



State of the art motors benefiting from 45 years of experience and innovating constantly to fit your demands.



*Powering Business Worldwide*

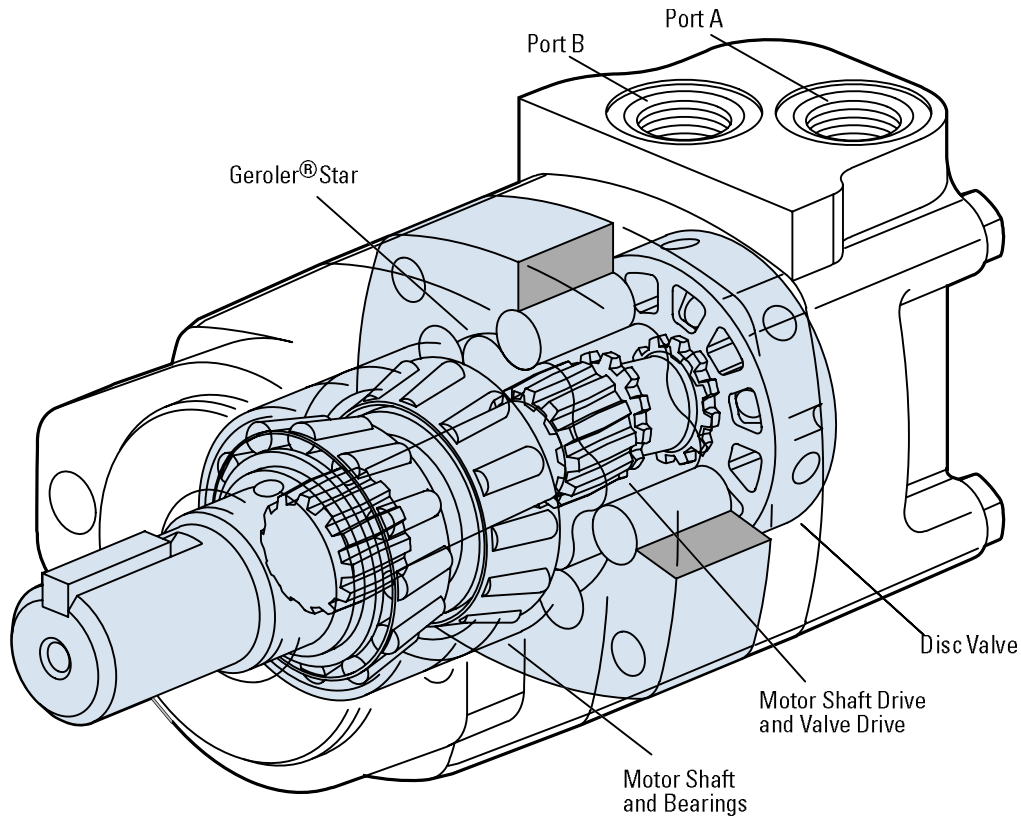
# Disc Valve Hydraulic Motors

## 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:

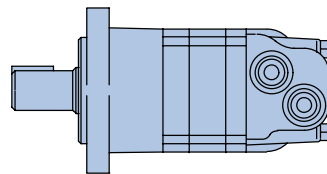
- Displacement (Geroler size)
- Output Shaft
- No Shaft and Bearing Assembly (Bearingless Motor)
- Port Configuration
- Mounting Flange
- Other Special Features

## Benefits

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

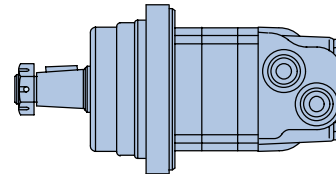
## Applications

- 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



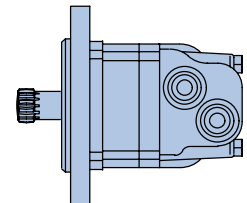
### Standard Motor

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.

# Table of Contents

Highlights	C-ii
Features, Benefits and Applications	C-iii
Table of Contents	C-iv

## 2000 Series

Highlights	C-1-1
Specifications	C-1-2
Performance Data	C-1-3
Dimensions	C-1-8
Installation Information	C-1-14
Shaft Side Load Capacity	C-1-18
Case Pressure and Case Porting	C-1-19
Product Numbers	C-1-23
Model Code	C-1-24

## 2000 Series Two-Speed

Description	C-1-25
Performance Data	C-1-25
Typical Hydraulic Circuit	C-1-26
Specifications	C-1-27
Dimensions	C-1-28
Product Numbers	C-1-30

## 4000 Compact Series

Highlights	C-2-1
Specifications	C-2-2
Performance Data	C-2-3
Dimensions	C-2-9
Installation Information	C-2-12
Shaft Side Load Capacity	C-2-17
Case Pressure and Case Port	C-2-18
Model Code	C-2-22

## Delta Series

Highlights	C-3-1
Specifications	C-3-2
Performance Data	C-3-3
Dimensions	C-3-9
Shaft Side Load Capacity	C-3-12
Product Numbers	C-3-13
Model Code	C-3-14

## 4000 Series

Highlights	C-4-1
Specifications	C-4-2
Performance Data	C-4-3
Dimensions	C-4-8
Installation Information	C-4-11
Shaft Side Load Capacity	C-4-13
Case Pressure and Case Port	C-4-14
Product Numbers	C-4-16
Model Code	C-4-17

## 6000 Series

Highlights	C-5-1
Specifications	C-5-2
Performance Data	C-5-3
Dimensions	C-5-8
Installation Information	C-5-12
Shaft Side Load Capacity	C-5-14
Case Pressure and Case Port	C-5-15
Dimensions Ports	C-5-16
Product Numbers	C-5-17
Model Code	C-5-18

## 10,000 Series

Highlights	C-6-1
Specifications	C-6-2
Performance Data	C-6-3
Dimensions	C-6-5
Installation Information	C-6-8
Side Shaft Load Capacity	C-6-10
Product Numbers	C-6-12
Model Code	C-6-13

## 10,000 Series Two-Speed

Description	C-6-14
Performance Data	C-6-14
Typical Hydraulic Circuit	C-6-15
Specifications	C-6-16
Dimensions	C-6-17
Product Numbers	C-6-19

# 2000 Series Two-Speed

## Description

The Eaton 2000 Series motors are available with an integral two speed feature that changes the displacement in a ratio of 1 to 2 and shifts the motor from a low speed high torque (LSHT) mode to a high speed low torque (HSLT) mode. The open center selector valve shifts the speed mode from low to high speed when pilot pressure of 6.9  $\Delta$  Bar [100  $\Delta$  PSI] minimum is applied to the pilot port (6.9 Bar [100 PSI] higher than case pressure). In the high speed mode torque values are approximately one half with twice the speed of the conventional 2000 Series single speed motors.

An external two position three way valve is required for shifting the pilot pressure port between signal pressure (HSLT) and low pressure (LSHT)

Two speed motors are available with a return line closed center shuttle for closed circuit applications. Low speed high torque mode is the normal position of the speed selector valve. When a differential pressure is supplied to the pilot port and 6,9 Bar [100 PSI] is reached, the selector valve overcomes the return spring force and the spool shifts to the high speed mode. The oil in the opposite side of the spool is drained internally. Pressure between the pilot supply and case drain or return line (depending on open or closed circuit system) must be maintained to keep the motor in the high speed mode.

When pilot pressure is removed from the pilot port the pressure in the pilot end of the spool valve is relieved and drained back through

this three way valve, the spring force returns the spool valve to LSHT position. Pilot pressure may come from any source that will provide uninterrupted pressure during the high speed mode operation. Pilot pressure 6,9  $\Delta$  Bar [100  $\Delta$  PSI] minimum, up to the full operating pressure of the motor.

In normal LSHT operation the Char-Lynn two speed motor will function with equal shaft output in either direction (CW or CCW), the same as the single speed Char-Lynn disc valve motors. However, to prevent cavitation in the HSLT mode, the preferred direction of shaft rotation is counter clockwise (port B pressurized). This unique disc valve is not symmetrical in porting the fluid for the HSLT mode. Consequently, when the pressure is reversed for

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

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

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

## 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.

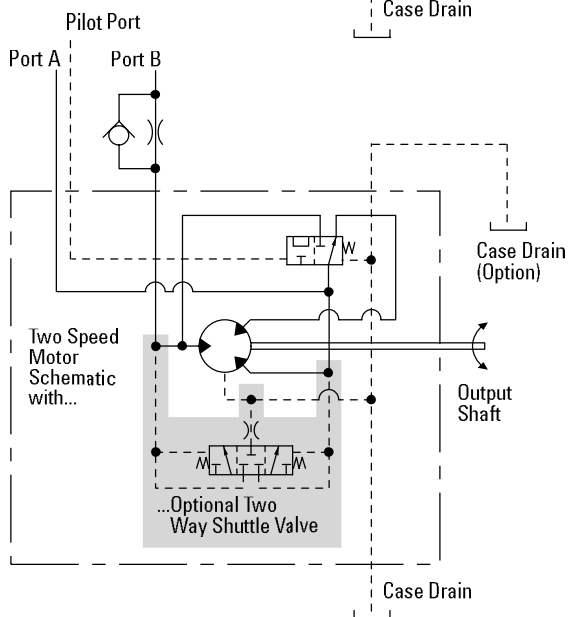
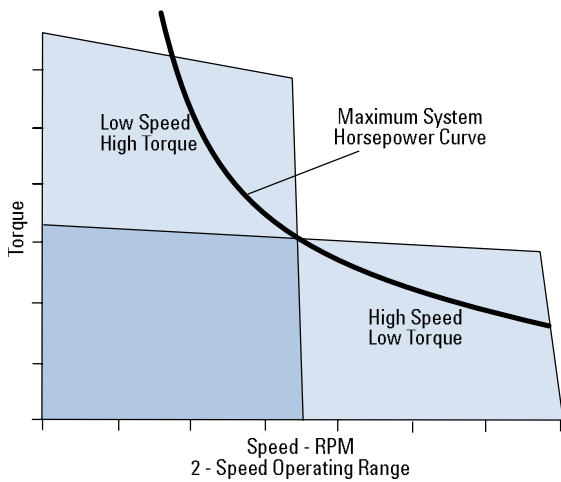
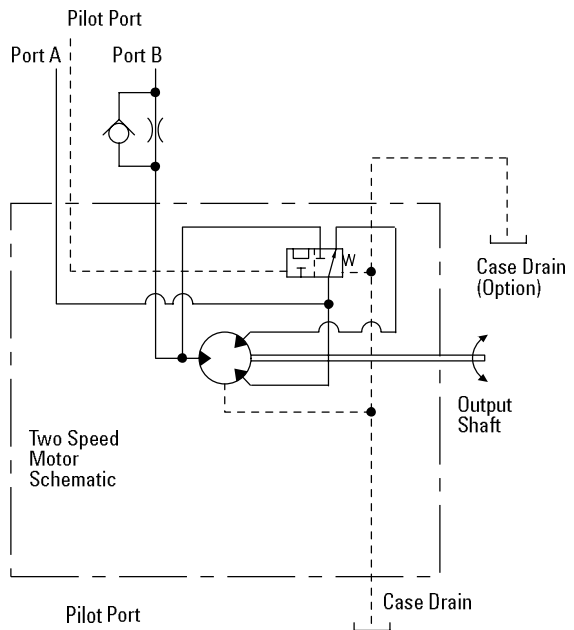
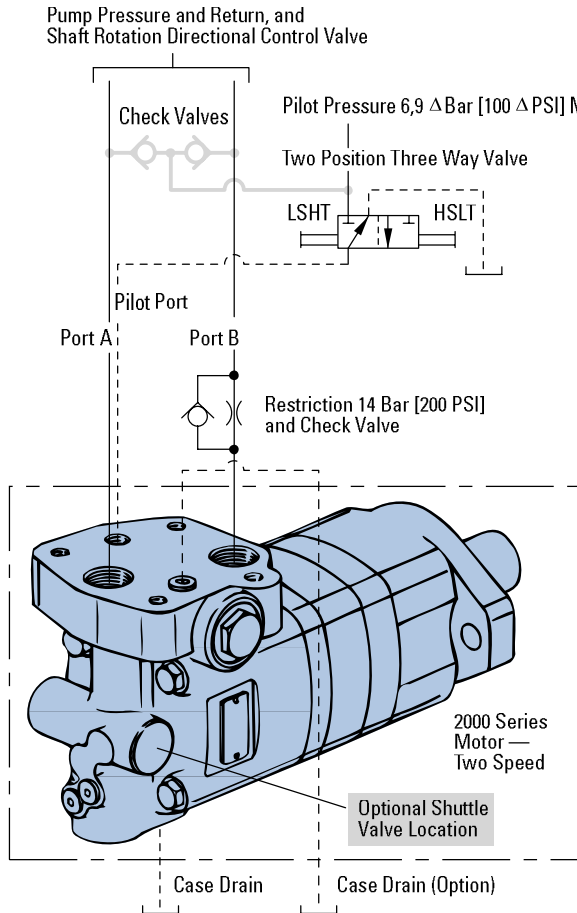
**Be certain in closed loop applications that the charge pump when used for back pressure on the B port, has sufficient displacement to maintain charge pressure especially in dynamic braking or overrunning load conditions.**

### Important!

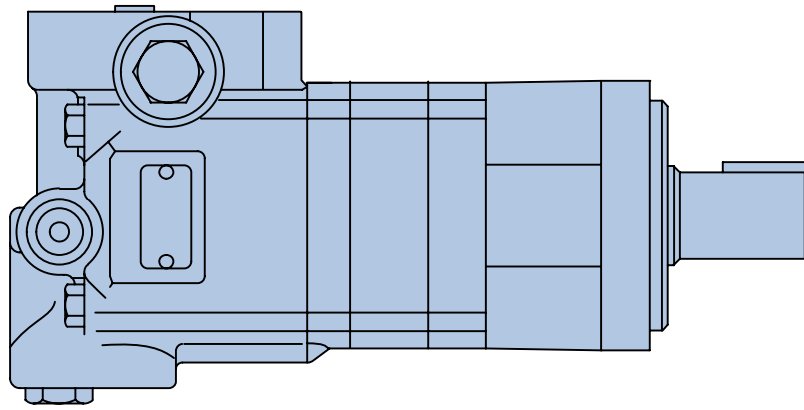
**Due to potential problems in maintaining charge pump pressure at port B for uninterrupted back pressure during dynamic braking, Eaton does not recommend the two speed motor where overrunning conditions may exist.**

# 2000 Series Two-Speed

## Typical Hydraulic Circuit



# 2000 Series Two-Speed Specifications



## SPECIFICATION DATA — 2000 SERIES TWO-SPEED MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]	High Speed Mode	40 [2.45]	50 [3.1]	65 [4.0]	80 [4.8]	95 [5.95]	120 [7.45]	155 [9.35]	195 [12.0]	245 [14.9]
	Low Speed Mode	80 [4.9]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
Max. Speed (RPM)	High Speed Mode	1000	1000	990	860	700	560	450	350	230
	Low Speed Mode	500	500	495	430	350	280	225	175	115
@ Continuous Flow										
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 $\Delta$ bar [ $\Delta$ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	155 [2250]	120 [1750]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	260 [3750]	260 [3750]	260 [3750]	260 [3750]	190 [2750]	140 [2000]
Weight kg [lb]	Standard or Wheel Mount	13,8 [30.5]	14,1 [31.0]	14,3 [31.5]	14,5 [32.0]	15,0 [33.0]	15,4 [34.0]	15,9 [35.0]	16,3 [36.0]	16,8 [37.0]
	Bearingless	11,8 [26.0]	12,0 [26.5]	12,2 [27.0]	12,5 [27.5]	12,9 [28.5]	13,4 [29.5]	13,8 [30.5]	14,3 [31.5]	14,7 [32.5]

Maximum Case Pressure: See case pressure seal limitation graph.

\*See shaft torque ratings for limitations.

### Note:

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

### High Speed Mode

(Reduced Motor Displacement)

### Low Speed Mode

(Full Motor Displacement)

### Maximum Inlet Pressure:

310 bar [4500 PSI]

Do not exceed  $\Delta$  pressure rating (see chart above).

### Maximum Return Pressure:

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

Do not exceed  $\Delta$  pressure rating (see chart above).

### $\Delta$ bar [ $\Delta$ PSI] :

The true pressure difference between inlet port and outlet port

### Continuous Rating:

Motor may be run continuously at these ratings

### Intermittent Operation:

10% of every minute

### Peak Operation:

1% of every minute

### Recommended Fluids:

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

### Recommended Maximum System Operating Temp.:

82° C [180° F]

### Recommended Filtration:

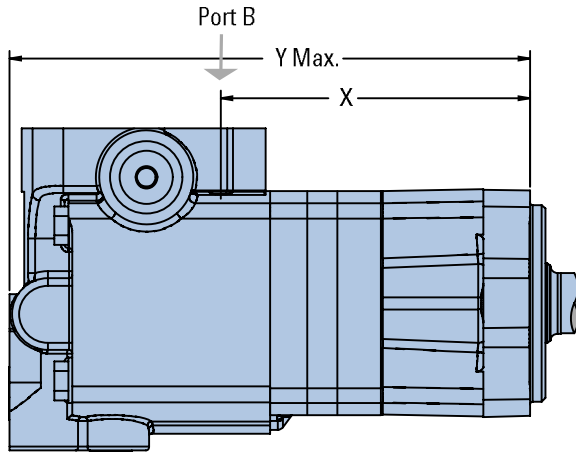
per ISO Cleanliness Code, 4406: 20/18/13

# 2000 Series Two-Speed

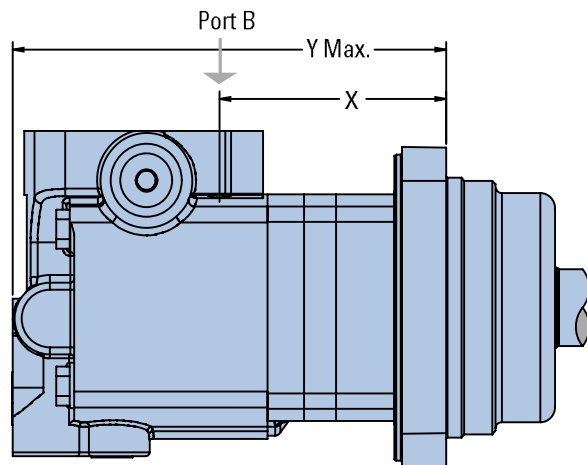
## Dimensions

Standard and Wheel

### Two-Speed Standard Motors



### Two-Speed Wheel Motors



### 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

### STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	137,4 [5.41]	231,6 [9.12]
100 [6.2]	142,0 [5.59]	236,5 [9.31]
130 [8.0]	148,5 [5.85]	242,9 [9.56]
160 [9.6]	148,5 [5.85]	242,9 [9.56]
195 [11.9]	155,2 [6.11]	249,4 [9.82]
245 [14.9]	164,2 [6.47]	258,6 [10.18]
305 [18.7]	175,7 [6.92]	270,1 [10.63]
395 [24.0]	191,5 [7.54]	286,1 [11.26]
490 [29.8]	209,0 [8.23]	303,3 [11.94]

### WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	97,2 [3.83]	191,5 [7.54]
100 [6.2]	101,8 [4.01]	196,4 [7.73]
130 [8.0]	108,3 [4.27]	202,7 [7.98]
160 [9.6]	108,3 [4.27]	202,7 [7.98]
195 [11.9]	115,0 [4.53]	209,3 [8.24]
245 [14.9]	124,2 [4.89]	218,5 [8.60]
305 [18.7]	135,5 [5.34]	229,9 [9.05]
395 [24.0]	151,4 [5.96]	245,9 [9.68]
490 [29.8]	168,9 [6.65]	263,1 [10.36]

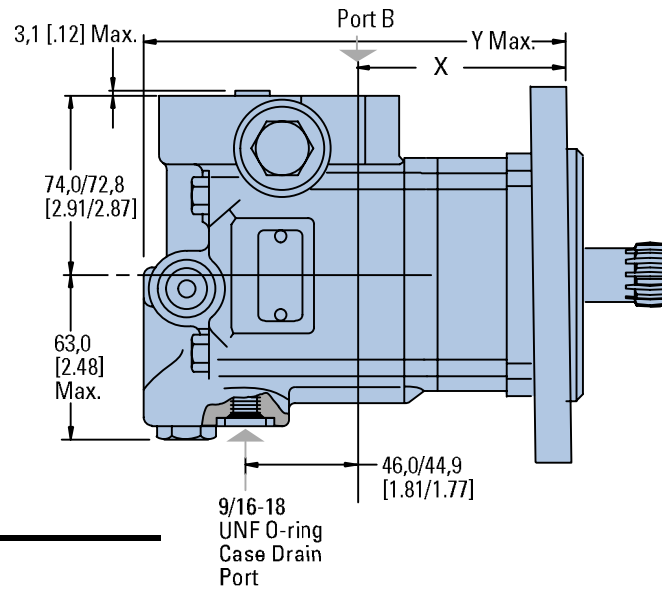
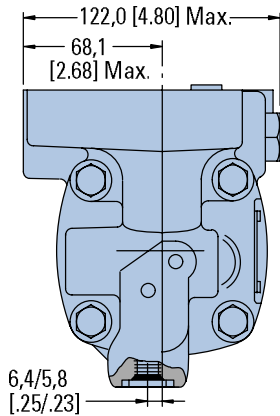
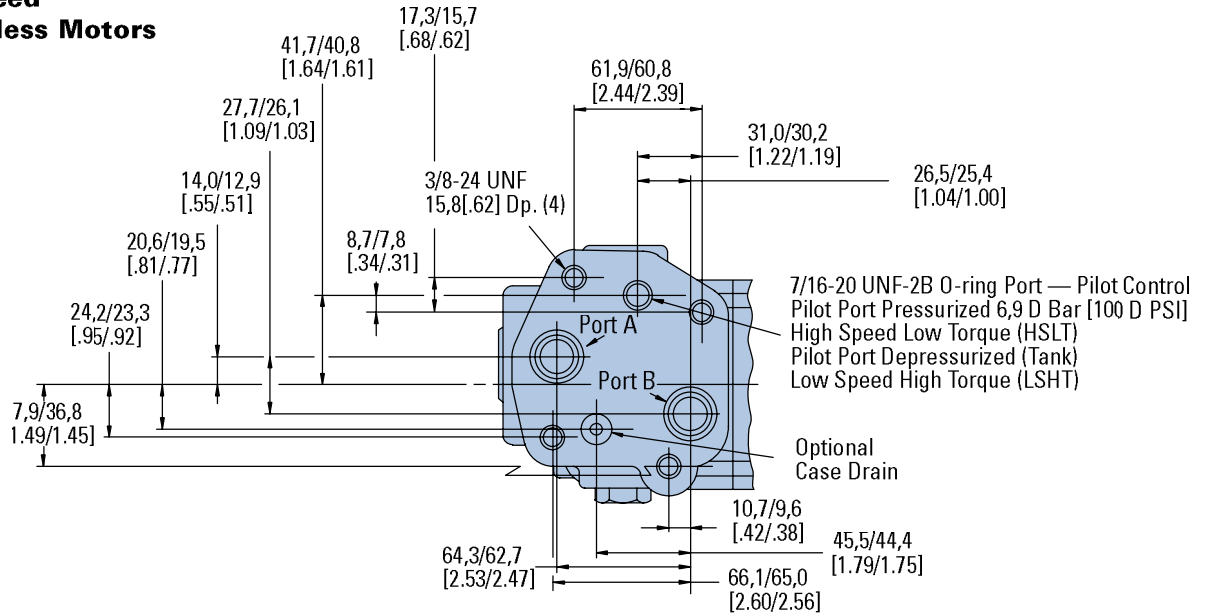


# 2000 Series Two-Speed

## Dimensions

Bearingless

### Two-Speed Bearingless Motors



#### BEARINGLESS MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	79,3 [3.13]	174,0 [6.85]
100 [6.2]	84,1 [3.31]	178,9 [7.04]
130 [8.0]	90,7 [3.57]	185,2 [7.29]
160 [9.6]	90,7 [3.57]	185,2 [7.29]
195 [11.9]	97,3 [3.83]	191,8 [7.55]
245 [14.9]	106,4 [4.19]	201,0 [7.91]
305 [18.7]	117,8 [4.64]	212,4 [8.36]
395 [24.0]	133,6 [5.26]	228,4 [8.99]
490 [29.8]	151,1 [5.95]	245,6 [9.67]

# 2000 Series Two-Speed

## Product Numbers

**Note:**

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

Use digit prefix — 104-, 105-, or 106- plus four digit number from charts for complete product number— Example 106-2007.

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

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER								
			80 [4.9]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
2 Bolt SAE A Flange	1 Inch Straight	7/8 -14 O-ring Staggered	104-2001	-2002	-2003	-2004	-2005	-2006	-2007	-2008	—
	1 1/4 Inch Straight	7/8 -14 O-ring Staggered	104-2009	-2010	-2011	-2012	-2013	-2014	-2015	-2016	-2219
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	104-2017	-2018	-2019	-2020	-2021	-2022	-2023	-2024	—
Wheel Motor	1 1/4 Inch Tapered	7/8 -14 O-ring Staggered	105-2001	-2002	-2003	-2004	-2005	-2006	-2007	-2008	—
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	105-2009	-2010	-2011	-2012	-2013	-2014	-2015	-2016	—
Bearingless		7/8 -14 O-ring Staggered	106-2001	-2002	-2003	-2004	-2005	-2006	-2007	-2008	—

106-2006

# Notes