P1/PD Series
Medium Pressure Axial Piston Pumps

Variable Displacement
Catalog HY28-2665-01/P1/EN
Effective: August 1, 2014
WARNING - USER RESPONSIBILITY

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General Information

Description
- Variable displacement, axial piston pump for open-circuit applications
- Medium pressure, continuous operation at pressures up to 280 bar
- High drive speed models for mobile markets and low noise models for industrial markets
- Quiet and efficient control capability

Benefits
- Compact overall package size
- Quiet operation
- Low flow ripple to further reduce noise
- Elastomer seals that eliminate gaskets and external leakage
- High operating efficiency for lower power consumption and reduced heat generation
- Simple hydraulic controls with “no-leak” adjustments
- SAE and ISO standard mounting flanges and ports
- Long life, tapered-roller shaft bearings
- Long life, low friction, hydrostatically balanced swash plate saddle bearings
- Full power through-drive capability
- End or side inlet and outlet ports
- Case drain ports for horizontal or vertical, shaft-up mounting
- Optional minimum and maximum displacement adjustments
- Easy to service

Ripple Chamber Technology
The chart refers to the "Ripple Chamber " technology engineered into the P1/PD 18, 28 and 45 Series, side ported pumps. The ripple chamber reduces pressure pulsations (called ripple) at the outlet of the pump by 40-60%. This leads to a significant reduction in overall system noise, without the added expense of noise dampening components.
## Medium Pressure Axial Piston Pumps
### P1/PD Series

#### Pump Series
- **P1**: Mobile
- **PD**: Industrial

#### Mounting & Ports
- **S**: SAE A Pilot SAE Threaded Work Ports with SAE Aux Ports
- **A**: SAE A Pilot Metric Work Ports with BSPP Aux Ports
- **M**: ISO - 80mm Pilot Metric Work Ports with Metric Aux Ports
- **B**: ISO - 80mm Pilot Metric Work Ports with BSPP Aux Ports

#### Shaft Options
- **01**: Spline shaft - SAE 19-4 11T
- **02**: Keyed shaft - SAE 19-1 .75” Dia.
- **04**: ISO keyed 20MM Dia.
- **06**: Spline shaft - SAE A 9T
  - *Not available with Thru-Drive*

#### Shaft Rotation
- **R**: Clockwise
- **L**: Counterclockwise

#### Configuration
- **M**: Mobile (P1)
- **S**: Industrial (PD)

### Control Options
- **C0**: Pressure limiter 942-4061 PSI (65 - 280 bar)
- **C1**: Pressure limiter 290-1160 PSI (20 - 80 bar)
- **L0**: Load sensing 145 - 435 PSI with pressure limiter 942-4061 PSI (65 - 280 bar)
- **L2**: Load sensing 145 - 435 PSI with bleed & pressure limiter 942-4061 PSI (65 - 280 bar)
- **AN**: Pilot operated pressure limiter with ISO4401 interface & SAE 4 Vent Port
- **AM**: Pilot operated pressure limiter with mechanical adjustment and SAE 4 Vent Port
- **AE**: Pilot operated pressure limiter with mechanical and electrical adjustment 12 VDC
- **AF**: Pilot operated pressure limiter with mechanical and electrical adjustment 24 VDC
- **##**: See chart below for electronic control options

### Adjustable Displacement Stops
- **0**: None
- **1**: Adjustable maximum displacement stop
- **2**: Adjustable minimum displacement stop
- **3**: Adjustable maximum and minimum displacement stop
  - *Not available with Thru-Drive*

#### Port Orientation
- **E**: End Ports
- **R**: Side ported with ripple chamber
- **T**: Side ported with Thru-Drive

#### Port Type
- **0**: Flange Ports*
- **2**: Threaded Ports
  - *With Thru-Drive Only*

#### Thru-Drive Mounting Pad/Coupling
- **0**: No Thru-Drive
- **A**: SAE 82-2(A), 16(A), 9T coupling
- **H**: SAE 82-2(A), 19(--), 11T coupling

#### Paint
- **00**: No Paint
- **PB**: Black Paint

### Electronic Control Options
- **P**: Electronic valve with zero displacement default and hydromechanical Pmax
- **T**: Electronic valve with max displacement default and hydromechanical Pmax
- **S**: Electronic valve with zero displacement default and hydromechanical Pmax
- **U**: Electronic valve with max displacement default and hydromechanical Pmax
- **W**: Electronic valve with zero displacement default (CANBUS compatible)
- **Y**: Electronic valve with max displacement default (CANBUS compatible)
- **X**: Electronic valve with zero displacement default and hydromechanical Pmax (CANBUS compatible)
- **Z**: Electronic valve with max displacement default and hydromechanical Pmax (CANBUS compatible)

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*W, X, Y and Z only available with "D" and "Y"
**Medium Pressure Axial Piston Pumps**

**P1/PD Series**

<table>
<thead>
<tr>
<th>P1/PD 28cc, Model Ordering Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pump Series</strong></td>
</tr>
<tr>
<td>P Mobile</td>
</tr>
<tr>
<td>PD Industrial</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mounting &amp; Ports</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>S SAE B Pilot SAE Work Ports with SAE Aux Ports</td>
</tr>
<tr>
<td>A SAE B Pilot Metric Work Ports with BSPP Aux Ports</td>
</tr>
<tr>
<td>M ISO - 100MM Pilot Metric Work Ports with Aux Ports</td>
</tr>
<tr>
<td>B ISO - 100MM Pilot Metric Work Ports with BSPP Aux Ports</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Shaft Options</strong></th>
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<tbody>
<tr>
<td>01 Splined shaft - SAE B-B 15T</td>
</tr>
<tr>
<td>02 Keyed shaft - SAE B-B 1&quot; Dia.</td>
</tr>
<tr>
<td>04 ISO keyed 25MM Dia.</td>
</tr>
<tr>
<td>08 Splined shaft - SAE B 13T</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Shaft Rotation</strong></th>
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</thead>
<tbody>
<tr>
<td>R Clockwise</td>
</tr>
<tr>
<td>L Counterclockwise</td>
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<table>
<thead>
<tr>
<th><strong>Configuration</strong></th>
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<tbody>
<tr>
<td>M Mobile (P1)</td>
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<tr>
<td>S Industrial (PD)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Control Options</strong></th>
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</thead>
<tbody>
<tr>
<td>C0 Pressure limiter 942-4061 PSI (65-280 bar)</td>
</tr>
<tr>
<td>C1 Pressure limiter 290-1160 PSI (20-80 bar)</td>
</tr>
<tr>
<td>L0 Load sensing 145-435 PSI &amp;P (10-30 bar &amp;P) with pressure limiter 942-4061 PSI (65-280 bar)</td>
</tr>
<tr>
<td>L2 Load sensing 145-435 PSI &amp;P (10-30 bar &amp;P) with bleed &amp; pressure limiter 942-4061 PSI (65-280 bar)</td>
</tr>
<tr>
<td>AN* Pilot operated pressure limiter with ISO4401 interface &amp; SAE 4 Vent Port</td>
</tr>
<tr>
<td>AM Pilot operated pressure limiter with mechanical and electrical adjustment 12 VDC</td>
</tr>
<tr>
<td>AE Pilot operated pressure limiter with mechanical and electrical adjustment 12 VDC</td>
</tr>
<tr>
<td>AF Pilot operated pressure limiter with mechanical and electrical adjustment 24 VDC</td>
</tr>
<tr>
<td>## See chart below for electronic control options</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Adjustable Displacement Stops</strong>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 None</td>
</tr>
<tr>
<td>1* Adjustable maximum displacement stop</td>
</tr>
<tr>
<td>2* Adjustable minimum displacement stop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Port Orientation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>E End Ports</td>
</tr>
<tr>
<td>R Side ported with ripple chamber</td>
</tr>
<tr>
<td>T Side ported with through drive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Port Type</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Flange Ports</td>
</tr>
<tr>
<td>2 Threaded Ports</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Thru-Drive Mounting Pad/Coupling</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 No Thru-Drive</td>
</tr>
<tr>
<td>A SAE 82-2 (A), 16 (A), 9T coupling</td>
</tr>
<tr>
<td>H SAE 82-2 (A), 19 (--), 11T coupling</td>
</tr>
<tr>
<td>B SAE 101-2 (B), 22 (B), 13T coupling</td>
</tr>
<tr>
<td>Q SAE 101-2 (B), 25 (B-B), 15T coupling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Paint</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>00 No Paint</td>
</tr>
<tr>
<td>PB Black Paint</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Electronic Control Options</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>P Electronic valve with zero displacement default</td>
</tr>
<tr>
<td>T Electronic valve with max displacement default</td>
</tr>
<tr>
<td>S Electronic valve with zero displacement default and hydromechanical Pmax</td>
</tr>
<tr>
<td>U Electronic valve with max displacement default and hydromechanical Pmax</td>
</tr>
<tr>
<td>W Electronic valve with zero displacement default (CANBUS compatible)</td>
</tr>
<tr>
<td>Y Electronic valve with max displacement default (CANBUS compatible)</td>
</tr>
<tr>
<td>X Electronic valve with zero displacement default and hydromechanical Pmax (CANBUS compatible)</td>
</tr>
<tr>
<td>Z Electronic valve with max displacement default and hydromechanical Pmax (CANBUS compatible)</td>
</tr>
</tbody>
</table>

***W, X, Y and Z only available with "D" and "Y"
### Medium Pressure Axial Piston Pumps

#### P1/PD Series

<table>
<thead>
<tr>
<th>Pump Series</th>
<th>Mounting &amp; Ports</th>
<th>Shaft Options</th>
<th>Shaft Rotation</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Mobile</td>
<td>Splined shaft - SAE B-B 1ST</td>
<td>R</td>
<td>Mobile (P1)</td>
</tr>
<tr>
<td>PD</td>
<td>Industrial</td>
<td>Keyed shaft - SAE B-B 1” Dia.</td>
<td>L</td>
<td>Clockwise</td>
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<tr>
<td>0</td>
<td>Open Circuit</td>
<td>ISO keyed 25MM Dia.</td>
<td>0</td>
<td>No other options</td>
</tr>
<tr>
<td>45</td>
<td>Displacement 45cc/rev.</td>
<td>Splined shaft - SAE B 13T</td>
<td>00</td>
<td>No ECU - 9 VDC valve</td>
</tr>
</tbody>
</table>

#### Paint

- PB: Black Paint

#### Additional Control Options

- **mandatory with "W*** and "X***
- "Y***, "Z***, "D*** and "Y***

#### Control Options

- **C0**: Pressure limiter 942 - 4061 PSI (65 - 280 bar)
- **C1**: Pressure limiter 290 - 1160 PSI (20 - 80 bar)
- **L0**: Load sensing 145 - 435 PSI (10 - 30 bar) with pressure limiter 942 - 4061 PSI (65 - 280 bar)
- **L2**: Load sensing 145 - 435 PSI (10 - 30 bar) with bleed & pressure limiter 942 - 4061 PSI (65 - 280 bar)
- **AN***: Pilot operated pressure limiter with ISO 4401 interface & SAE 4 Vent Port
- **AL**: Pilot operated pressure limiter with Load sensing (only available with "T" Torque Limiter option, i.e. "ALT")

#### Thru-Drive Mounting Pad/Coupling

- 0: No Thru-Drive
- A: SAE 82-2 (A), 16 (A), 9T coupling
- H: SAE 82-2 (A), 19 (--), 11T coupling
- B: SAE 101-2 (B), 22 (B), 13T coupling
- Q: SAE 101-2 (B), 25 (B-B), 15T coupling

#### Port Orientation

- E: Side ported with ripple chamber
- T: Side ported through drive

#### Adjustable Displacement Stops**

**Not available with Thru-Drive

#### Shaft Rotation

- R: Clockwise
- L: Counterclockwise

#### Configuration

- M: Mobile (P1)
- S: Industrial (PD)
- U: Universal (SAE Mounting Option, S, Only)

#### Electronic Control Options

- 0: No ECU - 9 VDC valve
- M: No ECU - 24 VDC valve
- D: Proportional displacement control
- Y: Proportional pressure and displacement control

- **Electronic Valve with zero displacement default**
- **Electronic Valve with max displacement default**
- **Electronic Valve with zero displacement default and hydromechanical Pmax**
- **Electronic Valve with max displacement default and hydromechanical Pmax**
- **Electronic Valve with zero displacement default (CANBUS compatible)**
- **Electronic Valve with max displacement default (CANBUS compatible)**
- **Electronic Valve with zero displacement default and hydromechanical Pmax (CANBUS compatible)**
- **Electronic Valve with max displacement default and hydromechanical Pmax (CANBUS compatible)**

***W, X, Y and Z only available with "D" and "Y"
P1/PD 75cc, Model Ordering Code

**Pump Series**
- **P1**: Mobile
- **PD**: Industrial

**Open Circuit**
- **P**: Open Circuit (One Side of Center)
- **X**: Open Circuit (100% over Center)

**Mounting & Ports**
- **S**: SAE C Pilot SAE Flange Connection Ports with SAE Aux Ports
- **A**: SAE C Pilot Metric Flange Connection Ports with BSPP Aux Ports
- **M**: ISO - 125MM Pilot Metric Flange Connection Ports with Metric Aux Ports
- **B**: ISO - 125MM Pilot, Metric Flange Connection Ports with BSPP Aux Ports
- **C**: SAE C 2-Bolt Pilot SAE Flange Connection Ports with SAE Aux Ports
- **D**: SAE C 2-Bolt Pilot SAE Flange Connection Ports with BSPP Aux Ports

**Shaft Options**
- **01**: Spline shaft - SAE C 14T
- **02**: Keyed shaft - SAE C 32-1 KEY
- **04**: Keyed shaft - ISO / DIN KEY 32MM Dia.

**Shaft Rotation**
- **R**: Clockwise
- **L**: Counterclockwise

**Configuration**
- **M**: Mobile (P1)
- **S**: Industrial (PD)
- **U**: Universal

**Port Orientation**
- **E**: End Ports
- **S**: Side Ports
- **T**: Side Ports with Thru-Drive

**Adjustable Displacement Stops**
- **0**: None
- **1**: Adjustable maximum displacement stop
- **2**: Adjustable minimum displacement stop
- **3**: Adjustable maximum and minimum displacement stop

**Thru-Drive Mounting Pad/Coupling**
- **0**: No Thru-Drive
- **A**: SAE 82-2 (A), 16 (A), 9T coupling
- **B**: SAE 101-2 (B), 22 (B), 13T coupling
- **C**: SAE 127-4 (C), 32 (C), 14T coupling

**Paint**
- **PB**: Black Paint
- **00**: No Paint

**Electronic Control Options**
- **P**: Electronic valve with zero displacement default
- **T**: Electronic valve with max displacement default
- **S**: Electronic valve with zero displacement default and hydromechanical Pmax
- **W**: Electronic valve with zero displacement default (CANBUS compatible)
- **Y**: Electronic valve with max displacement default (CANBUS compatible)
- **X**: Electronic valve with zero displacement default and hydromechanical Pmax (CANBUS compatible)
- **Z**: Electronic valve with max displacement default and hydromechanical Pmax (CANBUS compatible)

**Additional Control Options**
- **0**: No other options
- **2**: Displacement sensor
- **T**: Torque Limiter Control (Used with AM, AN, L0 or L2 control options)

**Control Options**
- **C0**: Pressure limiter 942-4061 PSI (65-280 bar)
- **C1**: Pressure limiter 290-1160 PSI (20-80 bar)
- **L0**: Load sensing 145-435 PSI (10-30 bar) with pressure limiter 942-4061 PSI (65-280 bar)
- **L2**: Load sensing 145-435 PSI (10-30 bar) with bleed & pressure limiter 942-4061 PSI (65-280 bar)
- **AN**: Pilot operated pressure limiter with ISO4401 interface & SAE 4 Vent Port
- **AM**: Pilot operated pressure limiter with mechanical adjustment 12 VDC
- **AF**: Pilot operated pressure limiter with mechanical and electrical adjustment 12 VDC

**Additional Control Options**
- **0**: No other options
- **2**: Displacement sensor
- **T**: Torque Limiter Control (Used with AM, AN, L0 or L2 control options)

**Not functional control as such**

**Parker Hannifin Corporation**
Hydraulic Pump Division
Marysville, Ohio USA
### Medium Pressure Axial Piston Pumps

**P1/PD Series**

**Configuration**

- **Pump Series**
  - P: Mobile
  - PD: Industrial

- **Displacement**
  - 100cc/rev. (6.1 in³/rev)

- **Mounting & Ports**
  - S: SAE C Pilot SAE Flange Connection Ports with SAE Aux Ports
  - A: SAE C Pilot Metric Flange Connection Ports with Metric Aux Ports
  - M: ISO - 125MM Pilot Metric Flange Connection Ports with Metric Aux Ports
  - B: ISO - 125MM Pilot, Metric Flange Connection Ports with BSPP Aux Ports

- **Shaft Options**
  - 01: Splined shaft - SAE C-C 17T
  - 02: Keyed shaft - SAE C-C 38-1
  - 04: Keyed shaft - ISO / DIN 40MM Dia.
  - 06: Splined shaft - SAE C 14T

- **Shaft Rotation**
  - R: Clockwise
  - L: Counterclockwise

- **Control Options**
  - **Pressure Limiter**
    - C0: Pressure limiter 942-4061 PSI (65-280 bar)
    - C1: Pressure limiter 290-1160 PSI (20-80 bar)
  - **Load Sensing**
    - L0: Load sensing 145-435 PSI (10-30 bar) with pressure limiter 942-4061 PSI (65-280 bar)
    - L2: Load sensing 145-435 PSI (10-30 bar) with bleed & pressure limiter 942-4061 PSI (65-280 bar)
  - **Pilot Operated Pressure Limiter**
    - AN*: Pilot operated pressure limiter with ISO4401 interface & SAE 4 Vent Port
    - AM: Pilot operated pressure limiter with mechanical adjustment and SAE 4 Vent Port
    - AE: Pilot operated pressure limiter with mechanical and electrical adjustment 12 VDC
    - AF: Pilot operated pressure limiter with mechanical and electrical adjustment 24 VDC
  - **Torque Limiter Control**
    - T: Torque Limiter Control (Used with AM, AN, L0 or L2 control options)

**Adjustable Displacement Stops**

- 0: None
- 1*: Adjustable maximum displacement stop
- 2*: Adjustable minimum displacement stop
- 3*: Adjustable maximum and minimum displacement stop

**Port Orientation**

- E: End Ports
- S: Side Ports
- T: Side Ports with Thru-Drive

**Thru-Drive Mounting Pad/Coupling**

- G: No Thru-Drive
- A: SAE 82-2 (A), 16 (A), 9T coupling
- H: SAE 82-2 (A), 19 (--), 11T coupling
- B: SAE 101-2 (B), 22 (B), 13T coupling
- Q: SAE 101-2 (B), 25 (B-B), 15T coupling
- J: SAE 101-2 (B), rotated 45 degrees, 22 (B), 13T coupling
- K: SAE 101-2 (B), rotated 45 degrees, 25 (B-B), 15T coupling
- C: SAE 127-4 (C), 32 (C), 14T coupling
- N: SAE 127-4 (C), 38 (C-C), 17T coupling

**Paint**

- 00: No Paint
- PB: Black Paint

**Electronic Control Options**

- 0: No ECU - 9 VDC valve
- M: No ECU - 24 VDC valve
- D: Proportional displacement control
- Y: Proportional pressure control

- P: Electronic valve with zero displacement default
- T: Electronic valve with max displacement default
- S: Electronic valve with zero displacement default and hydromechanical Pmax
- U: Electronic valve with max displacement default and hydromechanical Pmax
- W: Electronic valve with zero displacement default (CANBUS compatible)
- Y: Electronic valve with max displacement default (CANBUS compatible)
- X: Electronic valve with zero displacement default and hydromechanical Pmax (CANBUS compatible)
- Z: Electronic valve with max displacement default and hydromechanical Pmax (CANBUS compatible)

***W, X, Y and Z only available with "D" and "Y***
# Medium Pressure Axial Piston Pumps

## P1/PD Series

### Pump Series
- **P1**: Mobile
- **PD**: Industrial

### Open Circuit
- **P**: Open Circuit (One Side of Center)
- **X**: Open Circuit (100% over Center)

### Mounting & Ports
- **S**: SAE D Pilot SAE Flange Connection Ports with SAE Aux Ports
- **A**: SAE D Pilot BSPP Flange Connection Ports with BSPP Aux Ports
- **M**: ISO - 180MM Pilot Metric Flange Connection Ports with Metric Aux Ports
- **B**: ISO - 180MM Pilot Metric Flange Connection Ports with BSPP Aux Ports

### Shaft Options
- **01**: Splined shaft - SAE D 13T
- **02**: Keyed shaft - SAE D 44-1
- **04**: Keyed shaft - ISO / DIN 50MM Dia.

### Shaft Rotation
- **R**: Clockwise
- **L**: Counterclockwise

### Configuration
- **M**: Mobile (P1)
- **S**: Industrial (PD)
- **U**: Universal

### Control Options
- **C0**: Pressure limiter
  - 942-4061 PSI (65-280 bar)
- **C1**: Pressure limiter
  - 290-1160 PSI (20-80 bar)
- **L0**: Load sensing 145-435 PSI \( \cdot \) P
  - 942-4061 PSI (65-280 bar)
- **L2**: Load sensing 145-435 PSI \( \cdot \) P
  - With bleed & pressure limiter
  - 942-4061 PSI (65-280 bar)
- **AN**: Pilot operated pressure limiter with ISO4401 interface & SAE 4 Vent Port
- **AM**: Pilot operated pressure limiter with mechanical adjustment and SAE 4 Vent Port
- **AE**: Pilot operated pressure limiter with mechanical and electrical adjustment 12 VDC
- **AF**: Pilot operated pressure limiter with mechanical and electrical adjustment 24 VDC

### Additional Control Options
- **0**: No other options
- **1**: Displacement sensor
- **2**: Displacement sensor
** mandatory with “W”, “X”, “Y”, ”Z” “D” and ”Y”

### Adjustable Displacement Stops*
*Not available with Thru-Drive

- **0**: None
- **1**: Adjustable maximum displacement stop
- **2**: Adjustable minimum displacement stop
- **3**: Adjustable maximum and minimum displacement stop

### Thru-Drive Mounting Pad/Coupling
- **0**: No Thru-Drive
- **A**: SAE 82-2 (A), 9T coupling
- **B**: SAE 101-1 (B), 11T coupling
- **Q**: SAE 101-2, 15T coupling
- **J**: SAE 101-2, 15T coupling
- **K**: SAE 101-2, 15T coupling
- **C**: SAE 127-4, 14T coupling
- **N**: SAE 127-4, 17T coupling
- **D**: SAE 152-4, 13T coupling

### Paint
- **00**: No Paint
- **PB**: Black Paint

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**Parker Hannifin Corporation**
Hydraulic Pump Division
Marysville, Ohio USA
## Medium Pressure Axial Piston Pumps

### P1/PD Series

**Technical Information**

**Model**

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<thead>
<tr>
<th>Model Code</th>
<th>P1/PD 018</th>
<th>P1/PD 028</th>
<th>P1/PD 045</th>
<th>P1/PD 060</th>
<th>P1/PD 075</th>
<th>P1/PD 100</th>
<th>P1/PD 140</th>
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<tbody>
<tr>
<td>Maximum Displacement, cm³/rev</td>
<td>18</td>
<td>28</td>
<td>45</td>
<td>60</td>
<td>75</td>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>1.10</td>
<td>1.71</td>
<td>2.75</td>
<td>3.66</td>
<td>4.58</td>
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<td>8.54</td>
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<td>Outlet Pressure – Continuous, bar</td>
<td>280</td>
<td>4000</td>
<td>320</td>
<td>4500</td>
<td>350</td>
<td>5000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak, bar</td>
<td>350</td>
<td>5000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1 Maximum Speed (1.3 bar abs inlet), rpm</td>
<td>3600</td>
<td>3400</td>
<td>3100</td>
<td>2800</td>
<td>2700</td>
<td>2500</td>
<td>2400</td>
</tr>
<tr>
<td>P1 (1.0 bar abs inlet), rpm</td>
<td>3300</td>
<td>3200</td>
<td>2800</td>
<td>2500</td>
<td>2400</td>
<td>2100</td>
<td>2100</td>
</tr>
<tr>
<td>P1 (0.8 bar abs inlet), rpm</td>
<td>2900</td>
<td>2900</td>
<td>2400</td>
<td>2200</td>
<td>2100</td>
<td>1900</td>
<td>1800</td>
</tr>
<tr>
<td>PD Maximum Speed (1.0 bar abs inlet), rpm</td>
<td>1800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PD (0.8 bar abs inlet), rpm</td>
<td>1800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Speed, rpm</td>
<td>600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inlet Pressure – Maximum, bar</td>
<td>10 (gage)</td>
<td>145</td>
<td>1.0 absolute (0.0 gage)</td>
<td>14.5</td>
<td>0.8 absolute (-0.2 gage)</td>
<td>11.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>psi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated, bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated, psi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum, bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>psi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated, psi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Pressure – Peak, bar</td>
<td>4.0 absolute (3.0 gage)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and less than 0.5 bar above inlet pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated, bar</td>
<td>2.0 absolute (1.0 gage)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and less than 0.5 bar above inlet pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid Temperature Range, °C</td>
<td>-40 to +95</td>
<td>-40 to +203</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid Viscosity – Rated, cSt</td>
<td>6 to 160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Intermittent, cSt</td>
<td>5000 (for cold starting)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Intermittent, cSt</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid Contamination – Rated, ISO</td>
<td>20/18/14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum, ISO</td>
<td>21/19/16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAE Mounting – Flange</td>
<td>82-2 (A)</td>
<td>101-2 (B)</td>
<td>101-2 (B)</td>
<td>127-2 (C) or 127-4 (C)</td>
<td>127-4 (C)</td>
<td>152-4 (D)</td>
<td></td>
</tr>
<tr>
<td>ISO Mounting - Flange</td>
<td>80 mm</td>
<td>100 mm</td>
<td>100 mm</td>
<td>125 mm</td>
<td>125 mm</td>
<td>125 mm</td>
<td>180 mm</td>
</tr>
<tr>
<td>SAE Keyed Shafts</td>
<td>19-1, A</td>
<td>25-1, BB</td>
<td>25-1, BB</td>
<td>32-1, C</td>
<td>32-1, C</td>
<td>38-1, CC</td>
<td>44-1, D</td>
</tr>
<tr>
<td>ISO Keyed Shafts</td>
<td>20 mm</td>
<td>25 mm</td>
<td>25 mm</td>
<td>32 mm</td>
<td>32 mm</td>
<td>40 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight – End Port, kg (lb)</td>
<td>13.4 (29.5)</td>
<td>17.7 (39.0)</td>
<td>23 (50)</td>
<td>29 (64)</td>
<td>30 (66)</td>
<td>51 (112)</td>
<td>66 (145)</td>
</tr>
<tr>
<td>Side Port, kg (lb)</td>
<td>17.8 (39.8)</td>
<td>18.1 (40.0)</td>
<td>24 (52)</td>
<td>30 (67)</td>
<td>31 (68)</td>
<td>53 (117)</td>
<td>67 (147)</td>
</tr>
<tr>
<td>Thru-Drive, kg (lb)</td>
<td>19.6 (43.9)</td>
<td>22.5 (50.4)</td>
<td>27 (59)</td>
<td>34 (75)</td>
<td>35 (77)</td>
<td>55 (121)</td>
<td>82 (180)</td>
</tr>
<tr>
<td>Moment of Inertia kg·mm²</td>
<td>793</td>
<td>1618</td>
<td>3268</td>
<td>4687</td>
<td>5207</td>
<td>12402</td>
<td>22343</td>
</tr>
<tr>
<td>Moment of Inertia Thru-Drive kg·mm²</td>
<td>793</td>
<td>1618</td>
<td>3268</td>
<td>4687</td>
<td>5207</td>
<td>12402</td>
<td>22343</td>
</tr>
</tbody>
</table>

*Intermittent pressure is defined as less than 10% of operation time, not exceeding 6 successive seconds.

**Typical Control Reponse Times**

<table>
<thead>
<tr>
<th>Control Description</th>
<th>Pump Operating Condition</th>
<th>Typical Control Response Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>018</td>
<td>028</td>
</tr>
<tr>
<td>&quot;C&quot; Pressure Limiter</td>
<td>Maximum Displacement to Zero</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Zero Displacement to Maximum</td>
<td>80</td>
</tr>
<tr>
<td>&quot;L&quot; Load Sensing</td>
<td>Maximum Displacement to Zero</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Zero Displacement to Maximum</td>
<td>70</td>
</tr>
<tr>
<td>&quot;A&quot; Pilot Operated Control</td>
<td>Maximum Displacement to Zero</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Zero Displacement to Maximum</td>
<td>80</td>
</tr>
</tbody>
</table>

* Based on NFPA testing standards

For max volume stops:

- **Pump Size % Stroke reduction per turn**
  - P°060 6.76
  - P°018 6.2
  - P°075 6.2
  - P°028 8.2
  - P°100 5.5
  - P°045 7.5
  - P°140 4.8

**Control Adjustment Sensitivity:**

- Load Sense 28 Bar/Turn
- Pressure Compensator 80 to 280 Bar range (C0) = 40 Bar/Turn
- Pressure Compensator 20 to 80 Bar range (C1) = 18.6 Bar/Turn
- A Compensator 100 Bar/Turn
- A Compensator Differential 20 Bar/Turn
Control Option “C”
Pressure Limiter Control

The pressure limiter control is used to limit the maximum system pressure. The control acts such that full pump displacement is achieved unless the system valve restricts the output flow or the load pressure reaches the maximum setting of the control. If pump flow is restricted by the system valve, the pump will provide only the flow demanded, but at the maximum pressure setting of the compensator control. If the outlet flow is completely blocked, the pump will destroke to zero displacement and maintain the pressure at the setting of the compensator spring.

Pressure Limiter Control
with Optional Maximum & Minimum Displacement Adjustments
(A minimum displacement stop requires the use of a system relief valve.)

Refer to page 9 for typical control characteristics.
Control Option “L”
Load Sensing and Pressure Limiter Control

These controls feature load sensing and maximum pressure compensation. Load sense controls are used to match pump flow and pressure to system demands, thus minimizing losses due to wasted horsepower. The pump automatically adjusts for changes in drive speed and load pressures to match the pump output flow to the load requirement. Since the pump load sense control will maintain a constant pressure drop across the main system throttling valve, the flow rate will remain constant, independent of changes in load pressure and pump shaft speed.

Load Sensing and Pressure Limiter Control
with Optional Minimum & Maximum Displacement Adjustments

(A minimum displacement stop requires the use of a system relief valve.)

Refer to page 9 for typical control characteristics.
Control Options “AN”
Pilot Operated Control with ISO 4401 NG6 Interface for Customer Added Pressure Limiter

This control is a standard pressure compensator, but with a NG6 (D03) valve interface. This interface allows the integral mounting of valves to achieve a variety of pressure control circuits, as well as pump standby mode.

(Caution: Pumps shipped with the “AN” control need to have a valve mounted to the NG6 interface for operation. This is not a functional control as shipped, but is intended for customers that desire to mount accessory valves for pressure control to in place of plumbing the control valves externally.)

"AN"
with Optional Minimum & Maximum Displacement Adjustments
(A minimum displacement stop requires the use of a system relief valve.)

Refer to page 9 for typical control characteristics.
Control Options “AM”
Pilot Operated Pressure Limiter Control with Vent Port V

This control allows the pump pressure compensator setting to be adjusted from a remote relief valve. The control acts such that full pump displacement is achieved unless the system valve restricts the output flow or the load pressure reaches the maximum setting of the control. If pump flow is restricted by the system valve, the pump will provide only the flow demanded, but at the maximum pressure setting of the compensator control. If the outlet flow is completely blocked, the pump will destroke to zero displacement and maintain the pressure at the setting of the remote relief valve.

Refer to page 9 for typical control characteristics.
Control Options “AE” and “AF”

Pilot Operated Pressure Limiter Control with Proportional Electronic Adjustment

This control allows the pump pressure compensator setting to be adjusted by an on-board 4VP0150G-24B1C1 (24V) or RE06M35W2N1KW8087 (12V) proportional, electronic relief valve. The control acts such that full pump displacement is achieved unless the system valve restricts the output flow or the load pressure reaches the maximum setting of the control. If pump flow is restricted by the system valve, the pump will provide only the flow demanded, but at the maximum pressure setting of the compensator control. If the outlet flow is completely blocked, the pump will destroke to zero displacement and maintain the pressure at the setting of the relief valve.

The following are recommended to drive the proportional valve on the AE or AF pump:

<table>
<thead>
<tr>
<th>Parker Part#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>027-22071-0</td>
<td>Dual Driver Module (12/24V)</td>
</tr>
<tr>
<td>027-22067-0</td>
<td>Plug-Top-Driver 12V (0-10V command)</td>
</tr>
<tr>
<td>027-22066-0</td>
<td>Plug-Top-Driver 24V (0-10V command)</td>
</tr>
<tr>
<td>701-00600-8</td>
<td>Proportional Amplifier 12V (Eurocard)</td>
</tr>
<tr>
<td>701-00601-8</td>
<td>Proportional Amplifier 24V (Eurocard)</td>
</tr>
<tr>
<td>EX00-S05</td>
<td>Eurocard Holder</td>
</tr>
</tbody>
</table>

Note: Consult Factory for more driver options and information.

“AE” and “AF” with Optional Minimum & Maximum Displacement Adjustments

(A minimum displacement stop requires the use of a system relief valve.)

AE denotes the 12vdc soleniod.
AF denotes the 24vdc soleniod.
Refer to page 9 for typical control characteristics.
**Torque Limiting Control with Maximum Pressure Limiter**

AMT, ALT, LOT

These controls provide the benefit of pressure limiting control, plus the ability to limit the input torque the pump will draw. These controls are beneficial when the power available from the prime mover for the hydraulics is limited; or the application power demand has both high flow/low pressure and low flow/high pressure duty cycles.

**“AMT” Control (Available on P'045, P'060, P'075, P'100, P'140 Models)**

The “AMT” combines the functions of a pressure limiter and a torque limiter control. The pressure limiter function can also be controlled remotely by connecting the vent port to an external pilot relief valve. The pump will maintain maximum displacement until the torque limiter setting is reached, and then the pump will maintain the input torque at the pre-selected setting. If the system pressure reaches the pressure compensator setting, then the pump flow will be lowered to the level needed to maintain the maximum pressure setting.

**“ALT” Control (Available on P'045, P'060 Models)**

The “ALT” combines the functions of a pressure limiter, load sense and torque limiter control. The pressure limiter function limits the maximum pump outlet pressure. The load sense control function requires the vent port to be connected to the highest load pressure via a load sense signal line. The control will match pump output flow and pressure to the system demand, thus minimizing horsepower losses. The pump will operate in a load sense mode until the torque limiter setting is reached, and then the pump will maintain the input torque at the pre-selected setting. If the system pressure reaches the pressure compensator setting, then the pump flow will be lowered to the level needed to maintain the maximum pressure setting.

**“LOT” Control (Available on P'075, P'100, P'140 Models)**

The “LOT” combines the functions of a pressure limiter, load sense and torque limiter control. This high performance control features separate load sense and pressure limiter spools which results in optimal flow versus pressure characteristics, and more productivity for the application. The load sense control function requires the signal port to be connected to the highest load pressure via a load sense signal line. The control will match pump output flow and pressure to the system demand, thus minimizing horsepower losses. The pump will operate in a load sense mode until the torque limiter setting is reached, and then the pump will maintain the input torque at the pre-selected setting. If the system pressure reaches the pressure compensator setting, then the pump flow will be lowered to the level needed to maintain the maximum pressure setting.
Electronic Control Options

These controls are electronic proportional displacement and pressure controls with or without an adjustable hydromechanical pressure limiter.*

*Pumps without pressure limiter should be designed in a circuit with other means of pressure relief.

The control will provide precisely the flow specified per a displacement input command and maintain that flow level until a new displacement command level is received, or until the pressure command overrides to limit system pressure.

A minimum of 25 bar servo pressure is required to control the pump. To control the pump at system pressure below 25 bar, either a sequence valve in the pressure line or an external servo source is required. Without adequate servo pressure, the pump is biased on stroke.

Options are available for the sequence valve:

R5S which is a standard product from our Hydraulic Valve Division

IC-6481 (3/4" flange), IC-6482 (1" flange), IC-6483 (1-1/4" flange) manifold with cartridge solution from Hydraulic Cartridge Systems Division

Cables are not included with the pump but needed when ECU is purchased:

12-pin connector cable needed

6-pin connector cable needed

Cable assembly

Hydromechanical Pmax compensator can be adjusted with the same sensitivity as C0 and C1 control.

Parameters adjustment, calibration info and Interface between ECU and Pump are described in the "Electronic Controls - Graphical User Interface"

Typical Control Response Times

<table>
<thead>
<tr>
<th>Displacement (cc)</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>60</th>
<th>75</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum displacement to zero</td>
<td>40</td>
<td>40</td>
<td>43</td>
<td>63</td>
<td>96</td>
<td>101</td>
<td>109</td>
</tr>
<tr>
<td>Zero displacement to Maximum</td>
<td>35</td>
<td>35</td>
<td>36</td>
<td>52</td>
<td>72</td>
<td>77</td>
<td>84</td>
</tr>
</tbody>
</table>

A driver control module can be provided with the pump either with analog or CANBUS control capability. Additionally preset control values can be selected via a RS232/USB connection using GUI software available on Parker Hannifin's website.

The mechanical pressure limiter will override the electronic inputs and limit pump outlet pressure to the preset level.

Using electronic control, the pump can be used in overcenter condition. (Energy recovery is one example of application for this.)
P1 Series Typical Pump Outlet Flow

P1 018 Outlet Flow - Full Stroke
50c inlet oil temperature - ISO VG32 fluid

P1 028 Outlet Flow - Full Stroke
50c inlet oil temperature - ISO VG32 fluid

P1 045 Outlet Flow - Full Stroke
50c inlet oil temperature, ISO VG32 fluid
P1 Series Typical Pump Outlet Flow

P1 060 Outlet Flow - Full Stroke
50 C inlet oil temperature - ISO VG32 fluid - maximum displacement

P1 075
50 C inlet oil temperature - ISO VG32 fluid - maximum displacement

P1 100
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

P1 140
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement
P1 Series Typical Overall Efficiency

P1 018
50°C inlet oil temperature - ISO VG 32 fluid - maximum displacement

P1 028
50°C inlet oil temperature - maximum displacement

P1 045
50°C inlet oil temperature - ISO VG 32 fluid - maximum displacement
P1 Series Typical Overall Efficiency

P1 060
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

P1 075
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

P1 100
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

P1 140
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

P1 Series Performance Data
P1 Series Typical Shaft Input Power

P1 018
shaft input power at zero outlet flow
50°C inlet oil temperature - ISO VG 32 fluid

P1 018
shaft input power at maximum displacement
50°C inlet oil temperature - ISO VG 32 fluid

P1 028
shaft input power at zero outlet flow
50°C inlet oil temperature - ISO VG 32 fluid

P1 028
shaft input power at maximum displacement
50°C inlet oil temperature - ISO VG 32 fluid

P1 045
shaft input power at zero outlet flow
50°C inlet oil temperature - ISO VG 32 fluid

P1 045
shaft input power at maximum displacement
50°C inlet oil temperature - ISO VG 32 fluid
P1 Series Typical Shaft Input Power

**P1 060**

- Shaft input power at zero outlet flow
- 50°C inlet oil temperature - ISO VG 32 fluid

**P1 075**

- Shaft input power at zero outlet flow
- 50°C inlet oil temperature - ISO VG 32 fluid

**P1 060**

- Shaft input power at maximum displacement
- 50°C inlet oil temperature - ISO VG 32 fluid

**P1 075**

- Shaft input power at maximum displacement
- 50°C inlet oil temperature - ISO VG 32 fluid
P1 Series Typical Shaft Input Power

P1 100
shaft input power at zero outlet flow
50°C inlet oil temperature - ISO VG 32 fluid

P1 140
shaft input power at zero outlet flow
50°C inlet oil temperature - ISO VG 32 fluid

P1 100
shaft input power at maximum displacement
50°C inlet oil temperature - ISO VG 32 fluid

P1 140
shaft input power at maximum displacement
50°C inlet oil temperature - ISO VG 32 fluid
P1 Series Typical Noise Characteristics
(These are anechoic sound pressure readings)

P1 018 Sound Levels (Zero Flow)
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 018 Sound Levels (Full Flow)
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 028 Sound Levels (Zero Flow)
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 028 Sound Levels (Full Flow)
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 045 Sound Levels (Zero Flow)
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 045 Sound Levels (Full Flow)
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature
P1 Series Typical Noise Characteristics
(These are anechoic sound pressure readings)

P1 060 Mobile Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 075 Mobile Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 100 Mobile Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

P1 140 Mobile Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

solid lines are for maximum displacement and dashed lines are for zero flow
P1 Series Typical Shaft Bearing Life
P1 Series Typical Shaft Bearing Life

P1 060

P1 100

P1 075

P1 140

Duty cycle average pump outlet pressure (bar)

Shaft bearing B-10 life at maximum displacement

Shaft bearing B-10 life (hours)

P1 Series Performance Data

P1/PD Series

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA
PD Series Typical Pump Outlet Flow

PD 018 Outlet Flow - Full Stroke
50°C inlet oil temperature - ISO VG32 fluid

PD 028 Outlet Flow - Full Stroke
50°C inlet oil temperature - ISO VG32 fluid

PD 045 Output Flow - Full Stroke
50°C inlet oil temperature, ISO VG32 fluid
PD Series Typical Pump Outlet Flow

**PD 060**

50°C inlet oil temperature - ISO VG32 fluid - maximum displacement

- **Pump outlet pressure (bar)**
- **Pump outlet flow (lpm)**

**PD 075**

50°C inlet oil temperature - ISO VG32 fluid - maximum displacement

- **Pump outlet pressure (bar)**
- **Pump outlet flow (lpm)**

**PD 100**

50°C inlet oil temperature - ISO VG32 fluid - maximum displacement

- **Pump outlet pressure (bar)**
- **Pump outlet flow (lpm)**

**PD 140**

50°C inlet oil temperature - ISO VG32 fluid - maximum displacement

- **Pump outlet pressure (bar)**
- **Pump outlet flow (lpm)**
PD Series Typical Overall Efficiency

PD 018 Overall Efficiency
50 C inlet oil temperature - ISO VG32 fluid - Maximum Displacement

PD 028 Overall Efficiency
50 C inlet oil temperature - ISO VG32 fluid - Maximum Displacement

PD 045 Overall Efficiency
50 C inlet oil temperature - Maximum Displacement
PD Series Typical Overall Efficiency

**PD 060**
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

**PD 075**
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

**PD 100**
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement

**PD 140**
50 C inlet oil temperature - ISO VG 32 fluid - maximum displacement
PD Series Typical Shaft Input Power

**PD 018 Input Power - Zero Stroke**
50 °C inlet oil temperature - ISO VG32 fluid

**PD 018 Input Power - Full Stroke**
50 °C inlet oil temperature - ISO VG32 fluid

**PD 028 Input Power - Zero Stroke**
50 °C inlet oil temperature - ISO VG32 fluid

**PD 028 Input Power - Full Stroke**
50 °C inlet oil temperature - ISO VG32 fluid

**PD 045 Input Power - Zero Stroke**
50 °C inlet oil temperature - ISO VG32 fluid

**PD 045 Input Power - Full Stroke**
50 °C inlet oil temperature - ISO VG32 fluid
PD Series Typical Shaft Input Power

**PD 060**
- Shaft input power at zero outlet flow
- 50°C inlet oil temperature - ISO VG 32 fluid

**PD 075**
- Shaft input power at zero outlet flow
- 50°C inlet oil temperature - ISO VG 32 fluid

**PD 060**
- Shaft input power at maximum displacement
- 50°C inlet oil temperature - ISO VG 32 fluid

**PD 075**
- Shaft input power at maximum displacement
- 50°C inlet oil temperature - ISO VG 32 fluid
PD Series Typical Shaft Input Power

**PD 100**
- Shaft input power at zero outlet flow
- 50°C inlet oil temperature - ISO VG 32 fluid

**PD 140**
- Shaft input power at zero outlet flow
- 50°C inlet oil temperature - ISO VG 32 fluid

**PD 100**
- Shaft input power at maximum displacement
- 50°C inlet oil temperature - ISO VG 32 fluid

**PD 140**
- Shaft input power at maximum displacement
- 50°C inlet oil temperature - ISO VG 32 fluid
PD Series Typical Noise Characteristics
(These are anechoic sound pressure readings)

**PD 018 Sound Levels (Zero Flow)**
ISO VG32 fluid - 50°C inlet oil temperature

**PD 018 Sound Levels (Full Flow)**
ISO VG32 fluid - 50°C inlet oil temperature

**PD 028 Sound Levels (Zero Flow)**
ISO VG32 fluid - 50°C inlet oil temperature

**PD 028 Sound Levels (Full Flow)**
ISO VG32 fluid - 50°C inlet oil temperature

**PD 045 Sound Levels (Zero Flow)**
ISO VG32 fluid - 50°C inlet oil temperature

**PD 045 Sound Levels (Full Flow)**
ISO VG32 fluid - 50°C inlet oil temperature
PD Series Typical Noise Characteristics
(These are anechoic sound pressure readings)

PD 060 Industrial Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

PD 075 Industrial Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

PD 100 Industrial Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

PD 140 Industrial Pump Typical Sound Level
anechoic conditions - ISO VG 32 fluid - 50 C inlet oil temperature

solid lines are for maximum displacement and dashed lines are for zero flow
PD Series Typical Shaft Bearing Life

PD 018 Shaft Bearing L-10 Life (Max Displacement)

PD 028 Shaft Bearing L-10 Life (Max Displacement)

PD 045 Shaft Bearing L-10 Life (Max Displacement)
PD Series Typical Shaft Bearing Life

**PD 060**

- **Shaft bearing B-10 life at maximum displacement**

**PD 075**

- **Shaft bearing B-10 life at maximum displacement**

**PD 100**

- **Shaft bearing B-10 life at maximum displacement**

**PD 140**

- **Shaft bearing B-10 life at maximum displacement**
## Dimensional Data

### Pump Installation - P1/PD 018

#### Input Shaft Dimensions

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Pump Installation - P1/PD 018
End Port
“L” Control Option

For Shaft and Flange Dimensions See the First Page of this 18cc Section

Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Inch o-ring port conforms to SAE J514
Note C: BSP port conforms to ISO 228-1

Note: See Page 79 for shaft torq rating
Pump Installation - P1/PD 018
Side Port
“L” Control Option

For Shaft & Flange Dimensions, See the First Page of this 18cc Section

P1/PD 018 Port Sizes

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<td>M27x2A</td>
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<td>&quot;BG&quot;</td>
<td>SAE-4B</td>
<td>M12x1 5A</td>
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Note A: Metric o-ring boss ports conform to ISO 6149-1
Note B: Inch o-ring ports conform to SAE J514
Note C: BSP ports conform to ISO 228-1
Pump Installation - P1/PD 018
Side Ports with Thru-Drive
“L” Control Option

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<td>&quot;B&quot; Outlet</td>
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Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Inch o-ring port conforms to SAE J514
Note C: BSP port conforms to ISO 228-1

Note: See Page 79 for shaft torq rating

Pump Installation - P1/PD 018
Side Ports with Thru-Drive
Mounting Options

SAE-A Mounting Options Information

Model Number T0*A
Spline: ANSI B92.1 1996
SAE 16-4 (A) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 9
Pitch - 0.5625
Minor Diameter - 0.514/0.509 in
Pitch Diameter - 0.53625 in ref

Model Number T0*H
Spline: ANSI B92.1 1996
SAE 19-4 Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 11
Pitch - 0.536
Minor Diameter - 0.6356/0.6306 in
Pitch Diameter - 0.6875 in ref

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA
## Pump Installation - P1/PD 028
### Input Shaft Dimensions

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<th>Dimension</th>
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<td>PITCH DIAMETER - 20.638</td>
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Medium Pressure Axial Piston Pumps
P1/PD Series

Pump Installation - P1/PD 028
End Port
“L” Control Option

Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Inch o-ring port conforms to SAE J514
Note C: BSP port conforms to ISO 228-1
Note D: Inch 4-bolt flange port conforms to SAE J518

P1/PD 028 Port Sizes

<table>
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<tr>
<th>Port Type</th>
<th>SAE 4 Bolt</th>
<th>SAE Threaded</th>
<th>ISO</th>
<th>BSP</th>
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Note: Metric o-ring boss port conforms to ISO 6149-1
Note: Inch o-ring port conforms to SAE J514
Note: BSP port conforms to ISO 228-1
Note: Inch 4-bolt flange port conforms to SAE J518
Pump Installation - P1/PD 028
Side Port
“L” Control Option

P1/PD 028 Port Sizes

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<th>BSP</th>
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Note A: Metric o-ring boss ports conform to ISO 6149-1
Note B: Inch o-ring ports conform to SAE J514
Note C: BSP ports conform to ISO 228-1
Note D: Inch 4-bolt flange port conforms to SAE J518
Pump Installation - P1/PD 028
Side Ports with Thru-Drive
“L” Control Option

View Showing SAE "B" Mounting Pad

View Showing SAE "A" Mounting Pad

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<th>P1/PD 028 Port Sizes</th>
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Note A: Metric o-ring boss ports conform to ISO 6149-1
Note B: Inch o-ring ports conform to SAE J514
Note C: BSP ports conform to ISO 228-1
Note D: Inch 4-bolt flange port conforms to SAE J518

Note: See Page 79 for shaft torque rating
Pump Installation - P1/PD 028
Side Ports with Thru-Drive Mounting Options

**SAE A Mounting Options Information**
- Model Number T0*A
- Spline: ANSI B92.1 1996
- SAE 16-4 (A) Involute Spline Data
- Class 5 Flat Root Side Fit
- Number of Teeth - 9
- Pitch - 16/32
- Pressure Angle - 30
- Minor Diameter - 0.514/0.509 in
- Pitch Diameter - 0.5625 in

**SAE B Mounting Options Information**
- Model Number T0*B
- Spline: ANSI B92.1 1996
- SAE 22-4 (B) Involute Spline Data
- Class 5 Flat Root Side Fit
- Number of Teeth - 13
- Pitch - 16/32
- Pressure Angle - 30
- Minor Diameter - 0.759/0.754 in
- Pitch Diameter - 0.8125 in

**SAE-B Mounting Options Information**
- Model Number T0*Q
- Spline: ANSI B92.1 1996
- SAE 25-4 (B-B) Involute Spline Data
- Class 5 Flat Root Side Fit
- Number of Teeth - 15
- Pitch - 16/32
- Pressure Angle - 30
- Minor Diameter - 0.877/0.882 in
- Pitch Diameter - 0.9375 in
## Pump Installation - P1/PD 045
### Input Shaft Dimensions

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Pump Installation - P1/PD 045
End Port
“L” Control Option

Medium Pressure Axial Piston Pumps
P1/PD Series

P1/PD 045 Port Sizes

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<th>SAE Threaded</th>
<th>ISO</th>
<th>BSP</th>
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Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Inch o-ring port conforms to SAE J514
Note C: BSPP port conforms to ISO 228-1
Note D: Inch 4-bolt flange port conforms to SAE J518
Note E: Metric 4-bolt flange port conforms to ISO 6162
Pump Installation - P1/PD 045
Side Port
“L” Control Option

Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Inch o-ring port conforms to SAE J514
Note C: BSPP port conforms to ISO 228-1
Note D: Inch 4-bolt flange port conforms to SAE J518
Note E: Metric 4-bolt flange port conforms to ISO 6162

P1/PD 045 Port Sizes

<table>
<thead>
<tr>
<th>SAE 4 Bolt</th>
<th>SAE Threaded</th>
<th>ISO</th>
<th>BSP</th>
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<tbody>
<tr>
<td>&quot;A&quot; Inlet</td>
<td>38mm Code 61D</td>
<td>SAE-24</td>
<td>38mm DN38</td>
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<tr>
<td>&quot;B&quot; Outlet</td>
<td>25mm Code 61</td>
<td>SAE-16</td>
<td>25mm DN25B</td>
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<tr>
<td>&quot;BG&quot;</td>
<td>SAE-4B</td>
<td>M12x1.5A</td>
<td>1/4&quot;C</td>
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<tr>
<td>D1 D2 D3</td>
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<td>1/2&quot;C</td>
</tr>
<tr>
<td>&quot;X&quot;</td>
<td>SAE-4B</td>
<td>M12x1.5A</td>
<td>1/4&quot;C</td>
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</table>

Note: Metric o-ring boss port conforms to ISO 6149-1
Note: Inch o-ring port conforms to SAE J514
Note: BSPP port conforms to ISO 228-1
Note: Inch 4-bolt flange port conforms to SAE J518
Note: Metric 4-bolt flange port conforms to ISO 6162
Medium Pressure Axial Piston Pumps
P1/PD Series

Pump Installation - P1/PD 045
Side Ports with Thru-Drive
“L” Control Option

Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Inch o-ring port conforms to SAE J514
Note C: BSPP port conforms to ISO 228-1
Note D: Inch 4-bolt flange port conforms to SAE J518
Note E: Metric 4-bolt flange port conforms to ISO 6162
Note: See Page 79 for shaft torq rating
Medium Pressure Axial Piston Pumps
P1/PD Series

Pump Installation - P1/PD 045
Side Ports with Thru-Drive
Mounting Options

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

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### Pump Installation - P1/PD 060

#### Input Shaft Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
<th>ISO (Code 04)</th>
<th>SAE (Code 01 or 02)</th>
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<tbody>
<tr>
<td>AA</td>
<td>Length 1</td>
<td>32.021/32.002</td>
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<tr>
<td>AB</td>
<td>Length 2</td>
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<td>35.33/35.02</td>
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<tr>
<td>AC</td>
<td>Length 3</td>
<td>68.8/67.2</td>
<td>56.8/55.2</td>
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<td>AD</td>
<td>Flange</td>
<td>ISO E32N</td>
<td>SAE J744 32.1 C</td>
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<td>Keyed</td>
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<tr>
<td>BB</td>
<td>Diameter</td>
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<td>Drain</td>
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<tr>
<td>BD</td>
<td>Spline</td>
<td>N/A</td>
<td>SPLINE: SAE ASA-B 1960, SAE 32-4C INVOLUTE SPLINE DATA, CLASS 2 FLAT ROOT SIDE FIT, NUMBER OF TEETH - 14, PITCH - 12/24, PRESSURE ANGLE - 30, MAJOR DIAMETER - 1.2268/1.4763 IN, PITCH DIAMETER - 1.1666</td>
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<tr>
<td>CA</td>
<td>Flange B</td>
<td>ISO 3019/202991 125B4SW</td>
<td>SAE J744 JUN96 127-4 C</td>
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<td>14.4 DIA.</td>
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<td>57.2</td>
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<td>CD</td>
<td>Diameter</td>
<td>113.2 SQUARE</td>
<td>114.5 SQUARE</td>
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<tr>
<td>CE</td>
<td>Diameter</td>
<td>125.00/124.94 ISO 3019/2</td>
<td>127.00/126.95 SAE J744</td>
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<tr>
<td>CF</td>
<td>Diameter</td>
<td>9.5/9.0</td>
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<td>Key Width</td>
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Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA
Pump Installation - P1/PD 060
End Port
“L” Control Option

Medium Pressure Axial Piston Pumps
P1/PD Series

Dimensional Data

P1/PD 060 Port Sizes

<table>
<thead>
<tr>
<th></th>
<th>SAE</th>
<th>ISO</th>
<th>BSP</th>
</tr>
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<tbody>
<tr>
<td>A Inlet</td>
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<td>50mm</td>
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<tr>
<td></td>
<td>code 61</td>
<td></td>
<td></td>
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<tr>
<td>W Threads</td>
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<td>M12 x 1.75</td>
<td>—</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>B Outlet</td>
<td>25mm</td>
<td>25mm</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>code 61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y Threads</td>
<td>⅜ - 16 UNC-2B</td>
<td>M10 x 1.5</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>BG</td>
<td>SAE-4D</td>
<td>M12x1.5A</td>
<td>¼&quot;E</td>
</tr>
<tr>
<td>D1 D2 D3</td>
<td>SAE-10D</td>
<td>M22x1.5A</td>
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<tr>
<td>X</td>
<td>SAE-4D</td>
<td>M12x1.5A</td>
<td>¼&quot;E</td>
</tr>
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</table>

Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1
Pump Installation - P1/PD 060
Side Port
“L” Control Option

Dimensional Data

P1/PD 060 Port Sizes

<table>
<thead>
<tr>
<th></th>
<th>SAE</th>
<th>ISO</th>
<th>BSP</th>
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<tr>
<td>☞ A Inlet</td>
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<td>50mm</td>
<td>—</td>
</tr>
<tr>
<td>W Threads</td>
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<td>M12 x 1.75</td>
<td>—</td>
</tr>
<tr>
<td>☞ B Outlet</td>
<td>25mm code 61</td>
<td>25mm</td>
<td>—</td>
</tr>
<tr>
<td>Y Threads</td>
<td>½ - 16 UNC-2BC</td>
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<td>—</td>
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<tr>
<td>BG</td>
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<td>M12x1.5A</td>
<td>¼&quot;E</td>
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<tr>
<td>D1 D2 D3</td>
<td>SAE-10D</td>
<td>M22x1.5A</td>
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<tr>
<td>X</td>
<td>SAE-4D</td>
<td>M12x1.5A</td>
<td>¼&quot;E</td>
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</table>

Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1
Pump Installation - P1/PD 060
Side Ports with Thru-Drive
“L” Control Option

P1/PD 060 Port Sizes

<table>
<thead>
<tr>
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<td>B Outlet</td>
<td>25mm code 61</td>
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<tr>
<td>Y Threads</td>
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<td>¼&quot;E</td>
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</table>

Note A: Metric o-ring boss port conforms to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1

Note: See Page 79 for shaft torq rating
## Medium Pressure Axial Piston Pumps

**P1/PD Series**

### Dimensional Data

**Pump Installation - P1/PD 060**

**Side Ports with Thru-Drive Mounting Options**

#### SAE A Mounting Options Information

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Splines</th>
<th>SAE 16-4 (A) Data</th>
<th>SAE 19-4 (H) Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0*A</td>
<td>ANSI B92.1 1996</td>
<td>Class 5 Flat Root Side Fit</td>
<td>Number of Teeth - 9</td>
</tr>
<tr>
<td></td>
<td>Pressure Angle - 30</td>
<td>Minor Diameter - 0.514/0.509 in</td>
<td>Pitch Diameter - 0.5625 in ref</td>
</tr>
<tr>
<td>T0*J</td>
<td>ANSI B92.1 1996</td>
<td>Class 5 Flat Root Side Fit</td>
<td>Number of Teeth - 13</td>
</tr>
<tr>
<td></td>
<td>Pressure Angle - 30</td>
<td>Minor Diameter - 0.6875/0.680 in</td>
<td>Pitch Diameter - 0.8750 in ref</td>
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</table>

#### SAE B Mounting Options Information

<table>
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<tr>
<th>Model Number</th>
<th>Splines</th>
<th>SAE 22-4 (B) Data</th>
<th>SAE 25-4 (B-B) Data</th>
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</thead>
<tbody>
<tr>
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<td>ANSI B92.1 1996</td>
<td>Class 5 Flat Root Side Fit</td>
<td>Number of Teeth - 13</td>
</tr>
<tr>
<td></td>
<td>Pressure Angle - 30</td>
<td>Minor Diameter - 0.8775/0.870 in</td>
<td>Pitch Diameter - 1.1667 in ref</td>
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</table>

#### SAE C Mounting Options Information

<table>
<thead>
<tr>
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<th>Splines</th>
<th>SAE 32-4 (C) Data</th>
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</thead>
<tbody>
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<td>ANSI B92.1 1996</td>
<td>Class 5 Flat Root Side Fit</td>
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<td>Pressure Angle - 30</td>
<td>Minor Diameter - 1.0875/1.090 in</td>
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<tr>
<td></td>
<td>Pitch Diameter - 1.1667 in ref</td>
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**SAE A-Mounting Options Information**

- **PARTIAL SECTION A-A**
- **SAE 16-4 (A) & SAE 19-4 (H)**
- **VERTICAL OR HORIZONTAL 2 BOLT**

- **PARTIAL SECTION A-A**
- **SAE 22-4 (B) & SAE 25-4 (B-B)**
- **4 BOLT & VERTICAL OR HORIZONTAL 2 BOLT**

- **PARTIAL SECTION A-A**
- **SAE 32-4 (C)**
- **4 BOLT**
### Pump Installation - P1/PD 075

**Input Shafts**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>ISO (Code 04)</th>
<th>SAE (Code 01 or 02)</th>
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<tbody>
<tr>
<td>AA</td>
<td>32.021/32.002</td>
<td>31.75/31.70</td>
</tr>
<tr>
<td>AB</td>
<td>35.00/34.71</td>
<td>35.33/35.02</td>
</tr>
<tr>
<td>AC</td>
<td>68.8/67.2</td>
<td>56.8/55.2</td>
</tr>
<tr>
<td>AD</td>
<td>ISO E32N</td>
<td>SAE J744 32.1 C</td>
</tr>
<tr>
<td>BA</td>
<td>N/A</td>
<td>38.00</td>
</tr>
<tr>
<td>BB</td>
<td>N/A</td>
<td>48.00</td>
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<td>BC</td>
<td>N/A</td>
<td>56.8/55.2</td>
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<td>BD</td>
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<td>SPLINE: SAE ASA-B 1960 SAE 32-4 (C) INVOLUTE SPLINE DATA CLASS 2 FLAT ROOT SIDE FIT NUMBER OF TEETH - 14 PITCH - 12/24 PRESSURE ANGLE - 30 MAJOR DIAMETER - 1.2268/1.4763 IN PITCH DIAMETER - 1.1766</td>
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<tr>
<td>CA</td>
<td>ISO 3019/202991 125B4SW</td>
<td>SAE J744 JUN'96 127-4C</td>
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<td>113.2 SQUARE</td>
<td>114.5 SQUARE</td>
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<td>125.00/124.94 ISO 3019/2</td>
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Medium Pressure Axial Piston Pumps
P1/PD Series

Pump Installation - P1/PD 075
End Port
“L” Control Option

For Shaft & Flange Dimensions, See the First Page of this 75cc Section

<table>
<thead>
<tr>
<th>P1/PD 075 Port Sizes</th>
<th>SAE 50mm</th>
<th>ISO 50mm DN 51</th>
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<tbody>
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<td>50mm DN 51&lt;sup&gt;B&lt;/sup&gt;</td>
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</tr>
<tr>
<td>W Threads</td>
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<td>M12 x 1.75&lt;sup&gt;B&lt;/sup&gt;</td>
<td>—</td>
</tr>
<tr>
<td>B Outlet</td>
<td>25mm code 61&lt;sup&gt;C&lt;/sup&gt;</td>
<td>25mm DN25&lt;sup&gt;B&lt;/sup&gt;</td>
<td>—</td>
</tr>
<tr>
<td>Y Threads</td>
<td>⅛ - 16 UNC-2B&lt;sup&gt;C&lt;/sup&gt;</td>
<td>M10 x 1.5&lt;sup&gt;B&lt;/sup&gt;</td>
<td>—</td>
</tr>
<tr>
<td>BG</td>
<td>SAE-4&lt;sup&gt;D&lt;/sup&gt;</td>
<td>M12x1.5&lt;sup&gt;A&lt;/sup&gt;</td>
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</tr>
<tr>
<td>D1 D2 D3</td>
<td>SAE-12&lt;sup&gt;D&lt;/sup&gt;</td>
<td>M27x2&lt;sup&gt;A&lt;/sup&gt;</td>
<td>¼&lt;sup&gt;IE&lt;/sup&gt;</td>
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<td>X</td>
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<td>M12x1.5&lt;sup&gt;A&lt;/sup&gt;</td>
<td>¼&lt;sup&gt;IE&lt;/sup&gt;</td>
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</tbody>
</table>

Note A: Metric o-ring boss port conform to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1
Pump Installation - P1/PD 075
Side Port
“L” Control Option

P1/PD 075 Port Sizes

<table>
<thead>
<tr>
<th></th>
<th>SAE</th>
<th>ISO</th>
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<tr>
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<td>50mm</td>
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</tr>
<tr>
<td>W Threads</td>
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<td>M12 x 1.75R</td>
<td>—</td>
</tr>
<tr>
<td>B Outlet</td>
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</tr>
<tr>
<td>Y Threads</td>
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<td>M10 x 1.5B</td>
<td>—</td>
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<td>BG</td>
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<td>¼E</td>
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<td>D1 D2 D3</td>
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<td>X</td>
<td>SAE-4D</td>
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<td>¼E</td>
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</table>

Note A: Metric o-ring boss port conform to ISO 6149-1
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Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1
Pump Installation - P1/PD 075
Side Ports with Thru-Drive
“L” Control Option

Pressure Compensator
Adjusting Screw
Load Sense
Adjusting Screw
"X" Load Sense Port
CCW Control Location
CW Rotation Arrow
CCW Control Location

For Shaft & Flange Dimensions, See the First Page of this 75cc Section

<table>
<thead>
<tr>
<th>P1/PD 075 Port Sizes</th>
<th>SAE</th>
<th>ISO (mm)</th>
<th>BSP</th>
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<td>50mm</td>
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<tr>
<td>W Threads</td>
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<td>ΦB Outlet</td>
<td>25mm</td>
<td>25mm</td>
<td>—</td>
</tr>
<tr>
<td>Y Threads</td>
<td>¾ - 16 UNC-2B</td>
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<td>—</td>
</tr>
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<td>M12x1.5A</td>
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Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1

Note: See Page 79 for shaft torq rating
Pump Installation - P1/PD 075
Side Ports with Thru-Drive Mounting Options

SAE-A Mounting Options Information
Model Number T0*A
Spline: ANSI B92.1 1996
SAE 16-4 (A) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 9
Pitch - 16/32
Pressure Angle - 30
Minor Diameter - 0.5435 in
Pitch Diameter - 0.565 in

SAE-B Mounting Options Information
Model Number T0*B & T0*J
Spline: ANSI B92.1 1996
SAE 22-4 (B) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 16/32
Pressure Angle - 30
Minor Diameter - 0.878 in
Pitch Diameter - 0.936 in

SAE-C Mounting Options Information
Model Number T0*C
Spline: ANSI B92.1 1996
SAE 32-4 (C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 14
Pitch - 16/32
Pressure Angle - 30
Minor Diameter - 1.167 in
Pitch Diameter - 1.144 in

SAE-A
SAE 16-4 (A) (T0*A) & SAE 19-4 (T0*H)
2 BOLT DIAGONAL & VERTICAL OR HORIZONTAL 2 BOLT

SAE-B
SAE 22-4 (B) (T0*B) & SAE 25-4 (B-B) (T0*Q)
4 BOLT & VERTICAL OR HORIZONTAL 2 BOLT

SAE-C
SAE 32-4 (T0*C) 4 BOLT

SECTION A-A
SECTION B-B
PARTIAL SECTION A-A
SAE 28.5 51.1 28.5 78.7 28.5 101.6 51.6 28.5 34.5 73.0 28.5 51.6 101.6 28.5 34.5 73.0 28.5 51.6 73.0 28.5 101.6

Scale 0.75

Medium Pressure Axial Piston Pumps
P1/PD Series
Dimensional Data
# Medium Pressure Axial Piston Pumps

## P1/PD Series

### Pump Installation - P1/PD 100 Input Shafts

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<th>SAE (Code 06)</th>
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Pump Installation - P1/PD 100
End Ports
“L” Control Option

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<td>W Threads</td>
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<td>32mm</td>
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<td>ØB Outlet</td>
<td>code 62C</td>
<td>DN 32</td>
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<td>Y Threads</td>
<td>½ - 13</td>
<td>M12 x 1.75B</td>
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<td>UNC-2Bc</td>
<td>M12</td>
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<td>X</td>
<td>SAE-4D</td>
<td>M12x1.5A</td>
<td>¼&quot;E</td>
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</table>

Note A: Metric o-ring boss port conform to ISO 6149-1
Note B: Metric 4-bolt flange port conform to ISO 6162
Note C: Inch 4-bolt flange port conform to SAE J518
Note D: Inch o-ring boss port conform to SAE J514
Note E: BSP boss port conform to ISO 228-1
Medium Pressure Axial Piston Pumps
P1/PD Series

Pump Installation - P1/PD 100
Side Ports
“L” Control Option

<table>
<thead>
<tr>
<th>P1/PD 100 Port Sizes</th>
<th>SAE</th>
<th>ISO</th>
<th>BSP</th>
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<tr>
<td>W Threads</td>
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<td>ØB Outlet</td>
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<td>32mm DN 32</td>
<td>—</td>
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<tr>
<td>Y Threads</td>
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<td>M12 x 1.75</td>
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<td>BG</td>
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<td>M12x1.5A</td>
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<tr>
<td>D1 D2 D3</td>
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<tr>
<td>X</td>
<td>SAE-4D</td>
<td>M12x1.5A</td>
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</table>

Note A: Metric o-ring boss port conform to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1
**Medium Pressure Axial Piston Pumps**

**P1/PD Series**

**Pump Installation - P1/PD 100**

**Side Ports with Thru-Drive**

*“L” Control Option*

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**Medium Pressure Axial Piston Pumps**

**P1/PD Series**

---

**Dimensional Data**

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**P1/PD 100 Port Sizes**

<table>
<thead>
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<tr>
<td>W Threads</td>
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<tr>
<td>ØB Outlet</td>
<td>32mm code 62c</td>
<td>32mm DN 32</td>
<td>—</td>
</tr>
<tr>
<td>Y Threads</td>
<td>½ - 13 UNC-2BC</td>
<td>M12 x 1.75B</td>
<td>—</td>
</tr>
<tr>
<td>BG</td>
<td>SAE-4D</td>
<td>M12x1.5A</td>
<td>¼E</td>
</tr>
<tr>
<td>D1 D2 D3</td>
<td>SAE-12D</td>
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<td>¼E</td>
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<tr>
<td>X</td>
<td>SAE-4D</td>
<td>M12x1.5A</td>
<td>¼E</td>
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</table>

Note A: Metric o-ring boss port conform to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1

Note: See Page 79 for shaft torq rating
Medium Pressure Axial Piston Pumps
P1/PD Series

Dimensional Data

Pump Installation - P1/PD 100
Side Ports with Thru-Drive Mounting Options

SAE-A Mounting Options Information
Model Number T0*A
Spline: ANSI B92.1 1996
SAE 16-4 (A) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 9
Pitch - 16/32
Pressure Angle - 30
Minor Diameter - 0.514/0.509 in
Pitch Diameter - 0.5625 in ref

SAE-B Mounting Options Information
Model Number T0*B & T0*J
Spline: ANSI B92.1 1996
SAE 22-4 (B) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 16/32
Pressure Angle - 30
Minor Diameter - 0.759/0.754 in
Pitch Diameter - 0.8125 in ref

SAE-C Mounting Options Information
Model Number T0*C
Spline: ANSI B92.1 1996
SAE 32-4 (C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 14
Pitch - 12/24
Pressure Angle - 30
Minor Diameter - 1.0870/1.092 in
Pitch Diameter - 1.0667 in ref

Model Number T0*N
Spline: ANSI B92.1 1996
SAE 38-4 (C-C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 17
Pitch - 12/24
Pressure Angle - 30
Minor Diameter - 1.334/1.339 in
Pitch Diameter - 1.4166 in ref

SAE-A Mounting Options
Model Number T0*A
Spline: ANSI B92.1 1996
SAE 16-4 (A) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 9
Pitch - 16/32
Pressure Angle - 30
Minor Diameter - 0.514/0.509 in
Pitch Diameter - 0.5625 in ref

SAE-B Mounting Options
Model Number T0*B & T0*J
Spline: ANSI B92.1 1996
SAE 22-4 (B) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 16/32
Pressure Angle - 30
Minor Diameter - 0.759/0.754 in
Pitch Diameter - 0.8125 in ref

SAE-C Mounting Options
Model Number T0*C
Spline: ANSI B92.1 1996
SAE 32-4 (C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 14
Pitch - 12/24
Pressure Angle - 30
Minor Diameter - 1.0870/1.092 in
Pitch Diameter - 1.0667 in ref

Model Number T0*N
Spline: ANSI B92.1 1996
SAE 38-4 (C-C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 17
Pitch - 12/24
Pressure Angle - 30
Minor Diameter - 1.334/1.339 in
Pitch Diameter - 1.4166 in ref
## Medium Pressure Axial Piston Pumps

### P1/PD Series

### Pump Installation - P1/PD 140

#### Input Shafts

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<td>PITCH DIAMETER - 1.6265</td>
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Pump Installation - P1/PD 140 End Ports  
“L” Control Option

Medium Pressure Axial Piston Pumps  
P1/PD Series

P1/PD 140 Port Sizes

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<td>SAE-4D</td>
<td>M12x1.5A</td>
<td>1/4E</td>
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Note A: Metric o-ring boss port conform to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1
Pump Installation - P1/PD 140
Side Ports
"L" Control Option

Note A: Metric o-ring boss port conform to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conforms to ISO 228-1
Medium Pressure Axial Piston Pumps
P1/PD Series

Pump Installation - P1/PD 140
Side Ports with Thru-Drive
"L" Control Option

P1/PD 140 Port Sizes

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Note A: Metric o-ring boss port conform to ISO 6149-1
Note B: Metric 4-bolt flange port conforms to ISO 6162
Note C: Inch 4-bolt flange port conforms to SAE J518
Note D: Inch o-ring boss port conforms to SAE J514
Note E: BSP boss port conform to ISO 228-1

Note: See Page 79 for shaft torq rating
Pump Installation - P1/PD 140
Side Ports with Thru-Drive Mounting Options

SAE-A Mounting Options Information
Model Number T0*A
Spline: ANSI B92.1 1996
SAE 16-4 (A) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 9
Pitch - 1/16
Pressure Angl - 30
Minor Diameter - 0.750/0.754 in
Pitch Diameter - 0.8125 in

SAE-B Mounting Options Information
Model Number T0*Q & T0*K
Spline: ANSI B92.1 1996
SAE 25-4 (B-B) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 1/32
Pressure Angl - 30
Minor Diameter - 0.870/0.875 in
Pitch Diameter - 0.9375 in

SAE-C Mounting Options Information
Model Number T0*C
Spline: ANSI B92.1 1996
SAE 32-4 (C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 14
Pitch - 1/24
Pressure Angl - 30
Minor Diameter - 1.0870/1.0920 in
Pitch Diameter - 1.0625 in

SAE-D Mounting Options Information
Model Number T0*D
Spline: ANSI B92.1 1996
SAE 44-4 (D) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 1/32
Pressure Angl - 30
Minor Diameter - 1.480/1.488 in
Pitch Diameter - 1.882 in

SAE-A (T0*A) Mounting Options Information
Model Number T0*A
Spline: ANSI B92.1 1996
SAE 16-4 (A) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 9
Pitch - 1/16
Pressure Angl - 30
Minor Diameter - 0.750/0.754 in
Pitch Diameter - 0.8125 in

SAE-B (T0*B) & T0*J Mounting Options Information
Model Number T0*B & T0*J
Spline: ANSI B92.1 1996
SAE 22-4 (B) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 1/32
Pressure Angl - 30
Minor Diameter - 0.750/0.754 in
Pitch Diameter - 0.8125 in

SAE-C (T0*C) Mounting Options Information
Model Number T0*C
Spline: ANSI B92.1 1996
SAE 32-4 (C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 14
Pitch - 1/24
Pressure Angl - 30
Minor Diameter - 1.0870/1.0920 in
Pitch Diameter - 1.0625 in

SAE-D (T0*D) Mounting Options Information
Model Number T0*D
Spline: ANSI B92.1 1996
SAE 44-4 (D) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 1/32
Pressure Angl - 30
Minor Diameter - 1.480/1.488 in
Pitch Diameter - 1.882 in

SAE-A Mounting Options Information
Model Number T0*A
Class: SAE 16-4 (A) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 9
Pitch - 1/16
Pressure Angle - 30
Minor Diameter - 0.750/0.754 in
Pitch Diameter - 0.8125 in

SAE-B Mounting Options Information
Model Number T0*Q & T0*K
Class: SAE 25-4 (B-B) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 1/32
Pressure Angle - 30
Minor Diameter - 0.870/0.875 in
Pitch Diameter - 0.9375 in

SAE-C Mounting Options Information
Model Number T0*C
Class: SAE 32-4 (C) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 14
Pitch - 1/24
Pressure Angle - 30
Minor Diameter - 1.0870/1.0920 in
Pitch Diameter - 1.0625 in

SAE-D Mounting Options Information
Model Number T0*D
Class: SAE 44-4 (D) Involute Spline Data
Class 5 Flat Root Side Fit
Number of Teeth - 13
Pitch - 1/32
Pressure Angle - 30
Minor Diameter - 1.480/1.488 in
Pitch Diameter - 1.882 in

SAE-A (A) Vertical or Horizontal 2 Bolt
SAE-B (B) & SAE 25-4 (B-B) (T0*Q) 4 Bolt and Vertical or Horizontal 2 Bolt
SAE 22-4 (B) (T0*J) & SAE 25-2 (B-B) (T0*K) 2 Bolt, Horizontal, Vertical & Diagonal
SAE 32-4 (C) (T0*C) & SAE 38-4 (C-C) (T0*N) 4 Bolt & 2 Bolt Horizontal & Vertical
SAE 44-4 (D) (T0*D) 4 Bolt

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

78
# Medium Pressure Axial Piston Pumps

## P1/PD Series

### Shaft Torque Ratings

<table>
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<th>18</th>
<th>28</th>
<th>45</th>
<th>60</th>
<th>75</th>
<th>100</th>
<th>140</th>
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<td>Spline - SAE B-B 15T</td>
<td>Spline - SAE B-B 15T</td>
<td>Spline - SAE C 14T</td>
<td>Spline - SAE C 14T</td>
<td>Spline - SAE C-C 17T</td>
<td>Spline - SAE D 13T</td>
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<tr>
<td>02</td>
<td>Key - SAE 19-1 .75&quot; Dia.</td>
<td>Key - SAE B-B 1&quot; Dia.</td>
<td>Key - SAE B-B 1&quot; Dia.</td>
<td>Key - SAE C 32-1 KEY</td>
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### Displacement cc (cu.in)

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<th>75 (4.58)</th>
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<td>198</td>
<td>263</td>
<td>329</td>
<td>439</td>
<td>614</td>
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<td>Max Input</td>
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<td>ft.lbs</td>
<td>N.m</td>
<td>ft.lbs</td>
<td>N.m</td>
<td>ft.lbs</td>
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<td>N.m</td>
<td>ft.lbs</td>
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*efficiency not considered
Medium Pressure Axial Piston Pumps
P1/PD Series

C** Control
Pressure Limiter

C** CONTROL

ADJUSTMENT SENSITIVITY

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<td>C10</td>
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CCW ORIENTATION

P*075 Shown

Dimensions

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<th>H Max</th>
<th>J</th>
<th>L Max</th>
<th>Z</th>
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<td>127.7</td>
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L** Control
Load Sensing with Pressure Limiter

** Dimensional Data **

** ADJUSTMENT SENSITIVITY **

| Load Sense  | 28 Bar per Turn |
| Pressure Compensator L0 | 40 Bar per Turn |

** Dimensions **

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
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<th>G</th>
<th>H Max</th>
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</table>

** LOAD SENSE PORT "X" **

- PS: SAE J514 Straight Thread O-Ring Port
  7/16-20 UNF-2B (SAE-4)
- PA: 1/4“ BSPP per ISO 228-1
- PB: 1/4“ BSPP per ISO 228-1
- PM: M12 x 1.5-6H per ISO 6149-1
AE or AF Control
AE is a pilot operated pressure limiter control with proportional electronic adjustment and is a 12 volt dc option. AF is the 24 vdc version of AE.

### Dimensions

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<th>D</th>
<th>AB</th>
<th>AC</th>
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<td>106.0</td>
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AN Control
Pilot operated control with ISO-4401 (NG 6) interface and shipping cover.

AN* CONTROL

CCW ORIENTATION
P*075 SHOWN

Dimensions

<table>
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<tr>
<th>Model</th>
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A** Control
Adjustment Sensitivity

Pressure Compensator 106 Bar/Turn

With screw backed Out CCW until stop, screw must be turned 2-1/4 turns CW before adjustment begins.
AM Control
Pilot operated pressure limiter control with mechanical adjustment and vent port.

Dimensions

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<tr>
<th>Model</th>
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<th>C</th>
<th>D</th>
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"V" Vent Port

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<tr>
<td>P****PB</td>
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<td>P****PM</td>
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Medium Pressure Axial Piston Pumps

P1/PD Series

**Torque Limiter L0T Control**
Load Sensing with Torque Limiter

"L0T" P*075

**Dimensions**

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<th>A</th>
<th>B</th>
<th>G</th>
<th>H Max</th>
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**Adjustment Sensitivity**

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<td>Pressure Compensator L0</td>
<td>40 BAR per turn</td>
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**CW ORIENTATION**
P*075 SHOWN

**CCW ORIENTATION**
P*075 SHOWN

By Customer

BX

.8mm

External Line

By Customer

BG

AD 1

D2

D3

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA
Medium Pressure Axial Piston Pumps
P1/PD Series

Torque Limiter L0T Control
Load Sensing with Torque Limiter
"L0T" P*0100 & P*140

### Dimensional Data

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Torque Limiter AMT and ALT Control

"AMT" Pressure Compensator with Torque Limiter

"ALT" Load Sense and Torque Limiter

"AMT" and "ALT" P*060 & P*045

Dimensions

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## Medium Pressure Axial Piston Pumps
### P1/PD Series

**Dimensional Data**

**Torque Limiter AMT Control**

**Pressure Compensator with Torque Limiter**

"AMT" P*075, P*100 & P*140

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<td>127</td>
<td>71.6</td>
<td>122</td>
<td>161.0</td>
<td>71.1</td>
<td>130</td>
<td>71.1</td>
<td>104.5</td>
</tr>
<tr>
<td>P*100</td>
<td>191.9</td>
<td>154.1</td>
<td>143</td>
<td>102.5</td>
<td>122</td>
<td>175.5</td>
<td>71.1</td>
<td>130</td>
<td>71.1</td>
<td>122.0</td>
</tr>
<tr>
<td>P*140</td>
<td>203.8</td>
<td>166.0</td>
<td>155</td>
<td>95.4</td>
<td>122</td>
<td>184.5</td>
<td>71.1</td>
<td>130</td>
<td>71.1</td>
<td>134.0</td>
</tr>
</tbody>
</table>
Medium Pressure Axial Piston Pumps
P1/PD Series

Electronic Control Options

Dimensions in the table below are shown for pump with servo, hydromechanical compensator Pmax and Electronic valve.

<table>
<thead>
<tr>
<th>Displacement (cc)</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>60</th>
<th>75</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>A max</td>
<td>179.2</td>
<td>188.2</td>
<td>195.2</td>
<td>199.2</td>
<td>202.2</td>
<td>218.2</td>
<td>230.2</td>
</tr>
<tr>
<td>B max</td>
<td>84.8</td>
<td>91.8</td>
<td>98.9</td>
<td>103.4</td>
<td>106</td>
<td>124.4</td>
<td>132.4</td>
</tr>
<tr>
<td>C max</td>
<td>116.1</td>
<td>137.5</td>
<td>148.2</td>
<td>160.5</td>
<td>122.8</td>
<td>155.9</td>
<td>151.2</td>
</tr>
<tr>
<td>D max</td>
<td>101.2</td>
<td>111.1</td>
<td>115.0</td>
<td>119.0</td>
<td>171.4</td>
<td>218.3</td>
<td>230.2</td>
</tr>
</tbody>
</table>

Hydromechanical Pmax thickness (E)= 39mm
Servo body thickness (F)= 25mm - S2E-19182-5.

12 Pin Connector

<table>
<thead>
<tr>
<th>PIN</th>
<th>Designation</th>
<th>Type</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coil High</td>
<td>Input / Output</td>
<td>PWM</td>
</tr>
<tr>
<td>2</td>
<td>Power</td>
<td>Input</td>
<td>+9 to 36VDC</td>
</tr>
<tr>
<td>3</td>
<td>Pump Enable</td>
<td>Input</td>
<td>+9 to 36VDC</td>
</tr>
<tr>
<td>4</td>
<td>Source</td>
<td>Output</td>
<td>+5VDC</td>
</tr>
<tr>
<td>5*</td>
<td>Displacement Command</td>
<td>Input</td>
<td>0 to 5VDC or 4 to 20mA</td>
</tr>
<tr>
<td>6*</td>
<td>Pressure Command</td>
<td>Input</td>
<td>0 to 5VDC or 4 to 20mA</td>
</tr>
<tr>
<td>7*</td>
<td>Torque Command</td>
<td>Input</td>
<td>0 to 5VDC</td>
</tr>
<tr>
<td>8</td>
<td>Pressure Signal</td>
<td>Input</td>
<td>0 to 5VDC</td>
</tr>
<tr>
<td>9</td>
<td>Displacement Signal</td>
<td>Input</td>
<td>0 to 5VDC</td>
</tr>
<tr>
<td>10</td>
<td>Signal Ground</td>
<td>Input</td>
<td>0 VDC</td>
</tr>
<tr>
<td>11</td>
<td>Power Ground</td>
<td>Input / Output</td>
<td>0 VDC</td>
</tr>
<tr>
<td>12</td>
<td>Coil Low</td>
<td>Input / Output</td>
<td>PWM</td>
</tr>
</tbody>
</table>

*10k ohm's minimum resistor suggested

6 Pin Connector

<table>
<thead>
<tr>
<th>PIN</th>
<th>Designation</th>
<th>Type</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS232 Receive</td>
<td>Input / Output</td>
<td>–</td>
</tr>
<tr>
<td>2</td>
<td>RS232 Ground</td>
<td>Output</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>CANBUS Low</td>
<td>Input / Output</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>CANBUS High</td>
<td>Input / Output</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>Chassis Ground</td>
<td>Output</td>
<td>0VDC</td>
</tr>
<tr>
<td>6</td>
<td>RS232 Transmit</td>
<td>Input</td>
<td>–</td>
</tr>
</tbody>
</table>

Cables Available

12 PIN Unshielded Control Cable ASSY, S2E-19179-0, Ordered Separately. Not all Conductors Shown. Cable Length, 10ft.

Enlarged view of the Dip Switch Configuration

System select Engineering use only
5 up 6 down = normal operation
5 down 6 up = boot flash mode

16.0 MOUNTING HOLE HEIGHT

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA
Electronic Control Options (Continued)

Displacement Sensor Information

Sensor Wiring

<table>
<thead>
<tr>
<th>Wire color</th>
<th>Pin #</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>C</td>
<td>+5VDC</td>
</tr>
<tr>
<td>Black</td>
<td>A</td>
<td>0VDC</td>
</tr>
<tr>
<td>Blue</td>
<td>B</td>
<td>0 to 5VDC</td>
</tr>
</tbody>
</table>

For CW:  
- Full stroke = 0.9VDC
- Zero stroke = 2.5VDC
- 100% overcenter = 0.9VDC

For CCW:  
- Full stroke = 4.1VDC
- 100% overcenter = 4.1VDC

Directional Proportional Valve Info

Valve Wiring

<table>
<thead>
<tr>
<th>Wire color</th>
<th>Pin #</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>A</td>
<td>PWM High</td>
</tr>
<tr>
<td>Black</td>
<td>B</td>
<td>PWM Low</td>
</tr>
</tbody>
</table>

Valve mounts same direction regardless of rotation.

Technical specification:
- Minimum holding current of 1.2 to 1.6A is required to the proportional valve at all times (at metering edge for 9 VDC valve)
- Superimposed dither amplitude of +/- 200mA has given good results (for 9 VDC valve)
- PWM frequency requirement is 100 to 250Hz (for 9 VDC valve)

When ECU is supplied, pump uses 9 VDC valve

9 VDC (4-ohm) or 24 VDC (24-ohm) available

Coils
- 9 VDC – 1210694
- 24 VDC – 121-98336-0
Medium Pressure Axial Piston Pumps
P1/PD Series

Connectors

Sealed METRI-PACK 150 series connectors and locks used on RDEC-Valve

<table>
<thead>
<tr>
<th>Item</th>
<th>Parker OEM-No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S2E-19196-OK</td>
<td>Female Connector Kit</td>
</tr>
<tr>
<td>C</td>
<td>(on the coil)</td>
<td>12162000 Make Connector</td>
</tr>
</tbody>
</table>

Weather Pack connectors for swash angle-sensor

<table>
<thead>
<tr>
<th>Item</th>
<th>Parker OEM-No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>S2E-19190-OK</td>
<td>Female Connector Kit</td>
</tr>
<tr>
<td>F</td>
<td>(on the sensor)</td>
<td>12010717 Make Connector</td>
</tr>
</tbody>
</table>

Deutsh Connectors for Pressure Transducer

Item included on S2E-19191-0 kit
- DT06-4S Qty 1 – Connector
- 0462-201-16141 Qty 3 – Sockets
- W4S Qty 1 – Wedgelock
- 114017 Qty 1 – Cavity Plug

Communications Port

Item included on S2E-19259-0 cable assembly
- DT06-5S-C015 Qty 1 – Connector
- 462-201-16141 Qty 6 – Sockets
- W6C Qty 1 – Orange Wedgelock

Pump Control Port

Item included on S2E-19179-0 cable assembly
- DT06-12SA Qty 1 – Connector
- 0462-201-16141 Qty 12 – Pins
- W12S Qty 1 – Wedgelock

RS232 Communications Cable Connection

Item included on S2E-19259-0 cable assembly
- DT06-3P-C015 Qty 1 – Connector
- 0460-202-16141 Qty 2 – Pins
- W3P Qty 1 – Wedgelock
These pumps are designed to operate in any position. The pump shaft must be in alignment with the shaft of the source driver and should be checked with a dial indicator. The mating pilot bore and coupling must be concentric. This concentricity is particularly important if the shaft is rigidly connected to the driven load without a flexible coupling.

**SHAFT INFORMATION**

**Splined:** The shafts will accept a maximum misalignment of 0.15mm, 0.005 inch, total indicator reading. Angular misalignment at the external and internal spline axis must be less than ± 0.002 mm per mm of shaft radius, ± 0.002 inches per inch of shaft radius. The coupling interface must be lubricated. PARKER recommends lithium molydisulfide or similar grease. The internal coupling should be hardened to Rc 27-34 and must conform to SAE-J498c, class 5 flat root side fit.

**Keyed:** High strength heat treated keys must be used. Replacement keys must be hardened to 27-34 Rc. The key corners must be chamfered 0.81-1.0 mm, 0.032”-0.040”, at 45° to clear radii that exist in the keyway.

**SIDE LOAD CAPABILITY**

The P1/PD series is designed for inline-drive. Side loading on the shaft is not recommended. If this is unavoidable consult your nearest PARKER representative.

**FLUID CONNECTIONS**

Connect inlet and outlet lines to the port block of the pump. The maximum case pressure is 2 bar (30 psi) continuous, 4 bar (60 psi) intermittent. The case pressure must never exceed inlet pressure by more than .5 bar (7 psi). When connecting case drain line make certain that drain plumbing passes above highest point of the pump before passing to the reservoir. The case leakage line must be of sufficient size to prevent back pressure in excess of 2 bar (30 psi) and returned to the reservoir below the surface of the oil as far from the supply inlet as possible. All fluid lines, whether pipe, tubing, or hose must be adequate size and strength to assure free flow through the pump. An undersize inlet line will prevent the pump from operating properly at full rated speed. An undersize outlet line will cause back pressure and cause heat generation and increased noise. Flexible hose lines are recommended. If rigid piping is used, the workmanship must be accurate to eliminate strain on the pump port block or to the fluid connections. Sharp bends in the lines must be eliminated wherever possible. All system piping must be cleaned and flushed before installing pump. Make sure the entire hydraulic system is free of dirt, lint, scale, or other foreign material.

**Caution:** Do not use galvanized pipe. Galvanized coating can flake off with continued use.

**SYSTEM RELIEF VALVES**

Although the P1/PD series pumps have very fast off-stroke compensator response, system relief valves are recommended in all cases for safety considerations.

**RECOMMENDED FLUIDS**

The fluid recommended for use in these pumps has a petroleum base and contains agents which provide oxidation inhibition and anti-rust, anti-foam and de-aerating properties as described in PARKER standard HF-1. Where anti-wear additive fluids are specified, see PARKER standard HF-0.

**VISCOSITY INDEX**

90 V. I. minimum. Higher values extend the range of operating temperature but may reduce the service life of the fluid.

**TEMPERATURE**

Determined by the viscosity characteristics of the fluid used. Because high temperatures degrade seals, reduce the service life of the fluid and create hazards, fluid temperature should not exceed 110°C (230°F) at the case drain.

**MAINTENANCE**

The pump is self-lubricating and preventative maintenance is limited to keeping system fluid clean by changing filters frequently. Keep all fittings and screws tight. Do not operate at pressures and speeds in excess of the recommended limit. If the pump does not operate properly, check the troubleshooting chart before attempting to overhaul the unit. Overhauling may be accomplished by referring to the disassembly, rework limits of wear parts, and assembly procedures as provided in this service manual.

**FLUID CLEANLINESS**

Fluid must be cleaned before and continuously during operation, by filters that maintain a cleanliness level of ISO 20/18/14. Better cleanliness levels will significantly extend the life of the components. As contaminant generation may vary with each application, each must be analyzed to determine proper filtration to maintain the required cleanliness level.
Mar 1st, 2012 - New ordering code format

Jul 1st, 2012 - Addition of electronic controls

Apr 1st, 2013 - Addition of P1/PD018 thru drive
- Miscellaneous drawings updates
- Shaft torque rating consolidation
- Electrical connector information

Jan 30th, 2014 - P1045 - All drawings updated

Aug 1st, 2014 - Add 1A valve to standard options
- Miscellaneous minor updates
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8. Limitations on Buyer. Any defect, tool, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, or expenses (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

13. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

14. Waiver and Severability. Failure to enforce any provision of this agreement will not be deemed a waiver of such provision nor will any such failure prejudice Seller's right to enforce any provision in the future. INVALIDATION OF ANY PROVISION OF THIS AGREEMENT BY LEGISLATION OR OTHER RULE OF LAW SHALL NOT INVALIDATE ANY OTHER PROVISION HEREIN. The remaining provisions of this agreement will remain in full force and effect.

15. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. The courts of such county shall have exclusive jurisdiction over all such disputes, and Buyer hereby submits to the personal jurisdiction of such courts in connection with any such dispute.

16. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. The courts of such county shall have exclusive jurisdiction over all such disputes, and Buyer hereby submits to the personal jurisdiction of such courts in connection with any such dispute.

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19. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modifications, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. Equal Opportunity Clause. For the performance of government contracts and where such performance is directly connected with the manufacture of the Products except with respect to the federal dollar value of the Products exceed $10,000, the equal employment opportunity clauses in Executive Order 11246, VERRAA, and 41 C.F.R. §§ 60-1-4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.
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