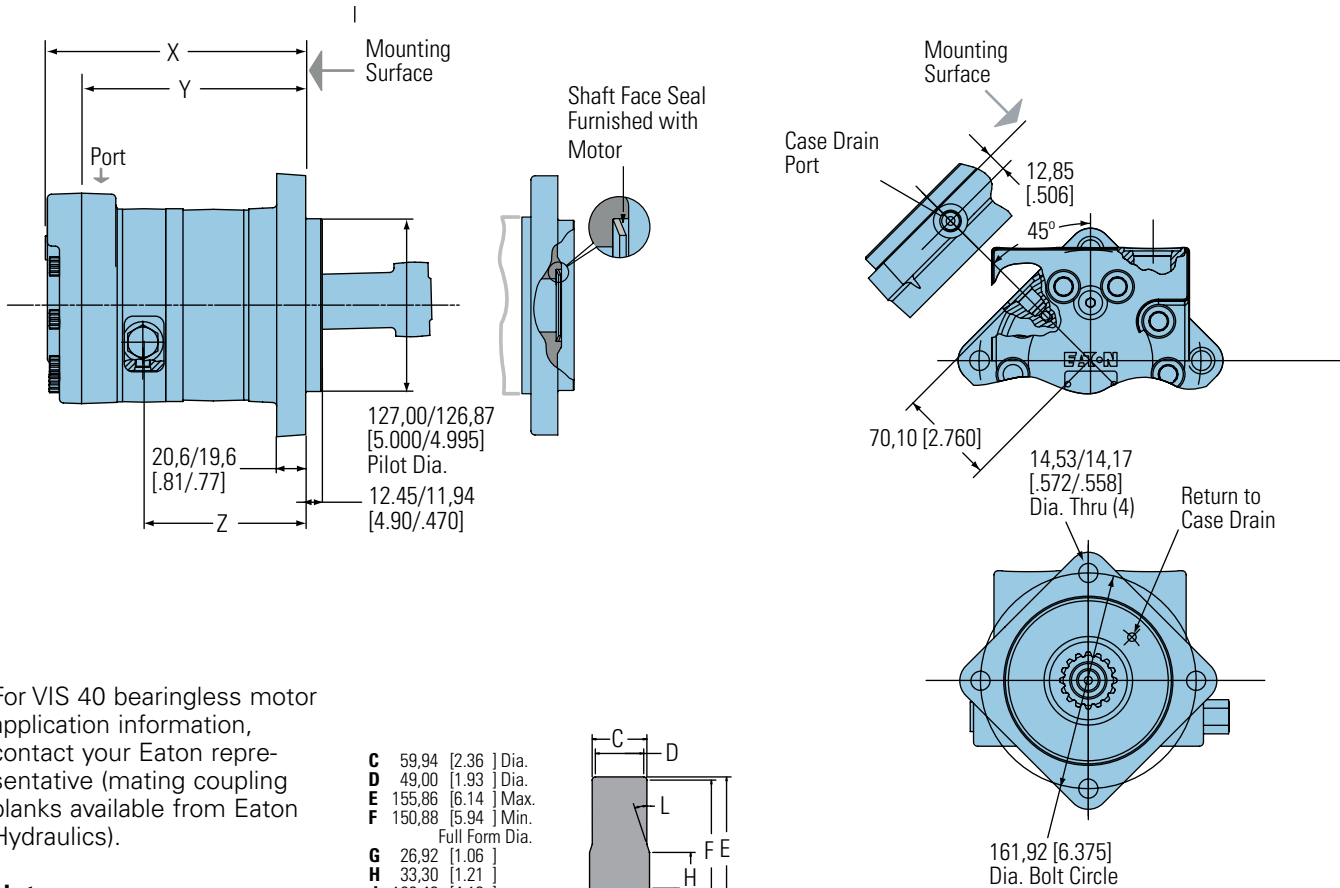


Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)
- or G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

Standard Rotation Viewed from Drive End

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

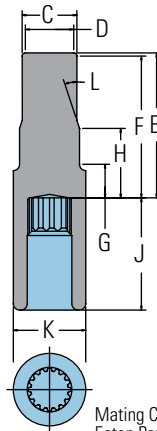


For VIS 40 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

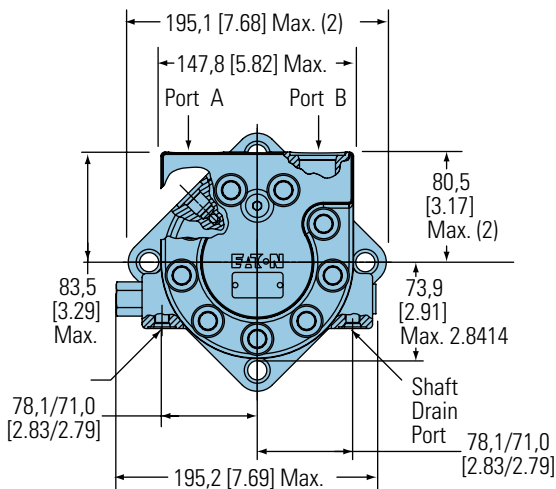
Note:

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

- C** 59,94 [2.36] Dia.
- D** 49,00 [1.93] Dia.
- E** 155,86 [6.14] Max.
- F** 150,88 [5.94] Min.
- G** 26,92 [1.06] Full Form Dia.
- H** 33,30 [1.21]
- J** 106,43 [4.19] Full Form Dia.
- K** 72,64 [2.86]
- L** 15



Mating Coupling Blank
Eaton Part No. 13280-002



BEARINGLESS MOTORS

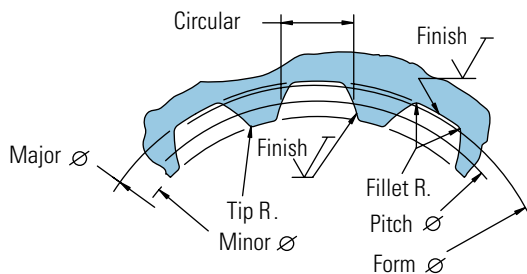
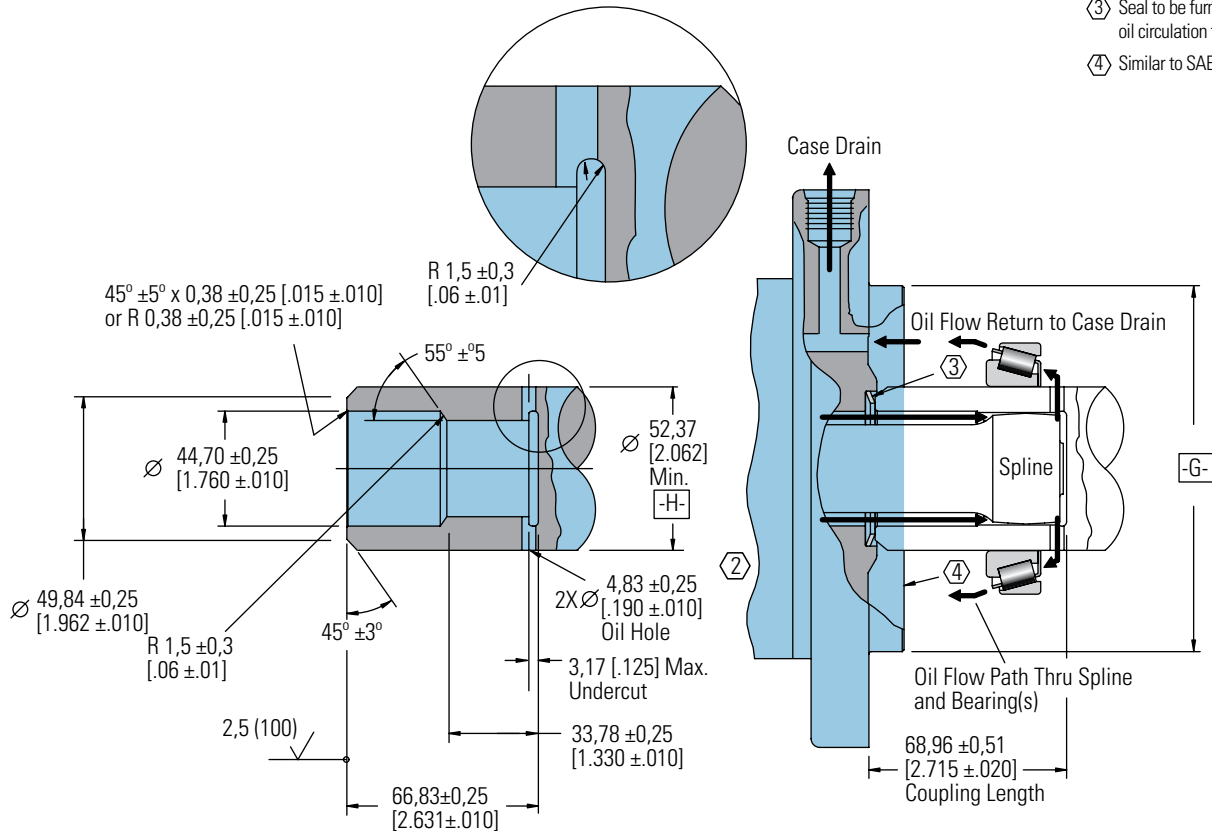
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	177,0 [6.97]	149,1 [5.87]	103,9 [4.09]
400 [24.4]	183,6 [7.23]	155,7 [6.13]	110,7 [4.36]
505 [30.7]	193,0 [7.60]	164,8 [6.49]	119,6 [4.71]
570 [34.9]	199,1 [7.84]	170,9 [6.73]	126,0 [4.96]
630 [38.5]	204,0 [8.03]	176,0 [6.93]	131,1 [5.16]
685 [41.7]	208,8 [8.22]	180,8 [7.12]	135,6 [5.34]
785 [48.0]	217,9 [8.58]	190,0 [7.48]	145,0 [5.71]
940 [57.4]	231,6 [9.12]	203,7 [8.02]	158,8 [6.25]

VIS 40 Series Two-speed

Installation Information

Bearingless

- 1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 60-64 HRC with case depth (to 50HRC) of 0,076 -1,27 [.030 -.050]. Dimensions apply after heat treat.
- ② Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- ③ Seal to be furnished with motor for proper oil circulation thru splines.
- ④ Similar to SAE "C" Four Bolt Flange.



Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	16
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 40,640000 [1.6000000] $\text{Ⓞ} 0,20$ [.008] H
Base Diameter.....	Ref. 35,195272 [1.3856406]
Major Diameter.....	43,56 [1.715] Max. 43,18 [1.700]
Min. Minor Diameter.....	36,83 -37,08 [1.450 -1.460]
Form Diameter, Min.....	42.47 [1.672]
Fillet Radius.....	0,64 -0,76 [.025 -.030]
Tip Radius.....	0,25 -0,51 [.010 -.020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+ .0000 - .0010]
Total Index Variation.....	0,040 [.0016]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	4.105 [.1616]
Minimum Effective.....	3,995 [.1573]
Maximum Effective.....	Ref. 4,056 [.1597]
Minimum Actual.....	Ref. 4,081 [.1582]
Dimension Between Two Pins.....	Ref. 34,272 -34,450 [1.3493 -1.3563]
Pin Diameter.....	4,389 [.1728]

VIS 40 Series Two-speed

Product Numbers

Closed Loop

Use digit prefix —
176-, 178-, or 182- plus four
digit number from charts for
complete product number—
Example 176-0022.

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

SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r[in ³ /r] / PRODUCT NUMBER							
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	-0106	-0021	-0022	-0023	-0024	-0025	-0026
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	178-0108	-0109	-0027	-0028	-0029	-0030	-0031	-0032
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	-0128	-0033	-0034	-0035	-0036	-0037	-0038
Wheel	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	-0002	-0003	-0004	-0005	-0006	-0007
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	-0008	-0009	-0010	-0011	-0012	-0013
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	182-0041	-0014	-0015	-0016	-0017	-0018	-0019
Bearingless		1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	176-0037	—	-0019	-0020	-0021	-0022	-0023	-0024

176-0022

Oversize

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r[in ³ /r] / PRODUCT NUMBER							
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	178-0039	-0040	—	—	—	—
	46 mm 28 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	178-0045	-0046	—	—	—	—
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	—	—	178-0051	-0052	—	—	—	—

ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r[in ³ /r] / PRODUCT NUMBER							
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	178-0110	-0111	-0057	-0058	-0059	-0060	-0061	-0062
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	178-0095	—	-0069	-0070	-0071	-0072	-0073	-0074
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0063	-0064	-0065	-0066	-0067	-0068
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	182-0042	—	-0020	-0021	-0022	-0023	-0024	-0025
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0026	-0027	-0028	-0029	-0030	-0031
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0032	-0033	-0034	-0035	-0036	-0037
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	—	—	-0025	-0026	-0027	-0028	-0029	-0030

176-0028

Note:

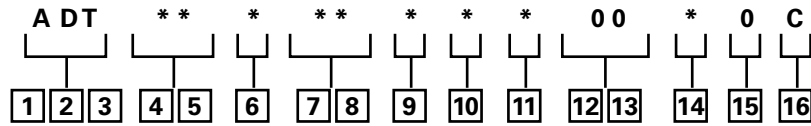
The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 4,5 bar [65 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

VIS 40 Series Two-speed

Model Code

The following 16 - digit coding system has been developed to identify all of the configuration options for the VIS 40 two-speed motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1, 2, 3 Product Series

ADT – VIS 40- Two-speed Motor

4, 5 Displacement – cm³/r [in³/r]

- 20** – 325 [19.8]
- 24** – 400 [24.4]
- 31** – 505 [30.7]
- 35** – 570 [34.9]
- 38** – 630 [38.5]
- 42** – 685 [41.7]
- 48** – 785 [48.0]
- 57** – 940 [57.4]

6 Mounting Type

A – 4 Bolt Bearingless 127,00 [5.000] Pilot Dia. with 12,19 [.480] Pilot Length and 14,35 [.565] Dia holes on 161,92 [6.375] Dia. Bolt Circle

B – 4 Bolt Wheel Mount 160,00 [6.3] Pilot Dia. With 5,8 [.23] Pilot Length and 18,00 [.709] Dia. Holes on 200,00 [7.874] Dia. Bolt Circle (ISO Compatible)

C – 4 Bolt Oversize Flange 185,4 [7.30] Rear Pilot Dia., 169,90 [6.689], 139,93 [5.509], 127,0 [5.00] Dia (Front Pilots) and 18,01 [.709] Dia. Holes on 224,00 [8.819] Dia. Bolt Circle

F – 4 Bolt Standard Mount (SAE CC) 127,00 [5.000] Pilot Dia. With 12,2 [.48] Pilot Length and 14,32 [.564] Dia. Holes on 161,92 [6.375] Dia.

Bolt Circle

G – 4 Bolt Wheel Mount 139,7 [5.50] Pilot Dia. with 7,9 [.31] Pilot Length and 14,32 [.564] Dia. Holes on 184,15 [7.250] Dia. Bolt Circle (SAE Compatible)

H – 4 Bolt Standard Mount 125,00 [4.92] Pilot Dia. With 8,9 [.35] Pilot Length and 14,00 [.551] Dia. Holes on 160,00 [6.299] Dia. Holes on 160,00 [6.299] Dia. Bolt Circle (ISO Compatible)

M – Standard, 4 Bolt: 169,75 [6.683] Pilot Dia. With 4.3 [.17] Pilot Length and M16 X 2 -6H Threaded Holes on 224,00 [8.819] Dia. Bolt Circle (To be selected for Brake Option)

7, 8 Output Shaft

00 – None (Bearingless)

01 – 45 mm Dia. 10:1 Tapered Shaft Per ISO R775 with M30X2-6H Threaded Shaft End, 12W X 8H X 28L [.472W X .313H X 1.102L] Key

02 – 1-3/4 inch Dia. .125:1 Tapered Shaft Per SAE J501 with 1-1/4 - 18 UNF-2A Threaded Shaft End, 11,11 [.4375] Square X 31,8 [1.25] Straight Key

04 – 46 mm Dia. Flat Root Side Fit, 28 Tooth, 16/32 DP 30 Degree Involute Spline, 93,0 [3.66] Minimum Full Spline with M16 X 2,0-6H Thread in End

07 – 40 mm Dia. Straight Shaft with M12 X 1,75-6H Thread in End, 12W X 8H X 63L [.472W X .313H X 2.480L] Key (SAE Compatible)

08 – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Degree Involute Spline, 39,1 [1.54] Minimum Full Spline with 3/8-16 UNC-2B Thread in End (SAE Compatible)

09 – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Degree Involute Spline, 56,6 [2.23] Minimum Full Spline with M12 X 1.75-6H Thread in End (ISO Compatible)

10 – 40 mm Dia. Straight Shaft with M12 X 1,75-6H Thread in End, 12W X 8H X 67L [.472W X .313H X 2.630L] Key (ISO Compatible)

9 Ports

A – 1-1/16-12 UN-2B Size 12 O-ring Port, Accepts Fittings for SAE J1926

B – G 3/4 (BSP) Straight Thread Port

10 Case Flow Options

A – Shuttle Valve with 9/16-18 UNF-2B, Size 6 O-ring Port Case Drain, Accepts Fittings for SAE J1926

B – Shuttle Valve with G 1/4 (BSP) Straight Thread Port Case Drain

11 Back-Pressure Relief

1 – Set at 4,5 bar [65 PSI] (for Manual Pumps)

2 – Set at 15,2 bar [220 PSI] (for Servo Pumps)

4 – Set at 15,2 bar [300 PSI] (for high charge Servo Pumps)

12, 13 Special Features

00 – None

08 – Spring Applied Hydraulic Release Wet Brake With Brake Capacity of 20,000 lbf-in Static and 150 lbf/in² release pressure

14 _ Paint/ Special Packaging

0 – Primer, Individual Box

A – Low Gloss Black Primer, Individual Box

B – No Paint, Bulk Box Option

C – Low Gloss Black Primer, Bulk Box Option

15 _ Eaton Assigned Code when Applicable

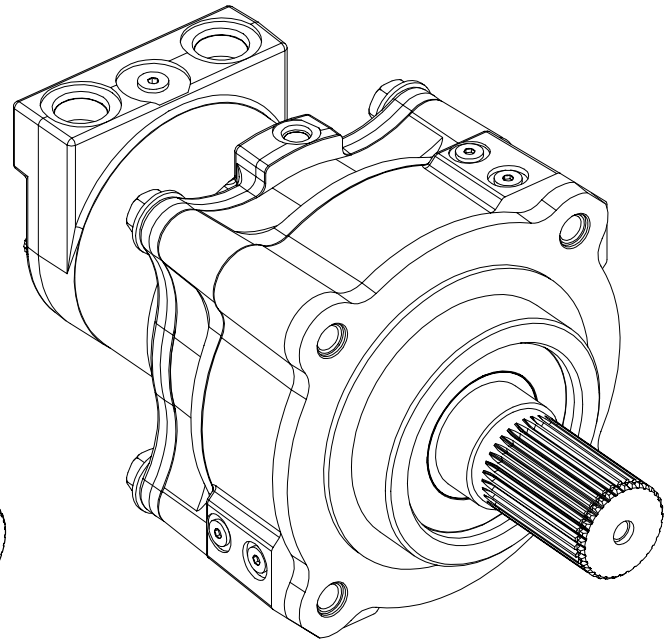
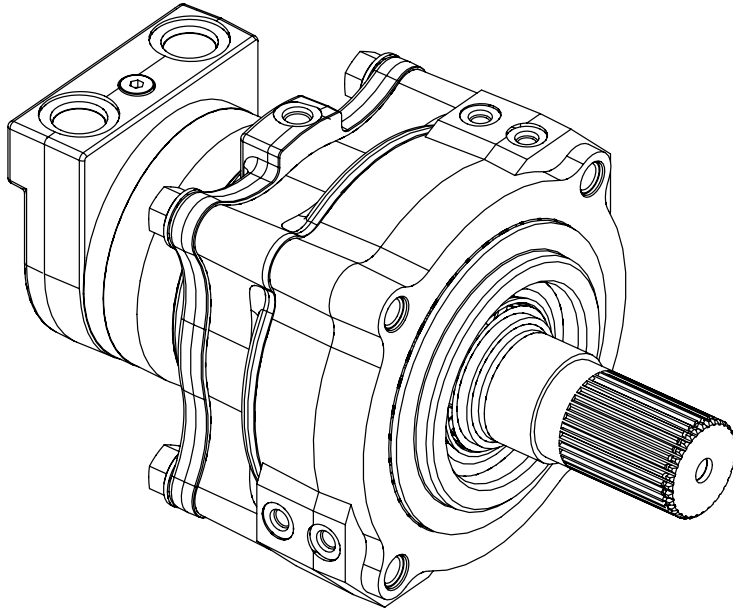
0 – Assigned Code

16 _ Eaton Assigned Design Code

C – Assigned Design Code

VIS 40 Series

Brake Description



Brake Motor WITH Outer Grease Seal

Features

- Spring-Applied/
Hydraulically Released
Multi-Disc Brake
- Spring automatically
applies brake when hydro-
static pressure is absent
- Environmentally Protected
- Integral Design –
Motor and brake as a sin-
gle package to minimize
length and cost.
- Infinite Braking –
Eliminates machine creep
associated with park pawl
mechanisms
- Boost Feature –
Increases holding capacity
to match full motor output
torque
- No adjustments needed
- Two Sets of Release
and Boost Ports –
Allows for multiple plumb-
ing options and facilitates
bleeding
- Outer Grease Seal -
optional feature that
encloses the front bearing
protecting it from external
contamination

Applications

- Skid Steer Loaders
- Mini Excavators
- Trenchers
- Road Rollers
- Anywhere load-holding
is needed on a Low-
Speed High-Torque drive
system

Specifications

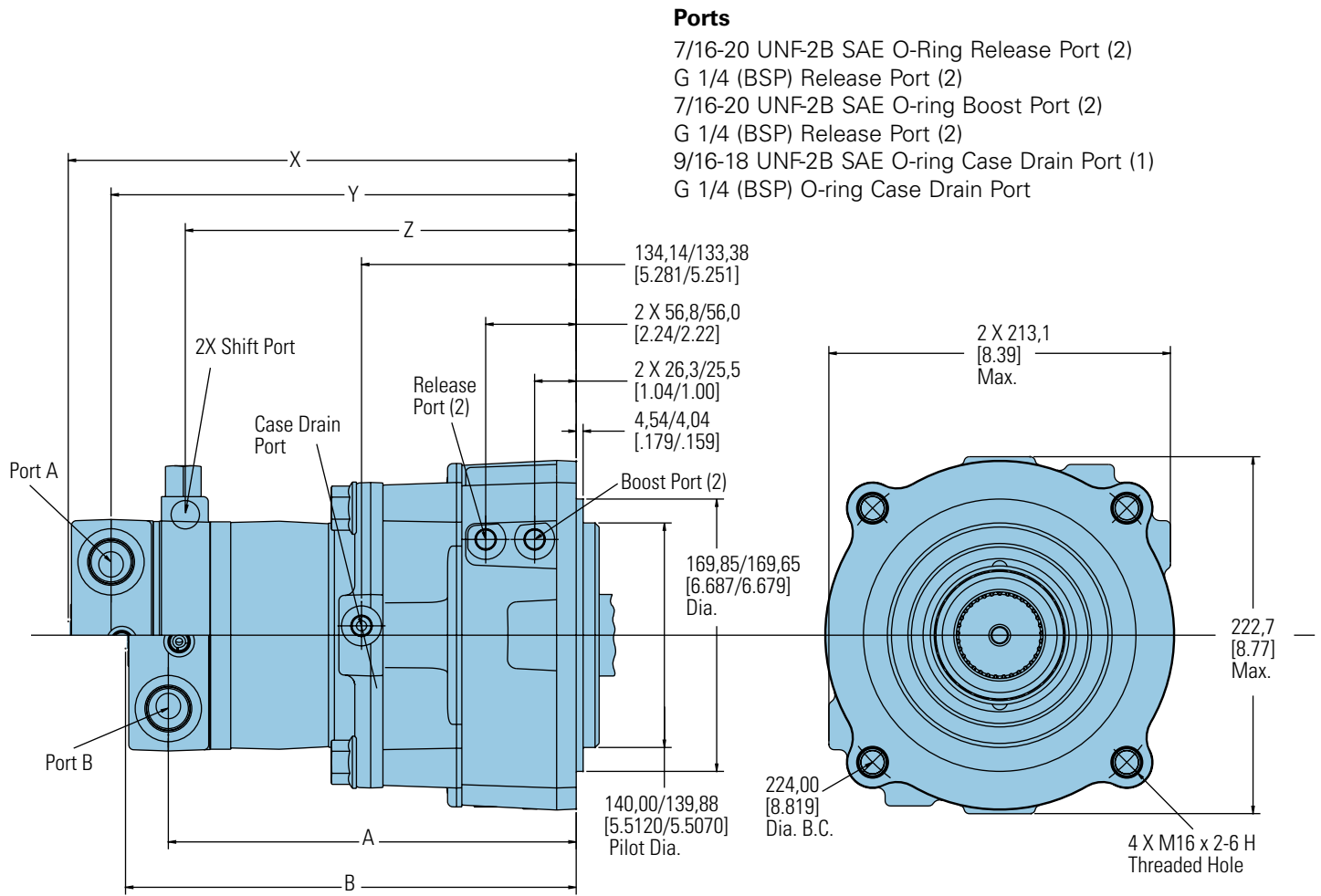
- Static Holding Torque – 780 N-m [6900 lb-in] minimum
(spring only - no boost)
2621 N-m [23200 lb-in] minimum
(@ 10,3 bar [150 PSI] boost)
3570 N-m [31600 lb-in] minimum
(@ 15,2 bar [220 PSI] boost)
- Release Pressure – 10,3 bar [150 PSI] minimum
for full release
68,9 bar [1000 PSI] maximum
allowed at release port
- Case Pressure – 1,4 bar [20 PSI] continuous
3,5 bar [50 PSI] maximum
- Boost Pressure – 15,2 bar [220 PSI] continuous
34,5 bar [500 PSI] maximum
- Speed – 360 RPM maximum
- Emergency – After 3 consecutive stops,
brake to still meet parking
requirement

Model Code Selection:

To add a brake to the motor, select Mounting Option 'M' from Mounting Options and select Brake Option from Special Features.

VIS 40 Series

Brake Dimensions



BRAKE MOTORS (SINGLE-SPEED)

Displacement cm ³ /r [in ³ /r]	A mm [inch]	B mm [inch]
325 [19.8]	220,9 [8.78]	250,2 [9.85]
400 [24.4]	229,7 [9.05]	256,9 [10.11]
505 [30.7]	238,7 [9.40]	265,9 [10.47]
570 [34.9]	244,9 [9.64]	272,1 [10.71]
630 [38.5]	250,1 [9.85]	277,3 [10.92]
685 [41.7]	254,7 [10.04]	281,9 [11.10]
785 [48.0]	264,0 [10.40]	291,2 [11.46]
940 [57.4]	277,7 [10.94]	304,9 [12.00]

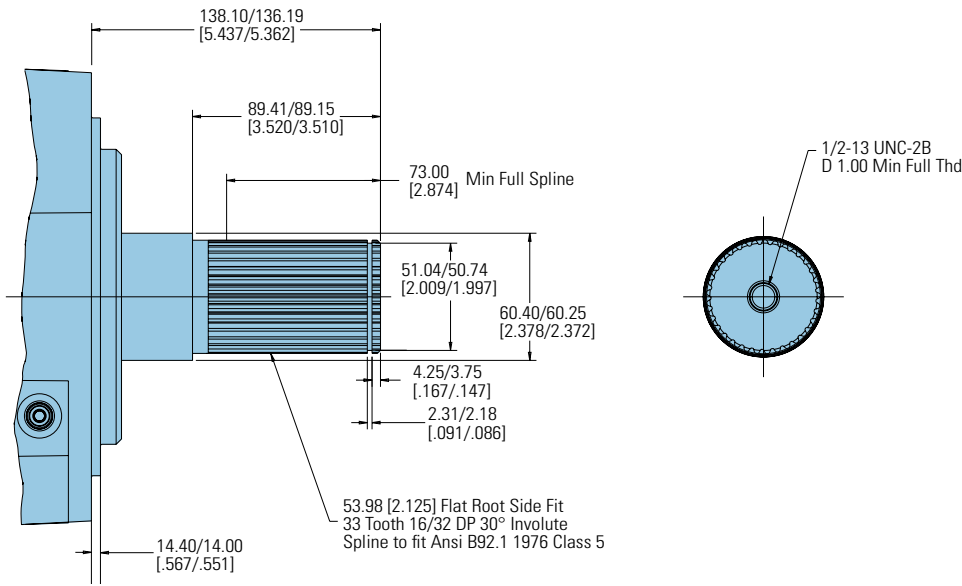
BRAKE MOTORS (TWO-SPEED)

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	286,1 [11.26]	258,9 [10.20]	213,5 [8.41]
400 [24.4]	292,7 [11.52]	265,7 [10.46]	220,3 [8.67]
505 [30.7]	301,9 [11.88]	274,7 [10.82]	229,3 [9.03]
570 [34.9]	308,0 [12.12]	280,9 [11.06]	235,5 [9.27]
630 [38.5]	313,1 [12.32]	285,9 [11.27]	238,5 [9.27]
685 [41.7]	317,9 [12.52]	290,7 [11.45]	245,3 [9.66]
785 [48.0]	327,0 [12.88]	300,0 [11.80]	254,6 [10.02]
940 [57.4]	340,7 [13.42]	313,7 [12.35]	268,3 [10.56]

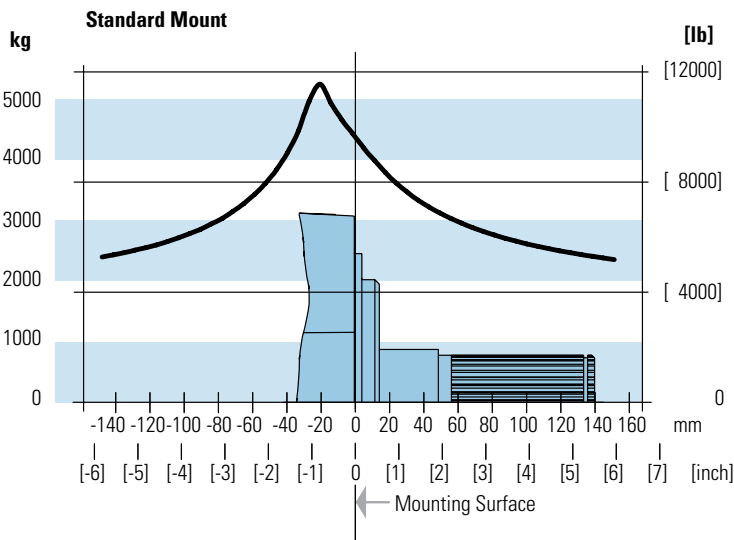
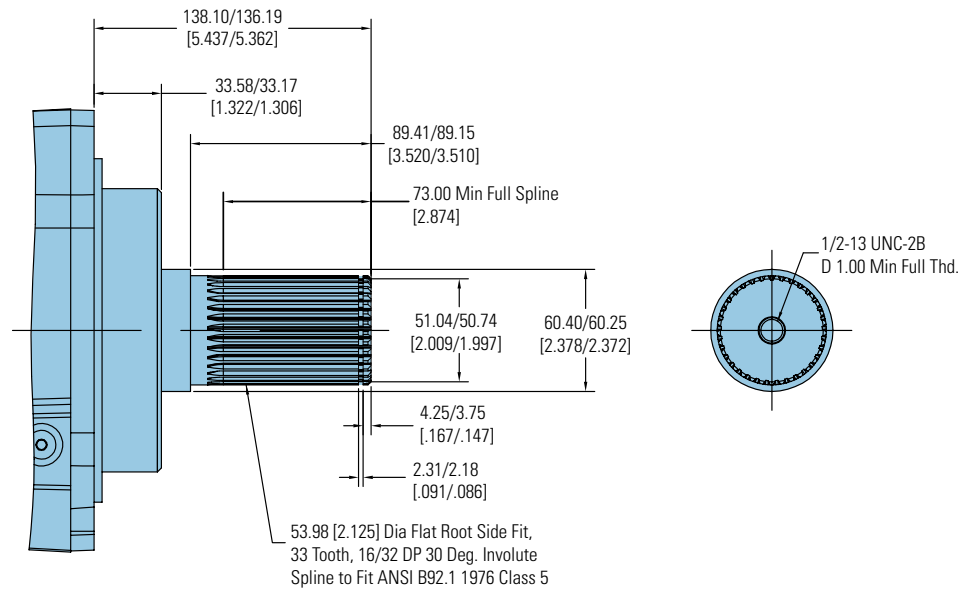
VIS 40 Series

Brake Shaft Dimensions/ Sideload Curves

Standard Brake

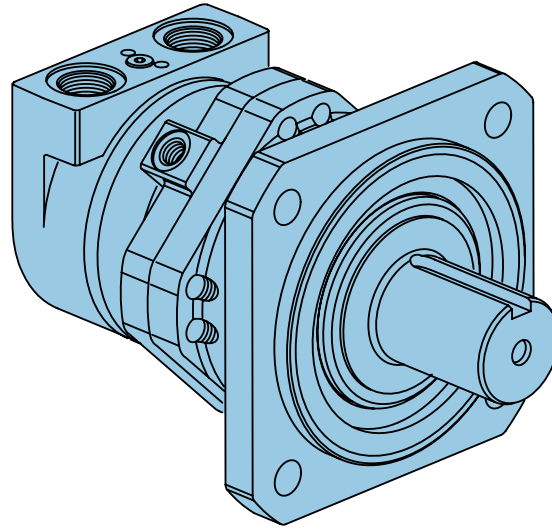


Brake with Outer Grease Seal



VIS 45 Series

Highlights



Description

The VIS 45 is the most powerful motor in the VIS Series product line. Maximum continuous output torque capability is rated to 4520 Nm [40,000 lb-in.] with a displacement range from 630cc to 1560cc per revolution. VIS 45 motors can be run up to 170 LPM [45 GPM] with pressure capability up to 310 bar [4500 PSI]. The motor utilizes patented VIS technology with improved high-strength Geroler, optimized drive geometry, and two-piece pre-loaded balance plate for increased starting efficiency, reduced leakage and higher back pressure capacity.

VIS 45 Motors

Geroler Element	5 Displacements
Flow l/min [GPM]	170 [45] Continuous 189 [50] Intermittent
Speed	Up to 284 RPM
Pressure bar [PSI]	310 [4500] Cont. 345 [5000] Inter. 380 [5500] Peak
Torque Nm [lb - in]	4520 [40000] Cont. 5650 [50000] Inter.

Features

- Patented VIS Geroler technology
- Three moving components: (Geroler, star, drive, and output shaft)
- Two-piece pre-loaded pressure balance plate
- Variety of optional features including two-speed option, and case flow solutions for both closed-loop and open-loop applications.

Benefits

- Extremely compact powerful package
- Increased torque capability
- Greatest horsepower density in the VIS motor line
- High efficiency
- Quiet, smooth operation
- Reliable performance
- Design Flexibility

Applications

- Traction Drives
- Skid Steer loaders
- Grapples
- Excavator Swing Drives
- Marine & Military Winches
- Utility Reels
- Harvesters
- Snow Grooming Equipment
- Trenchers
- Piggy-back Forklifts
- Industrial Machine Tools
- Truck Grapples
- Wood Processing – Saw Mills
- Augers



Auger



Skid Steer



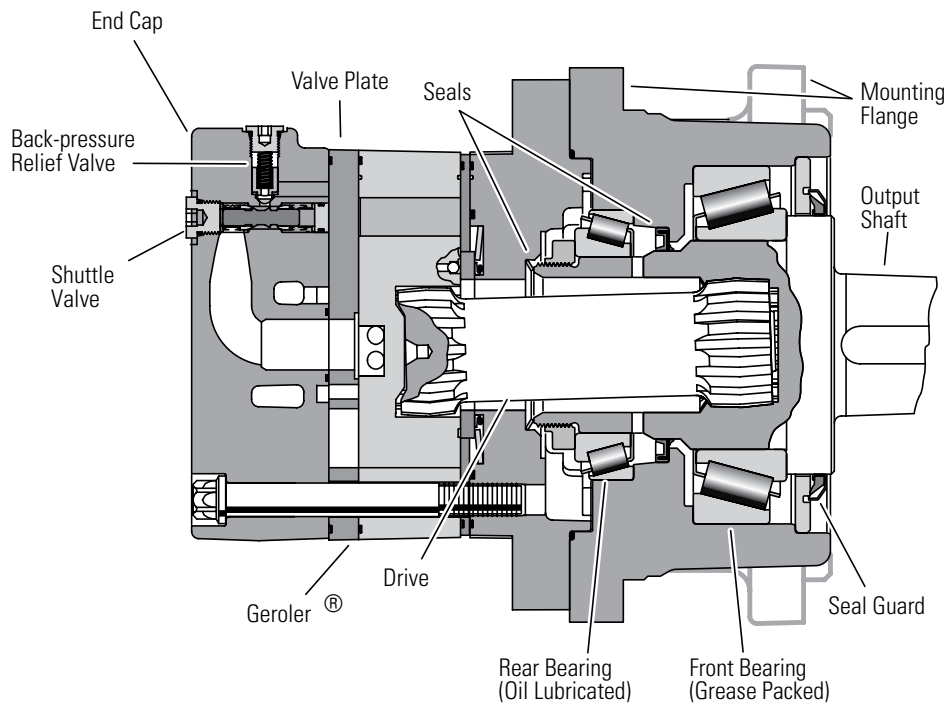
Injector



Port Equipment

VIS 45 Series

Specifications



SPECIFICATION DATA – VIS 45 SERIES MOTORS

Displ. cm ³ /r [in ³ /r]		630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Max. Speed (RPM) @ Flow	Continuous	256	198	164	129	104
	Intermittent	284	220	183	143	115
Flow l/min [GPM]	Continuous	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]
	Intermittent	189 [50]	189 [50]	189 [50]	189 [50]	189 [50]
Torque Nm [lb-in]	Continuous	2963 [26080]	3555 [31460]	4052 [35860]	4520 [40000]	4520 [40000]
	Intermittent	3111 [27530]	3722 [32940]	4549 [40269]	5376 [47592]	5650 [50000]
Pressure Δ bar [Δ PSI]	Continuous	310 [4500]	310 [4500]	258 [3740]	205 [2975]	164 [2380]
	Intermittent	345 [5000]	345 [5000]	322 [4675]	256 [3720]	205 [2975]
	Peak	379 [5500]	379 [5500]	379 [5500]	308 [4465]	246 [3570]
Weight kg [lb]	Standard or Wheel Mount Bearingless	53,8 [118.7]	55,2 [121.6]	56,7 [125.0]	58,7 [129.4]	61,2 [134.9]
	Two-speed Standard or Wheel Mount	58,5 [128.9]	59,8 [131.8]	61,3 [135.2]	63,3 [139.6]	65,8 [145.1]
	Two-speed Bearingless	32,9 [72.5]	34,2 [75.4]	35,7 [78.8]	37,7 [83.2]	40,2 [88.7]

A simultaneous maximum torque and maximum speed NOT recommended.

Note:

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

Maximum Inlet Pressure:

400 bar [5800 PSI]
Do Not Exceed A Pressure Rating (for displacement size see chart above).

Return Pressure (Back-Pressure):

Minimum – 3,5 bar [50 PSI]
Maximum – 21 bar [300 PSI]

Note:

Return (back-pressure) must be 3,5 bar [50 PSI] greater than the case pressure, except with open loop circuit.

Δ Pressure:

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

Case Pressure:

Minimum – No Pressure
Maximum – 3,5 bar [50 PSI]

Note:

The case must be full when the motor is operating. A case drain is recommended.

Continuous Rating:

Motor may be run continuously at these ratings

Intermittent Operation:

10% of every minute

Peak Operation:

1% of every minute

Recommended Fluids:

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

Recommended System Operating Temp.:

-34°C to 82°C [-30°F to 180°F]

Recommended Filtration:

Per ISO Cleanliness Code, 4406: 20/18/13

Shuttle:

Standard

Back-Pressure Relief Valve:

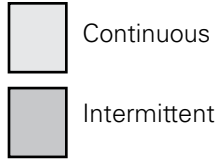
Required for closed loop circuit.

VIS 45 Series

Performance Data

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

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



805 cm³/r [48.6 in³/r]

□ Pressure Bar [PSI]

Flow LPM [GPM]	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	15	35	70	105	140	170	205	240	275	310	345
4	1600	3350	7180	10670	13480	16640	19680	21740	25860	28500	31720
15	181	379	811	1206	1523	1880	2224	2457	2922	3221	3584
8	1620	3380	7240	10730	13740	16920	19950	22160	25920	28970	32200
30	183	382	818	1212	1553	1912	2254	2504	2929	3274	3639
12	1640	3310	7180	10770	14170	17290	20730	23270	26340	29420	32470
45	185	374	811	1217	1601	1954	2342	2630	2976	3324	3669
16	1660	3220	7010	10680	14290	17710	21240	24170	26830	30340	32940
61	188	364	792	1207	1615	2001	2400	2731	3032	3428	3722
20	1600	3110	6840	10380	14000	17290	20990	24490	27270	31390	
76	181	351	773	1173	1582	1954	2372	2767	3082	3547	
24	1560	3030	6750	10250	13830	17340	21110	24450	27620	31460	
91	176	342	763	1158	1563	1959	2385	2763	3121	3555	
28		2720	6560	10190	13780	17390	21090	24360	27420	31238	
106		307	741	1151	1557	1965	2383	2753	3098	3529	
32		2620	6330	10000	13480	17070	20730	24180	27270	31064	
121		296	715	1130	1523	1929	2342	2732	3082	3509	
36		147	140	139	137	137	135	135	134	127	
136		2620	5910	9480	13140	16640	20200	23570	26910	30646	
40		296	668	1071	1485	1880	2283	2663	3041	3462	
151		165	158	156	154	154	152	152	150	143	
45			5390	9220	12790	16120	19700	23080	26343	30019	
170			609	1042	1445	1822	2226	2608	2976	3391	
50			175	173	171	171	169	169	167	159	
189			5150	8970	12450	15780	19420	22650	25848	29462	
			582	1014	1407	1783	2194	2559	2920	3328	
			198	196	193	193	191	191	189	179	
			4770	8610	12140	15380	19180	22440			
			539	973	1372	1738	2167	2536			
			220	217	215	215	212	212			

630 cm³/r [38.6 in³/r]

□ Pressure Bar [PSI]

Flow LPM [GPM]	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	15	35	70	105	140	170	205	240	275	310	345
4	1270	2710	5530	8250	10300	12900	15540	17720	20820	23640	25740
15	144	306	625	932	1164	1458	1756	2002	2353	2671	2909
8	1290	2720	5580	8290	10490	13110	15760	18070	21000	24100	26070
30	146	307	631	937	1185	1481	1781	2042	2373	2723	2946
12	1310	2670	5440	8320	10820	13400	16370	18970	21230	24540	26840
45	148	302	615	940	1223	1514	1850	2144	2399	2773	3033
16	1320	2600	5400	8250	10910	13730	16780	19710	21970	24870	27530
61	149	294	610	932	1233	1551	1896	2227	2483	2810	3111
20	1290	2500	5270	8020	10690	13400	16730	20020	22320	25420	
76	146	283	596	906	1208	1514	1890	2262	2522	2872	
24	1240	2440	5200	7920	10560	13430	16700	19970	22610	25730	
91	140	276	588	895	1193	1518	1887	2257	2555	2907	
28		2190	5050	7870	10520	13480	16660	19860	22450	26080	
106		247	571	889	1189	1523	1883	2244	2537	2963	
32		160	160	157	157	155	150	146	143	136	
121		2110	4870	7720	10300	13230	16370	19720	22320	25986	
36		238	550	872	1164	1495	1850	2228	2522	2936	
136		182	182	180	180	177	172	166	164	156	
40			4150	7120	9760	12490	15560	18820	21600	25185	
151			469	805	1103	1411	1758	2127	2441	2845	
45			228	224	224	221	214	208	204	194	
170			3970	6930	9500	12230	15340	18470	21207	24742	
50			449	783	1074	1382	1733	2087	2396	2795	
189			256	252	252	249	241	234	229	218	
			3680	6660	9270	11920	15150	18300			
			416	753	1048	1347	1712	2068			
			284	280	280	276	268	259			

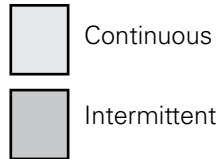


VIS 45 Series

Performance Data

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

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



1245 cm³/r [76.0 in³/r]
□ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4250
	15	35	70	105	140	170	205	240	275	295
4	2160	4800	9960	15150	20200	26450	30670	39180	42800	43220
15	244	542	1125	1712	2283	2989	3466	4427	4836	4884
8	2250	4830	10370	15760	22010	27180	33330	39840	43660	44400
30	254	546	1172	1781	2487	3071	3766	4502	4934	5017
12	2400	5390	10910	17290	22780	28470	34170	40140	44160	47220
45	271	609	1233	1954	2574	3217	3861	4536	4990	5336
16	2410	5150	10930	16970	22880	28600	33900	39500	44510	47592
61	272	582	1235	1918	2585	3232	3831	4464	5030	5376
20	2350	4890	10650	16470	21960	27450	33130	37710	43890	46933
76	266	553	1203	1861	2481	3102	3744	4261	4960	5302
24	2190	4760	10460	15920	21230	26530	32320	37680	42670	45673
91	247	538	1182	1799	2399	2998	3652	4258	4822	5156
28	1990	4260	10070	15860	21200	26420	32480	37500	42464	45418
106	225	481	1138	1792	2396	2985	3670	4238	4797	5131
32		4100	9770	15410	20770	26300	31920	37240	42167	45103
121		463	1104	1741	2347	2972	3607	4208	4764	5095
36		4090	9060	14650	20060	25670	31110	36295	41087	43955
136		462	1024	1655	2267	2901	3515	4100	4642	4966
40			8300	14150	19570	24900	30320	35373	40034	42836
151			938	1599	2211	2814	3426	3996	4523	4839
45			8100	13970	19310	24610	29972	34967	39570	42343
170			915	1579	2182	2781	3386	3950	4470	4783
50			7900	13790	19050	24310				
189			893	1558	2153	2747				

990 cm³/r [60.5 in³/r]
□ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	4750
	15	35	70	105	140	170	205	240	275	310	330
4	2000	4100	8630	12620	16050	20080	24150	28320	32590	35150	37040
15	226	463	975	1426	1814	2269	2729	3200	3683	3972	4186
8	2020	4130	8700	12740	16350	20420	24480	28400	32850	35670	37250
30	228	467	983	1440	1848	2307	2766	3209	3712	4031	4209
12	2050	4050	8630	12780	16870	20860	25440	28550	32920	35860	37630
45	232	458	975	1444	1906	2357	2875	3226	3720	4052	4252
16	2070	3940	8420	12680	17010	21380	26070	29660	33020	36620	38439
61	234	445	951	1433	1922	2416	2946	3352	3731	4138	4342
20	2000	3800	8220	12330	16660	20860	25760	30060	33550	37880	39766
76	226	429	929	1393	1883	2357	2911	3397	3791	4280	4492
24	1950	3700	8120	12180	16460	20890	25820	30090	33990	38366	40269
91	220	418	918	1376	1860	2361	2918	3400	3841	4334	4549
28		3320	7880	12100	16400	20990	25890	29900	33750	39106	39995
106		375	890	1367	1853	2372	2926	3379	3814	4280	4518
32		105	102	102	101	99	97	97	95	92	90
121		3210	7610	11870	16050	20600	25440	29680	33550	37890	39766
36		363	860	1341	1814	2328	2875	3354	3791	4280	4492
136		120	117	117	115	114	110	110	109	106	103
40		3200	7100	11260	15640	20080	24800	28930	32716	36936	38759
151		362	802	1272	1767	2269	2802	3269	3696	4173	4379
45		135	131	131	130	128	124	124	123	119	116
170			6480	10950	15220	19460	24170	28330	32023	36155	37935
50			732	1237	1720	2199	2731	3201	3618	4084	4286
189			146	146	144	142	138	138	137	133	130
			6190	10650	14810	19040	23830	27952	31599	35679	37432
			699	1203	1674	2152	2693	3158	3570	4031	4229
			164	164	162	160	155	155	154	149	145
			5740	10230	14450	18570	23540				
			649	1156	1633	2098	2660				
			183	183	180	178	173				

[18570] Torque [lb-in]
2098 } Nm
178 Speed RPM

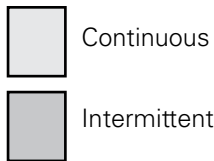
VIS 45 Series

1560 cm³/r [95.0 in³/r]

Performance Data

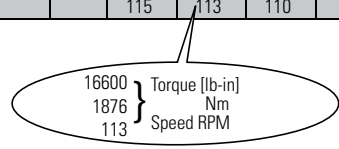
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Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



□ Pressure Bar [PSI]

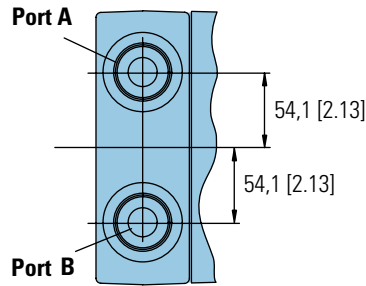
	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275
4	2700	5670	11910	18520	24910	30860	37610	42320	48366
15	305 9	641 9	1346 9	2093 9	2815 9	3487 8	4250 8	4782 8	5464 8
8	2810	5910	12400	19260	25590	31740	39310	44150	50457
30	318 19	668 19	1401 18	2176 18	2892 18	3587 17	4442 16	4989 15	5700 15
12	3010	6300	13040	20490	26600	33070	39880	46670	53337
45	340 29	712 28	1474 28	2315 27	3006 26	3737 25	4506 23	5274 22	6025 22
16	3020	6300	13360	20740	27270	33950	40450	48630	55577
61	341 38	712 38	1510 37	2344 36	3082 35	3836 34	4571 31	5495 29	6279 29
20	2930	6150	13200	20490	27110	34830	39820	47662	54470
76	331 48	695 47	1492 46	2315 45	3063 44	3936 42	4500 39	5384 37	6154 37
24	2780	5910	12880	19750	26930	34390	39310	47300	54057
91	314 58	668 56	1455 55	2232 54	3043 53	3886 50	4442 47	5343 44	6107 44
28		5310	12500	19630	26600	33950	38740	46635	53297
106		600 66	1413 64	2218 63	3006 62	3836 59	4378 55	5268 52	6021 52
32		5120	12070	19260	26260	33510	38180	45982	52550
121		579 75	1364 74	2176 72	2967 70	3787 67	4314 62	5195 58	5937 58
36		5100	11270	18270	25590	33070	37652	45366	
136		576 85	1274 83	2065 81	2892 79	3737 76	4254 70	5125 66	
40			10280	17760	24910	32630	37124	44750	
151			1162 92	2007 90	2815 88	3687 84	4194 78	5055 73	
45			9820	17280	24240	31793	36119	43577	
170			1110 104	1953 101	2739 99	3592 95	4080 87	4923 82	
50			9100	16600	23650				
189			1028 115	1876 113	2672 110				



VIS 45 Series

Dimensions

Standard Mount

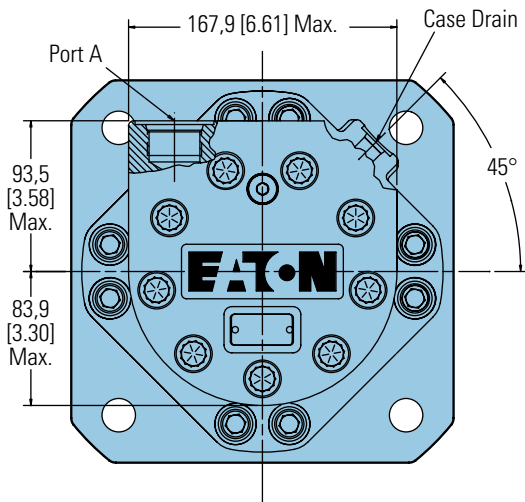
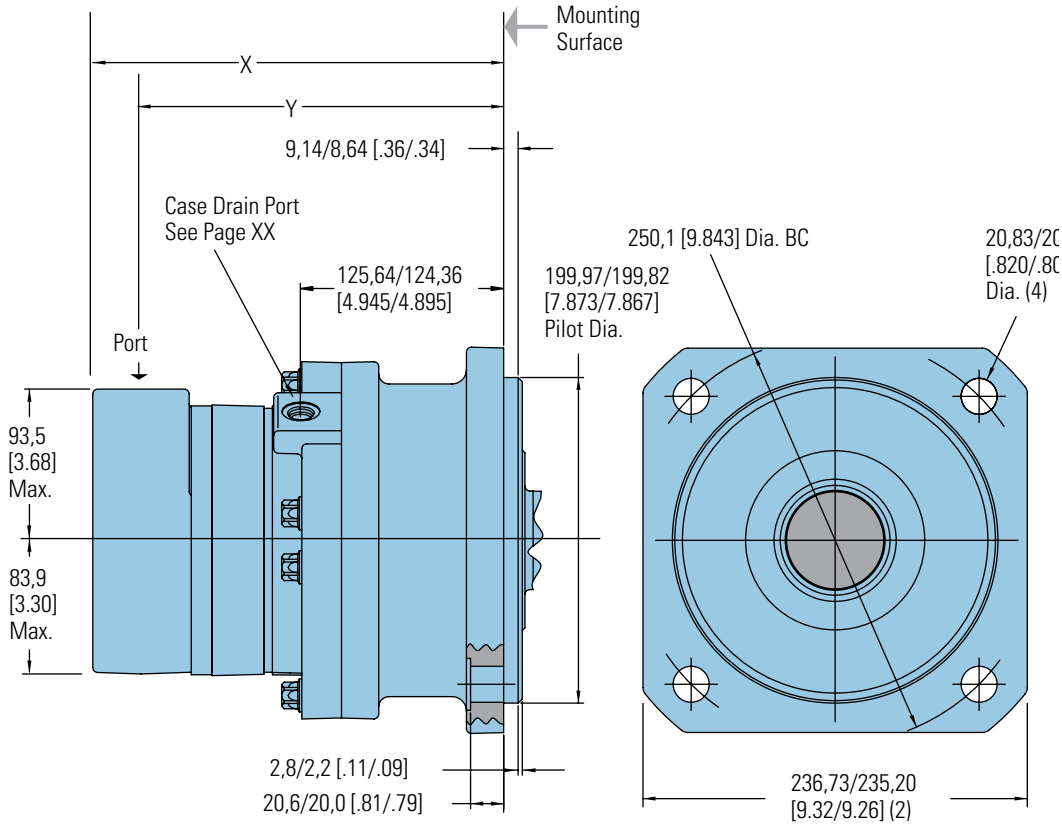


Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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



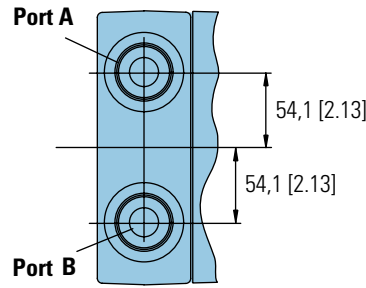
STANDARD MOTORS

Displacement cm ³ /r [in ³ /r]	X Max. mm [inch]	Y mm [inch]
630 [38.6]	260,9 [10.27]	228,6 [9.00]
805 [48.6]	271,3 [10.68]	239,0 [9.41]
990 [60.5]	283,7 [11.17]	251,5 [9.90]
1245 [76.0]	299,7 [11.80]	267,7 [10.54]
1560 [95.0]	319,5 [12.58]	287,5 [11.32]

VIS 45 Series

Dimensions

Wheel Mount

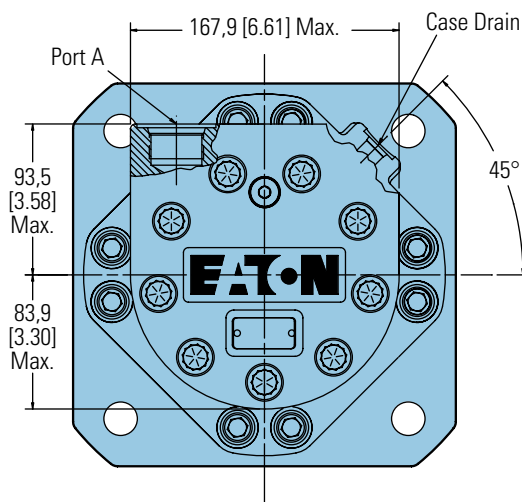
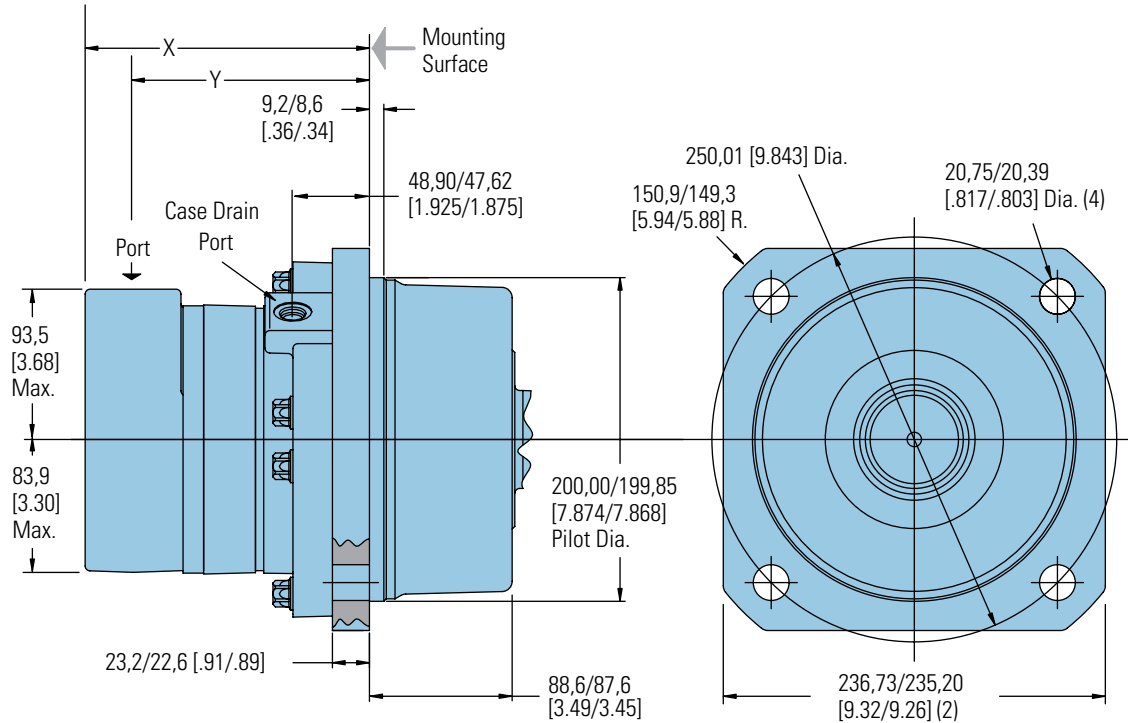


Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

Standard Rotation Viewed from Shaft End

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

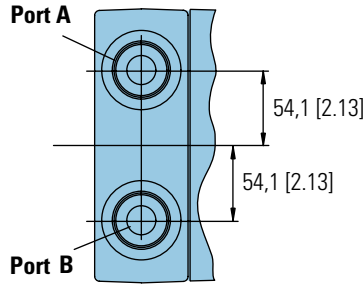


WHEEL MOTORS

Displacement cm ³ /r [in ³ /r]	X Max. mm [inch]	Y mm [inch]
630 [38.6]	184,2 [7.25]	151,9 [5.98]
805 [48.6]	194,6 [7.66]	162,3 [6.39]
990 [60.5]	207,0 [8.15]	174,8 [6.88]
1245 [76.0]	223,0 [8.78]	191,0 [7.52]
1560 [95.0]	242,8 [9.56]	210,8 [8.30]

VIS 45 Series

Dimensions
Bearingless



Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

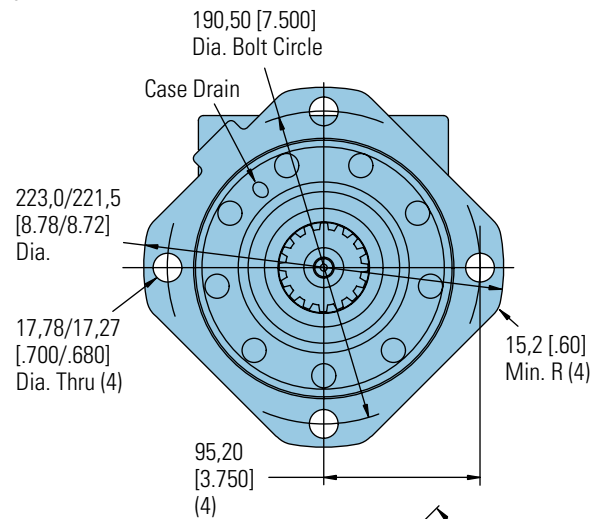
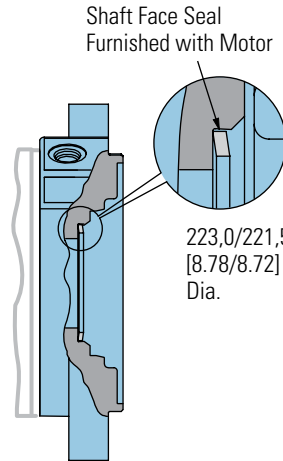
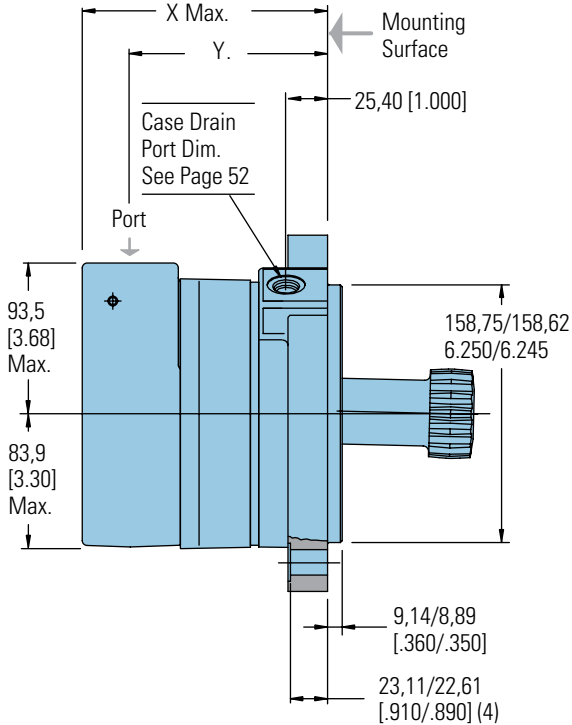
Standard Rotation Viewed from Drive End

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

For VIS 45 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

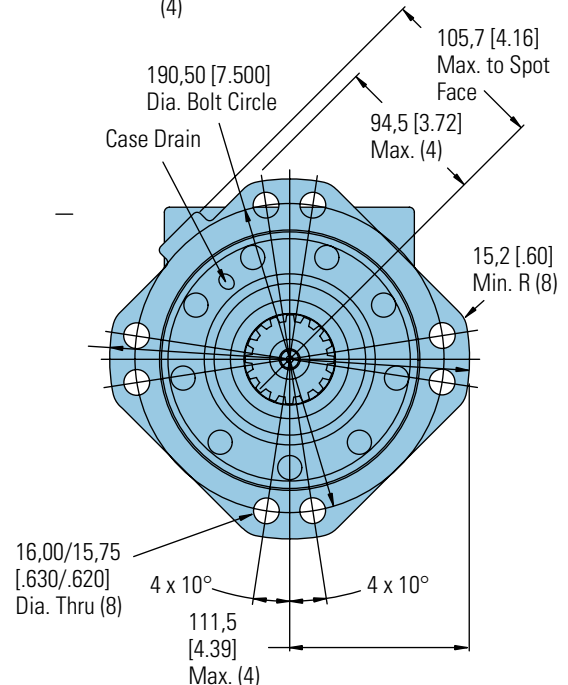
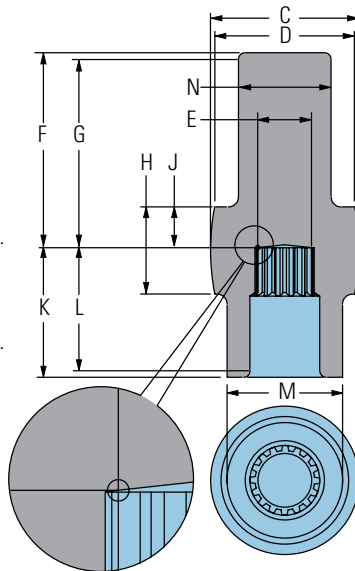
Note:

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



Mating Coupling Blank Eaton Part No. 13521-003

- C** 116,3 [4.58] Dia. Max.
- D** 111,8 [4.40] Dia. Min.
- E** 37,64 [1.482] Dia.
- F** 136,7 [5.38] Max.
- G** 131,6 [5.18] Min. Full Form Dia.
- H** 64,8 [2.55]
- J** 26,4 [1.04]
- K** 109,7 [4.32] Max.
- L** 104,6 [4.12] Min. Full Form Dia.
- M** 92,58 [3.645] Dia.
- N** 73,28 [2.885] Dia.



BEARINGLESS MOTORS

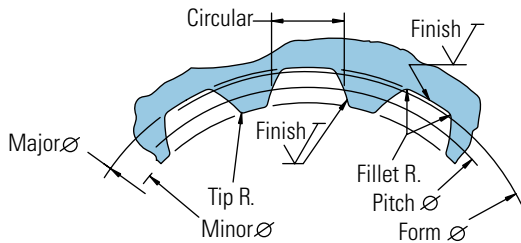
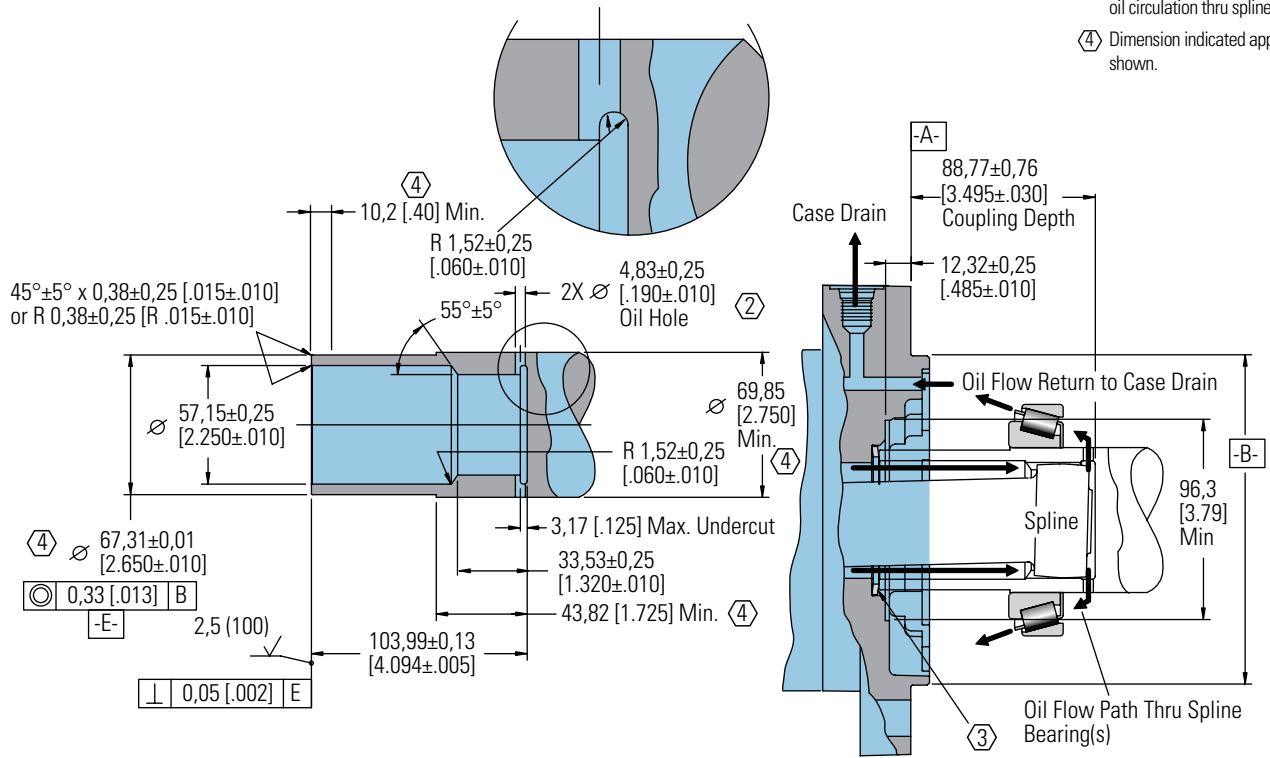
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]
630 [38.6]	161,5 [6.36]	130,3 [5.13]
805 [48.6]	172,5 [6.79]	141,2 [5.56]
990 [60.5]	184,4 [7.26]	153,4 [6.04]
1245 [76.0]	200,7 [7.90]	169,7 [6.68]
1560 [95.0]	220,5 [8.68]	189,5 [7.46]

VIS 45 Series

Installation Information

Bearingless

- 1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 59-62 HRC with case depth (to 50HRC) of 0,76 -1,27 [.030 -.050]. Dimensions apply after heat treat.
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.
- 4 Dimension indicated applies within area shown.



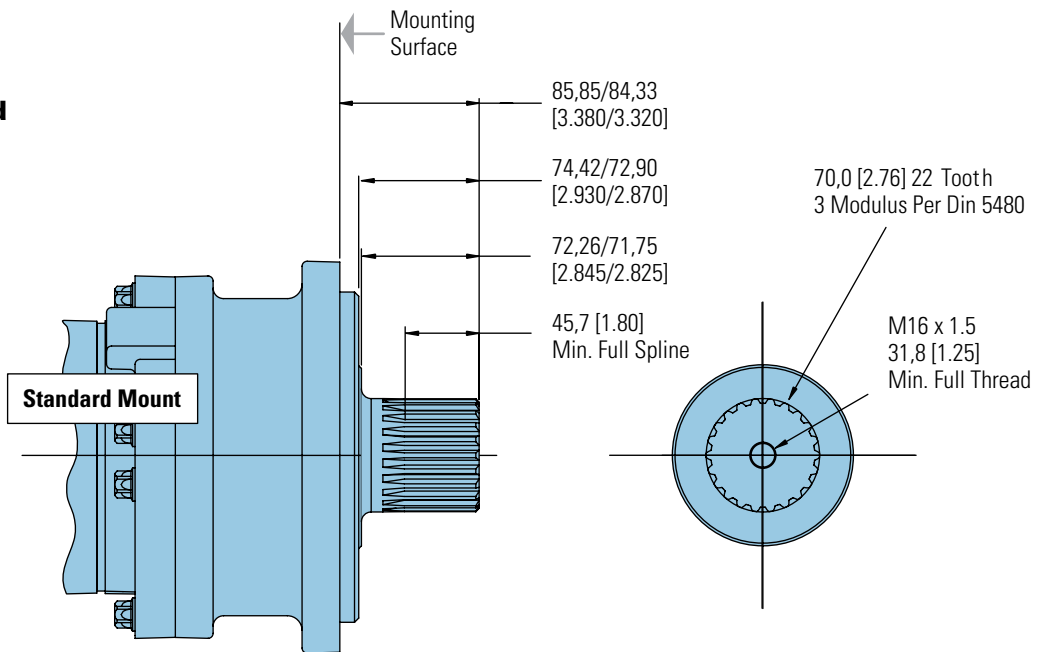
Spline Pitch.....	8/16
Pressure Angle.....	30°
Number of teeth.....	16
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 50,80000 [2.0000000] $\text{Ⓢ} 0,33 [.013] B$
Base Diameter.....	Ref. 43,994090032 [1.7320508]
Major Diameter.....	56,34±0,15 [2.218±.006]
Min. Minor Diameter.....	48,44±0,08 [1.907±.003]
Form Diameter, Min.....	55,22 [2.174]
Fillet Radius.....	1,02±0,25 [.040±.010]
Tip Radius.....	0,38±0,13 [.015±.005]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 -0.0010]
Total Index Variation.....	0,041 [.0016]
Lead Variation.....	0,015 [.0006]
Circular Space Width:	
Maximum Actual.....	6,180 [.2433]
Minimum Effective.....	6,048 [.2381]
Maximum Effective.....	Ref. 6,099 [.2401]
Minimum Actual.....	Ref. 6,114 [.2407]
Dimension Between Two Pins.....	Ref. 42,659 ±0,05 [1.6795±.0020]
Pin Diameter.....	6,223 [.2450]

VIS 45 Series

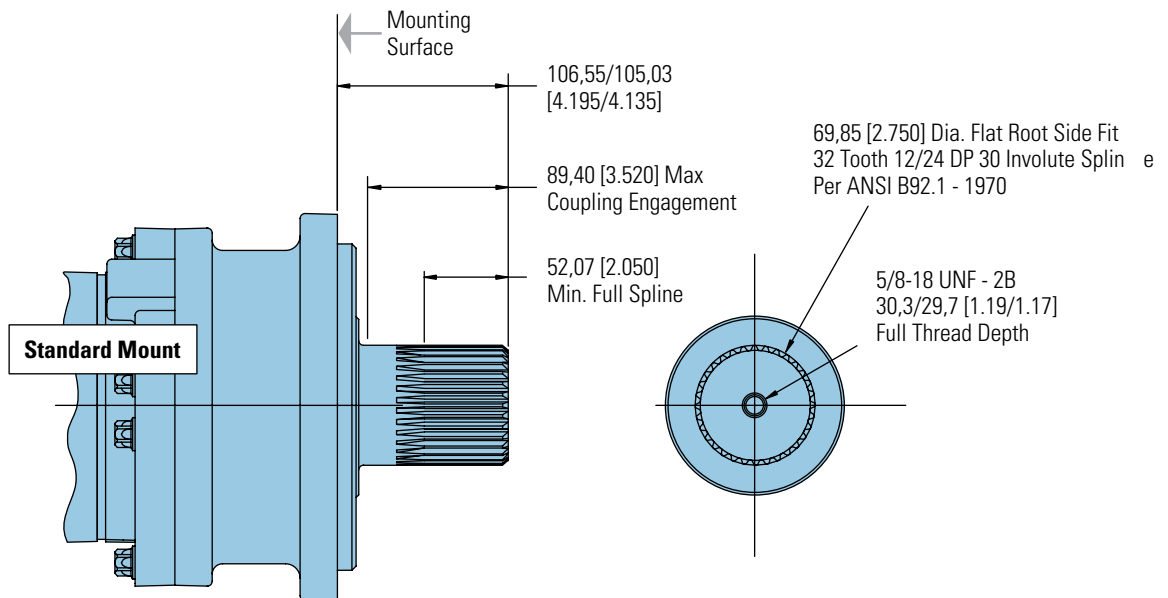
Dimensions Shafts

Splined

70 mm 22 Tooth Splined



2-3/4 Inch 32 Tooth Splined

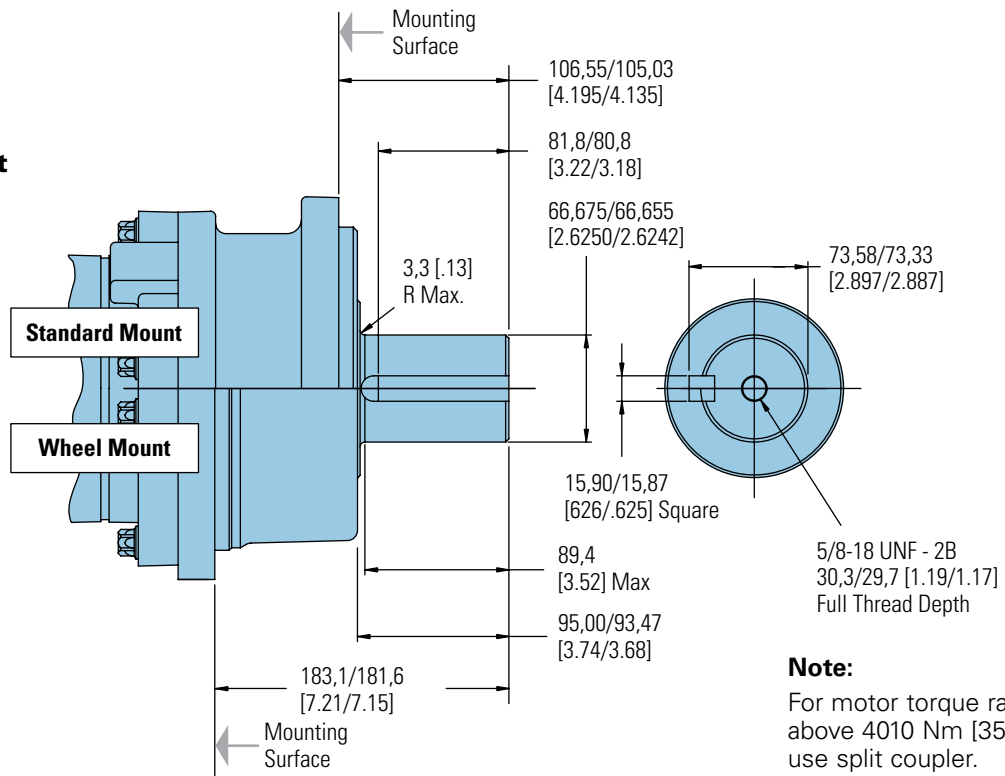


VIS 45 Series

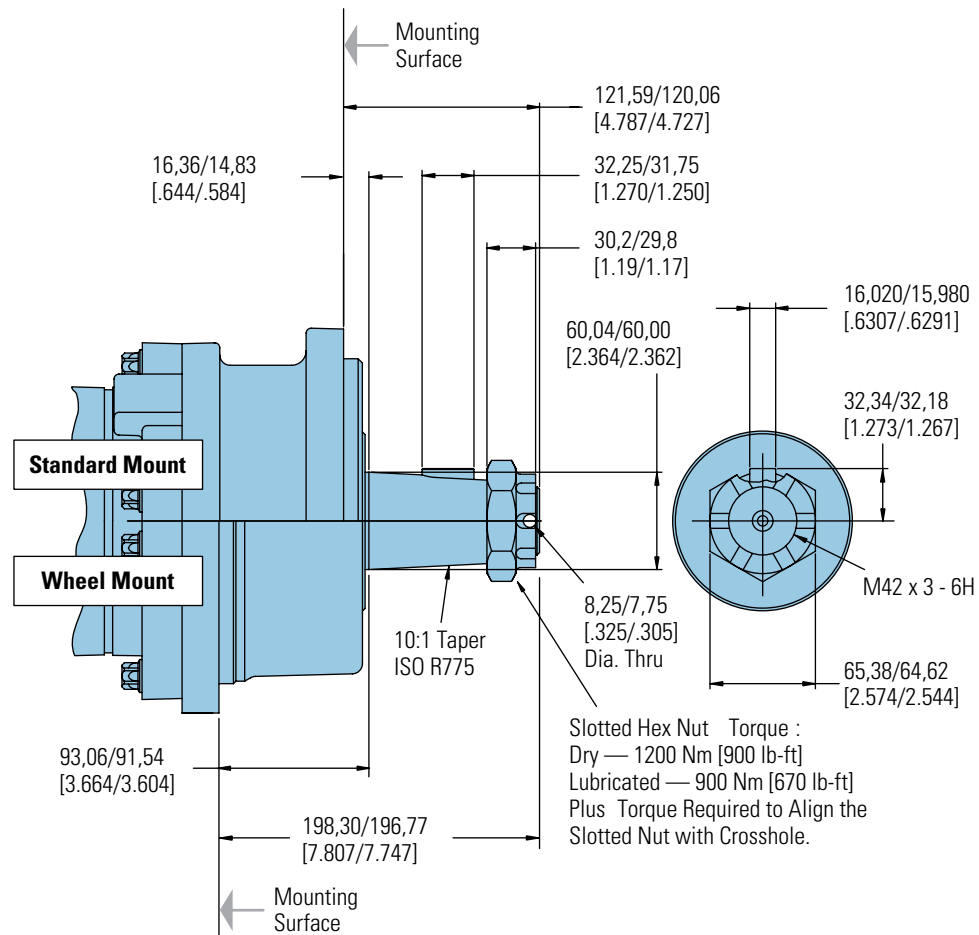
Dimensions Shafts

Keyed

2-5/8 Inch Straight



60 mm Tapered



VIS 45 Series

Side Load Capacity

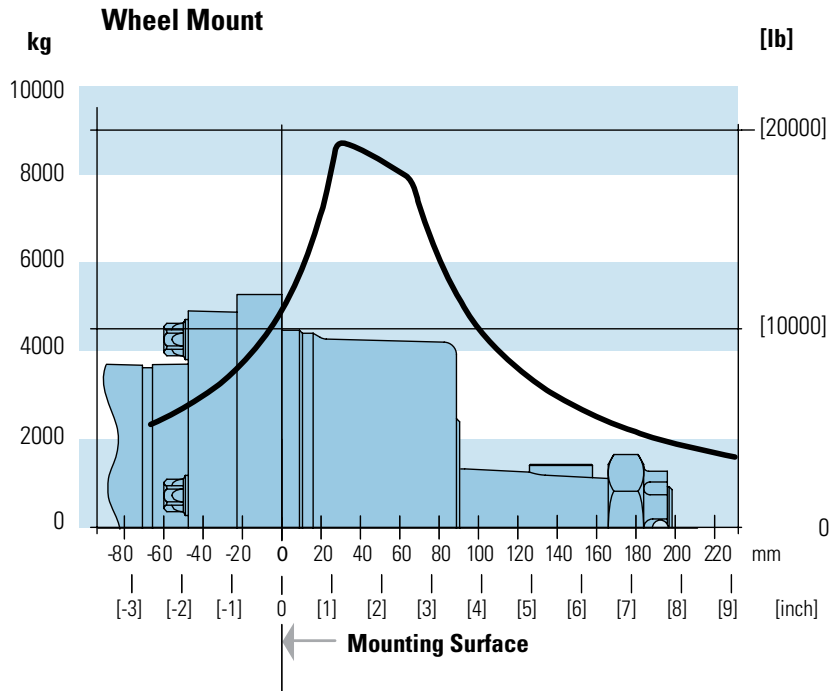
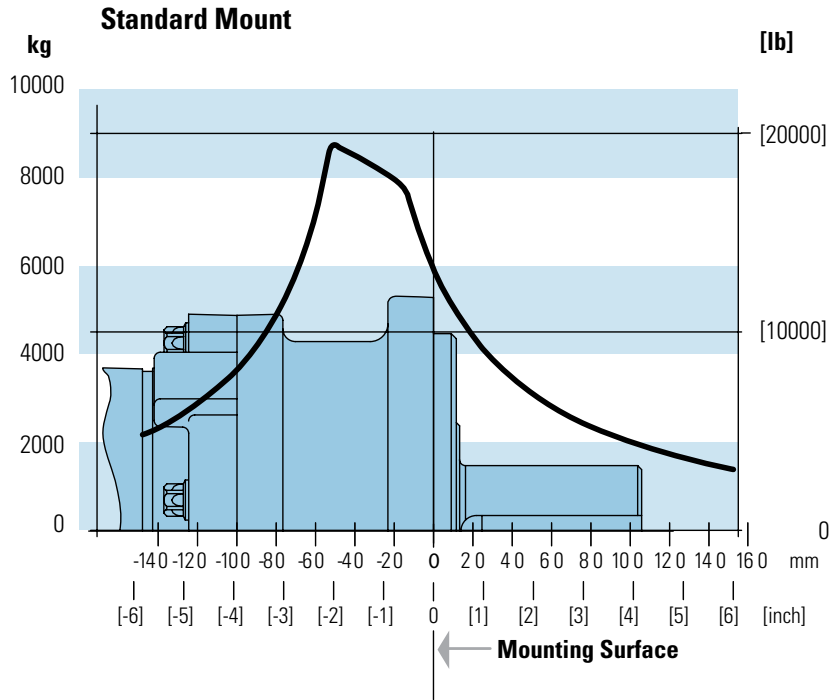
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

The curve is based on B 10 bearing life (2000 hours or 12,000,000 shaft revolutions at 100 RPM) at rated output torque.

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

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

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.



VIS 45 Series

Product Numbers

Closed Loop

Use three-digit prefix (155-, 156-, or 157-) plus four-digit number from charts for complete product number (ex: 157-0034).

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

SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0107	-0108	-0109	-0110	-0111
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0114	-0115	-0116	-0117	-0118
	70 mm 22 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0121	-0122	-0123	-0124	-0125
	2-3/4 inch 32 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0128	-0085	-0129	-0130	-0131
Wheel	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	156-0039	-0040	-0041	-0042	-0043
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	156-0046	-0047	-0048	-0049	-0050
Bearingless	(8 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	157-0066	-0067	-0068	-0069	-0070
	(4 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	157-0004	-	-	-	-

157-0004

ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0134	-0135	-0136	-0137	-0138
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0141	-0142	-0143	-0144	-0145
	70 mm 22 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0148	-0149	-0150	-0151	-0152
	2-3/4 inch 32 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0155	-0156	-0157	-0158	-0159
Wheel	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	156-0053	-0054	-0055	-0056	-0057
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	156-0060	-0061	-0062	-0063	-0064
Bearingless	(8 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	157-0074	-0075	-0076	-0077	-0078
	(4 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	157-0081	-	-	-	-

157-0081

Note:

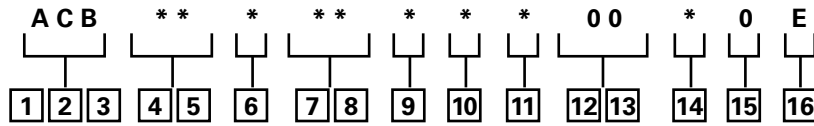
The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 15,2 bar [220 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

VIS 45 Series

Model Code

The following 16 - digit coding system has been developed to identify all of the configuration options for the VIS 45 motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



1, 2, 3 Product Series
ACB – VIS 45 Motor

4, 5 Displacement
cm³/r [in³/r]

39 – 630 [38.6]

49 – 805 [48.6]

60 – 990 [60.5]

76 – 1245 [76.0]

95 – 1500 [95.0]

6 Mounting Type

A – 4 Bolt Bearingless
 158,70 [6.250] Pilot Dia.
 With 9,07 [.355] Pilot Length
 and 17,53 [.690] Dia holes
 on 190,50 [7.500] Dia. B. C.
 - Max. Torque Allowed 3615
 Nm [32000 lb - in] (Displ.
 Code 32, 35, 39 Only)

C – 8 Bolt Bearingless
 158,70 [6.250] Pilot Dia.
 With 9,07 [.355] Pilot Length
 and 17,53 [.690] Dia holes
 on 190,50 [7.500] Dia. Bolt
 Circle

D – 4 Bolt Wheel Mount
 200,0 [7.87] Pilot Dia. With
 9,0 [.35] Pilot Length and
 20,57 [.810] Dia. Holes on
 250,0 [9.84] Dia. Bolt Circle

H – 4 Bolt Standard Mount
 200,0 [7.87] Pilot Dia. With
 9,0 [.35] Pilot Length and
 20,57 [.810] Dia. Holes on
 250,00 [9.84] Dia. Bolt Circle

7, 8 Output Shaft

00 – None (Bearingless)

05 – 2-5/8 inch Dia. Straight
 Shaft with 5/8-18 UNF-2B
 Thread in End and 15,88
 [.625] Sq. X 81,3 [3.20]
 Straight Key

06 – 70 mm Dia. 22 Tooth
 3 Modulus Splined Shaft Per
 DIN 5480 with M16 X 1,5
 Thread in End

08 – 2-3/4 inch Dia. Flat
 Root Side Fit 32 Tooth 12/24
 DP 30°. Involute Spline with
 5/8-18 UNF-2B Thread in End

09 – 60 mm Dia. 10:1
 Tapered Shaft Per ISO R775
 with M42 x 3 - 6H Threaded
 Shaft End, 16W x 10H x 32L
 [.630W x .394H x 1.260L]

9 Ports

A – 1-5/16-12 UN-2B O-ring
 Port, Accepts Fittings for
 SAE J1926/1

B – G 1 (BSP) Ports, Accepts
 Fittings with Elastomeric or
 Deformable Metallic Sealing
 Member Per DIN 3852

10 Case Flow Options

B – Check valve with
 leakage orifice, no case
 drain (for Open Loop only)

D – Shuttle Valve with Side
 Facing 9/16-18 UNF-2B,
 O-ring Port Case Drain,
 Accepts Fittings for SAE
 J1926/1, Case Drain
 Required

H – Shuttle Valve with Side
 Facing G 1/4 (BSP) Port
 Case Drain, Case Drain
 Required

11 Back-Pressure Relief

0 – None (for Open Loop
 Only)

1 – Set at 15,2 bar [220 psi]
 (for Servo Pumps)

3 – Set at 4,5 bar [65 psi]
 (for Manual Pumps)

4 – Set at 20,7 bar [300 PSI]
 (for High Pressure Servo
 Pumps)

12, 13 Special Features

00 – None

**14 Paint/ Special
 Packaging**

0 – Primer, Individual Box

A – Low Gloss Black Primer,
 Individual Box

B – No Paint, Bulk Box
 Option

C – Low Gloss Black Primer,
 Bulk Box Option

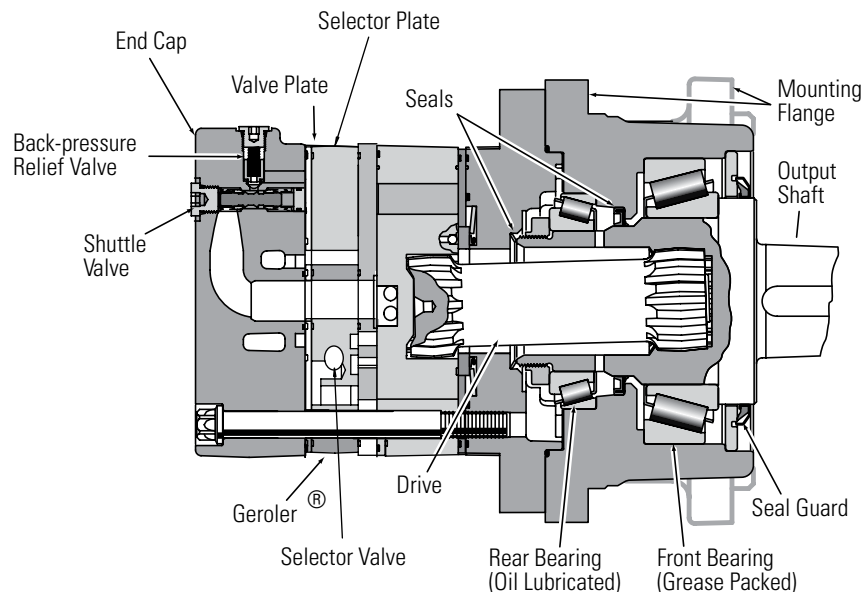
**15 Eaton Assigned
 Code when Applicable**

0 – Assigned Code

**16 Eaton Assigned
 Design Code**

E – Assigned Design Code

VIS 45 Series Two-speed



Specifications

VIS 45 Series motors are available with an integral two-speed feature that allows the operator to shift the motor between low speed high torque (LSHT) mode and high speed low torque (HSLT) mode. In the LSHT mode, output torque and rotation speed values are equal to those of the conventional VIS 45 motor. In the HSLT mode motor displacement is reduced by one third, resulting in a fifty percent increase in rotation speed and a torque output reduction of one third. The VIS 45 two speed motor is bidirectional. It will function with equal shaft output in either rotation direction (CW or CCW) in both LSHT and HSLT modes. Shift on the fly technology allows full-power operation throughout the full duration of the shift.

Changing between modes is accomplished by changing the displacement in a ratio of 1 to 1.5. An external two-position three-way control valve is required for shifting pressure to the pilot port between low pressure (LSHT mode) and pilot signal pressure (HSLT mode). An integral selector valve shifts the motor from LSHT mode to HSLT mode. Initially, low pressure is supplied to the pilot port. The selector valve is biased to LSHT mode by a return spring. When pilot signal pressure is supplied to the pilot port and 3,5 Δbar [50 ΔPSI] is reached, the selector valve overcomes return spring force and the shifts the spool to select HSLT mode. Oil on the opposite side of the spool is drained to tank via the drain port. The pressure difference between the pilot port and drain port must be maintained to keep the motor in the high speed mode. When pilot pressure

is removed from the pilot port, the pressure in the pilot end of the spool valve is relieved and drained back through the control valve and the return spring forces the spool valve to LSHT position.

Pilot pressure may come from any source that will provide uninterrupted pressure during the high-speed mode operation. Allowable pilot pressure must be at least 3,5 Δbar [50 ΔPSI] and may be as high as full operating pressure of the motor.

All VIS 45 Series two speed motors are equipped with a return line shuttle for closed circuit applications as standard equipment. All options available on the conventional VIS 45 are also available on VIS 45 two speed motors.

Performance Data

In the LSHT mode, torque and speed values are equal to those of the conventional VIS 45 motor. In the HSLT mode, rotation speed is increased by fifty percent and torque output is reduced by one third.

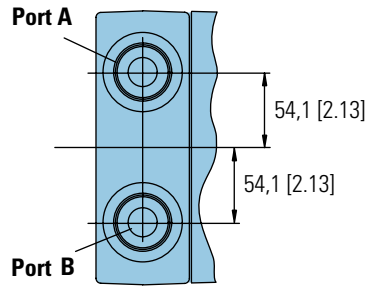
The VIS 45 two speed motor will function with equal shaft output in either rotation direction (CW or CCW) in both LSHT and HSLT modes.

VIS 45 Series

Two-speed

Dimensions

Standard Mount

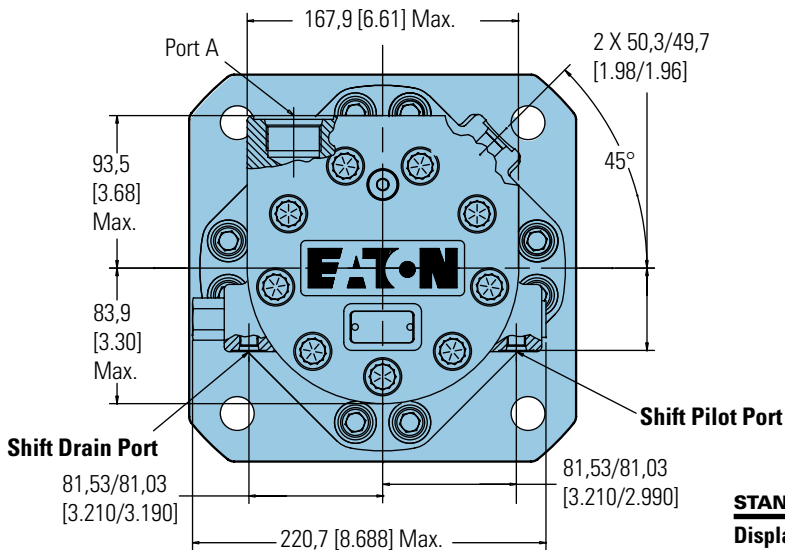
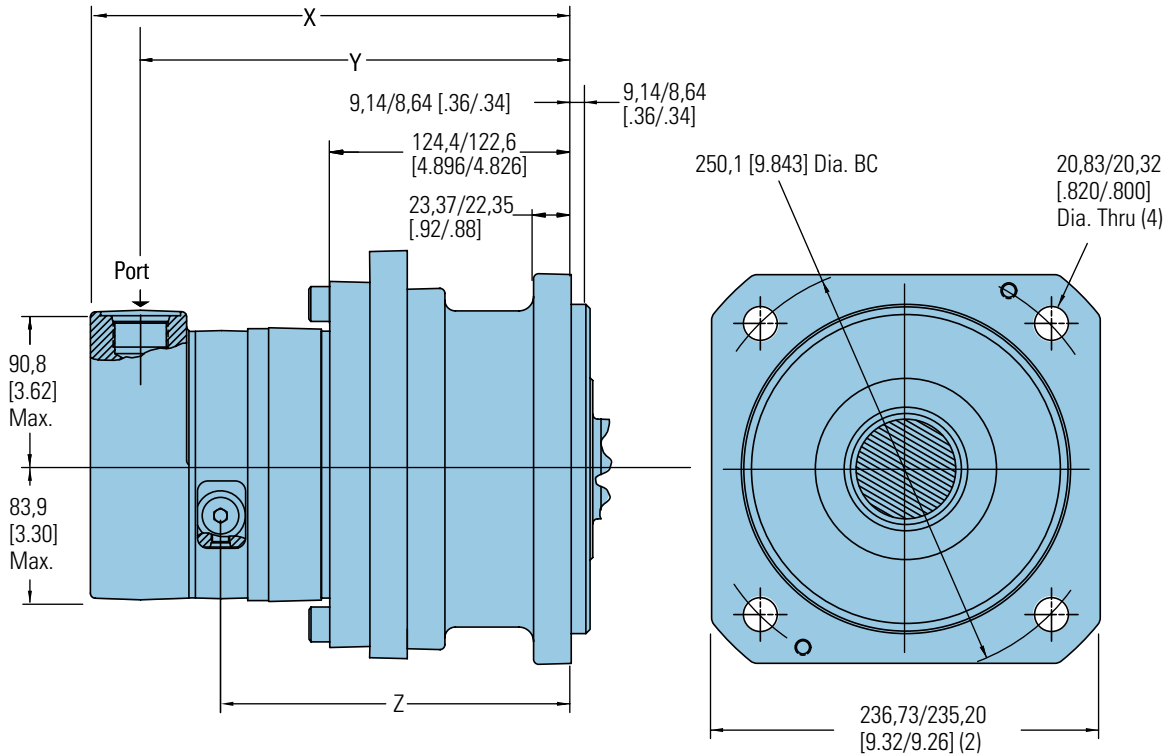


Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)
- or
- G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

Standard Rotation Viewed from Shaft End

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



STANDARD MOUNT

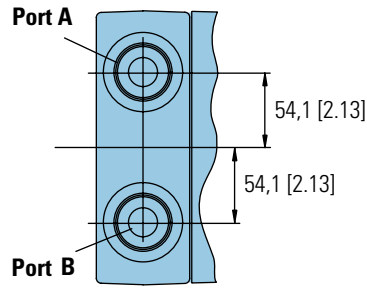
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
630 [38.6]	295,5 [11.63]	263,2 [10.36]	216,3 [8.51]
805 [48.6]	305,9 [12.04]	273,6 [10.77]	226,7 [8.92]
990 [60.5]	318,3 [12.53]	286,0 [11.26]	239,1 [9.41]
1245 [76.0]	334,3 [13.16]	302,0 [11.89]	255,1 [10.04]
1560 [95.0]	353,3 [13.94]	321,0 [12.67]	274,1 [10.82]

VIS 45 Series

Two-speed

Dimensions

Wheel Mount

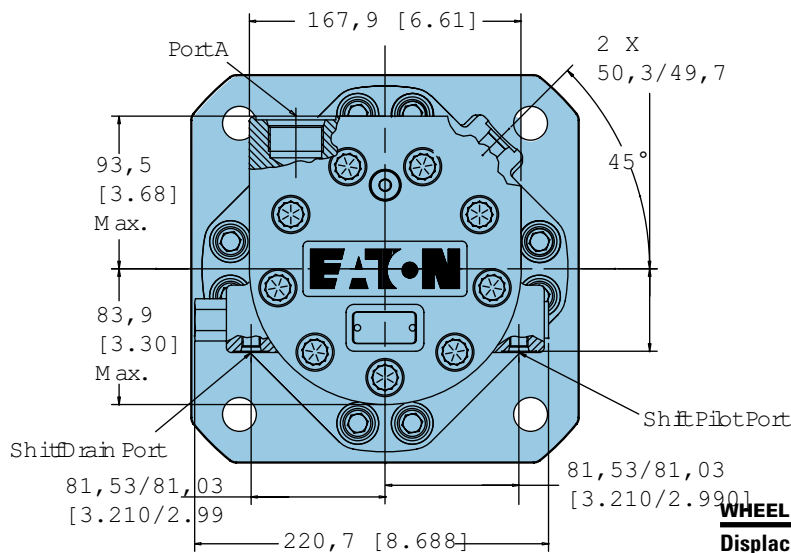
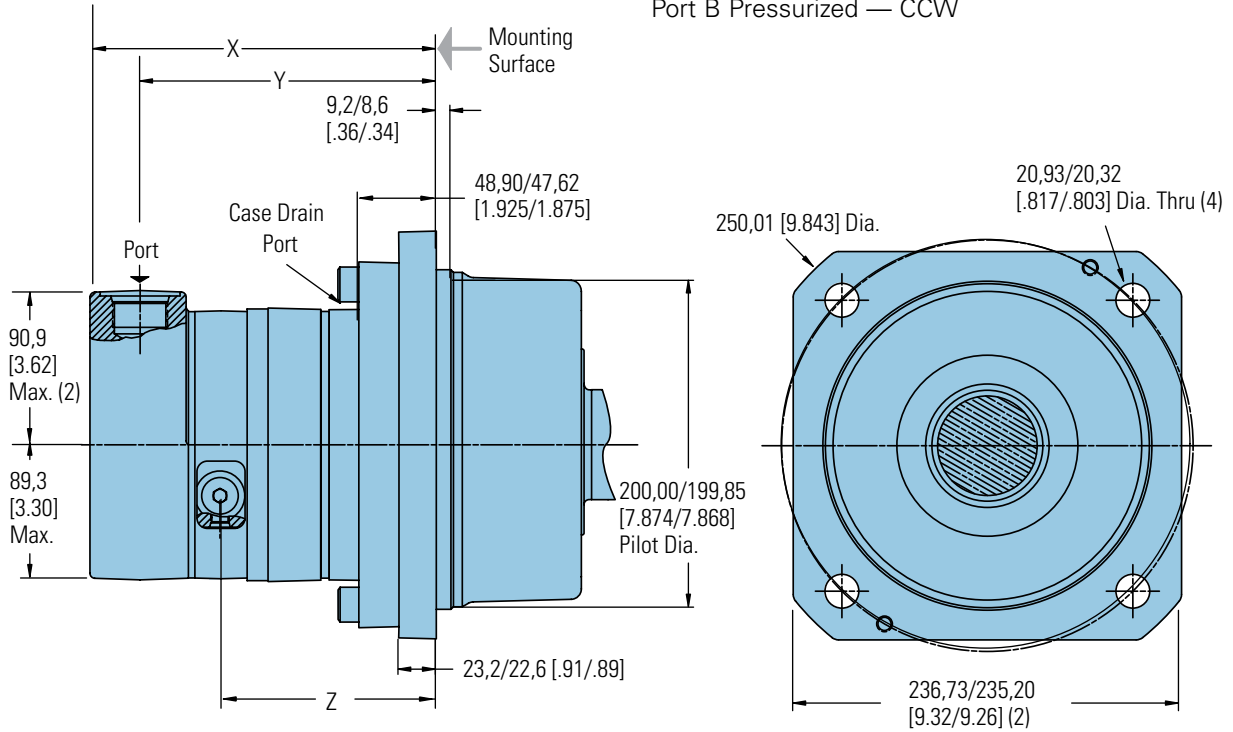


Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)
- or
- G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)

Standard Rotation Viewed from Shaft End

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



WHEEL MOUNT

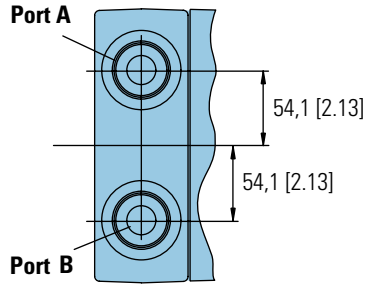
Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
630 [38.6]	218,8 [8.61]	186,5 [7.34]	139,6 [5.49]
805 [48.6]	229,2 [9.02]	196,9 [7.75]	150,0 [5.90]
990 [60.5]	241,6 [9.51]	209,4 [8.24]	162,4 [6.39]
1245 [76.0]	257,6 [10.14]	225,6 [8.88]	178,4 [7.02]
1560 [95.0]	276,6 [10.92]	245,4 [9.66]	197,4 [7.80]

D-2

VIS 45 Series

Two-speed

Dimensions
Bearingless



Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)
- Or
- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

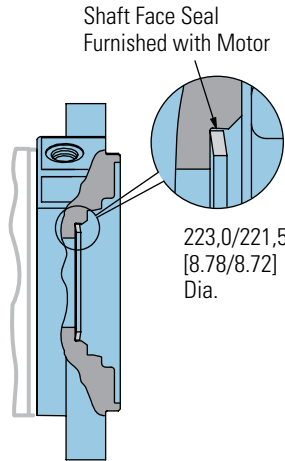
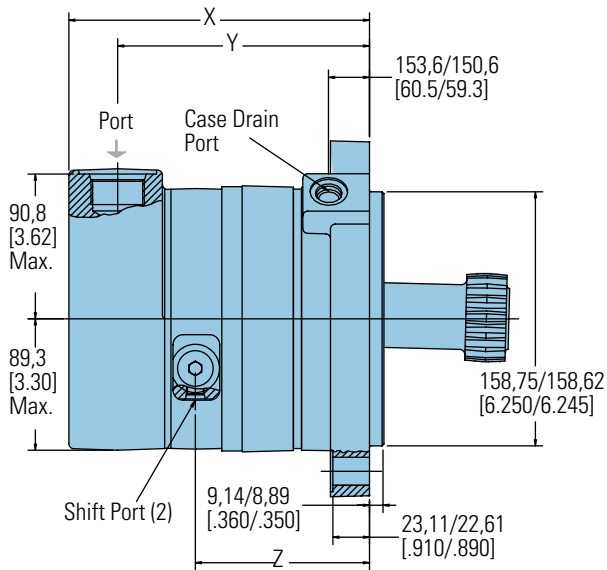
Standard Rotation Viewed from Drive End

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

For VIS 45 two-speed bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

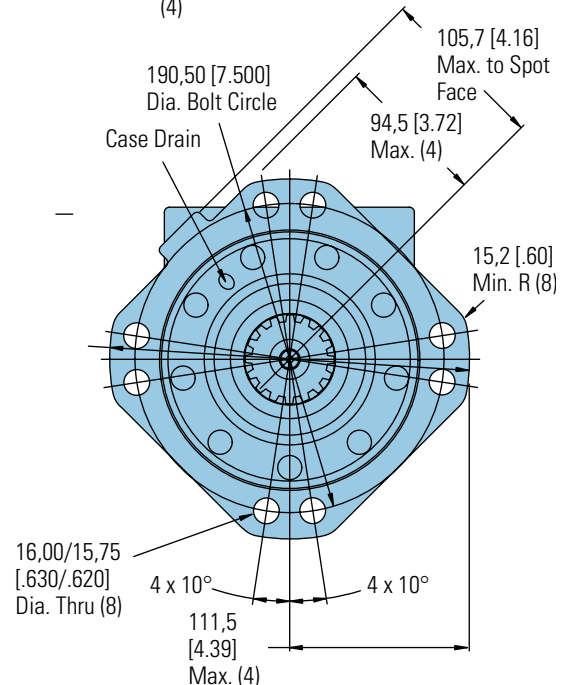
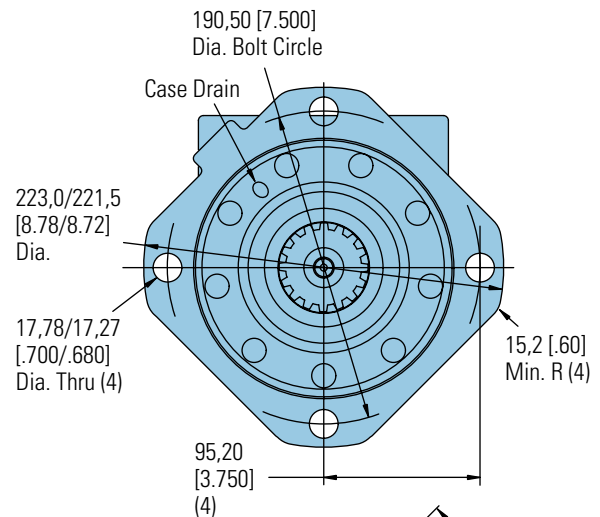
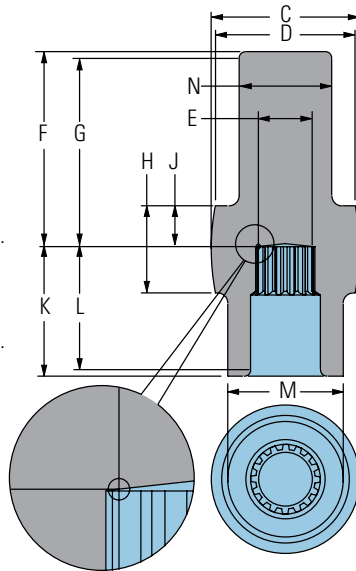
Note:

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



Mating Coupling Blank Eaton Part No. 13521-003

- C** 116,3 [4.58] Dia. Max.
- D** 111,8 [4.40] Dia. Min.
- E** 37,64 [1.482] Dia.
- F** 136,7 [5.38] Max.
- G** 131,6 [5.18] Min. Full Form Dia.
- H** 64,8 [2.55]
- J** 26,4 [1.04]
- K** 109,7 [4.32] Max.
- L** 104,6 [4.12] Min. Full Form Dia.
- M** 92,58 [3.645] Dia.
- N** 73,28 [2.885] Dia.



BEARINGLESS MOTORS

Displacement cm ³ /r [in ³ /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
630 [38.6]	196,1 [7.72]	165,9 [6.53]	116,9 [4.60]
805 [48.6]	206,5 [8.13]	176,3 [6.94]	127,3 [5.01]
990 [60.5]	218,9 [8.62]	188,8 [7.43]	139,7 [5.50]
1245 [76.0]	235,2 [9.26]	205,0 [8.07]	156,0 [6.14]
1560 [95.0]	255,0 [10.04]	224,8 [8.85]	175,8 [6.92]

VIS 45 Series Two-speed

Product Numbers

(Closed Loop)

Use digit prefix—173-,174- or 183- plus four digit number from charts for complete product number—

Example: 173-0013.

Orders will not be accepted without three digit prefix.

SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0006	-0007	-0008	-0009	-0010
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0011	-0012	-0013	-0014	-0015
	70 mm 22 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0016	-0017	-0018	-0019	-0020
Wheel	2-3/4 inch 32 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0021	-0022	-0023	-0024	-0025
	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	183-0006	-0007	-0008	-0009	-0010
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	183-0011	-0012	-0013	-0014	-0015
Bearingless	(8 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	173-0008	-0009	-0010	-0011	-0012
	(4 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	173-0013	-	-	-	-

173-0013

ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm ³ /r [in ³ /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0026	-0027	-0028	-0029	-0030
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0031	-0032	-0033	-0034	-0035
	70 mm 22 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0036	-0037	-0038	-0039	-0040
Wheel	2-3/4 inch 32 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0041	-0042	-0043	-0044	-0045
	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	183-0016	-0017	-0018	-0019	-0020
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	183-0021	-0022	-0023	-0024	-0025
Bearingless	(8 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	173-0014	-0015	-0016	-0017	-0018
	(4 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	173-0019	-	-	-	-

173-0019

Note:

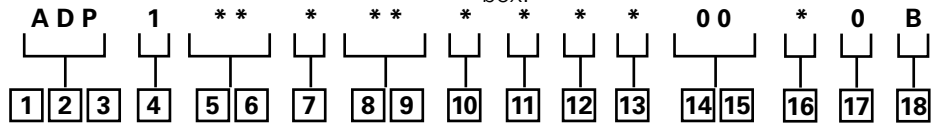
The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 15,2 bar [220 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

VIS 45 Series Two-speed

Model Code

The following 18-digit coding system has been developed to identify all of the configuration options for the VIS 45 Two-Speed motor. Use this model code to specify a motor with the desired features. All 18 digits of the code must be present when ordering. You may want to photocopy the matrix below to endure that each number is entered in the correct box.



1, 2, 3 Product Series
ADP – VIS 45 Two-speed Motor

4 Eaton Assigned Code
1 – Assigned Code

5, 6 Displacement
cm³/r [in³/r]

- 49** – 805 [48.6]
- 60** – 990 [60.5]
- 76** – 1245 [76.0]
- 95** – 1560 [95.0]

7 Mounting Type

- A** – 4 Bolt Bearingless
 158,70 [6.250] Pilot Dia.
 With 9,07 [.355] Pilot Length
 and 17,53 [.690] Dia holes
 on 190,50 [7.500] Dia. B. C.
 - Max. Torque Allowed 3615
 Nm [32000 lb-in] (Displ.
 Code 32, 35, 39 Only)
- C** – 8 Bolt Bearingless
 158,70 [6.250] Pilot Dia.
 With 9,07 [.355] Pilot Length
 and 17,53 [.690] Dia holes
 on 190,50 [7.500] Dia. Bolt
 Circle

D – 4 Bolt Wheel Mount
 200,0 [7.87] Pilot Dia. With
 9,0 [.35] Pilot Length and
 20,57 [.810] Dia. Holes on
 250,0 [9.84] Dia. Bolt Circle

H – 4 Bolt Standard Mount
 200,0 [7.87] Pilot Dia. With
 9,0 [.35] Pilot Length and
 20,57 [.810] Dia. Holes on
 250,00 [9.84] Dia. Bolt Circle

8, 9 Output Shaft

- 00** – None (Bearingless)
- 05** – 2-5/8 inch Dia. Straight
 Shaft with 5/8-18 UNF-2B
 Thread in End and 15,88
 [.625] Sq. X 81,3 [3.20]
 Straight Key
- 06** – 70 mm Dia. 22 Tooth
 3 Modulus Splined Shaft Per
 DIN 5480 with M16 X 1,5
 Thread in End
- 08** – 2-3/4 inch Dia. Flat
 Root Side Fit 32 Tooth 12/24
 DP 30°. Involute Spline with
 5/8-18 UNF-2B Thread in End
- 09** – 60 mm Dia. 10:1
 Tapered Shaft Per ISO R775
 with M42 x 3 - 6H Threaded
 Shaft End, 16W x 10H x 32L
 [.630W x .394H x 1.260L]

10 Ports

A – 1-5/16-12 UN-2B O-ring
 Port, Accepts Fittings for
 SAE J1926/1

B – G 1 (BSP) Straight
 Thread Ports

11 Case Flow Options

- D** – Shuttle Valve with Side
 Facing 9/16-18 UNF-2B,
 O-ring Port Case Drain,
 Accepts Fittings for SAE
 J1926/1, Case Drain
 Required
- F** – Shuttle Valve with Side
 Facing G 1/4 (BSP) Port
 Case Drain, Case Drain
 Required

12 Back-Pressure Relief

- 1** – Set at 15,2 bar [220 psi]
 (for Servo Pumps)
- 3** – Set at 4,5 bar [65 psi]
 (for Manual Pumps)
- 4** – Set at 20,7 bar [300 PSI]
 (for High Pressure Servo
 Pumps)

13 Eaton Assigned Code

0 – Assigned Code

14, 15 Special Features

00 – None

16 Paint/ Special Packaging

- 0** – Primer, Individual Box
- A** – Low Gloss Black Primer,
 Individual Box
- B** – No Paint, Bulk Box
 Option
- C** – Low Gloss Black Primer,
 Bulk Box Option

17 Eaton Assigned Code when Applicable

0 – Assigned Code

18 Eaton Assigned Design Code

B – Assigned Design Code

Notes

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