Fixed Displacement Gear Pumps
D/H/HD Series
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</table>

### “D” Series

<table>
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</table>

### “H” Series

<table>
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<th>Description</th>
<th>Page No.</th>
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</thead>
<tbody>
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<td>Ordering Information</td>
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Fixed Displacement Gear Pumps
Series D/H/HD

Quick Reference Data Chart

<table>
<thead>
<tr>
<th>Pump Series</th>
<th>Displacement IN³/REV. (CC/REV.)</th>
<th>Pump Delivery @ 1000 RPM In GPM (LPM)</th>
<th>Weight In Pounds (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>.114 - .641 (1.87 - 10.50)</td>
<td>.5 - 2.7 (1.9 - 10.2)</td>
<td>2 - 3 (.9 - 1.4)</td>
</tr>
<tr>
<td>H</td>
<td>.603 - 2.227 (9.88 - 36.50)</td>
<td>2.5 - 9.3 (9.5 - 35.2)</td>
<td>5 - 7 (2.3 - 3.2)</td>
</tr>
<tr>
<td>HD</td>
<td>See above</td>
<td>See above</td>
<td>See above</td>
</tr>
</tbody>
</table>

Features
- Pressure-loaded design
- Efficient, simple design - few moving parts
- Exceptionally compact and lightweight for their capacity
- Efficient at high pressure operation
- Resistant to cavitation effects
- High tolerance to system contamination
- Reliable under cold weather operation
- Sleeve-bearing construction
- Multi-fluid compatibility

Pressure capabilities
- D - to 2500 PSI (172 Bar) continuous
- H - to 2500 PSI (172 Bar) continuous
- HD - to 2500 PSI (172 Bar) continuous

Controls
- Optional built-in relief valve on “D” series
- Optional built-in relief valve on “H” series
- Optional built-in relief valve, and flow divider on “H” series
- Special controls (Consult Technical Services)

Speed capabilities
- D - to 4000 RPM
- H - to 4000 RPM
- HD - to 4000 RPM
A Parker pressure-loaded gear pump consists of two, intermeshing, hardened-steel, precision-ground gear assemblies. These precision gears are enclosed by a high-strength, die-cast aluminum front cover, back cover and a high-yield, strength-extruded aluminum center section.

Gear assemblies consist of one drive gear, shrink-fitted on a precision-ground and polished drive shaft. This shaft extends outside the pump to permit coupling to an external prime mover. The second gear, being the driven gear, is also shrink-fitted on a precision-ground and polished driven shaft. Retaining rings, which are installed in grooves provided on the shaft, ensure that the gears will not move axially, and a key keeps the drive gear from moving radially.

A lip-type, shaft seal is provided at the drive shaft to prevent external leakage of pump fluid. The sealing lip in contact with the fluid is spring-loaded. Vent passages within the housings and driven shaft communicate pump inlet pressure to the rotary seal area, thus imposing the lowest possible pressure at the rotary seal for extended seal life.

The phenolic heat shield, backup gasket, and molded rubber seal form chambers behind the steel-backed bronze wearplate. These chambers are connected either to inlet or discharge pressure. Discharge pressure, acting within the chambers, axially loads and deflects the wear plate toward the gear faces to take up gear side clearances. This pressure-loading on the wear plate increases pump efficiency by reducing internal leakage to a minimum, providing longer pump life.

Pump rotation is dependent upon the proper orientation of the heat shield, backup gasket, and rubber seal in the front cover housing, the center section and rear cover, respectively.

Pumping action is achieved by connecting the pump drive shaft to a prime mover, and rotating the gears away from the inlet port. Rotation causes the gear mesh to increase on the inlet side and decrease on the outlet (pressure) side.
**Ordering Information**

### Fixed Displacement Gear Pumps

**Series D**

#### Frame Size Code "D"

- **D**
- **Displacement**
- **Front Cover**
- **Shaft**
- **Rotation**
- **Port Options**
- **Relief Valve Setting**
- **Seals**

#### Displacement

<table>
<thead>
<tr>
<th>Code</th>
<th>Gals. Per 1000 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>.46</td>
</tr>
<tr>
<td>07</td>
<td>.71</td>
</tr>
<tr>
<td>09</td>
<td>.89</td>
</tr>
<tr>
<td>11</td>
<td>1.10</td>
</tr>
<tr>
<td>14</td>
<td>1.39</td>
</tr>
<tr>
<td>17</td>
<td>1.71</td>
</tr>
<tr>
<td>22</td>
<td>2.20</td>
</tr>
<tr>
<td>27</td>
<td>2.71</td>
</tr>
</tbody>
</table>

#### Front Cover

- **A** SAE AA 2-Bolt
- **B** 4-Bolt

#### Rotation

<table>
<thead>
<tr>
<th>Code</th>
<th>Dir.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CCW</td>
</tr>
<tr>
<td>2</td>
<td>CW</td>
</tr>
</tbody>
</table>

#### Shaft

- **A** 1/2" Dia. Woodruff Key
- **R** .250" Wide Tang
- **S** .147" Wide Tang

#### Seals

- **Code**
- **Type**
  - Omit
  - Buna-N
  - V Viton

### Accessories For "D" Pump

- **Code**
  - D01 — Subplate Kit 825602K
  - 2 Qt. Tank Kit 715631
  - 4 Qt. Tank Kit 715632
  - 6 Qt. Tank Kit 735560
  - "R" Shaft Coupling 825387K
  - "S" Shaft Coupling 825366K
  - Buna-N Seal Kit 686632K
  - Viton" Seal Kit 745083K

### Relief Valve Setting

<table>
<thead>
<tr>
<th>PSI ± 2.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available in any PSI rating up to 2500 PSI except: D27 rated at 2000 PSI max.</td>
</tr>
<tr>
<td>3 Digit Code</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>175</td>
</tr>
</tbody>
</table>

Etc....

#### Porting Location

- **A** Side
- **D** Rear
- **L** Rear W/Relief Valve
- **N** Rear W/Relief Valve

#### Inlet

- 7/8"-14 UNF-2B SAE Straight Thread
- 7/8"-14 UNF-2B SAE Straight Thread
- 1/2" NPTF Threaded
- 7/8"-14 UNF-2B SAE Straight Thread

#### Outlet

- 3/4"-16 UNF-2B SAE Straight Thread
- 3/4"-16 UNF-2B SAE Straight Thread
- .312" Dia. Manifold Type
- 3/4"-16 UNF-2B SAE Straight Thread

#### Other Consult Factory

*Relief Valve is preset at factory. Specify setting.*
Performance Data
Series D Fixed Displacement, Pressure-Loaded Gear Pump

Features
• Pressure-loaded design
• Efficient, simple design - few moving parts
• Exceptionally compact and lightweight for their capacity
• Efficient at high pressure operation
• Resistant to cavitation effects
• High tolerance to system contamination
• Reliable under cold weather operation
• Sleeve-bearing construction
• Multi-fluid compatibility

Controls
• Optional built-in relief valve
• Consult factory for special controls

Specifications
Flow Ratings:
.5 GPM (1.9 LPM) to 2.7 GPM (10.2 LPM) (At 1000 RPM) See next page for additional flow data.

Pressure Ratings:
D05 thru D22 - 2500 PSI (172 Bar) continuous
D27 - 2000 PSI (138 Bar) continuous

Speed Ratings:
D05 thru D22 - 500 to 4000 RPM
D27 - 3000 RPM

Mounting:
SAE-AA - 2-Bolt Flange
4-Bolt Flange

Housing Material:
Die-Cast Aluminum

Schematic Symbol
(Basic Pump)

Installation Data
Inlet Conditions:
10 in. hg. max. vacuum condition
(At 1800 RPM)
5 in. hg. max. vacuum condition
(At max. RPM)
20 PSI (1.4 Bar) max. positive pressure

Operating Temperature Range:
-40°F to 185°F
(-40°C to 85°C)

Filtration:
Maintain SAE Class 4

Installation Note:
See page 28 for specific recommendations pertaining to system cleanliness, fluids, start-up, inlet conditions, shaft alignment, and other important factors relative to the proper installation and use of these pumps.
## Performance Data

### Flow in Gallons Per Minute – GPM (LPM)

<table>
<thead>
<tr>
<th>Pump Model</th>
<th>Displacement IN³ (CC/REV.)</th>
<th>RPM</th>
<th>100 PSI (6.9 Bar)</th>
<th>1000 PSI (69 Bar)</th>
<th>1500 PSI (103 Bar)</th>
<th>2000 PSI (138 Bar)</th>
<th>2500 PSI (172 Bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1200</td>
<td>1.14   (1.87)</td>
<td>0.58 (2.20)</td>
<td>0.48 (1.82)</td>
<td>0.42 (1.59)</td>
<td>0.37 (1.40)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>0.77 (2.92)</td>
<td>0.67 (3.30)</td>
<td>0.77 (2.92)</td>
<td>0.71 (2.69)</td>
<td>0.66 (2.50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3600</td>
<td>1.65 (6.25)</td>
<td>1.73 (6.56)</td>
<td>1.65 (6.25)</td>
<td>1.61 (6.10)</td>
<td>1.56 (5.91)</td>
</tr>
<tr>
<td>D05</td>
<td></td>
<td>1200</td>
<td>0.85 (3.22)</td>
<td>0.85 (3.22)</td>
<td>0.73 (2.77)</td>
<td>0.68 (2.58)</td>
<td>0.62 (2.35)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>1.16 (4.40)</td>
<td>1.28 (4.85)</td>
<td>1.16 (4.40)</td>
<td>1.10 (4.17)</td>
<td>1.05 (3.98)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3600</td>
<td>2.47 (9.36)</td>
<td>2.56 (9.70)</td>
<td>2.47 (9.36)</td>
<td>2.42 (9.17)</td>
<td>2.37 (8.98)</td>
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<tr>
<td>D07</td>
<td>0.168 (2.76)</td>
<td>1200</td>
<td>1.06 (4.02)</td>
<td>1.06 (4.02)</td>
<td>0.94 (3.56)</td>
<td>0.87 (3.30)</td>
<td>0.81 (3.07)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>1.41 (5.34)</td>
<td>1.60 (6.06)</td>
<td>1.41 (5.34)</td>
<td>1.35 (4.81)</td>
<td>1.29 (4.81)</td>
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<tr>
<td></td>
<td></td>
<td>3600</td>
<td>2.99 (11.33)</td>
<td>3.19 (12.09)</td>
<td>3.09 (11.71)</td>
<td>3.04 (11.52)</td>
<td>2.99 (11.33)</td>
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<tr>
<td>D09</td>
<td>0.210 (3.45)</td>
<td>1200</td>
<td>1.12 (4.24)</td>
<td>1.32 (5.00)</td>
<td>1.19 (4.51)</td>
<td>1.12 (4.24)</td>
<td>1.06 (4.02)</td>
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<tr>
<td></td>
<td></td>
<td>1800</td>
<td>1.79 (6.78)</td>
<td>1.99 (7.54)</td>
<td>1.86 (7.05)</td>
<td>1.79 (6.78)</td>
<td>1.73 (6.56)</td>
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<tr>
<td></td>
<td></td>
<td>3600</td>
<td>3.76 (14.25)</td>
<td>3.97 (15.05)</td>
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<td>3.81 (14.44)</td>
<td>3.76 (14.25)</td>
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<tr>
<td>D11</td>
<td>0.262 (4.29)</td>
<td>1200</td>
<td>1.44 (5.46)</td>
<td>1.66 (6.29)</td>
<td>1.52 (5.76)</td>
<td>1.44 (5.46)</td>
<td>1.37 (5.19)</td>
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<tr>
<td></td>
<td></td>
<td>1800</td>
<td>2.27 (8.60)</td>
<td>2.49 (9.44)</td>
<td>2.35 (8.91)</td>
<td>2.27 (8.60)</td>
<td>2.20 (8.34)</td>
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<tr>
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<td></td>
<td>3600</td>
<td>4.76 (18.04)</td>
<td>4.99 (18.91)</td>
<td>4.88 (18.50)</td>
<td>4.82 (18.27)</td>
<td>4.76 (18.04)</td>
</tr>
<tr>
<td>D14</td>
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<td>1200</td>
<td>1.80 (6.82)</td>
<td>2.04 (7.73)</td>
<td>1.88 (7.13)</td>
<td>1.80 (6.82)</td>
<td>1.72 (6.52)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>2.83 (10.73)</td>
<td>3.07 (11.64)</td>
<td>2.91 (11.03)</td>
<td>2.83 (10.73)</td>
<td>2.75 (10.42)</td>
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<tr>
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<td></td>
<td>3600</td>
<td>5.88 (22.29)</td>
<td>6.14 (23.27)</td>
<td>6.01 (22.78)</td>
<td>5.95 (22.55)</td>
<td>5.88 (22.29)</td>
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<tr>
<td>D17</td>
<td>0.404 (6.62)</td>
<td>1200</td>
<td>2.37 (8.96)</td>
<td>2.64 (10.00)</td>
<td>2.46 (9.32)</td>
<td>2.37 (8.96)</td>
<td>2.28 (8.64)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>3.70 (14.02)</td>
<td>3.97 (15.05)</td>
<td>3.79 (14.36)</td>
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<tr>
<td></td>
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<td>3600</td>
<td>7.64 (28.96)</td>
<td>7.93 (30.05)</td>
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<tr>
<td>D22</td>
<td>0.522 (8.55)</td>
<td>1200</td>
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<td>3.25 (12.32)</td>
<td>3.05 (11.56)</td>
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<td>2.85 (10.80)</td>
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<tr>
<td></td>
<td></td>
<td>1800</td>
<td>4.47 (16.94)</td>
<td>3.97 (15.05)</td>
<td>4.67 (17.70)</td>
<td>4.57 (17.32)</td>
<td>4.47 (16.94)</td>
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<td>3000</td>
<td>7.80 (29.56)</td>
<td>8.12 (30.77)</td>
<td>7.96 (30.17)</td>
<td>7.88 (29.86)</td>
<td>7.80 (29.56)</td>
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</tbody>
</table>
Performance Data
Based On Oil Temperature of 120°F (49°C)
(100 SSU) Atmospheric Inlet

D05/D07 Horsepower/Speed

D09/D11 Horsepower/Speed

D05/D07 Flow/Speed

D09/D11 Flow/Speed
Performance Data
Based On Oil Temperature of 120°F (49°C)
(100 SSU) Atmospheric Inlet

D14/D17 Horsepower/Speed

D14/D17 Flow/Speed

D22/D27 Horsepower/Speed

D22/D27 Flow/Speed
Dimensions – 2-Bolt Mounting

Clockwise rotation and “A” shaft shown
(Port locations reverse for CCW rotation)

Dimensions: Inches (mm)

```
<table>
<thead>
<tr>
<th>Model</th>
<th>D05</th>
<th>D07</th>
<th>D09</th>
<th>D11</th>
<th>D14</th>
<th>D17</th>
<th>D22</th>
<th>D27</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>2.57</td>
<td>2.64</td>
<td>2.72</td>
<td>2.83</td>
<td>2.96</td>
<td>3.15</td>
<td>3.34</td>
</tr>
<tr>
<td></td>
<td>(62.99)</td>
<td>(65.26)</td>
<td>(67.06)</td>
<td>(69.09)</td>
<td>(71.88)</td>
<td>(75.18)</td>
<td>(80.01)</td>
<td>(84.84)</td>
</tr>
</tbody>
</table>
```
Dimensions – 4-Bolt Mounting

Clockwise rotation and “A” shaft shown
(Port locations reverse for CCW rotation.)

Dimensions: Inches (mm)

“S” Tang-end Shaft Option – For Use With 4-Bolt Mounting

Primarily used to direct-couple to electric motor drive.
Dimensions – 2-Bolt Mounting  
(With “L” Back Cover For Tank Mounting)

Clockwise rotation and “A” shaft shown  
(Pump mounting flange opposite side of back cover centerline for CW rotation.)

Dimensions: Inches (mm)

<table>
<thead>
<tr>
<th>D05</th>
<th>D07</th>
<th>D09</th>
<th>D11</th>
<th>D14</th>
<th>D17</th>
<th>D22</th>
<th>D27</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.39</td>
<td>3.48</td>
<td>3.55</td>
<td>3.64</td>
<td>3.75</td>
<td>3.87</td>
<td>4.06</td>
<td>4.26</td>
</tr>
<tr>
<td>(86.11)</td>
<td>(88.39)</td>
<td>(90.17)</td>
<td>(92.46)</td>
<td>(95.25)</td>
<td>(98.30)</td>
<td>(103.12)</td>
<td>(108.20)</td>
</tr>
</tbody>
</table>
Dimensions – 4-Bolt Mounting
(With “L” Back Cover For Tank Mounting)

Clockwise rotation and “A” shaft shown
(Pump mounting flange opposite side of back cover centerline for CW rotation.)

Dimensions: Inches (mm)

<table>
<thead>
<tr>
<th></th>
<th>D05</th>
<th>D07</th>
<th>D09</th>
<th>D11</th>
<th>D14</th>
<th>D17</th>
<th>D22</th>
<th>D27</th>
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<tr>
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<td>4.23</td>
<td>4.30</td>
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<td>(114.30)</td>
<td>(117.35)</td>
<td>(122.17)</td>
<td>(127.25)</td>
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</table>

“R” Tang-end Shaft Option
Primarily used to direct-couple to electric motor drives.
Dimensions – Accessories For “L” Back Cover Pump

Sub-plate for supply, return and gage ports –
Kit no. 735555K

Dimensions: Inches (mm)

Note: Kit includes (1) sub-plate, (4) mounting bolts, (3) 0-rings, (1) plug.

Sub-Plate For Mounting (NFPA D01) Directional Control Valve – Kit No. 825602K

Note: Kit includes (1) sub-plate, (4) mounting bolts, (3) 0-rings, (1) plug.

Tanks (Hydraulic Reservoir)

2-Quart Capacity Tank - Kit No. 715631
“B” Dimension 4.67 (118.62) inches

4-Quart Capacity Tank - Kit No. 715632
“B” Dimension 10.17 (258.32) inches

6-Quart Capacity Tank - Kit No. 735560
“B” Dimension 14.17 (359.92) inches

Note: Kit includes- (1) reservoir assembly, (1) suction strainer, (1) filler cap.
Series H Standard Pumps

**Ordering Information**

**Fixed Displacement Gear Pumps**

**Series H**

**Displacement**
- Code
  - 25: 2.52
  - 31: 3.15
  - 39: 3.93
  - 49: 4.92
  - 62: 6.16
  - 77: 7.70
  - 99: 9.31

**Front Cover**
- Code: A
  - SAE "A" 2-Bolt

**Shaft**
- Code
  - A: Key Driven 1.56 Extension
  - B: 9-Tooth Spline
  - T: 11-Tooth Spline

**Rotation**
- Code: Dir.
  - 1: CCW
  - 2: CW

**Seals**
- Code: Type
  - Omit: Buna-N
  - V: Viton

**Port Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Porting Location</th>
<th>Inlet</th>
<th>Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Side</td>
<td>1-1/16&quot;-12 UNF-2B SAE Straight Thread</td>
<td>7/8&quot;-14 UNF-2B SAE Straight Thread</td>
</tr>
<tr>
<td>B</td>
<td>Side</td>
<td>3/4&quot; NPTF</td>
<td>7/8&quot;-14 UNF-2B SAE Straight Thread</td>
</tr>
<tr>
<td>D</td>
<td>Rear</td>
<td>1-5/16&quot;-12 UNF-2B SAE Straight Thread</td>
<td>7/8&quot;-14 UNF-2B SAE Straight Thread</td>
</tr>
</tbody>
</table>

*Available on H39-H90*

Buna-N Replacement Seal Kit: Order Part No. 708024K
Viton® Replacement Seal Kit: Order Part No. 745100K
Series H Standard Pumps

Displacement

<table>
<thead>
<tr>
<th>Code</th>
<th>Gals. Per 1000 RPM</th>
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<tbody>
<tr>
<td>25</td>
<td>2.52</td>
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<tr>
<td>31</td>
<td>3.15</td>
</tr>
<tr>
<td>39</td>
<td>3.93</td>
</tr>
<tr>
<td>49</td>
<td>4.92</td>
</tr>
<tr>
<td>62</td>
<td>6.16</td>
</tr>
<tr>
<td>77</td>
<td>7.70</td>
</tr>
<tr>
<td>90</td>
<td>9.31</td>
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</tbody>
</table>

Rotation

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>1</td>
<td>CCW</td>
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<tr>
<td>2</td>
<td>CW</td>
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Port Position

<table>
<thead>
<tr>
<th>Code</th>
<th>Inlet</th>
<th>Primary</th>
<th>Secondary</th>
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<tbody>
<tr>
<td>A</td>
<td>Rear</td>
<td>Rear</td>
<td>Side</td>
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<td>B</td>
<td>Rear</td>
<td>Bottom</td>
<td>Side</td>
</tr>
<tr>
<td>C</td>
<td>Bottom</td>
<td>Rear</td>
<td>Side</td>
</tr>
<tr>
<td>F</td>
<td>Bottom</td>
<td>Bottom</td>
<td>Side</td>
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Port Size

<table>
<thead>
<tr>
<th>Code</th>
<th>Inlet</th>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
</table>

Relief Valve Setting

Available in any PSI rating up to 2500 PSI except: H77 rated at 2000 PSI max. H90 rated at 1500 PSI max.

<table>
<thead>
<tr>
<th>3 Digit Code</th>
<th>Times (X) 10</th>
<th>= Relief Valve Setting PSI</th>
</tr>
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<tbody>
<tr>
<td>150</td>
<td>X 10</td>
<td>= 1500 PSI</td>
</tr>
<tr>
<td>175</td>
<td>X 10</td>
<td>= 1750 PSI</td>
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Circuit Variations

<table>
<thead>
<tr>
<th>Code</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Relief Valve Returns to Pump Inlet Internally Secondary Port External</td>
</tr>
<tr>
<td>B</td>
<td>Relief Valve Drains External Secondary Port External</td>
</tr>
<tr>
<td>D</td>
<td>Relief Valve &amp; Flow Divider Secondary Returns To Pump Inlet Internally</td>
</tr>
</tbody>
</table>

Flow Divider Setting

1 GPM Increments To 10 GPM

<table>
<thead>
<tr>
<th>2 Digit Code</th>
<th>Times (X) 0.1</th>
<th>= Flow Setting in GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td></td>
<td>= No Flow Divider</td>
</tr>
<tr>
<td>40</td>
<td>X 0.1</td>
<td>= 4 GPM</td>
</tr>
<tr>
<td>60</td>
<td>X 0.1</td>
<td>= 6 GPM</td>
</tr>
</tbody>
</table>

Buna-N Replacement Seal Kit For Flow Divider Pump: Order Part No. 696173K
Viton® Replacement Seal Kit For Flow Divider Pump: Order Part No. 785491K
Performance Data
Series H Fixed Displacement, Pressure-Loaded Gear Pump

Features
• Pressure-loaded design
• Efficient, simple design - few moving parts
• Exceptionally compact and lightweight for their capacity
• Efficient at high-pressure operation
• Resistant to cavitation effects
• High tolerance to system contamination
• Reliable under cold weather operation
• Sleeve-bearing construction
• Multi-fluid compatibility

Controls
• Optional built-in relief valve
• Optional built-in relief valve and flow divider
• Special controls (Consult Technical Services)

Specifications
Flow Ratings:
2.5 GPM (9.5 LPM) to 9.3 GPM (35.2 LPM) (At 1000 RPM) See next page for additional flow data

Pressure Ratings:
H25 thru H62 - 2500 PSI (172 Bar) continuous
H77 - 2000 PSI (138 Bar) continuous
H90 - 1500 PSI (103 Bar) continuous

Speed Ratings:
H25 thru H49 - 500 to 4000 RPM
H62, H77, H90 - 3600 RPM

Mounting:
SAE-A - 2-Bolt Flange
Optional SAE-A - 2-Bolt Flange
Extended Front Cover

Housing Material:
Die-Cast Aluminum

Installation Data
Inlet Conditions:
10 in. hg. max. vacuum condition (at 1800 RPM)
5 in. hg. max. vacuum condition (at max. RPM)
20 PSI (1.4 Bar) max. positive pressure

Operating Temperature Range:
-40°F to 185°F (-40°C to 85°C)

Filtration:
Maintain SAE Class 4

Installation Note:
See page 28 for specific recommendations pertaining to system cleanliness, fluids, start-up, inlet conditions, shaft alignment, and other important factors relative to the proper installation and use of these pumps.
## Performance Data

### Flow In Gallons Per Minute — GPM (LPM)

<table>
<thead>
<tr>
<th>Pump Model</th>
<th>Displacement IN^3 (CC/REV.)</th>
<th>RPM</th>
<th>100 PSI (6.9 Bar)</th>
<th>1000 PSI (69 Bar)</th>
<th>1500 PSI (103 Bar)</th>
<th>2000 PSI (138 Bar)</th>
<th>2500 PSI (172 Bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H25</td>
<td>0.603 (9.88)</td>
<td>1200</td>
<td>3.02 (11.45)</td>
<td>2.84 (10.76)</td>
<td>2.75 (10.42)</td>
<td>2.66 (10.06)</td>
<td>2.57 (9.74)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>4.54 (17.21)</td>
<td>4.35 (16.49)</td>
<td>4.26 (16.15)</td>
<td>4.17 (15.80)</td>
<td>4.09 (15.50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3600</td>
<td>9.07 (34.38)</td>
<td>8.93 (33.84)</td>
<td>8.85 (33.54)</td>
<td>8.78 (33.28)</td>
<td>8.70 (32.97)</td>
</tr>
<tr>
<td>H31</td>
<td>0.754 (12.35)</td>
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<td>3.78 (14.33)</td>
<td>3.58 (13.57)</td>
<td>3.49 (13.23)</td>
<td>3.40 (12.89)</td>
<td>3.30 (12.50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>5.67 (21.49)</td>
<td>5.48 (20.77)</td>
<td>5.38 (20.39)</td>
<td>5.28 (20.01)</td>
<td>5.19 (19.67)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3600</td>
<td>11.34 (42.98)</td>
<td>11.19 (42.41)</td>
<td>11.11 (42.11)</td>
<td>11.03 (41.80)</td>
<td>10.96 (41.54)</td>
</tr>
<tr>
<td>H39</td>
<td>0.942 (15.44)</td>
<td>1200</td>
<td>4.27 (16.17)</td>
<td>4.51 (17.09)</td>
<td>4.41 (16.71)</td>
<td>4.30 (16.30)</td>
<td>4.20 (15.92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>7.08 (26.83)</td>
<td>6.87 (26.04)</td>
<td>6.77 (25.66)</td>
<td>6.66 (25.24)</td>
<td>6.56 (24.86)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3600</td>
<td>14.20 (53.82)</td>
<td>14.00 (53.06)</td>
<td>13.90 (52.68)</td>
<td>13.80 (52.30)</td>
<td>13.70 (51.92)</td>
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<tr>
<td>H49</td>
<td>1.178 (19.30)</td>
<td>1200</td>
<td>5.90 (22.36)</td>
<td>5.67 (21.49)</td>
<td>5.56 (21.07)</td>
<td>5.44 (20.61)</td>
<td>5.33 (20.20)</td>
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<tr>
<td></td>
<td></td>
<td>1800</td>
<td>8.85 (33.54)</td>
<td>8.62 (32.67)</td>
<td>8.51 (32.25)</td>
<td>8.39 (31.80)</td>
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<tr>
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<td></td>
<td>3600</td>
<td>17.70 (67.08)</td>
<td>17.50 (66.33)</td>
<td>17.40 (65.95)</td>
<td>17.30 (65.57)</td>
<td>17.20 (65.19)</td>
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<tr>
<td>H62</td>
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<td>7.13 (27.02)</td>
<td>7.00 (26.53)</td>
<td>6.88 (26.08)</td>
<td>6.75 (25.58)</td>
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<td></td>
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<td>1800</td>
<td>11.10 (42.07)</td>
<td>10.81 (40.97)</td>
<td>10.70 (40.55)</td>
<td>10.60 (40.17)</td>
<td>10.40 (39.42)</td>
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<td></td>
<td></td>
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<td>22.20 (84.14)</td>
<td>22.00 (83.38)</td>
<td>21.90 (83.00)</td>
<td>21.80 (82.62)</td>
<td>21.70 (82.24)</td>
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<tr>
<td>H77</td>
<td>1.842 (30.18)</td>
<td>1200</td>
<td>9.23 (34.98)</td>
<td>8.95 (33.92)</td>
<td>8.81 (33.39)</td>
<td>8.67 (32.86)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>13.90 (52.68)</td>
<td>13.60 (51.54)</td>
<td>13.40 (50.79)</td>
<td>13.30 (50.41)</td>
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<tr>
<td></td>
<td></td>
<td>3600</td>
<td>27.70 (104.98)</td>
<td>27.50 (104.23)</td>
<td>27.40 (103.85)</td>
<td>27.20 (103.09)</td>
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<tr>
<td>H90</td>
<td>2.227 (36.50)</td>
<td>1200</td>
<td>11.20 (42.45)</td>
<td>10.90 (41.31)</td>
<td>10.80 (40.93)</td>
<td>—</td>
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<tr>
<td></td>
<td></td>
<td>1800</td>
<td>16.70 (63.29)</td>
<td>16.50 (62.54)</td>
<td>16.30 (61.78)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3600</td>
<td>33.50 (126.97)</td>
<td>33.20 (125.83)</td>
<td>33.10 (125.45)</td>
<td>—</td>
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</table>

Data Based on 100 SSU
Viscosity Fluids at 120°F (49°C)
Performance Data
Based On Oil Temperature of 120°F (49°C)
(100 SSU) Atmospheric Inlet

H25/H31 Horsepower/Speed

H39/H49 Horsepower/Speed

H25/H31 Flow/Speed

H39/H49 Flow/Speed
Performance Data
Based On Oil Temperature of 120°F (49°C)
(100 SSU) Atmospheric Inlet

**H62/H77 Horsepower/Speed**

**H62/H77 Flow/Speed**

**H90 Horsepower/Speed**

**H90 Flow/Speed**
Dimensions – 2-Bolt Mounting

Clockwise rotation and “A” shaft shown
(Port locations reverse for CCW rotation.)

Dimensions: Inches (mm)

<table>
<thead>
<tr>
<th>Cover</th>
<th>H20</th>
<th>H25</th>
<th>H31</th>
<th>H39</th>
<th>H49</th>
<th>H62</th>
<th>H77</th>
<th>H90</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>3.34</td>
<td>3.43</td>
<td>3.54</td>
<td>3.68</td>
<td>3.86</td>
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<td>4.63</td>
<td>4.92</td>
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<tr>
<td></td>
<td>(84.84)</td>
<td>(87.12)</td>
<td>(99.22)</td>
<td>(93.47)</td>
<td>(98.04)</td>
<td>(103.63)</td>
<td>(117.60)</td>
<td>(124.97)</td>
</tr>
</tbody>
</table>

Cover Option

“A” COVER

3.250 (82.55)
3.248 (82.50)
DIA.
Dimensions – 2-Bolt Mounting

Series with built-in relief valve and flow divider

Clockwise rotation and “A” shaft shown
(Port locations reverse for CCW rotation.)

**Dimensions: Inches (mm)**

<table>
<thead>
<tr>
<th>Cover</th>
<th>H20</th>
<th>H25</th>
<th>H31</th>
<th>H39</th>
<th>H49</th>
<th>H62</th>
<th>H77</th>
<th>H90</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.43</td>
<td>2.52</td>
<td>2.64</td>
<td>2.77</td>
<td>2.95</td>
<td>3.18</td>
<td>3.45</td>
<td>3.75</td>
</tr>
<tr>
<td></td>
<td>(61.72)</td>
<td>(64.01)</td>
<td>(67.06)</td>
<td>(70.36)</td>
<td>(74.93)</td>
<td>(80.77)</td>
<td>(87.63)</td>
<td>(95.25)</td>
</tr>
</tbody>
</table>

Circuit Variations

"A" Circuit Schematic

"B" Circuit Schematic

"D" Circuit Schematic

*NOTE: "D" Circuit: Relief valve flow and flow divider secondary flow return to pump inlet internally - primarily used in "on-road" equipment power steering. Relief drain port for "B" variation 9/16"-18 UNF-2B SAE Straight Thread.
Dimensions – Drive Shaft Configurations

**“T” Shaft**
- 3/4” Dia. 11 – tooth spline
- Flat root side fit
- Diametral pitch – 16/32
- Pressure angle – 30°
- No. of teeth – 11

**“B” Shaft**
- 5/8” dia. 9-tooth spline
- Flat root side fit
- Diametral pitch – 16/32
- Pressure angle – 30°
- No. of teeth – 9
NOTE:
For additional features or options, please consult the factory.

Buna-N Seal Kit: 805041K
Buna-N Seal Kit with Plates: 815552K
Viton Seal Kit with Plates: 825092K
Performance Data
Series HD Fixed Displacement, Tandem Pump

Features
• Integral pressure-loaded pump design
• Individual inlet & outlet ports for 1st & 2nd stages of pump
• Fluids common/intermix between 1st & 2nd stages of pump.
• "H" series front cover mount - SAE "A" 2-Bolt
• Efficient at high-pressure operation
• Optional built-in relief - 2nd stage pump

Specifications
Flow Ratings:
See appropriate specification chart.

Pressure Ratings:
See appropriate specification chart.

Speed Ratings:
Minimum: 500 RPM
Maximum: Maximum rated speed of the larger displacement of the two pumps.
See appropriate specification chart for this data.

Torque:
• Combined: 800 in. lb. maximum total continuous duty
• 950 in. lb. maximum total intermittent duty
• 2nd Stage pump cannot exceed 260 in. lb.

For additional information, see the Performance Data chart on page 26.

Housing Material:
Die-cast aluminum

Schematic Symbol
(Basic Pump)

Installation Data
Inlet Conditions:
10 in. hg. max. vacuum condition (At 1200 RPM)
5 in. hg. max. vacuum condition (At 3000 RPM)
20 PSI (1.4 Bar) max. positive pressure

Operating Temperature Range:
-40°F to 185°F (-40°C to 85°C)

Filtration:
Maintain SAE Class 4

Installation Note:
See page 28 for specific recommendations pertaining to system cleanliness, fluids, start-up, inlet conditions, shaft alignment, and other important factors relative to the proper installation and use of these pumps.
### Performance Data

<table>
<thead>
<tr>
<th>Model</th>
<th>In. Lb. Torque Per 1000 PSI</th>
<th>Maximum Allowable</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>PSI</td>
</tr>
<tr>
<td><strong>FIRST STAGE</strong></td>
<td></td>
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</tr>
<tr>
<td>H25</td>
<td>121</td>
<td>2500</td>
</tr>
<tr>
<td>H31</td>
<td>152</td>
<td>2500</td>
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<tr>
<td>H39</td>
<td>190</td>
<td>2500</td>
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<td>H49</td>
<td>237</td>
<td>2500</td>
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<td>H62</td>
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<td>2250</td>
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<td>H77</td>
<td>372</td>
<td>2000</td>
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<tr>
<td><strong>SECOND STAGE</strong></td>
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<tr>
<td>D05</td>
<td>23</td>
<td>2500</td>
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<tr>
<td>D07</td>
<td>34</td>
<td>2500</td>
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<td>D11</td>
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<td>D14</td>
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<td>105</td>
<td>2250</td>
</tr>
<tr>
<td>D27</td>
<td>129</td>
<td>2000</td>
</tr>
</tbody>
</table>

Combined First and Second stage torque cannot exceed:
- 800 in. lb. Total continuous duty
- 950 in. lb. Total intermittent duty

Second stage torque cannot exceed 260 in. lb.

Example:
- H39 @ 2500 PSI = 190 in. lb. x 2.5/1000 PSI = 475 in. lb. torque
- D17 @ 2500 PSI = 81 in. lb. x 2.5/1000 PSI = 203 in. lb. torque
  
  678 in. lb. total torque
Performance Data
Dimensions: Inches (mm)

### Catalog HY09-D/H/HD/US

**Technical Information**

**Fixed Displacement Gear Pumps**

**Series HD**

#### Fixed Displacement Gear Pumps

**Series HD**

- **Model No. & Date Code:**
  - CW ROTATION
  - INLET PORTS:
    - 1ST STAGE INLET PORT
      - 1-5/16 - 12 SAE ST. THD.
  - OUTLET PORTS:
    - 1ST STAGE OUTLET PORT
      - 7/8 - 14 SAE ST. THD.

- **Dimensions:**
  - Front View:
    - 3.75 (95.25) DIA.
    - 200 IN-LB TORQUE TYP. 8 PLACES
  - Side View:
    - 25 (6.55)
    - 55 (13.97)
    - ROTATION STAMPING ON FLANGE SURFACE
  - Rear View:
    - 1.44 (36.576)
    - 2.47 (62.738)
    - 2.01 (51.054)
    - 1.44 (36.576)
  - Rear (CCW) View:
    - 1.56 (39.624)
    - DIM. "A" (See Chart)
    - DIM. "B" (See Chart)
    - 63 (16.002)
  - Side View:
    - 200 IN-LB TORQUE
    - .71 (18.03)
    - .53 (13.46)
    - 3.62 (91.95)

#### Technical Information

- **Technical Information**

- **Dimensions:**
  - 44 (11.176) DIA.
  - 2 PLACES
  - SAE "A"
  - 2 BOLT MOUNTING

#### Performance Data

- **Dimensions:**
  - Inches (mm)

<table>
<thead>
<tr>
<th>H-Pump Size</th>
<th>DIM &quot;A&quot;</th>
<th>DIM &quot;B&quot;</th>
</tr>
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<tbody>
<tr>
<td>25</td>
<td>2.67 (67.818)</td>
<td>2.66 (67.564)</td>
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<tr>
<td>31</td>
<td>2.78 (70.612)</td>
<td>2.77 (70.358)</td>
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<tr>
<td>39</td>
<td>2.92 (74.168)</td>
<td>2.81 (71.374)</td>
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<td>49</td>
<td>3.10 (78.740)</td>
<td>2.89 (73.406)</td>
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<tr>
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<td>3.32 (84.328)</td>
<td>3.01 (76.454)</td>
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<tr>
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<td>3.60 (91.440)</td>
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<td>22</td>
<td>3.33 (84.582)</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>3.52 (89.408)</td>
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</tbody>
</table>

**FOR CCW (1) ROTATION ONLY**

**Model No. & Date Code:**

- CW ROTATION
- INLET PORTS:
  - 1ST STAGE INLET PORT
    - 1-5/16 - 12 SAE ST. THD.
- OUTLET PORTS:
  - 1ST STAGE OUTLET PORT
    - 7/8 - 14 SAE ST. THD.

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- **Dimensions:**
  - Inches (mm)

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**Fluid Recommendations**

Use premium-quality hydraulic fluid with operating viscosity range of 80-1000 SSU. The maximum start-up viscosity is 4000 SSU. The fluid should have maximum anti-wear properties, rust and oxidation treatment.

**Filtration**

For maximum pump and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE Class 4).

**Fluid Compatibility**

- Petroleum-based fluid
- Water glycols
- Water emulsions
- Transmission fluid
- Mineral oil fluid

**Installation And Mounting**

The mounting position is not restricted.

**Special Installations**

Consult your Parker representative for any application requiring the following:

- Pressure above rated
- Drive speed above maximum
- Indirect drive
- Fluids other than those specified
- Fluid temperature above 185°F (85°C).

**Start-Up**

On any start-up, where the pump suction line is empty of fluid, the circuit should be open to permit priming.

**Inlet Conditions**

Conditioning should not exceed 10 in. Hg. at 1800 RPM or 5 in. Hg. at pump maximum rated RPM. Inlet positive pressure should not exceed 20 PSI (1.4 Bar) maximum.

**Shaft Rotation And Line Up**

Pump and motor shaft alignment must be within .007 inches total indicator reading. Please follow the coupling manufacturer’s recommended installation instructions to prevent end thrust on the pump shaft. Turn the pump by hand to assure freedom of rotation. The pump and motor must be on a rigid base.

The coupling should be sized to absorb the peak horsepower generated.
Instructions for Reversing Gear Pump Rotation

The basic tools needed are a vise, preferably with soft jaws, a torque wrench, a thin screwdriver, a small hone stone, a ratchet and a paper clip. The “D” series will require a 1-1/2” socket; the “H” series an additional 1/4” hex head driver. It is also recommended that you have extra heat shields and gaskets on hand. Part numbers are 655287 and 655288 for the “HD” series; 656942 and 656943 for “H” series.

To change rotation, hold the pump by the rear cover with the drive shaft pointing up. Remove all the bolts. The “HD” series will have four hex heads, and the “H” series will have six hex and two alien heads. For future reference, it would be helpful to scribe a line down the outlet side of the pump. If you choose not to mark it, the outlet port is usually the smallest.

If the pump has a key-type shaft, remove the key and hone down any burrs that may be on the shaft. This is important as the next step will be to lift off the front cover, and any sharp edges could possibly damage the front seal or bearing.

After the front cover is off, note the position of the little vent hole in the bronze wear plate, which should have come off with the front cover. The parts underneath also have a similar vent hole.

Remove in order, the wear plate, the heat shield, the gasket, and the V-seal. To facilitate this, make a small hook with a paper clip and lift the part high enough to slip a screwdriver under it and carefully pry up. Please note that the heat shield, in particular, is very brittle and may crack if bent.

After removing these four parts, reinstall the V-seal with the lips down in the front cover so that the vent hole is on the opposite side across from the reference mark. Use the screwdriver to seat it completely. Next, install the gasket, heat shield, and wear plate; again with the vent hole in line with that of the V-seal. The wear plate should be almost flush with the surface of the front cover.

Remove the center section and note the notch cut on the inside. This will be installed in line and next to the vent hole in the wear plate. The dowel pins used to locate the center section may be removed temporarily to facilitate sliding the center section over the gear assemblies. Be careful not to pinch the O-ring between the front cover and center section. If it doesn’t want to stay in place, it can be “glued” using heavy grease.

If the pump is an “H” series, install the thrust plate into the center section, orienting the side with the bar in line with the vent hole, ensuring that the bronze side faces the gears.

The rear cover is installed with the outlet side in line with the vent hole. The outlet side will be marked or can be identified by the smaller, internal cavity. As when installing the center section, be careful not to pinch the O-ring seal.

The line that was originally scribed on the side should now be located at 180° on both the rear cover and center section from that on the front cover.

Install the bolts and tighten down by hand. Then, torque to the proper setting, alternating from side to side. The correct torque specifications are 190-210” lbs. for the “D” and “H” series. Reverse or remove the rotation arrow originally stamped on the mounting flange.

Testing Procedure

After the pump has been reinstalled, run for 2-3 minutes before pressurizing. Try to apply pressure gradually for an additional five minutes, but do not pressurize for longer than 5 seconds at a time.
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4. Warranties: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from date of shipment from Parker Hannifin Corporation. THIS WARRANTY COMPRIS THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, CHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER’S DESIGNS OR SPECIFICATIONS.

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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller’s discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. 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 manufacturing of any item sold by Seller or any other item which become Buyer’s property, may be considered obsolete and may be destroyed by Seller after two (2) 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.

8. Buyer’s Property: Any designs, tools, 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 (2) 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. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, transfer, occupation or other like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. 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 Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter ‘Intellectual Property Rights’). Seller will defend at its own expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract 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 claim is based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller’s sole and exclusive liability and Buyer’s sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller’s obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter ‘Events of Force Majeure’). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller’s control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto.

This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.
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