

## Low-Speed, High-Torque Vane Motors

**HSM SERIES**  
**Torque to 13 750 lb•ft**  
**(18 645 N•m)**

HSM Series vane motors can increase design flexibility, simplify installation and reduce costs. Multiple speed models can improve efficiency.

### REDUCE WEIGHT AND SAVE SPACE

These motors transmit torque and motion through a hollow, internal-spline rotor. This direct-drive design eliminates the need for costly gear reductions and simplifies installation.

The motors can significantly reduce the space required on equipment used in mining, construction, military and other mobile applications.

Direct-drive is also well suited for industrial applications, such as the injector screw function on plastic molding machines.

### SIMPLIFIED WIRING AND PIPING

The thru-shaft spline drive simplifies system design and reduces installation time. The large diameter shaft opening allows the use of either a solid or hollow output shaft.

A hollow shaft accommodates the installation of wiring and other piping through the center of the motor.

This is an advantage on earth augers and drilling equipment and other similar applications. Air or water can be pumped through the center of the motor to remove chips or debris from the drill hole.

### IDEAL FOR VERTICAL MOUNTING

The thru-shaft rotor design makes the motors ideal for machines requiring vertical shaft mounting.

Models with *optional* vertical mounting covers supply increased lubrication



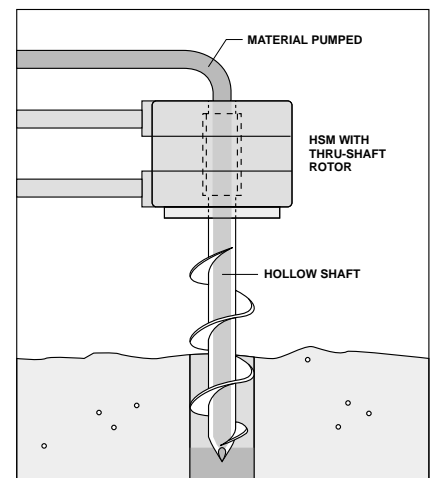
between the rotor and running surfaces on the covers. This provides increased service life for these applications.

For more information about this vertical mounting *option*, contact the Dynex sales department.

### REDUCED INPUT POWER

Multiple displacement models are available which can reduce input horsepower requirements in circuits using fixed pumps.

With two-speed models, the operator can efficiently select between two torque/speed options. Three speed models provide minimum, medium or maximum displacements. For a complete description, see page 3.



*Vertical mounting and a thru-shaft rotor design are advantages for earth augers and rock drills. Motors with hollow shafts provide a passageway through the center of the motor for air, water, wiring, piping and other control elements.*

# Efficient, Long-Life Motor Operation

## EFFICIENT LONG-LIFE OPERATION

HSM motors deliver smooth rotary power from stall to maximum speeds. A radially balanced design improves mechanical efficiency and extends operating life.

A unique square profile produces extra strength at the corners for extended fatigue life, especially at high pressures.

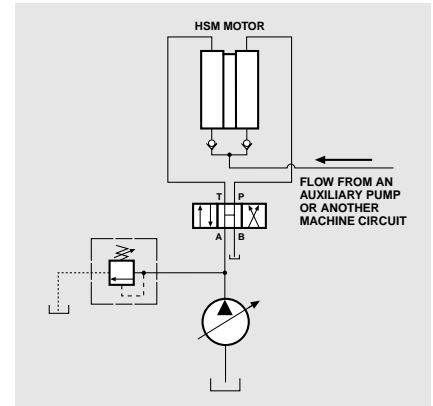
## THERMAL SHOCK PROTECTION

Optional warm-up ports in HSM Series motors can reduce the potential for motor seizure caused by thermal shock.

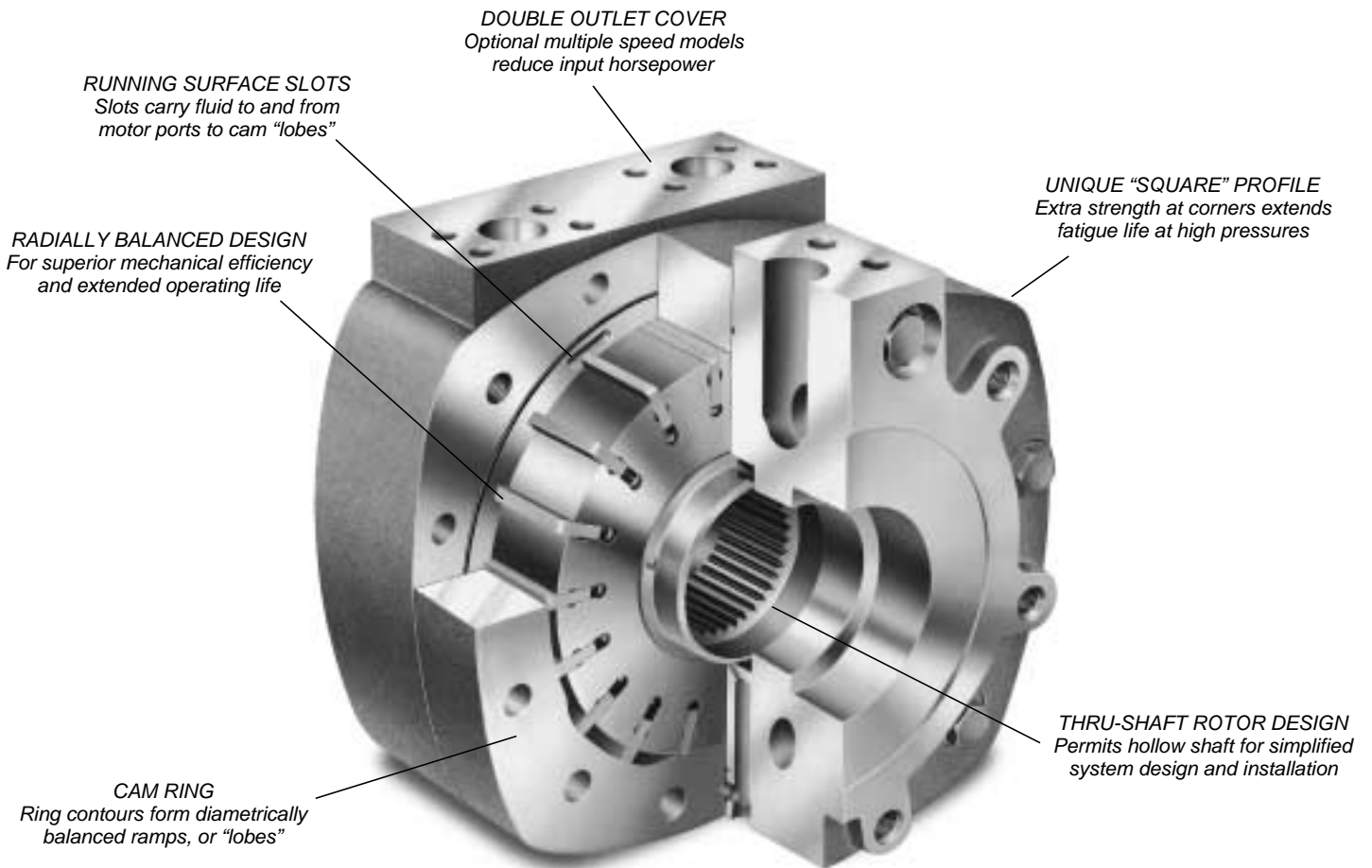
Thermal shock is caused by introducing warmer fluid, from a working portion of a circuit, into a cooler motor. A temperature difference approaching 50° F (10° C) can result in uneven expansion of internal components causing motor seizure.

Warm-up ports reduce the potential for shock by allowing fluid to be circulated through the motor without rotor rotation, equalizing fluid and motor temperatures. This feature is especially beneficial for mobile equipment used in cold weather.

For information on this option contact your Dynex representative.



Warm-up ports in the motor covers prevent motor seizure caused by thermal shock.

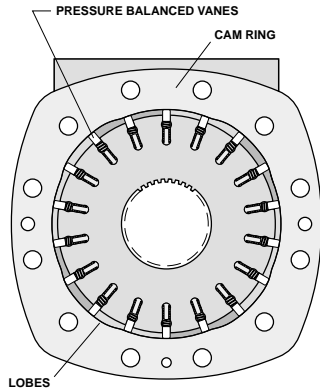


HSM100 Series Multiple Displacement Motor

# Single and Multiple Speed Operation

HSM Series motors utilize a slotted rotor with 18 vanes that move radially against a cam ring. As the rotor turns, the vanes ride on the ring and slide in and out of the slots.

The ring contours form four major and four minor radial sections, joined by transitional ramps, or lobes. Pressurized fluid is delivered to the lobes through slots in the cover running surface.



Cam ring contours form diametrically balanced ramps or "lobes". This radially balanced design provides superior mechanical efficiency and extended life.

## SINGLE SPEED MODELS

In single speed models, a port in each motor cover connects to two sets of diametrically opposed and balanced lobes. Fluid entering the port in one cover causes the rotor to turn.

Movement of the rotor transports fluid to the slots connected to the other port, to return to tank. As the rotor turns, it drives the shaft which is spline connected to the rotor. The direction of rotation is determined by which of the two ports are pressurized.

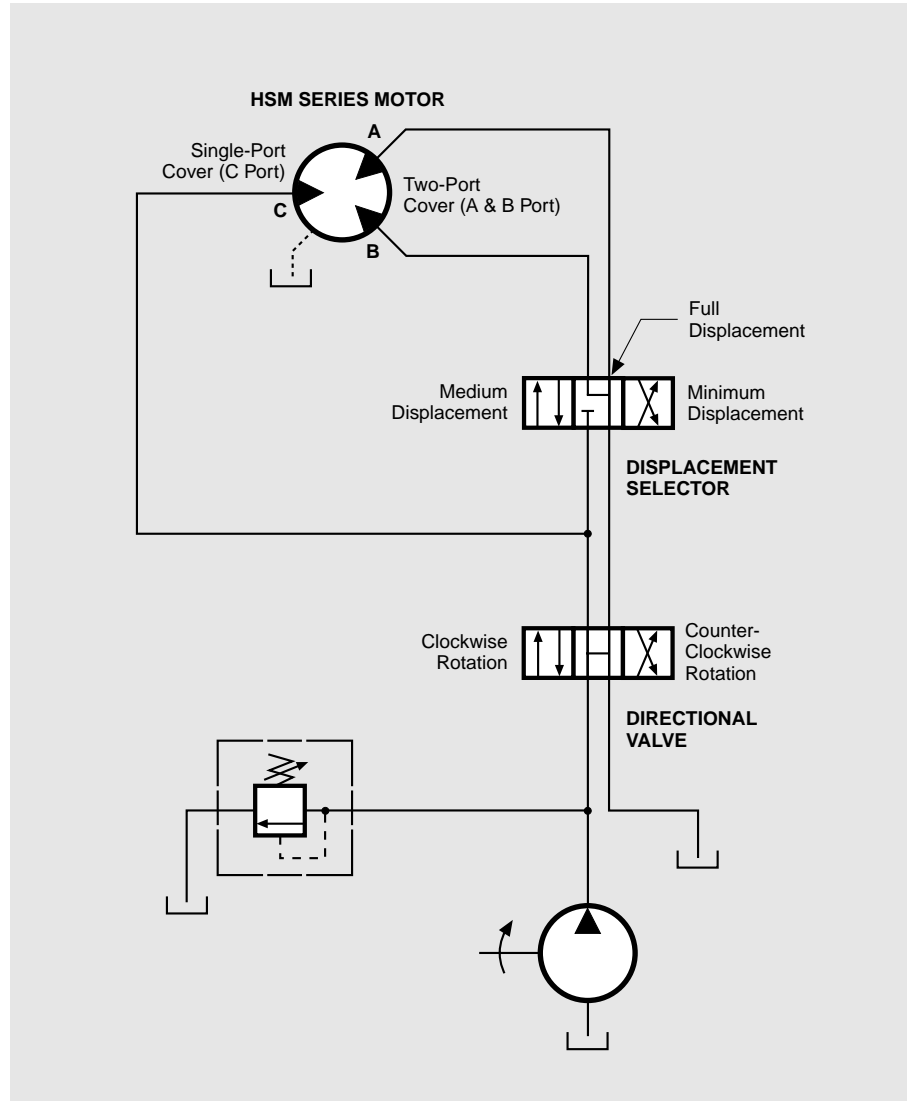
## MULTIPLE SPEED MODELS

In circuits using fixed displacement pumps, multiple speed/torque models can reduce input horsepower requirements.

With two-speed models, the operator can select either full torque at normal speed, or double speed at half the torque. These models utilize a two port cover, with each port independently connected to a separate set of diametrically opposed lobes of equal displacement.

Three-speed models offer greater flexibility. The operator selects either minimum, medium or maximum displacement (with speed and torque determined by the specific model).

These models also use a two-port cover, with a "split-rise" cam providing unequal displacements. In a typical circuit, shown below, a selector valve directs fluid to and from the motor ports to determine which pair of lobes will be pressurized.



Typical three-speed motor circuit uses a displacement selector valve which directs fluid to and from the motor ports to determine the speed and torque combination. The direction of rotation is determined by the other directional valve in the circuit. This circuit is shown for reference only. Other circuit arrangements are possible and may be more beneficial depending on the specific application.

## SPECIFICATIONS

Single Displacement Model Number	Theoretical Torque		Multiple Displacement Model Number	Multiple Displacement Torque Splits <sup>①</sup>				Input Flow, 100 rpm		Maximum Speed at 2000 psi (140 bar) rpm	Maximum Pressure at Stall	
	lb-ft per 100 psi	N·m per 10 bar		lb-ft per 100 psi		N·m per 10 bar		U.S. gpm	L/min		psi	bar
				Port A	Port B	Port A	Port B					
HSM100-2493	70	138	HSM100-2522	35	35	69	69	28.0	106,0	300	4000	280
HSM100-2454	90	177	HSM100-2455	45	45	88	88	38.0	143,8	300	4000	280
HSM200-2696	130	256	HSM200-2700	75	55	147	108	48.0	181,7	250	3000	210
HSM200-2695	150	295	HSM200-2699	75	75	147	147	55.0	208,2	250	3000	210
HSM300-2598	190	374	HSM300-2590	95	95	187	187	70.0	265,0	200	2750	190
HSM300-2601	220	433	HSM300-2591	125	95	246	187	80.0	302,8	150	2750	190
HSM300-2521	250	492	HSM300-2579	125	125	246	246	91.0	344,4	150	2750	190
HSM300-2592	380	747	HSM300-2594	190	190	374	374	140.0	529,9	200	2750	190
HSM300-2602	440	865	HSM300-2595	250	190	492	374	158.0	598,0	150	2750	190
HSM300-2551	500	983	HSM300-2597	250	250	492	492	184.0	696,4	150	2750	190

① Multiple displacement models use a two-port cover (Port A and Port B). Models with equal torque splits provide two speed/torque selection. Models with unequal torque splits provide three speed/torque selection when used in a typical circuit as shown on page 3.

## Installation and Performance Data

### SELECTING HSM MODELS

The table above shows single and multiple speed models.

The larger size HSM300 motors listed are double rotor models. To select these models, see performance curves on page 7 and installation drawings on page 8.

For information on *optional* warm-up ports and a review of your application, contact your Dynex representative.

### DIMENSIONS AND CURVES

Performance curves on the following pages are typical and are based on 100 SUS (20 cSt) petroleum-based fluid at 120° F (50° C). Dimensions are shown in inches (millimeters in parentheses) and are nominal values.

### INSTALLATION

HSM Series motors must be operated under a loaded condition, 150 psi (11 bar) minimum.

The table at right shows spline data. Units must have a slip fit between shaft and rotor splines with no axial force or binding. Axial movement of the shaft, under load, is not permitted.

Drive shaft must be concentric to motor pilot diameter within 0.004 inch (0,1 mm) TIR. Mounting surface should be flat within 0.001 inch (0,03 mm) and perpendicular to motor axis within 0.001 inch (0,03 mm) TIR.

Shaft design must provide for retention of grease as the spline is not lubricated by system fluid.

### OPERATING RECOMMENDATIONS

**Standard Seals** Buna-N (Nitrile)

#### Fluid

High-grade premium petroleum-based oil, with a combination of anti-wear, demulsibility, rust protection, and oxidation resistance and foam resistance properties.

See table right, below, for fluid specifications.

#### Minimum Filtration Levels

25 μ nominal;  
Consistent with recommended hydraulic practice, finer filtration levels than these are desirable and will result in longer component life.

### SPLINE DATA

Internal and External Involute Spline	HSM Motor Series		
	100	200	300
Fillet Root	Side Fit	Side Fit	Side Fit
No. of Teeth	39	40	48
Diametrical Pitch	12/24	10/20	10/20
Pressure Angle	30°	30°	30°
Major Diameter Internal (Rotor)	3.4130 3.4000	4.1950 4.1800	4.9950 4.9800
Major Diameter External (Shaft)	3.3333 3.3283	4.1000 4.0950	4.9000 4.8950

### Mounting

Models in the table are designed for horizontal mounting. For vertical shaft mounting, models are available that supply increased lubrication between the rotor and the running surfaces. For specific model numbers, contact the Dynex sales department.

#### Case Drain Pressure

Maximum 25 psig (1,7 bar)

#### Start-Up

Fill motor through any cover port prior to start-up.

#### Weight (Mass)

HSM 100: 230 lb (104 kg);

HSM 200: 315 lb (143 kg);

HSM 300:

Single Rotor, 460 lb (209 kg);

Double Rotor, 630 lb (286 kg)

### FLUID SPECIFICATIONS<sup>①</sup>

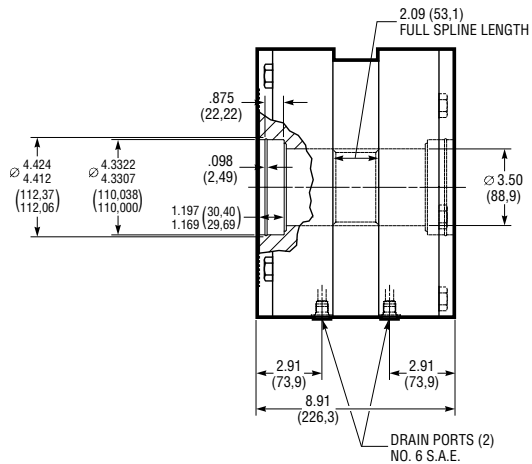
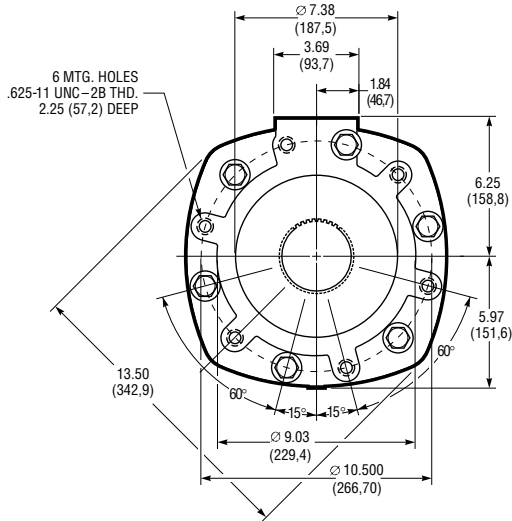
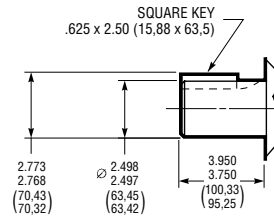
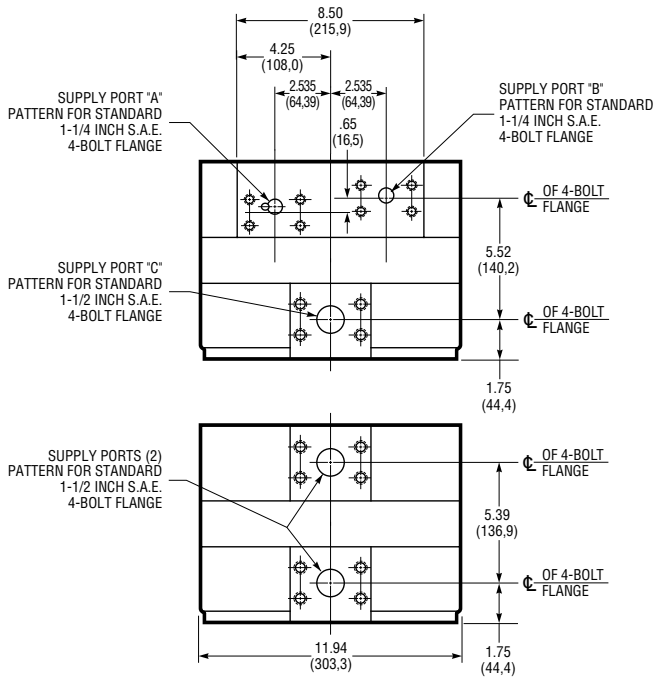
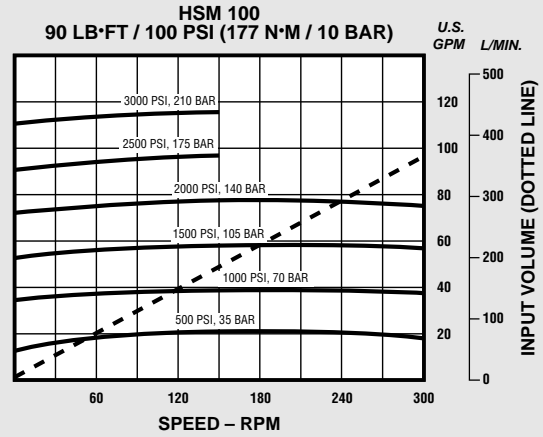
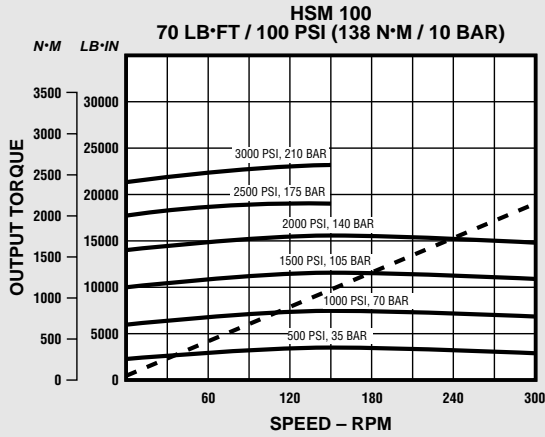
Specification	Fluid Grade	
	Summer <sup>②</sup>	Winter <sup>③</sup>
Viscosity at 100° F (37,8° C)	150-300 SUS (38,3-64,9 cSt)	75-200 SUS (14,4-43,1 cSt)
Viscosity at 210° F (98,9° C)	43 SUS (5,2 cSt) Minimum	43 SUS (5,2 cSt) Minimum
Pour Point, Typical	0° F (-17,8° C)	-40° F (-40° C) or Less
Viscosity Index	95 Minimum	95 Minimum

① If fluid conditions fall outside of the range shown, consult the Dynex sales department.

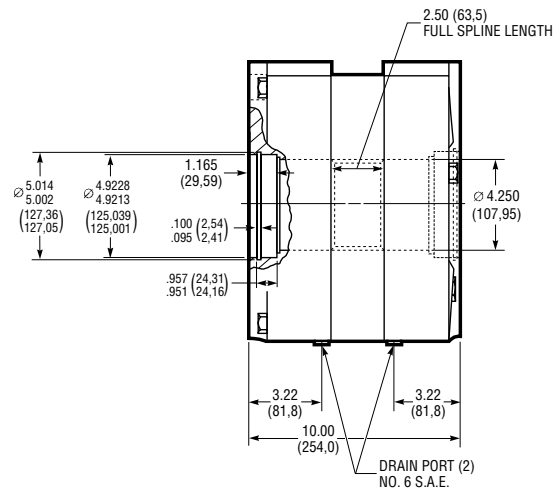
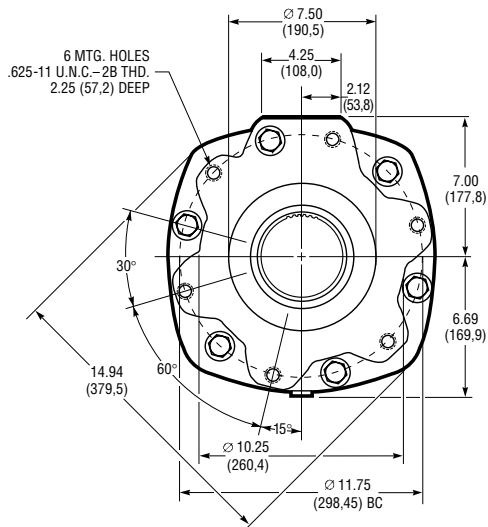
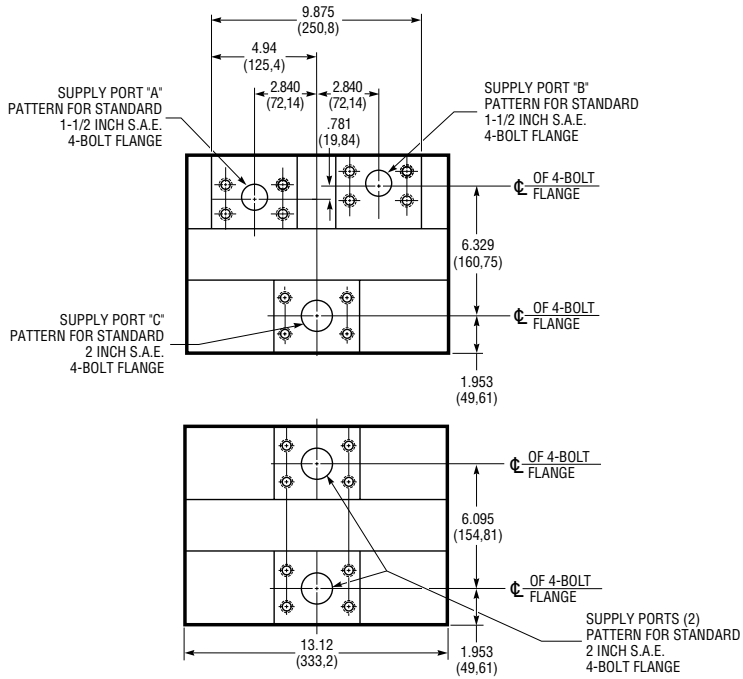
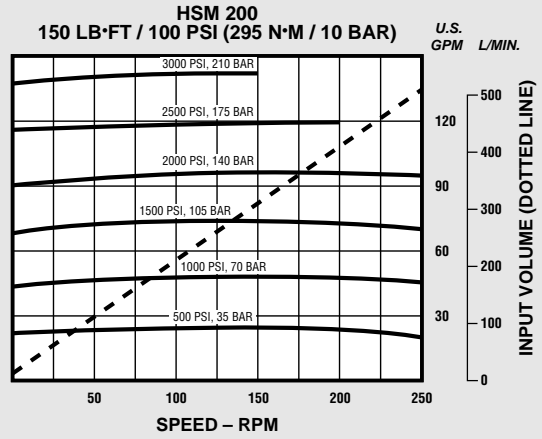
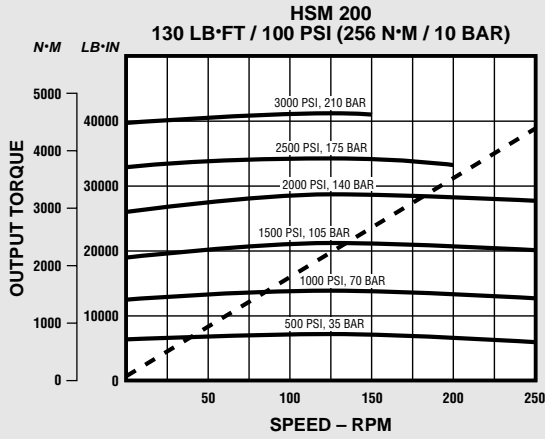
② Warm Weather Grade, Above +40° F (4,4° C)

③ Cold Weather Grade, Below +40° F (4,4° C)

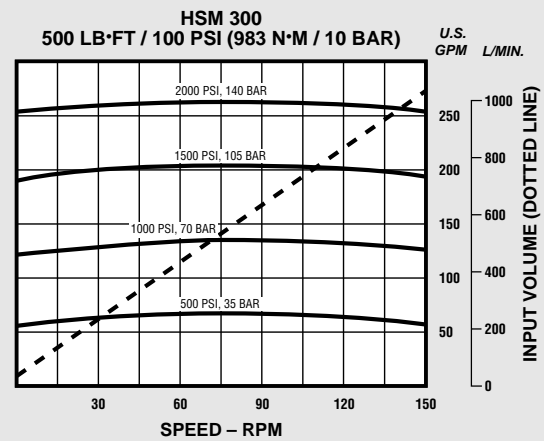
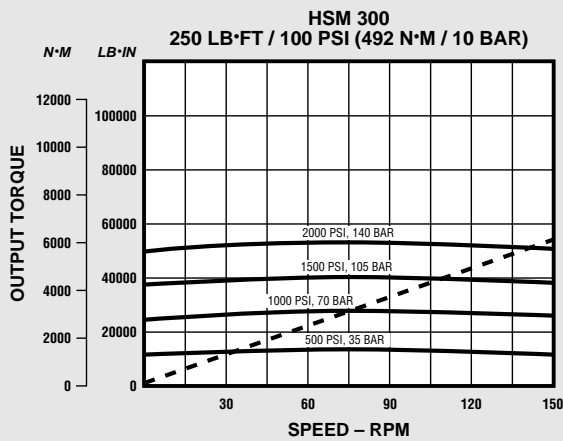
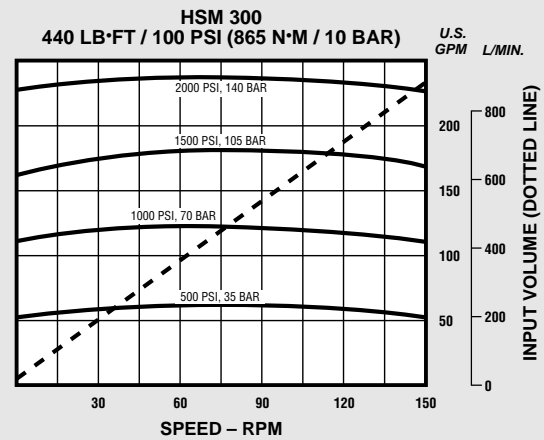
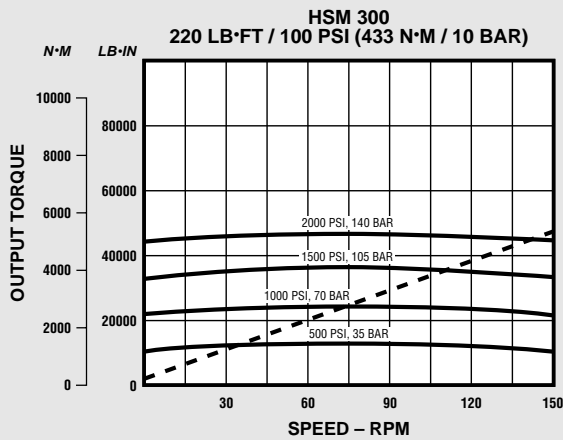
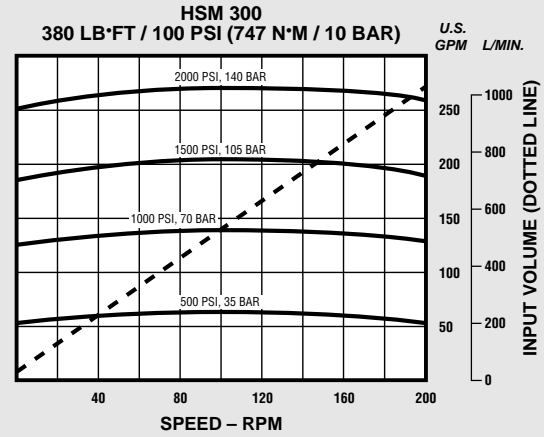
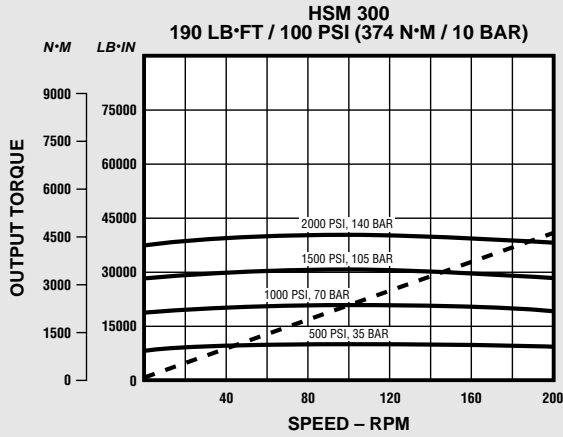
# HSM100 PERFORMANCE AND INSTALLATION



# HSM200 PERFORMANCE AND INSTALLATION



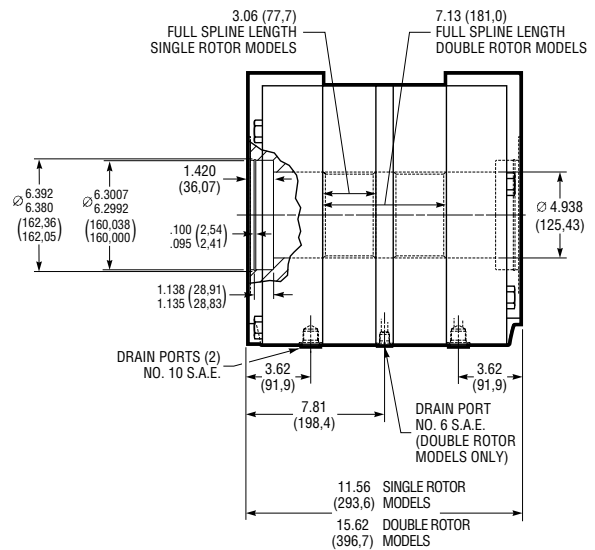
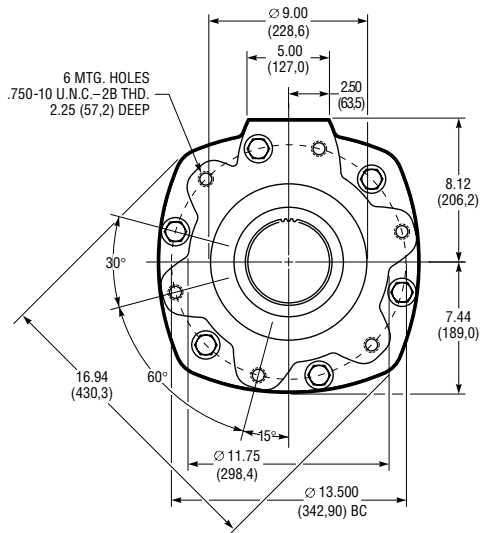
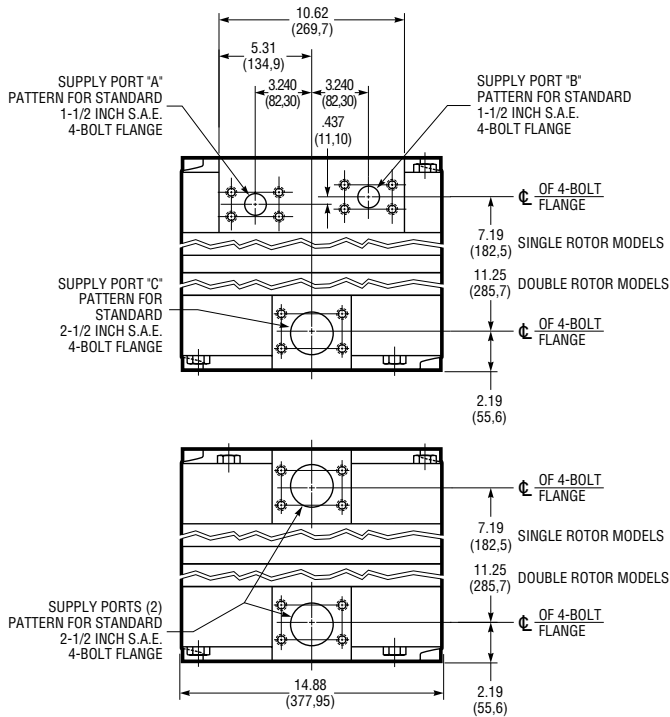
# HSM300 PERFORMANCE



## HSM300 INSTALLATION

The drawing below includes dimensions for both single and double rotor models.

Refer to the *Specifications Table* on page 4 and the performance curves on page 7, for specific model numbers.



For more information  
visit our web site:  
[www.dynexhydraulics.com](http://www.dynexhydraulics.com)

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