# How to Identify & Specify Hydraulic Pumps

## Replacing an Existing Pump

1. Identify Series, use chart below if necessary.

<table>
<thead>
<tr>
<th>SERIES</th>
<th>STUDS No. &amp; Diameter</th>
<th>HOUSING HEIGHT</th>
<th>HOUSING WIDTH = Gear Width + Thrust Plates:</th>
<th>THREADED BEARING RETAINER</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1200</td>
<td>10 - 1/2”</td>
<td>7”</td>
<td>1/2”</td>
<td>NO</td>
</tr>
<tr>
<td>P1500</td>
<td>4 - 1/2”</td>
<td>5.5”</td>
<td>3/4”</td>
<td>NO</td>
</tr>
<tr>
<td>P2100</td>
<td>4 - 9/16”</td>
<td>5”</td>
<td>3/4”</td>
<td>NO</td>
</tr>
<tr>
<td>P2500</td>
<td>4 - 5/8”</td>
<td>6.25”</td>
<td>3/4”</td>
<td>NO</td>
</tr>
<tr>
<td>P3700</td>
<td>8 - 1/2”</td>
<td>7.3125”</td>
<td>1”</td>
<td>YES</td>
</tr>
<tr>
<td>P3000 / 3100</td>
<td>4 - 5/8”</td>
<td>5.5”</td>
<td>3/4”</td>
<td>NO</td>
</tr>
<tr>
<td>P5000 / 5100</td>
<td>4 - 5/8”</td>
<td>6.25”</td>
<td>3/4”</td>
<td>NO</td>
</tr>
<tr>
<td>P7500 / 7600</td>
<td>8 - 5/8”</td>
<td>8”</td>
<td>1”</td>
<td>NO</td>
</tr>
<tr>
<td>P124 / 424</td>
<td>4 - 1/2”</td>
<td>4.75</td>
<td>.400”</td>
<td>NO</td>
</tr>
<tr>
<td>P197</td>
<td>4 - 5/8”</td>
<td>5.66”</td>
<td>1/2”</td>
<td>NO</td>
</tr>
<tr>
<td>P257</td>
<td>4 - 5/8”</td>
<td>5.68”</td>
<td>1/2”</td>
<td>NO</td>
</tr>
<tr>
<td>P360 / 460</td>
<td>4 - 5/8”</td>
<td>7.05”</td>
<td>1/2”</td>
<td>NO</td>
</tr>
<tr>
<td>M360</td>
<td>4 - 3/4”</td>
<td>7.05”</td>
<td>1/2”</td>
<td>NO</td>
</tr>
</tbody>
</table>

2. Gear Width: Housing Width minus Thrust Plates (see chart above)

3. Shaft Diameter and Configuration (# splines or key size if round)

4. Mounting Flange: Bolt Circle Diameter ______________
   Pilot Diameter: ___________       Number Studs ___________

5. Porting: Inlet NPT _______ ODT _______ Split Flange _______ Location _______
   Outlet NPT _______ ODT _______ Split Flange _______ Location _______

6. Rotation: Looking at the shaft end, belly down, inlet on the left = Clockwise
   Looking at the shaft end, belly down, inlet on the right = Counterclockwise
   Bi-rotation Pumps usually have equal size ports but must still be plumbed correctly.

## Helpful Formulas

- **PUMP INPUT HORSEPOWER**  \( HP = \frac{GPM \times PSI}{1714} / E \)
- **PUMP INPUT TORQUE**  \( T = \frac{GPM \times PSI \times 3.06}{RPM} / E \)
- **PUMP OUTPUT FLOW RATE**  \( GPM = \frac{D \times RPM}{231} \)
- **DISPLACEMENT OF PUMP**  \( D = \frac{GPM \times 231}{RPM} \)
- **PUMP INPUT SPEED**  \( RPM = \frac{GPM}{D} \)
- **GPM USING PTO**  \( GPM = \frac{Eng \times RPM \times % PTO \times D \times E}{231} \)

\( E = \text{Efficiency} \)
\( D = \text{Displacement} \)
How to Order PTO's

Precision-Engineered Fluid Power Products

1. Transmissions make and model number. The bill of material number and/or the serial number is also helpful on some transmissions. In some cases it may be necessary to know the make, model number, and year of the vehicle.

2. Go to the appropriate application page.

3. Which PTO Opening? (As viewed from the driver's seat) Right, left, bottom, top. Not all locations available on all transmissions. Make sure that the PTO opening you choose is free of interference.

4. Type of equipment to be driven. This will determine the type of PTO you choose. For some applications you will need to determine the torque required to drive the equipment.

5. Desired operating speed of driven equipment. Related in % of engine speed.

6. Rotation of driven equipment. Related as engine or opposite engine rotation. Rotation of driven equipment is normally determined as viewed from the input shaft. Clockwise rotation of the driven equipment, if determined in this way, equals engine rotation; counterclockwise equals opposite engine rotation.

7. Type of drive; direct mount to PTO or remote mount driven with drive shaft.

8. Type of shift; cable, lever, manual air, electric/air, electric, integral clutch with air or hydraulic shift. Not all shift types available on all PTO's.

9. Determine duty cycle; intermittent or continuous. Continuous duty is defined as any operation requiring more than 5 minutes in any 15 minute period. If the application is continuous duty multiply the torque rating of the PTO by 0.7 or divide the torque required by the application by 0.7

Helpful Formulas

- **Mechanical Horsepower**
  \[ HP = \frac{T \times RPM}{5252} \]
- **Torque**
  \[ T = \frac{HP \times 5252}{RPM} \]
- **RPM**
  \[ RPM = \frac{HP \times 5252}{Torque} \]
- **PTO Output Speed**
  \[ PTO \text{ RPM} = ENG \text{ RPM} \times \% \text{ PTO} \]
- **Engine Input RPM**
  Required \[ ENG \text{ RPM} = \frac{\text{Target PTO RPM}}{\% \text{ PTO}} \]
- **PTO %**
  \[ PTO = \frac{\text{Required PTO RPM}}{\text{Target ENG RPM}} \]

The above information is supplied as a helpful reference only and is not designed to substitute for sound engineering and experience.

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