Low-Speed, High-Torque Vane Motors

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.
**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.

**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.
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.

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Fluid Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity at 100° F, (37.8° C)</td>
<td>150-300 SUS (38.3-64.9 cSt)</td>
</tr>
<tr>
<td>Viscosity at 210° F, (98.9° C)</td>
<td>43 SUS (5.2 cSt)</td>
</tr>
<tr>
<td>Viscosity at 100° F, (37.8° C)</td>
<td>Minimum</td>
</tr>
<tr>
<td>Viscosity at 210° F, (98.9° C)</td>
<td>Minimum</td>
</tr>
<tr>
<td>Pour Point, Typical</td>
<td>0° F (-17.8° C)</td>
</tr>
<tr>
<td>Viscosity Index</td>
<td>95</td>
</tr>
</tbody>
</table>

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

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10 9 8 7 6 5 4 3 2 1
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.

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