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Introduction

This catalog introduces a new line of enhanced performance variable displacement pressure compensated vane pumps from Bosch Rexroth Corporation.

The pumps are designed to meet the requirements of the machine tool, general machinery, and other markets where low noise, high performance and competitive pricing are needed.

The design of the VPV series of vane pumps utilizes 30 years of field and manufacturing experience from the current Rexroth vane pump line. State-of-the-art technologies and materials were utilized while retaining the superior features of the existing designs. Additional goals were to create a pump with the international market in mind and to incorporate the extremely high quality standards the Rexroth name has come to exemplify.

Keeping in mind market expectations, Bosch Rexroth Corporation developed a pump with the following improvements and features:

1. High reliability with fewer parts.
2. Significant advances in noise reduction.
3. High volumetric and overall efficiency.
4. Excellent durability.
5. Modern appearance.
6. Improved ring and vane wear technology.
7. Very good response and recovery times.
8. Generally reduced envelope size.
9. Redesigned controls with shock clipper.
11. Combination capability - full horsepower may be transferred to pump 2. Combinations of construction of multiple pumps may be required to be de-rated.

Benefits

- LOW COST - Competitively priced with other manufacturers of vane pumps and economy axial piston pumps.
- EXCEPTIONALLY QUIET - Helps machinery builders meet government and purchased sound level requirements.
- CONTINUOUS DUTY RATING - @ 3,000 PSI - High performance and long life design for 10,000 plus hours.
- HIGHLY EFFICIENT FAST RESPONSE & RECOVERY - Exceptional reaction time for critical system demands.
- PRESSURE COMPENSATED - Controls pump delivery to circuit demand thereby conserving energy.
- HIGH STRENGTH - Computer optimized casting design.
- HYDRODYNAMIC JOURNAL BEARINGS - Provides long life and quiet operation.
- NO PREFILL REQUIREMENTS - Pump case prefll not required for initial start-ups.
- REPAIRABLE - Repair kits and parts available from local distribution centers or the factory.
- CONTROL OPTIONS - Single stage; two-stage, remote control; solenoid multi-pressure, and load sensing.
- SHOCK CLIPPER - Reduces shock pressure by up to 50% increasing system component life and system stability. Must be plumbed on VPV 16, 25, & 32. The shock clipper is integrated into VPV 45, 63, 80, 100, 130, & 164 and drains to the case drain. See page 88.
## Specifications

<table>
<thead>
<tr>
<th>General</th>
<th>VPV 16</th>
<th>VPV 25</th>
<th>VPV 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement (Nominal)</td>
<td>1 in³/rev (16 cm³/rev)</td>
<td>1.5 in³/rev (25 cm³/rev)</td>
<td>2 in³/rev (32 cm³/rev)</td>
</tr>
<tr>
<td>Displacement (Actual)</td>
<td>1.06 in³/rev (17.37 cm³/rev)</td>
<td>1.66 in³/rev (27.20 cm³/rev)</td>
<td>2.05 in³/rev (33.59 cm³/rev)</td>
</tr>
<tr>
<td>Flow at 1750 RPM</td>
<td>7.57 GPM (28.6 L/min)</td>
<td>11.36 GPM (43.0 L/min)</td>
<td>15.15 GPM (57.3 L/min)</td>
</tr>
<tr>
<td>Maximum continuous pressure</td>
<td>3000 psi (210 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure compensating range</td>
<td>Single stage</td>
<td>200-3000 psi (14-210 bar) Minimum pressure of 190 PSI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two stage</td>
<td>300-3000 psi (20-210 bar) Minimum pressure of 290 PSI</td>
<td></td>
</tr>
<tr>
<td>Maximum transient spike pressure</td>
<td>3800 psi (260 bar)</td>
<td>4000 psi (280 bar)</td>
<td></td>
</tr>
<tr>
<td>Maximum case pressure</td>
<td>10 psi (0.7 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed range</td>
<td>1150-1800 RPM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direction of rotation (viewed from shaft end)</td>
<td>Right hand (clockwise)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case drain flow while compensating @ 1800 RPM</td>
<td>0.6 GPM (2.3 L/min)</td>
<td>0.9 GPM (3.4 L/min)</td>
<td>1.26 GPM (4.8 L/min)</td>
</tr>
<tr>
<td></td>
<td>2000 psi (140 bar)</td>
<td>2000 psi (140 bar)</td>
<td>2000 psi (140 bar)</td>
</tr>
<tr>
<td></td>
<td>3000 psi (210 bar)</td>
<td>3000 psi (210 bar)</td>
<td>3000 psi (210 bar)</td>
</tr>
<tr>
<td>Maximum inlet vacuum at sea level</td>
<td>6 in. HG (152 mm HG)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port sizes</td>
<td>Inlet #16 S.A.E.</td>
<td>#24 S.A.E</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outlet #12 S.A.E.</td>
<td>#16 S.A.E.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Case drain #8 S.A.E.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clipper control drain (optional) #6 S.A.E.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remote control (optional) #4 S.A.E.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive</td>
<td>Pump to be connected to prime mover by means of a flexible coupling that is aligned to a maximum of 0.006&quot; (.152mm) total indicator reading. No overhung or side loads permitted. Alignments greater than 0.006&quot; indicator reading could cause increased noise and vibration as well as premature shaft seal wear resulting in leakage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid recommendations</td>
<td>A premium quality hydraulic oil with anti-wear additives is recommended, but not required. Refer to publication 9 535 233 456 &quot;Petroleum Hydraulic Fluids&quot; for a list of fluids which meet or exceed the necessary lubrication requirements. Consult factory for use with water base fire resistant fluids.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid viscosity at Maximum start-up</td>
<td>Minimum 100 SUS (21 cSt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>operating temperature</td>
<td>Maximum 1000 SUS (216 cSt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Optimum 150-250 SUS (32-54 cSt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum start-up 4000 SUS (864 cSt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>Normal inlet fluid temperature should not exceed 140°F (60° C). Always select a fluid for optimum viscosity at operating temperature. Consult factory for applications assistance when inlet fluid temperatures over 140° F (60° C) are expected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seals</td>
<td>Fluorocarbon Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filtration</td>
<td>Fluid cleanliness per ISO/DIS 4406 should be 18/15 or better for pressures of 2000 psi or less. For continuous operating pressures of 2000 to 3000 psi, fluid cleanliness should be 17/14 or better.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (circuit dependent)</td>
<td>Full flow to minimum flow 20-35 ms</td>
<td>20-35 ms</td>
<td></td>
</tr>
<tr>
<td>Recovery time (circuit dependent)</td>
<td>Minimum flow to full flow 50-135 ms – single stage compensator 70-185 ms – single stage compensator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Single stage 34 lbs. (16.5 kg)</td>
<td>61 lbs. (28 kg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two stage 38 lbs. (17.3 kg)</td>
<td>65 lbs. (28.5 kg)</td>
<td></td>
</tr>
</tbody>
</table>

1 Flows are actual. Volumetric efficiencies shown in technical data taken into account.
2 For new applications exceeding 2300 psi (159 bar) system pressure, please consult factory.
3 Metric 4-bolt flange available (ISO 3019/2) available. Please consult factory.
# Specifications

<table>
<thead>
<tr>
<th>General</th>
<th>VPV 45</th>
<th>VPV 63</th>
<th>VPV 80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement (Nominal)</td>
<td>2.75 in³/rev (45 cm³/rev)</td>
<td>3.84 in³/rev (63 cm³/rev)</td>
<td>4.88 in³/rev (80 cm³/rev)</td>
</tr>
<tr>
<td>Displacement (Actual)</td>
<td>2.98 in³/rev (48.83 cm³/rev)</td>
<td>4.03 in³/rev (66.04 cm³/rev)</td>
<td>5.06 in³/rev (82.92 cm³/rev)</td>
</tr>
<tr>
<td>Flow at 1750 RPM¹</td>
<td>20.83 GPM (72.84 L/min)</td>
<td>29.10 GPM (110.1 L/min)</td>
<td>36.97 GPM (139.9 L/min)</td>
</tr>
<tr>
<td>Maximum continuous pressure²</td>
<td>3000 psi (210 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure compensating range</td>
<td>Two stage</td>
<td>350-3000 psi (24-210 bar) Minimum pressure of 300 PSI</td>
<td></td>
</tr>
<tr>
<td>Maximum case pressure</td>
<td>10 psi (0.7 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed range</td>
<td>1150-1800 RPM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direction of rotation (viewed from shaft end)</td>
<td>Right hand (clockwise)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case drain flow while compensating ≤ 1800 RPM</td>
<td>1.5 GPM (5.7 L/min)</td>
<td>1.4 GPM (5.3 L/min)</td>
<td>1.4 GPM (5.3 L/min)</td>
</tr>
<tr>
<td>Inlet</td>
<td>1000 psi (70 bar)</td>
<td>2000 psi (140 bar)</td>
<td>3000 psi (210 bar)</td>
</tr>
<tr>
<td>Outlet</td>
<td>1.9 GPM (7.2 L/min)</td>
<td>1.8 GPM (6.8 L/min)</td>
<td>1.8 GPM (6.8 L/min)</td>
</tr>
<tr>
<td>Case drain</td>
<td>2.5 GPM (9.5 L/min)</td>
<td>2.4 GPM (9.1 L/min)</td>
<td>2.3 GPM (8.7 L/min)</td>
</tr>
<tr>
<td>Maximum inlet vacuum at sea level</td>
<td>6 in. HG (152 mm HG)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting² – SAE 2-bolt flange (ISO 3019/1)</td>
<td>S.A.E. 'C' 2-Bolt flange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port sizes</td>
<td>Inlet 2&quot; S.A.E.</td>
<td>Outlet 1 1/4&quot; S.A.E. flange</td>
<td>Case drain #8 S.A.E.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Remote control (optional) #4 S.A.E.</td>
</tr>
<tr>
<td>Drive</td>
<td>Pump to be connected to prime mover by means of a flexible coupling that is aligned to a maximum of 0.006&quot; (1.52 mm) total indicator reading. No overhung or side loads permitted. Alignments greater than 0.006&quot; indicator reading could cause increased noise and vibration as well as premature shaft seal wear resulting in leakage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid recommendations</td>
<td>A premium quality hydraulic oil with anti-wear additives is recommended, but not required. Refer to publication 9 535 233 456 “Petroleum Hydraulic Fluids” for a list of fluids which meet or exceed the necessary lubrication requirements. Consult factory for use with water base fire resistant fluids.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid viscosity at operating temperature</td>
<td>Minimum 150 SUS (32 cSt)</td>
<td>Maximum 1000 SUS (216 cSt)</td>
<td>Optimum 200-300 SUS (43-65 cSt)</td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>Normal inlet fluid temperature should not exceed 140°F (60°C). Always select a fluid for optimum viscosity at operating temperature. Consult factory for applications assistance when inlet fluid temperatures over 140°F (60°C) are expected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seals</td>
<td>Fluorocarbon Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filtration</td>
<td>Fluid cleanliness per ISO/DIS 4406 should be 18/15 or better for pressures of 2000 psi or less. For continuous operating pressures of 2000 to 3000 psi, fluid cleanliness should be 17/14 or better.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (circuit dependent)</td>
<td>Full flow to minimum flow</td>
<td>20-40 ms</td>
<td></td>
</tr>
<tr>
<td>Recovery time (circuit dependent)</td>
<td>Minimum flow to full flow</td>
<td>100-200 ms – two stage compensator</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Single stage 120 lbs. (55 kg)</td>
<td>Two stage 128 lbs. (58 kg)</td>
<td></td>
</tr>
</tbody>
</table>

¹ Flows are actual. Volumetric efficiencies shown in technical data taken into account.
² For new applications exceeding 2300 psi (159 bar) system pressure, please consult factory.
³ Metric 4-bolt flange available (ISO 3019/2) available. Please consult factory.
# Specifications

<table>
<thead>
<tr>
<th>General</th>
<th>VPV 100</th>
<th>VPV 130</th>
<th>VPV 164</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement (Nominal)</td>
<td>6.1 in³/rev (160 cm³/rev)</td>
<td>7.9 in³/rev (130 cm³/rev)</td>
<td>10.0 in³/rev (164 cm³/rev)</td>
</tr>
<tr>
<td>Displacement (Actual)</td>
<td>6.49 in³/rev (166.35 cm³/rev)</td>
<td>8.25 in³/rev (135.19 cm³/rev)</td>
<td>10.33 in³/rev (169.28 cm³/rev)</td>
</tr>
<tr>
<td>Flow at 1750 RPM&lt;sup&gt;1&lt;/sup&gt;</td>
<td>45.4 GPM (171.8 L/min)</td>
<td>59.85 GPM (226.5 L/min)</td>
<td>75.76 GPM (286.7 L/min)</td>
</tr>
<tr>
<td>Maximum continuous pressure&lt;sup&gt;2&lt;/sup&gt;</td>
<td>3000 psi (210 bar)</td>
<td>3000 psi (210 bar)</td>
<td></td>
</tr>
<tr>
<td>Pressure compensating</td>
<td>Two stage</td>
<td>350-3000 psi (24-210 bar)</td>
<td>350-3000 psi (24-210 bar)</td>
</tr>
<tr>
<td>Maximum transient spike pressure</td>
<td>4000 psi (280 bar)</td>
<td>4000 psi (280 bar)</td>
<td></td>
</tr>
<tr>
<td>Maximum case pressure</td>
<td>10 psi (0.7 bar)</td>
<td>10 psi (0.7 bar)</td>
<td>10 psi (0.7 bar)</td>
</tr>
<tr>
<td>Speed range</td>
<td>1150-1800 RPM</td>
<td>1150-1800 RPM</td>
<td>1150-1800 RPM</td>
</tr>
<tr>
<td>Direction of rotation (viewed from shaft end)</td>
<td>Right hand (counterclockwise)</td>
<td>Right hand (counterclockwise)</td>
<td>Right hand (counterclockwise)</td>
</tr>
<tr>
<td>Case drain flow while compensating</td>
<td>1000 psi (70 bar)</td>
<td>1.5 GPM (5.7 L/min)</td>
<td>1.6 GPM (6.0 L/min)</td>
</tr>
<tr>
<td>@ 1800 RPM</td>
<td>2000 psi (140 bar)</td>
<td>2.0 GPM (7.6 L/min)</td>
<td>2.2 GPM (8.3 L/min)</td>
</tr>
<tr>
<td>Maximum inlet vacuum at sea level</td>
<td>6 in. HG (152 mm HG)</td>
<td>6 in. HG (152 mm HG)</td>
<td>6 in. HG (152 mm HG)</td>
</tr>
</tbody>
</table>

Mounting<sup>4</sup> – SAE 2-bolt flange (ISO 3019/1) or SAE ‘D’, 2-bolt flange

Mounting Position | Unrestricted

Port sizes

<table>
<thead>
<tr>
<th>Inlet</th>
<th>2 1/2&quot; S.A.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlet</td>
<td>1 1/2&quot; S.A.E.</td>
</tr>
<tr>
<td>Case drain</td>
<td>#8 S.A.E.</td>
</tr>
<tr>
<td>Remote control (optional)</td>
<td>#4 S.A.E.</td>
</tr>
</tbody>
</table>

Drive

Pump to be connected to prime mover by means of a flexible coupling that is aligned to a maximum of 0.006" (.152mm) total indicator reading. No overhung or side loads permitted. Alignments greater than 0.006" indicator reading could cause increased noise and vibration as well as premature shaft seal wear resulting in leakage.

Fluid recommendations

A premium quality hydraulic oil with anti-wear additives is recommended, but not required. Refer to publication 9 535 233 456 “Petroleum Hydraulic Fluids” for a list of fluids which meet or exceed the necessary lubrication requirements. Consult factory for use with water base fire resistant fluids.

Fluid viscosity at operating temperature

<table>
<thead>
<tr>
<th>Minimum</th>
<th>150 SUS (32 cSt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>1000 SUS (216 cSt)</td>
</tr>
<tr>
<td>Optimum</td>
<td>200-300 SUS (42-65 cSt)</td>
</tr>
<tr>
<td>Maximum start-up</td>
<td>4000 SUS (864 cSt)</td>
</tr>
</tbody>
</table>

Fluid temperature

Normal inlet fluid temperature should not exceed 140°F (60°C). Always select a fluid for optimum viscosity at operating temperature. Consult factory for applications assistance when inlet fluid temperatures over 140°F (60°C) are expected.

Seals

Fluorocarbon Standard

Filtration

Fluid cleanliness per ISO/DIS 4406 should be 18/15 or better for pressures of 2000 psi or less. For continuous operating pressures of 2000 to 3000 psi, fluid cleanliness should be 17/14 or better.

Response time (circuit dependent)

Full flow to minimum flow | 20-50 ms |

Recovery time (circuit dependent)

Minimum flow to full flow | 180-280 ms – two stage compensator |

Weight

Single stage | 240 lbs. (109 kg) |
| Two stage | 248 lbs. (112.7 kg) |

<sup>1</sup> Flows are actual. Volumetric efficiencies shown in technical data taken into account.

<sup>2</sup> For new applications exceeding 2300 psi (159 bar) system pressure, please consult factory.

<sup>4</sup> Metric 4-bolt flange available (ISO 3019/2) available. Please consult factory.
Ordering Guide

Code Structure
The alpha-numeric ordering code system enables any particular type of pump to be specified. Preferred type are also identified by a 10-digit part number for computerized ordering.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Code Digit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0513</td>
<td>Vane Pump, stand alone version single pump or combination</td>
</tr>
<tr>
<td>2</td>
<td>R</td>
<td>Direction of Rotation</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>Clockwise, viewed from shaft end, maximum speed; e.g. 1150 rpm = 12</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>Drive Shaft, Key to DIN 6885</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Bearing Arrangement / Mounting Flange, Standard bearing arrangement, mounting flange to SAE standards</td>
</tr>
<tr>
<td>6</td>
<td>V</td>
<td>Principle of Operation, Vane Type</td>
</tr>
<tr>
<td>7</td>
<td>P</td>
<td>Mode of Operation, Pump</td>
</tr>
<tr>
<td>8</td>
<td>V</td>
<td>Type of Construction, Variable displacement pump (open circuit)</td>
</tr>
<tr>
<td>9</td>
<td>16</td>
<td>Displacement, 16 cc/rev = 0.98 cu in/rev</td>
</tr>
<tr>
<td>10</td>
<td>S</td>
<td>Housing, 210 bar = 3000 psi.</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td>Operating Fluid, Water glycol</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>Mineral Oil and Ester</td>
</tr>
</tbody>
</table>

Pump 1 0513 R 18 C 3 V P V 32 S M 21 F Z B03
Pump 2*** V P V 32 S M 21 F Z B03
Pump 3 (Gear Pump) AZ P F 14 R R R 12 M B

*** When trailing pump is another VPV pump, it can be coded by selecting items 6 through 15 for the alpha-numeric description. Consult factory for other models and descriptions of trailing pumps.

Price and Part Numbers

Product Literature Disclaimer
Specifications and/or dimensions are subject to change without prior notice. Please consult factory.
## Ordering Guide (cont.)

<table>
<thead>
<tr>
<th>Item No</th>
<th>Code</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>12</td>
<td></td>
<td><strong>Operating Pressure</strong></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Maximum operating pressure; e.g. 14 = 140 bar = 2000 psi</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>21 = 210 bar = 3000 psi</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td><strong>Control / Regulator</strong></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>Pressure regulator - single stage 16/25/32cc only</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td>Pressure regulator - single stage - lockable 16/25/32cc only</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>Pressure regulator - two stage - with remote option</td>
</tr>
<tr>
<td>J</td>
<td></td>
<td>Combined pressure/flow compensator (load sense)</td>
</tr>
<tr>
<td>S</td>
<td></td>
<td>Torque limiter (PHASED OUT 2002)</td>
</tr>
<tr>
<td>T</td>
<td></td>
<td>Proportional P/Q (PHASED OUT 2002)</td>
</tr>
<tr>
<td>XA</td>
<td></td>
<td>Solenoid Operated Two Press. Norm. (Normally open)/Normally Low Pressure/Energize to High</td>
</tr>
<tr>
<td>XB</td>
<td></td>
<td>115V N.O. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
</tr>
<tr>
<td>XC</td>
<td></td>
<td>220V N.O. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
</tr>
<tr>
<td>XD</td>
<td></td>
<td>12V N.O. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
</tr>
<tr>
<td>XE</td>
<td></td>
<td>24V N.O. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
</tr>
<tr>
<td>XF</td>
<td></td>
<td>115V N.O. w/flying leads</td>
</tr>
<tr>
<td>XG</td>
<td></td>
<td>220V N.O. w/flying leads</td>
</tr>
<tr>
<td>XH</td>
<td></td>
<td>12V N.O. w/flying leads</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24V N.O. w/flying leads</td>
</tr>
<tr>
<td>YA</td>
<td></td>
<td>Solenoid Operated Two Press. Normally Closed (Normally High Pressure/Energize to Low)</td>
</tr>
<tr>
<td>YB</td>
<td></td>
<td>115V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
</tr>
<tr>
<td>YC</td>
<td></td>
<td>220V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
</tr>
<tr>
<td>YD</td>
<td></td>
<td>12V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
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<tr>
<td>YE</td>
<td></td>
<td>24V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
</tr>
<tr>
<td>YF</td>
<td></td>
<td>115V N.C. w/flying leads</td>
</tr>
<tr>
<td>YG</td>
<td></td>
<td>220V N.C. w/flying leads</td>
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<tr>
<td>YH</td>
<td></td>
<td>12V N.C. w/flying leads</td>
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<td></td>
<td></td>
<td>24V N.C. w/flying leads</td>
</tr>
<tr>
<td>ZA</td>
<td></td>
<td>Solenoid Operated Vented Two Press. Normally Open (Normally Vented/Energize to Pressure)</td>
</tr>
<tr>
<td>ZB</td>
<td></td>
<td>115V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
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<tr>
<td>ZC</td>
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<td>220V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
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<td>ZE</td>
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<td>24V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
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<tr>
<td>ZF</td>
<td></td>
<td>115V N.C. w/flying leads</td>
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<tr>
<td>ZG</td>
<td></td>
<td>220V N.C. w/flying leads</td>
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<tr>
<td>ZH</td>
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<td>12V N.O. w/flying leads</td>
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<td></td>
<td></td>
<td>24V N.O. w/flying leads</td>
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<tr>
<td>WA</td>
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<td>Solenoid Operated Vented Norm. High Normally closed (Normally at Pressure/Energize to Vent)</td>
</tr>
<tr>
<td>WB</td>
<td></td>
<td>115V N.C. w/DIN 43650 &amp; quick connect (compression fitting) w/sentinel light</td>
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<tr>
<td>WC</td>
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<td>220V N.C. w/flying leads</td>
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<tr>
<td>WH</td>
<td></td>
<td>12V N.C. w/flying leads</td>
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<tr>
<td></td>
<td></td>
<td>24V N.C. w/flying leads</td>
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<tr>
<td>14</td>
<td></td>
<td><strong>Accessories</strong></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td>Special (Consult Factory)</td>
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<tr>
<td>Y</td>
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<td>Maximum delivery limiter</td>
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<tr>
<td>Z</td>
<td></td>
<td>No other accessories</td>
</tr>
<tr>
<td>15</td>
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<td><strong>B01 Design Series</strong></td>
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<tr>
<td>P1</td>
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<td>Pump 1 of a quick combination unit (adapter kit &amp; coupling required to create a combination-see page 78)</td>
</tr>
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## Gear Pump Guide

<table>
<thead>
<tr>
<th>Item No</th>
<th>Code</th>
<th>Principle of Operation</th>
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<tr>
<td>6</td>
<td>AZ</td>
<td>Hydraulic Gear</td>
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<tr>
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<th>Direction of Rotation</th>
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<table>
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<tr>
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<th>Shaft Type</th>
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<td>11</td>
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<tr>
<td></td>
<td>Q</td>
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<tr>
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<th>Mounting Shaft</th>
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<thead>
<tr>
<th>Item No</th>
<th>Port Type</th>
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<table>
<thead>
<tr>
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<th>Seals</th>
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<td></td>
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<thead>
<tr>
<th>Item No</th>
<th>End Cover</th>
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<tbody>
<tr>
<td>15</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>A</td>
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</table>
On the following pages are line graphs of the Performance Characteristics for each of the pumps in our series. Characteristics are shown at 1200 PSI, 1500 PSI and 3000 PSI. Since different geographical areas require different data, please refer to the appropriate graph.
Performance Characteristics – VPV 16 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-anchoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 16 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C) Viscosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

EFFICIENCY @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anchoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 25 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-anchoic chamber w/microphone placed 1 meter away at discrete locations.
Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 25 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

Efficiency @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 32 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-echoic chamber w/microphone placed 1 meter away at discrete locations.
Sound pressure levels are spatially and time-weighted averaged.
Performance Characteristics – VPV 32 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C) Viscosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

EFFICIENCY @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations.
Sound pressure levels are spatially and time-weighted averaged.
Performance Characteristics – VPV 45 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C) Viscosity at 120° = 140 SUS (29.6 cSt)

Output Flow & Power @ 1200 rpm

Output Flow & Power @ 1500 rpm

Efficiency @ 1200 rpm

Efficiency @ 1500 rpm

Sound Pressure @ 1200 rpm

Sound Pressure @ 1500 rpm

Sound pressure levels measured in a hemi-anechoic chamber with microphone placed 1 meter away at discrete locations.

Sound pressure levels are spatially and time-weighted averaged.
Performance Characteristics – VPV 45 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

EFFICIENCY @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 63 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-anchoic chamber w/microphone placed 1 meter away at discrete locations.
Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 63 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

EFFICIENCY @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 80 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C) Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 80 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

![Graph of Output Flow & Power at 1800 rpm](image)

![Graph of Efficiency at 1800 rpm](image)

![Graph of Sound Pressure at 1800 rpm](image)

Sound pressure levels measured in a hemi-anchioic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 100 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-anchoic chamber w/microphone placed 1 meter away at discrete locations.
Sound pressure levels are spatially and time-weighted averaged.
Performance Characteristics – VPV 100 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C) Visosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

EFFICIENCY @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anchoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 130 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-anchoic chamber w/microphone placed 1 meter away at discrete locations.
Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 130 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

EFFICIENCY @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations.

Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 164 to 3000 PSI (210 Bar)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations.
Sound pressure levels are spacially and time-weighted averaged.
Performance Characteristics – VPV 164 to 3000 PSI (210 Bar) (continued)

Data plotted: with oil at 120°F (49°C)  Viscosity at 120° = 140 SUS (29.6 cSt)

OUTPUT FLOW & POWER @ 1800 rpm

EFFICIENCY @ 1800 rpm

SOUND PRESSURE @ 1800 rpm

Sound pressure levels measured in a hemi-anechoic chamber w/microphone placed 1 meter away at discrete locations. Sound pressure levels are spacially and time-weighted averaged.
VPV 16, Single pump, S.A.E. ‘A’ flange, RH rotation

Optional combination capable pump with end cover

Optional volume control (CW rotation reduces flow)

Compensator adjusting knob (CW rotation increases pressure standard single stage compensator)

Optional 2-stage compensator

2-stage compensator adjusting knob (CW rotation increases pressure setting)

Optional 2-stage with load compensator

Optional 2 pressure operated solenoid compensator

Optional 2 pressure (vent) solenoid operated compensator

Manual override pushpin

DIN 43650 connector w/ 1/2" NPT compression fitting and sentinel light (Optional)

Spline (See data)

Flat root side fit Class 5
Pitch 16/32
Pressure angle 30°
Number of teeth 9
Base Dia. 0.487193 in. ref.
Form Dia. 0.504 in. ref.
Major Dia. 0.625 +0.060 in. ref.

30° Involute Spline Data

Inches (millimeters)

VPV Vane Pumps | 9 535 233 724/10.03

Bosch Rexroth Corp. | Industrial Hydraulics
VPV 16 Single pump, Metric flange, RH rotation

Optional combination capable pump with end cover

Compensator adjusting knob
(CW rotation increases pressure standard single stage compensator)

Optional single-stage compensator with locking device

Optional 2-stage compensator

Centerline pump control

Optional 2-stage compensator

Centerline pump control

Remote control port 1/4 - 19 BSPP

Centerline pump control

Manual override pushpin

DIN 43650 connector w/ 1/2" NPT compression fitting and sentinel light (Optional)

Optional 2 pressure solenoid operated compensator

Optional 2 pressure (vent) solenoid operated compensator

Outlet port 1/2 - 14 BSPP

Inlet port 1 - 11 BSPP

Load sense port 1/4 - 19 BSPP

Rotation arrows cast into body

#6 S.A.E. Shock Clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

Manual override pushpin

Case drain port 3/8 - 19 BSPP

Inches (millimeters)
VPV 25/32, Single pump, S.A.E. ‘B’ flange, RH rotation

Optional combination capable pump with end cover

Inches (millimeters)

Optional volume control (CW rotation reduces flow)

Outlet port #16 S.A.E.

Pump control mounting datum "T"

Optional 2-stage compensator

2-stage compensator adjusting knob (CW rotation increases pressure setting)

Centerline pump control

Optional 2-stage load compensator

Compensator adjusting knob (CW rotation increases pressure setting)

30° Involute Spline Data
Flat root side fit - Class 5
Pitch - 30°
Pressure angle - 30°
Number of teeth - 13
Base dia. - 0.703645 in. ref.
Form dia. - 0.749 in. ref.
Major dia. - 0.875+0.000 -0.022 in. ref

Remote control port #4 SAE

Load sense port #4 SAE

Rotation arrows cast into body

Inlet port #24 S.A.E.

Case drain port #8 S.A.E.

Shock clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

Optional 2-stage compensator adjusting knob (CW rotation increases pressure setting)

4.65 (118.0)
3.84 (97.7)
5.26 (133.7)

4.46 (113.4)
0.36 (9.25)
2.36 (59.7)
0.31 (7.8)
1.61 (41.0)

11.82 (300.2)
4.65 (118.1)
5.44 (138.2)

4.58 (116.4)
1.57 (40.0)
3.78 (96.0)

3.53 (89.7)
7.06 (179.4)
5.17 (131.4)
3.75 (95.5)

6.63 (168.6)
5.17 (131.4)

5.35 (135.0)
3.53 (89.7)
7.06 (179.4)

1.83 (46.6)
1.08 (27.5)
4.16 (105.8)

210 bar
140 bar

Optional combination capable pump with end cover

Inlet port #24 S.A.E.

S.A.E. "B" mounting flange

Square key

Flat root side fit

Pitch . . . . . . . . . . .
Pressure angle . . . . . .
Number of teeth . . . . .
Base dia. . . . . . . . . .
Form dia . . . . . . . . .
Major dia. . . . . . . . .

Class 5
16/32
30°
13
0.703645 in. ref.
0.749 in. ref.
0.875+0.000 in. ref

Inches (millimeters)
VPV 25/32, Single pump, Metric flange, RH rotation

Optional combination capable pump with end cover

Shaft / key detail

Optional 2 stage compensator with locking device

Optional single-stage compensator with locking device

Pump centerline

Optional 2 pressure (vent) solenoid operated compensator

Pump control mounting datum "T"

Pump centerline

Load sense port 1/4 - 19 BSPP

Centerline of pump control

Remote control port 1/4 - 19 BSPP

Shaft / key detail

Optional 2 pressure solenoid operated compensator

Manual override pushpin

DIN 43650 connector w/ 1/2" NPT compression fitting and sentinel light (Optional)

Optional 2-stage compensator adjusting knob (CW rotation increases pressure setting)

Optional 2 stage load compensator

Load sense port 1/4 - 19 BSPP

Inlet port 1-1/2 - 11 BSPP

Case drain port 3/8 - 19 BSPP

Inches (millimeters)
VPV 45/63/80, Single pump, S.A.E. ‘C’ flange, RH rotation

Optional eye bolt
Optional 2 stage with load compensator
Load sense port #4 S.A.E.
Compensator adjusting knob (CW rotation increases pressure setting)
Optional 2 stage with load compensator
Optional 2 pressure solenoid operated vent compensator
Optional 2 pressure solenoid operated (and vent) compensator
Centerline pump control
Rotation arrows cast into body

SCALE: 2X
VPV 45/63/80, Single pump, S.A.E. ‘C’ flange, RH rotation, (continued)

Optional combination capable pump with end cover (P1 Version)

Optional volume control (CW rotation reduces flow)

Support (Lift) point M10 X 1.5-6H X 11.25 deep TH'D

Pump control mounting Datum "T"
VPV 45/63/80, Single pump, Metric flange, RH Rotation

Optional eye bolt

Centerline pump control

Rotation arrows cast into body

Optional 2 stage with load compensator
1/4 - 19 BSPP

Optional 2 stage with load compensator

Remote control port
1/4 - 19 BSPP, 0.48 deep

Mounting flange

Case drain
3/8 - 19 BSPP

Std. SAE 2" pad suction
2.00 (50.8) dia.

Optional 2 pressure solenoid operated compensator

Optional 2 pressure solenoid operated vent compensator

Compensator adjusting knob (C.W. rotation increases pressure setting)

Manual override pushpin

1/2" conduit connector

DIN 43650 connector w/ 1/2" NPT compression fitting and sentinel light

Optional 2 pressure solenoid operated vent compensator

Optional 2 stage with load compensator

2 stage compensator

SCALE: 2X

SINGLE STAGE CONTROL
NOT AVAILABLE ON VPV 45-164

SCALE: 2X
Optional combination capable pump with end cover (P1 Version)

Support (Lift) point
M10 x 1.5-6H x 11.25 deep TH'D

Pump control Datum "T"

Optional volume control (CW rotation reduces flow)

Pump centerline

5.96 (151.4) max.

13.95 (354.5)

Std. SAE 1-1/4" pad pressure 1.25 (31.8) dia.

M12 x 1.75 -6H TH'D 4 holes

Pump centerline

5.36 (136.2)

2.04 (51.7)

0.59 (15.1)

1.19 (30.2)

5.64 (143.2)

9.64 (244.9)

10.55 (267.9)

Support (Lift) point
M10 x 1.5-6H x 11.25 deep TH'D

Inches (millimeters)
VPV 100/130/164, Single pump, S.A.E. ‘D’ flange, RH rotation

SINGLE STAGE CONTROL
NOT AVAILABLE ON VPV 45-164

Centerline of pump control

Rotation arrows cast into body

Case drain port #8 SAE

1/2" -13 UNC, 28 deep, 4 holes

Optional 2 pressure solenoid operated compensator

Compensator adjusting knob (C.W. rotation increases pressure setting)

Manual override pushpin

Remote control port 7/16" - 20 UNF, 0.45 deep

2 stage compensator

SAE "D" mounting flange

Optional 2 stage with load compensator

Load sense port #4 S.A.E.

Optional 2 pressure solenoid operated vent compensator

SCALE: 2X
VPV 100/130/164, Single pump, S.A.E. ‘D’ flange, RH rotation (continued)

Optional combination capable pump with end cover (P1 Version)

Optional volume control (CW rotation reduces flow)

Inches (millimeters)
VPV 100/130/164, Single pump, Metric flange, RH rotation

**SINGLE STAGE CONTROL**

**NOT AVAILABLE ON VPV 45-164**

- Centerline of pump control
- Rotation arrows cast into body
- Case drain port 3/8-19 BSPP
- M12 x 1.75, 28 deep 4 holes
- Std SAE 2-1/2" pad suction 2.47 (62.7) DIA

Optional 2 pressure solenoid operated compensator

- Compensator adjusting knob (CW rotation increases pressure setting)
- Manual override pushpin
- Remote control port 1/4 - 19 BSPP, 0.48 deep
- 2 stage compensator

Optional 2 stage with load compensator

- Optional 2 stage with load compensator
- Optional 2 pressure solenoid operated vent compensator

- Mounting flange
- Ø7.87 (Ø200.0)
- 6.30 (160.0)
- 6.06 (153.8)

**SCALE: 2X**
VPV 100/130/164, Single pump, Metric flange, RH rotation (continued)

Optional combination capable pump with end cover (P1 Version)

Optional volume control (CW rotation reduces flow)

Pump centerline

Std S.A.E. 1-1/2" pad pressure 1.46 (37.1) dia.

M12 x 1.75, 28 deep, 4 holes

Pump control mounting datum "T"

Lift point M10 x 1.5 - 6H x 11.0 deep th'd

9.24 (234.7)
VPV 16, Combination pump, S.A.E. ‘A’ flange, RH rotation

Optional volume control (C.W. rotation reduces flow)

Optional vertical supports for combination pumps when rotated 90°

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

View A-A

Standard single stage compensator

Compensator adjusting knob (C.W. rotation increases pressure setting)

2-stage compensator adjusting knob (C.W. rotation increases pressure setting)

#6 S.A.E. Shock clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #12 S.A.E.

Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

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Remote control #4 S.A.E. (239.4)

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Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
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Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

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Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

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Inlet port, #16 S.A.E.
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Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

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Case drain port, #8 S.A.E.

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Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

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Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

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Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

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Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Remote control #4 S.A.E. (239.4)

Support (Lift) point 3/8"-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.
Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)
VPV 25/32, Combination pump, S.A.E. ‘B’ flange, RH rotation

Optional vertical supports for combination pumps when rotated 90°

Optional volume control (C.W. rotation reduces flow)

Support (Lift) point 3/8"-16 UNC-2B X 22.0mm deep

#6 S.A.E. Shock clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

Inlet port, #24 S.A.E.

Case drain port, #8 S.A.E.

Remote control, #4 S.A.E.

Support (Lift) point 3/8" = 16 UNC-2B X 22.0mm deep

Outlet port, #16 S.A.E.

Inlet port, #24 S.A.E.

Case drain port, #8 S.A.E.
VPV 32/16, Combination pump, S.A.E. ‘B’ flange, RH rotation

Optional vertical supports for combination pumps when rotated 90°

Optional volume control (CW rotation reduces flow)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Outlet port, #12 S.A.E.

#6 S.A.E. Shock clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

Optional 2-stage compensator (now in modular design)

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Inlet port, #24 S.A.E.

Case drain port, #8 S.A.E.

Optional 2-stage compensator (now in modular design)

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #24 S.A.E.

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
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Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

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Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

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Optional 2-stage compensator

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Optional 2-stage compensator

Case drain port, #8 S.A.E.

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Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
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Inlet port, #16 S.A.E.

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Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

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3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.

Compensator adjusting knob (CW rotation increases pressure rating)

Support (Lift) point
3/8”-16UNC-2B X 22.0mm deep

Inlet port, #16 S.A.E.

Optional 2-stage compensator

Case drain port, #8 S.A.E.

Remote control port, #4 S.A.E.
VPV 32/25, Combination pump, S.A.E. to 'F' gear, RH rotation

Optional volume control (CW rotation reduces flow)

Support (Lift) point 3/8'-16UNC-2B X 15 deep

S.A.E. "F" gear pump

Compensator adjusting knob (CW rotation increases pressure setting)

Optional 2-stage compensator (now in modular design)

Centerline pump control

Outlet port, #16 S.A.E.

Rotation arrow cast into body

Remote control port, #4 S.A.E.

Case drain port, #8 S.A.E.

Standard single stage compensator

Optional vertical supports for combination pumps when rotated 90°

#6 S.A.E. Shock clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

---

**Gear Pump Theoretical Displacement**

<table>
<thead>
<tr>
<th>in³/rev (cc/rev)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.24</td>
<td>(4)</td>
<td>(39.9)</td>
<td>(85.0)</td>
<td>(269.7)</td>
</tr>
<tr>
<td>0.34</td>
<td>(5.5)</td>
<td>(41.1)</td>
<td>(87.5)</td>
<td>(267.0)</td>
</tr>
<tr>
<td>0.49</td>
<td>(8)</td>
<td>(43.2)</td>
<td>(91.6)</td>
<td>(269.0)</td>
</tr>
<tr>
<td>0.67</td>
<td>(11)</td>
<td>(47.0)</td>
<td>(96.6)</td>
<td>(272.8)</td>
</tr>
<tr>
<td>0.85</td>
<td>(14)</td>
<td>(47.2)</td>
<td>(101.6)</td>
<td>(273.3)</td>
</tr>
<tr>
<td>0.98</td>
<td>(16)</td>
<td>(47.5)</td>
<td>(105.0)</td>
<td>(273.3)</td>
</tr>
<tr>
<td>1.16</td>
<td>(19)</td>
<td>(47.8)</td>
<td>(110.0)</td>
<td>(273.3)</td>
</tr>
<tr>
<td>1.37</td>
<td>(22.5)</td>
<td>(55.1)</td>
<td>(115.4)</td>
<td>(281.0)</td>
</tr>
</tbody>
</table>

**Port Size**

<table>
<thead>
<tr>
<th>Port Size</th>
<th>9/16-18 UNF</th>
<th>9/16-18 UNF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Weight (Vane Pump + Gear Pump)</td>
<td>70.0 lb (31.7 kg)</td>
<td>70.2 lb (31.8 kg)</td>
</tr>
</tbody>
</table>

---

**Dimensions (inches, millimeters)**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centerline pump control</td>
<td>3.35 (85.0)</td>
<td>3.53 (89.7)</td>
<td>4.00 (101.6)</td>
<td>3.25 (82.6)</td>
</tr>
<tr>
<td>Outlet port, #16 S.A.E.</td>
<td>7.06 (179.4)</td>
<td>7.35 (186.8)</td>
<td>6.62 (168.4)</td>
<td>5.71 (145.0)</td>
</tr>
<tr>
<td>Inlet port, #4 S.A.E.</td>
<td>0.618 (15.7)</td>
<td>1.65 (41.9)</td>
<td>1.57 (40.0)</td>
<td>6.32 (160.2)</td>
</tr>
<tr>
<td>Remote control port, #4 S.A.E.</td>
<td>0.618 (15.7)</td>
<td>1.65 (41.9)</td>
<td>1.57 (40.0)</td>
<td>6.32 (160.2)</td>
</tr>
<tr>
<td>Centerline pump control mounting datum &quot;T&quot;</td>
<td>5.44 (138.2)</td>
<td>11.82 (300.2)</td>
<td>9.90 (251.5)</td>
<td></td>
</tr>
<tr>
<td>Compensator adjusting knob (CW rotation increases pressure setting)</td>
<td>3.87 (98.2)</td>
<td>0.87 (22.2)</td>
<td>5.75 (146.0)</td>
<td>4.46 (113.0)</td>
</tr>
<tr>
<td>S.A.E. &quot;B&quot; mounting flange</td>
<td>5.26 (133.7)</td>
<td>3.6 (92.5)</td>
<td>45.1 (114.5)</td>
<td>14.4 (36.5)</td>
</tr>
<tr>
<td>Key &amp; Shaft Detail</td>
<td>0.87 (22.2)</td>
<td>98 (25.0)</td>
<td>4.88 (123.9)</td>
<td>0.68 (17.3)</td>
</tr>
</tbody>
</table>

---

**Optional vertical supports for combination pumps when rotated 90°**

- ø12.0 thru support holes
- Support (Lift) point 3/8'-16UNC-2B X 15 deep

---

**Optional 2-stage compensator (now in modular design)**
VPV 45/63/80 to VPV 16, S.A.E. & Metric Combination

Support point
"SAE" 3/8-16UNC-2B THD  x 59 deep
"METRIC" M10 X 1.5-6H THD  (15.0)

Case drain port
"SAE" #8 S.A.E.
"METRIC" 3/8-19 BSPP

Inlet port
"SAE" #16 S.A.E.
"METRIC" 1-11 BSPP

Inlet port
SAE #16 S.A.E.
METRIC 1-11 BSPP

Case drain port
SAE #8 S.A.E.
METRIC 3/8-19 BSPP

Single stage compensator
NOT AVAILABLE ON VPV 45-164

Inches (millimeters)

SAE/METRIC SAE/METRIC

SAE "C" 2-bolt mounting flange per ISO 3019/1

METRIC 4-bolt mounting flange per ISO 3019/2

Inlet port std. SAE 2" pad
SAE #2 0.47 (12.0)
METRIC M10 X 1.5-6H THD

Case drain port
SAE #8 S.A.E.
METRIC 3/8-19 BSPP

Support point
"SAE" 3/8-16UNC-2B THD  x 59 deep
"METRIC" M10 X 1.5-6H THD  (15.0)

Optional eye bolt
SAE "C" 2-bolt mounting flange per ISO 3019/1

METRIC 4-bolt mounting flange per ISO 3019/2

Compensator adjusting knob (CW rotation increases pressure setting)
Optional volume control (CW rotation reduces flow)

Outlet port
Std. SAE 1-1/4" pad
ø1.25 (ø31.8)

Outlet port
SAE #12 SAE
"METRIC" 1-1/4 BSPP

Suport point
"SAE" 3/8" - 16 UNC - 2B TH'D X .59
(15.0) deep

"METRIC" M10 X 1.5-6H TH'D X .44
(11.2) deep

Suport (Lift) point
"SAE & METRIC" M10 X 1.5 - 6H TH'D

Optional VPV25/32 single stage compensator with locking device

VIEW A-A
(SH.1 @ N-4)

VIEW B-B
(SH.1 @ N-2)

Detail SAE1

Detail METRIC1

See detail "SAE1/METRIC1"

"SAE" 7/16-14UNC-2B TH'D X 1.14 deep typ
"METRIC" M12 X 1.75-6H TH'D (29.0) 4 holes

Shock clipper drain
"SAE" #6 SAE
"ISO" 3/8-19 BSPP

Inches (millimeters)
VPV 45/63/80 to VPV 16 (continued)

Inlet

Remote control

Optional 2-stage compensator

Centerline pump control

2-stage compensator adjusting knob (CW rotation increases pressure setting)

#6 S.A.E. Shock Clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

Inches (millimeters)
VPV 45/63/80 to VPV 25/32, S.A.E. & Metric Combination

Inches (millimeters)

SAE/METRIC  SAE/METRIC  SAE/METRIC

Compensator adjusting knob (CW rotation increases pressure setting)

Support point
"SAE" 3/8"-16 UNC-2B TH'D
"METRIC" M10 X 1.5-6H TH'D X .87 deep

Case drain port
"SAE" #8 S.A.E.
"METRIC" 3/8-19 BSPP

Inlet port
"SAE" #24 S.A.E.
"METRIC" 1 1/2-11 BSPP

SAE "1/2"-13 UNC-2B TH'D
"METRIC" M12 X 1.75-6H TH'D X .114 deep typ
4 holes

Case drain port
"SAE" #8 S.A.E.
"METRIC" 3/8-19 BSPP

"SAE" #6 S.A.E.

Optional eye bolt

METRIC 4-bolt mounting flange per ISO 3019/2

45° typ

SAE "C" 2-bolt mounting flange per ISO 3019/1

Optional eye bolt

DETAIL SAE-SAE

DETAIL METRIC-METRIC

---

SINGLE STAGE CONTROL
NOT AVAILABLE ON VPV 45-164

---

0.31 (7.98) square key

1.39 (35.23)

0.125 (3.174)

1.37 (34.91)

0.39 X 0.31 (10.0 X 8.0) rectangular key

---

0.69 (17.6)

5.61 (150.0)

5.96 (151.4)

6.30 (160.0)

9.31 (236.5)

---

Inlet port
std. SAE 2" pad
Ø2.00 (Ø50.8)

---

Support point
"SAE" 3/8"-16 UNC-2B TH'D
"METRIC" M10 X 1.5-6H TH'D X .87 deep

---

Support point
"SAE" 3/8"-16 UNC-2B TH'D
"METRIC" M10 X 1.5-6H TH'D X .87 deep
VPV 45/63/80 to VPV 25/32 (continued)

Optional volume control (CW rotation reduces flow)

Outlet port
Std. SAE 1-1/4” pad
Ø1.25 (31.8)

6.89 (174.9) max.

2.04 (51.7)

2.31 (58.72)

1.16 (29.36)

59 (15.09) (30.18)

14.41 (366.2)

10.82 (274.9)

5.36 (136.2) max.

5.26 (133.7) max.

Outlet port
"SAE" #16 S.A.E.
"METRIC" 1-11 B.S.P.

Support point
"SAE" 3/8”-16 UNC-2B TH’D x .87 (22.0) deep
"METRIC" M10 X 1.5-6H TH’D x .44 (11.2) deep

Support (Lift) point
"SAE & METRIC" M10 X 1.5-6H TH’D x .44 (11.2) deep

Optional VPV25/32 single stage compensator with locking device

VIEW A-A

(5H.1 @ N-4)

VIEW B-B

(5H.1 @ H-2)

"SAE" 7/16-14 UNC-2B TH’D x .114 (29.0) deep typ
"METRIC" M12 X 1.75-6H TH’D x 1.14 deep typ
4 holes

Inches (millimeters)

See detail “SAE1/METRIC1”

Detail SAE1

Detail METRIC1

Optional VPV25/32 single stage compensator with locking device

"SAE" #6 S.A.E.
"METRIC" 3/8-19 B.S.P.

Support point
"SAE" 3/8”-16 UNC-2B TH’D x .87 (22.0) deep
"METRIC" M10 X 1.5-6H TH’D x .44 (11.2) deep
VPV 45/63/80 to VPV 25/32 (continued)

VIEW A - A

Centerline pump control

2-stage compensator adjusting knob (CW rotation increases pressure setting)

#6 S.A.E. Shock Clipper port. Should be plumbed to tank to activate shock clipper function (See page 97).

Optional 2-stage compensator

Remote control

Inlet

2-stage compensator

Inches (millimeters)
VPV 45/63/80 to an ‘F’ Gear pump, S.A.E. & Metric Combination

**SAE/METRIC**

- **Compensator adjusting knob** (CW rotation increases pressure setting)
- **Ventricle**
- **Remote control port**
- **Case drain port**
- **Suction inlet port**
- **Support point**
- **Compensator adjusting knob** (CW rotation increases pressure setting)

**SAE/METRIC**

- **2 stage compensator**
- **Remote control port**
- **Compensator adjusting knob** (CW rotation increases pressure setting)

**IN**

- **ø6.30**
- **10.13**
- **ø1.26**

**OUT**

- **ø9.31**
- **7.13**
- **ø5.91**

**Inches (millimeters)**

- **Support point**
- **SAE** 1/2-13UNC-2B TH'D
- **METRIC** M12 X 1.75-6H TH'D

**SAE** 1/2-13UNC-2B TH'D

**METRIC** M12 X 1.75-6H TH'D

**SAE** 3/8-19 BSPP

**METRIC** M10 X 1.5 TH'D

**SAE** 1/2-13 UNC-2B TH'D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 2-bolt mounting flange per ISO 3019/1

**METRIC** 4-bolt mounting flange per ISO 3019/2

**SAE** 1/4-19 BSPP, 0.48/(12.2) deep

**METRIC** M12 X 1.75-6H TH’D

**SAE** 3/8"-16UNC-2B TH’D

**METRIC** M10 X 1.5 TH’D

**SAE** 3/8-19 BSPP

**METRIC** M10 X 1.5 TH’D

**SAE** 3/8-19 BSPP

**METRIC** M10 X 1.5 TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D

**SAE** 1/2-13 UNC-2B TH’D

**METRIC** M12 X 1.75-6H TH’D
VPV 45/63/80 to an ‘F’ Gear pump (continued)

Optional volume control (CW rotation reduces flow)

Support point

"SAE" 3/8"-16UNC-2B TH'D x 0.59 (15.0) deep

"METRIC" M10 x 1.5 TH'D

Support (Lift) point

"SAE & METRIC" M10 x 1.5-6H TH'D x 0.44 (11.2) deep

Pressure outlet port

std. S.A.E. 1-1/4" pad Ø 1.25 (Ø 31.8)

SAE "F" gear pump

Inches (millimeters)

1/8" Ø 0.125 (3.18)

2.95 (75.0)

3.73 (94.7)

3.57 (90.6)

Support point

"SAE 7/16-14UNC-2B TH’D X 1.14 (29.0) deep typ"

4 holes

"METRIC" M12 X 1.75-6H TH’D

See detail "SAE1/METRIC1"

VIEW B-B

(SH.1 @ H-2)

Pump centerline

VIEW A-A

(SH.1 @ N-4)

<table>
<thead>
<tr>
<th>Gear pump</th>
<th>Theoretical Displacement</th>
<th>Dimension</th>
<th>Gear Pump Port Sizes</th>
<th>Total Weight (lbs. KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>in³/rev</td>
<td>in. (mm)</td>
<td>in. (mm)</td>
<td>in. (mm)</td>
<td>in. (mm)</td>
</tr>
<tr>
<td>0.24 (4)</td>
<td>1.571 (39.9)</td>
<td>3.346 (85.0)</td>
<td>13.30 (337.8)</td>
<td>15.08 (383.2)</td>
</tr>
<tr>
<td>0.34 (6.5)</td>
<td>1.618 (41.1)</td>
<td>3.445 (87.5)</td>
<td>13.35 (339.1)</td>
<td>15.19 (386.7)</td>
</tr>
<tr>
<td>0.49 (8)</td>
<td>1.697 (43.2)</td>
<td>3.606 (91.6)</td>
<td>13.43 (341.1)</td>
<td>15.34 (389.7)</td>
</tr>
<tr>
<td>0.67 (11)</td>
<td>1.850 (47.0)</td>
<td>3.803 (96.6)</td>
<td>13.58 (344.6)</td>
<td>15.49 (390.4)</td>
</tr>
<tr>
<td>0.85 (14)</td>
<td>1.870 (47.5)</td>
<td>4.0 (101.6)</td>
<td>13.60 (345.4)</td>
<td>15.69 (398.5)</td>
</tr>
<tr>
<td>0.98 (16)</td>
<td>1.870 (47.6)</td>
<td>4.134 (105.0)</td>
<td>13.6 (345.6)</td>
<td>15.86 (398.0)</td>
</tr>
<tr>
<td>1.16 (19)</td>
<td>1.870 (47.5)</td>
<td>4.330 (110.0)</td>
<td>13.6 (345.5)</td>
<td>16.06 (408.0)</td>
</tr>
<tr>
<td>1.37 (22.5)</td>
<td>2.169 (55.1)</td>
<td>4.543 (115.4)</td>
<td>13.90 (353.12)</td>
<td>16.27 (413.4)</td>
</tr>
</tbody>
</table>
VPV 45/63/80 to an ‘F’ Gear pump (continued)

Outlet port / inlet port opposite sides

Compensator adjusting knob
(CW rotation increases pressure setting)

0.39 x 0.31 rectangular key

METRIC 4-bolt mounting flange
per ISO 3019/2

Inches (millimeters)
VPV 45/63/80 to an ‘G’ Gear pump, S.A.E. & Metric Combination

**DETAIL SAE-SAE**

- Inlet: 2.062 (52.3)
- Outlet: 1.875 (47.6)

**DETAIL METRIC-METRIC**

- Inlet: 1.031 (26.2)
- Outlet: 0.875 (22.2)

**SAE/ METRIC**

- Case drain port: “METRIC” 3/8-19 BSPP
- “SAE” #8 S.A.E.

**SAE/ METRIC**

- Compensator adjusting knob (CW rotation increases pressure setting)
- Remote control port 7/16 - 20 UNF, 0.45/(11.4) deep

**SAE “C” 2-bolt mounting flange per ISO 3019/1**

**METRIC 4-bolt mounting flange per ISO 3019/2**

**Standard 2 stage compensator**

**Optional 2 stage compensator**

**Optional eye bolt**

**4 holes**

**SAE/METRIC SAE/METRIC**

- Compensator adjusting knob (CW rotation increases pressure setting)
- Remote control port 7/16 - 20 UNF, 0.45/(11.4) deep

**SAE “C” 2-bolt mounting flange per ISO 3019/1**

**METRIC 4-bolt mounting flange per ISO 3019/2**

**Optional eye bolt**

**4 holes**

**SAE/METRIC SAE/METRIC**

- Compensator adjusting knob (CW rotation increases pressure setting)
- Remote control port 7/16 - 20 UNF, 0.45/(11.4) deep

**SAE “C” 2-bolt mounting flange per ISO 3019/1**

**METRIC 4-bolt mounting flange per ISO 3019/2**

**Optional eye bolt**

**4 holes**

**SAE/METRIC SAE/METRIC**

- Compensator adjusting knob (CW rotation increases pressure setting)
- Remote control port 7/16 - 20 UNF, 0.45/(11.4) deep

**SAE “C” 2-bolt mounting flange per ISO 3019/1**

**METRIC 4-bolt mounting flange per ISO 3019/2**

**Optional eye bolt**

**4 holes**

**SAE/METRIC SAE/METRIC**

- Compensator adjusting knob (CW rotation increases pressure setting)
- Remote control port 7/16 - 20 UNF, 0.45/(11.4) deep

**SAE “C” 2-bolt mounting flange per ISO 3019/1**

**METRIC 4-bolt mounting flange per ISO 3019/2**

**Optional eye bolt**

**4 holes**

**SAE/METRIC SAE/METRIC**

- Compensator adjusting knob (CW rotation increases pressure setting)
- Remote control port 7/16 - 20 UNF, 0.45/(11.4) deep

**SAE “C” 2-bolt mounting flange per ISO 3019/1**

**METRIC 4-bolt mounting flange per ISO 3019/2**

**Optional eye bolt**

**4 holes**
VPV 45/63/80 to an ‘G’ Gear pump (continued)

SAE "G" gear pump

Pressure outlet port std. S.A.E. 1-1/4" pad ø1.25 (ø31.8)

Optional volume control (C/W rotation reduces flow)

Support (Lift) point "SAE & METRIC" M10 x 1.5-6H TH'D x 0.44 (11.2) deep

VIEW B-B
(SH.1 @ H-2)

S.A.E "G" gear pump

VIEW A-A
(SH.1 @ N-4)

Support (Lift) point "SAE & METRIC" M10 x 1.5-6H TH'D x 0.44 (11.2) deep

DETAIL METRIC1

DETIAL SAE1

Gear pump Theoretical Displacement

<table>
<thead>
<tr>
<th>in³/rev (cc/rev)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Inlet</th>
<th>Outlet</th>
<th>lbs. (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.37 (22.5)</td>
<td>2.40 (61.0)</td>
<td>5.07 (128.5)</td>
<td>14.6 (370.8)</td>
<td>17.26 (438.6)</td>
<td>4 bolt</td>
<td>4 bolt</td>
<td>271.4 (123.1)</td>
</tr>
<tr>
<td>1.71 (28)</td>
<td>2.48 (63.0)</td>
<td>5.26 (133.7)</td>
<td>14.68 (372.6)</td>
<td>17.45 (443.0)</td>
<td>4 bolt</td>
<td>4 bolt</td>
<td>271.8 (123.3)</td>
</tr>
<tr>
<td>1.95 (32)</td>
<td>2.54 (64.5)</td>
<td>5.40 (137.2)</td>
<td>14.74 (374.4)</td>
<td>17.59 (446.8)</td>
<td>4 bolt</td>
<td>4 bolt</td>
<td>272.3 (123.5)</td>
</tr>
<tr>
<td>2.32 (38)</td>
<td>2.62 (66.5)</td>
<td>5.62 (142.6)</td>
<td>14.82 (376.6)</td>
<td>17.81 (453.2)</td>
<td>4 bolt</td>
<td>4 bolt</td>
<td>272.6 (123.6)</td>
</tr>
<tr>
<td>2.75 (45)</td>
<td>2.74 (69.5)</td>
<td>5.87 (149.2)</td>
<td>14.94 (379.4)</td>
<td>18.06 (458.7)</td>
<td>4 bolt</td>
<td>4 bolt</td>
<td>273.1 (123.9)</td>
</tr>
<tr>
<td>3.42 (56)</td>
<td>2.95 (75.2)</td>
<td>6.31 (160.2)</td>
<td>15.16 (384.8)</td>
<td>18.5 (469.9)</td>
<td>4 bolt</td>
<td>4 bolt</td>
<td>274.1 (124.3)</td>
</tr>
</tbody>
</table>
VPV 45/63/80 to VPV 45/63/80, S.A.E. & Metric Combination

Optional 2 stage compensator

Case drain port
M*etric*+3/8 BSPP typ
"SAE" #8 S.A.E. typ

Inlet port
SAE 2" pad
e2.00 (e50.8) typ

SAE 1/2"-13UNC-2B TH'D X 1.14 (29.0) deep typ
4 holes

Inlet port
"SAE" 1/2"-13UNC-2B TH'D X 1.14 (29.0) deep typ

Inlet port
"METRIC" M12 x 1.75-6H TH'D (33.0)

Case drain port
"METRIC" M10 x 2.5 TH'D (26.0)

A
B

Compensator adjusting knob (CW rotation increases pressure setting)

Remote control port
7/16 - 20 UNF, 0.45/ (11.4) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Support (Lift) point
"SAE" 5/8"-11UNC-2B TH'D X 1.30 (33.0) deep
"METRIC" M16 X 2-6H TH'D (33.0)

Optional eye bolt
Compensator adjusting knob
(CW rotation increases pressure setting)

SAE - METRIC

SAE - METRIC

SAE - METRIC

METRIC 4-bolt mounting flange per ISO 3019/2

Inches (millimeters)
VPV 45/63/80 to VPV 45/63/80 (continued)

Support (Lift) point
"SAE & METRIC" M10 X 1.5-6H THD X .44 deep typ

Outlet port
Std. SAE 1-1/4" pad ø1.25 (ø31.8) typ

Optional volume control
(CW rotation reduces flow)

Support point
"SAE" 5/8"-11 UNC-2b THD X 1.30 deep typ
"METRIC" M16 x 2-6H THD (33.0)

"SAE" 7/16"-14 UNC-2B THD
"METRIC" M12 X 1.75-6H THD X 1.14 (28.0) deep typ
4 holes

See detail "SAE1/METRIC1"
6.89 (174.9) max

Inches (millimeters)
VPV 45/63/80 to VPV 45/63/80 (continued)

Inches (millimeters)

Optional 2 pressure solenoid operated vent compensator

Optional 2 pressure solenoid operated compensator

Compensator adjusting knob (CW rotation increases pressure setting)

2 stage compensator

Remote control port 7/16 - 20 UNF, 0.45/ (11.4) deep

Remote control port 1/4 - 19 UNF, 0.48/ (12.2) deep

Optional eye bolt

Optional 2 stage with load compensator

Load sense port "SAE" #4 SAE "METRIC" 1/4-19 BSPP

Details:
- Optional 2 pressure solenoid operated vent compensator
- Optional 2 pressure solenoid operated compensator
- Compensator adjusting knob (CW rotation increases pressure setting)
- 2 stage compensator
- Remote control port 7/16 - 20 UNF, 0.45/ (11.4) deep
- Remote control port 1/4 - 19 UNF, 0.48/ (12.2) deep
- Optional eye bolt

Dimensions:
- Ø1.25 (Ø31.74)
- 0.31 square key (7.98)
- 0.39 X 0.31 rectangular key (10.0 X 8.0)
- Ø1.26 (Ø32.0)
- 1.39 (35.23)
- 0.31 square key

SAE - SAE

Metric - Metric
VPV 45/63/80 to VPV 45/63/80 (continued)
VPV 100/130/164 to VPV 100/130/164, S.A.E. & Metric Combination

Optional 2 stage with load sense compensator

Load sense port
S.A.E. "# 4 SAE
Metric " 1/4-19 BSPP

Remote control port
7/16 - 20 UNF, 0.45/ (11.4) deep

Compensator adjusting knob
(CW rotation increases pressure setting)

Compensator adjusting knob
(CW rotation increases pressure setting)

2 stage compensator

2 stage compensator

Remote control port
1/19-20 BSPP, 0.48/ (12.2) deep

1.57 (ø40.0)

ø7.87 (ø200.0)

12.80 (325.0)

METRIC 4-bolt mounting flange per ISO 3019/2

S.A.E. "D" 2-bolt mounting flange per ISO 3019/1

DETAIL METRIC-METRIC

DETAIL SAE-SAE

Optional 2 pressure solenoid operated vent compensator

Optional 2 pressure solenoid operated compensator

Manual override pushpin

DIN 43650 connector
W/ 1/2" NPT compression fitting and sentinel light
(Optional)
VPV 100/130/164 to VPV 100/130/164 (continued)

Optional 2 pressure solenoid operated (and vent) compensator

Remote control port

Case drain

Compensator adjusting knob (C.W. rotation increases pressure setting)

Inlet port

SAE/METRIC SAE/METRIC

SAE" #8 S.A.E., "METRIC" 3/8-19 BSPP

Inlet port

Std. S.A.E. 2 1/2" pad ø2.47, typ

"SAE" 1/2-13UNC-2B TH'D, "METRIC" M12 X 1.75-6H TH'D (28.0) deep
VPV 100/130/164 to VPV 16 S.A.E. & Metric Combination

Inches (millimeters)

**SAE**

- Inlet port
  - "SAE" #16 S.A.E.
  - "METRIC" 1-11 BSPP

- Case drain
  - "SAE" #8 S.A.E.
  - "METRIC" 3/8-19 BSPP

- Support point
  - "SAE" 3/8-16UNC-2B THD X 1.59 deep
  - "METRIC" M10 X 1.5 THD X (15.0)

**METRIC**

- Inlet port
  - Std. S.A.E. 2 1/2" pad
  - ø2.47 typ (ø62.7)
  - "SAE" 1/2-13UNC-2B TH
  - "METRIC" M12 X 1.75-6H TH'D X 1.10 deep

**Compensator adjusting knob**

(CW rotation increases pressure setting)

- ø0.69 thru support hole (ø17.5)

**Inlet port**

- S.A.E. "D" 2-bolt mounting flange per ISO 3019/1

- Case drain
  - S.A.E "D" 2-bolt mounting flange per ISO 3019/1

**Support point**

- "SAE" 3/8-16UNC-2B THD X 1.59 deep
  - "METRIC" M10 X 1.5 THD X (15.0)

- ø1.75 (ø44.42)

**METRIC**

- Inlet port
  - Std. S.A.E. 2 1/2" pad
  - ø2.47 typ (ø62.7)
  - "SAE" 1/2-13UNC-2B TH
  - "METRIC" M12 X 1.75-6H TH'D X 1.10 deep

**Case drain**

- "SAE" #8 S.A.E.
  - "METRIC" 3/8-19 BSPP

**Support point**

- "SAE" 3/8-16UNC-2B THD X 1.59 deep
  - "METRIC" M10 X 1.5 THD X (15.0)

**Compensator adjusting knob**

(CW rotation increases pressure setting)

- ø0.69 thru support hole (ø17.5)

**Inlet port**

- S.A.E. "D" 2-bolt mounting flange per ISO 3019/1

- Case drain
  - S.A.E "D" 2-bolt mounting flange per ISO 3019/1

**Support point**

- "SAE" 3/8-16UNC-2B THD X 1.59 deep
  - "METRIC" M10 X 1.5 THD X (15.0)

- ø1.75 (ø44.42)

**METRIC**

- Inlet port
  - Std. S.A.E. 2 1/2" pad
  - ø2.47 typ (ø62.7)
  - "SAE" 1/2-13UNC-2B TH
  - "METRIC" M12 X 1.75-6H TH'D X 1.10 deep

**Case drain**

- "SAE" #8 S.A.E.
  - "METRIC" 3/8-19 BSPP

**Support point**

- "SAE" 3/8-16UNC-2B THD X 1.59 deep
  - "METRIC" M10 X 1.5 THD X (15.0)

- ø1.75 (ø44.42)
VPV 100/130/164 to VPV 16 (continued)

Optional volume control (CW rotation reduces flow)

Outlet port
"SAE" #12 SAE
"METRIC" 1/2-14 BSPP

Support (Lift) point
"SAE" 3/8"-16 UNC-2B TH'D X .59 deep
"METRIC" M10 x 1.5-6H TH'D X .59 deep

Optional VPV25/32
single stage compensator with locking device

Control drain
"SAE" #6 S.A.E.
"METRIC" 3/8-19 BSPP

Inches (millimeters)
VPV 100/130/164 to VPV 16 (continued)

2 stage compensator adjusting knob (CW rotation increases pressure setting)

Centerline pump control

Inlet port

Remote control

Optional 2-stage compensator

Inches (millimeters)
VPV 100/130/164 to VPV 25/32 S.A.E. & Metric Combination

IN

OUT

ø6.9 thru support hole (ø17.5)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Inlet port

Std. S.A.E. 2 1/2" pad

ø2.47 (ø62.7)

Inlet port

"SAE" #24 S.A.E.

"METRIC" 1 1/2-11 BSPP

Case drain port

"SAE" #8 S.A.E.

"METRIC" 3/8-19 BSPP

Support (LH) point

"SAE" 3/8-16UNC-2B THD X (0.22) deep

"METRIC" M10 X 1.5-6H THD X (22.0) deep

Compensator adjusting knob (CW rotation increases pressure setting)
VPV 100/130/164 to VPV 25/32 (continued)

Optional volume control (CW rotation reduces flow)

Outlet port
- "SAE" #16 SAE
- "METRIC" 1-11 BSPP

Support point
- "SAE" 3/8"-16 UNC-2B TH'D X \( \frac{87}{22.0} \) deep
- "METRIC" M10 x 1.5-6H TH'D X \( \frac{43}{11.0} \) deep

Support (Lift) point
- "SAE & METRIC" M10 x 1.5-6H TH'D X \( \frac{43}{11.0} \) deep

Outlet port
Std. S.A.E. 1-1/2" pad
- \( \phi 1.46 \) (37.1)

Support point
- "SAE & METRIC" M10 x 1.5-6H TH'D X \( \frac{43}{11.0} \) deep

Optional VPV25/32 single stage compensator with locking device

Control drain
- "SAE" #6 S.A.E.
- "METRIC" 3/8-19 BSPP

See detail "SAE1/METRIC1"

Optional volume control

Outlet port
Std. S.A.E. 1-1/2" pad
- \( \phi 1.46 \) (37.1)

Support point
- "SAE" #6 S.A.E.
- "METRIC" 3/8-19 BSPP

Optional VPV25/32 single stage compensator with locking device
VPV 100/130/164 to VPV 25/32 (continued)

- Inlet port
- Remote control
- Optional 2-stage compensator
- 2 stage compensator adjusting knob (CW rotation increases pressure setting)
- Centerline pump control
- Shock clipper drain

**View A-A**

- Dimensions in inches and millimeters.
Optional volume control (CW rotation reduces flow)
VPV 100/130/164 to VPV 45/63/80 (continued)
VPV 100/130/164 to an ‘F’ Gear pump, S.A.E. & Metric Combination

**Inches (millimeters)**

- **Case drain**: 
  - SAE: #8 S.A.E.
  - METRIC: 3/8-19 BSPP
  - Diameter: 0.96 (24.4 mm)

- **Inlet port - Std. S.A.E. 2 1/2'' pad**: 
  - Ø2.47 (Ø62.7 mm)
  - Diameter: 3.93 (111.6 mm)

- **Remote control port**: 
  - 1/4 – 19 BSPP TH'D 0.48 (12.2 mm) deep

- **Compensator adjusting knob (CW rotation increases pressure setting)**: 
  - Ø1.57 (Ø40.0 mm)
  - Diameter: 0.78 (19.4 mm)

**Optional 2 stage compensator**

- **SAE/METRIC 2 stage compensator**: 
  - SAE: 3/8-16 UNC-2B TH'D X 0.59 (15.0 mm) deep
  - METRIC: M10 x 1.5-6H TH'D X 1.50 (38.0 mm) deep

**SAE/METRIC SAE/METRIC**

- **Remote control port**: 
  - 7/16-20 UNF TH'D 0.45 (11.4 mm) deep

- **Compensator adjusting knob**: 
  - Diameter: 0.44 (11.1 mm)
  - Diameter: 0.73 (18.0 mm)

- **Outlet port - opposite side**: 
  - Diameter: 0.78 (19.4 mm)

- **Remote control port**: 
  - Diameter: 0.81 (20.7 mm)

**Standard 2 stage compensator**

- **SAE**
  - Thread: M12 X 1.75-6H TH
  - Diameter: 3.93 (111.6 mm)

- **METRIC**
  - Thread: M10 X 1.5-6H TH
  - Diameter: 1.91 (48.6 mm)

**SAE**

- **Thread**: 1/2-13 UNC-2B TH
  - Diameter: 1.94 (49.3 mm)

- **METRIC**
  - Thread: M10 X 1.5-6H TH
  - Diameter: 1.91 (48.6 mm)
VPV 100/130/164 to an ‘F’ Gear pump (continued)

Optional volume control
(CW rotation reduces flow)

SAE "F" gear pump

Support point
"SAE" 3/8"-16UNC-2B TH'D x 0.59"
"METRIC" M10 X 1.5 TH'D x 15.0"

Support (Lift point)
"SAE & METRIC"
M10 X 1.5-6H TH'D x 43"

Outlet port
Std. S.A.E. 1-1/2" pad
ø1.46
(p37.1)

"SAE" 1/2"-13UNC-2B TH'D
X 0.59"
"METRIC" M12 X 1.75-6H TH'
(max)

I nches (m illimeters)

View B-B
(SH.1 @ G-1)

View A-A
(SH.1 @ P-1)

<table>
<thead>
<tr>
<th>Gear pump Theoretical Displacement</th>
<th>Dimension</th>
<th>Gear Pump Port Sizes</th>
<th>Total Weight (Vane Pump &amp; Gear Pump)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (in3/rev)</td>
<td>B (in.)</td>
<td>C (in.)</td>
<td>D (in.)</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>0.24 (4)</td>
<td>1.571 (39.9)</td>
<td>3.284 (85.0)</td>
<td>15.66 (397.6)</td>
</tr>
<tr>
<td>0.34 (6)</td>
<td>1.618 (41.1)</td>
<td>3.345 (87.5)</td>
<td>15.71 (399.0)</td>
</tr>
<tr>
<td>0.49 (8)</td>
<td>1.697 (43.2)</td>
<td>3.306 (89.1)</td>
<td>15.79 (401.0)</td>
</tr>
<tr>
<td>0.67 (11)</td>
<td>1.850 (47.0)</td>
<td>3.803 (96.8)</td>
<td>15.84 (404.9)</td>
</tr>
<tr>
<td>0.85 (14)</td>
<td>1.870 (47.5)</td>
<td>4.0 (101.6)</td>
<td>15.96 (405.4)</td>
</tr>
<tr>
<td>0.98 (16)</td>
<td>1.870 (47.5)</td>
<td>4.134 (105.0)</td>
<td>15.94 (404.8)</td>
</tr>
<tr>
<td>1.16 (19)</td>
<td>1.870 (47.5)</td>
<td>4.330 (110.0)</td>
<td>15.96 (405.5)</td>
</tr>
<tr>
<td>1.37 (22.5)</td>
<td>2.169 (55.1)</td>
<td>4.543 (116.4)</td>
<td>16.26 (413.0)</td>
</tr>
</tbody>
</table>
VPV100/130/164 to an ‘F’ Gear pump (continued)

Inches (millimeters)

Remote control port
1/4"-19 BSPP TH'D 0.48/(12.2) deep

Compensator adjusting knob (CW rotation increases pressure setting)

Compensator adjusting knob (CW rotation increases pressure setting)

Optional 2 stage compensator

Support point
SAE 3/8"-16 UNC-2B TH'D X (22.9) deep

Case drain
"SAE" #8 S.A.E. "METRIC" M12 X 1.75-6H TH'D X (28.0) deep

Inlet port
Std. S.A.E. 2 1/2" pad ø2.47 (ø62.7)

Outlet port, S.A.E.
4 bolt pad

Inlet: 2.062
(52.3)

Outlet: 1.875
(47.6)

3/8-16 UNC-2B TH'D X (22.9) deep

4 bolt pad

Inlet, 1 S.A.E.
opposite side

Inlet: 1.031
(26.2)

Outlet: 0.875
(22.2)

50 THD depth, inlet and outlet

ø0.69 thru support hole (ø175)

SAE/METRIC

SAE/METRIC

Remote control port
1/4"-19 BSPP TH'D 0.45/(11.4) deep

Remote control port
1/4"-19 BSPP TH'D 0.48/(12.2) deep

Compensator adjusting knob
(CW rotation increases pressure setting)

Optional 2 stage compensator

Support point
SAE 3/8"-16 UNC-2B TH'D X (22.9) deep

Case drain
"SAE" #8 S.A.E. "METRIC" M12 X 1.75-6H TH'D X (28.0) deep

Inlet port
Std. S.A.E. 2 1/2" pad ø2.47 (ø62.7)

Outlet port, S.A.E.
4 bolt pad

Inlet: 1.031
(26.2)

Outlet: 0.875
(22.2)

50 THD depth, inlet and outlet

ø0.69 thru support hole (ø175)

SAE/METRIC

SAE/METRIC

Optional 2 stage compensator

Support point
SAE 3/8"-16 UNC-2B TH'D X (22.9) deep

Case drain
"SAE" #8 S.A.E. "METRIC" M12 X 1.75-6H TH'D X (28.0) deep

Inlet port
Std. S.A.E. 2 1/2" pad ø2.47 (ø62.7)

Outlet port, S.A.E.
4 bolt pad

Inlet: 1.031
(26.2)

Outlet: 0.875
(22.2)
VPV 100/130/164 to an ‘F’ Gear pump (continued)

SAE "G" gear pump

Support point
"SAE" 3/8"-16 UNC-2B TH’D X .87 deep
"METRIC" M10 x 1.5-6H TH’D X .87 deep

Support (Lift) point
"SAE & METRIC"
M10 x 1.5-6H TH’D X .43 deep

Optional volume control
(CW rotation reduces flow)

Outlet port
Std. S.A.E. 1-1/2" pad
ø1.46 (ø37.1)

"SAE" 1/2"-13UNC-2B TH’D X 1.10 deep
"METRIC" M12 X 1.75-6H TH’D (28.0)

Support point
"SAE" 3/8"-16 UNC-2B TH’D X .87 deep
"METRIC" M10 x 1.5-6H TH’D X .87 deep

Inches (millimeters)

<table>
<thead>
<tr>
<th>Gear pump Theoretical Displacement</th>
<th>Dimension</th>
<th>Gear Pump Port Sizes</th>
<th>Total Weight (Vane Pump &amp; Gear Pump)</th>
</tr>
</thead>
<tbody>
<tr>
<td>in³/rev (cc/rev)</td>
<td>A (in)</td>
<td>B (mm)</td>
<td>C (in)</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------</td>
<td>----------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>1.37 (22.5)</td>
<td>2.40 (61.0)</td>
<td>5.07 (128.5)</td>
<td>17.0 (430.8)</td>
</tr>
<tr>
<td>1.71 (28)</td>
<td>2.48 (63.0)</td>
<td>5.28 (133.7)</td>
<td>17.04 (432.8)</td>
</tr>
<tr>
<td>1.96 (32)</td>
<td>2.54 (64.5)</td>
<td>6.40 (163.2)</td>
<td>17.10 (434.4)</td>
</tr>
<tr>
<td>2.32 (36)</td>
<td>2.62 (66.5)</td>
<td>5.62 (142.9)</td>
<td>17.18 (436.6)</td>
</tr>
<tr>
<td>2.76 (45)</td>
<td>2.74 (69.5)</td>
<td>6.87 (175.2)</td>
<td>17.30 (439.4)</td>
</tr>
<tr>
<td>3.42 (56)</td>
<td>2.95 (75.2)</td>
<td>6.31 (160.0)</td>
<td>17.51 (444.8)</td>
</tr>
</tbody>
</table>
VPV Controls

Schematics shown illustrate VPV 45–164 controls with shock clipper integrated and no exterior plumbing required. The case drain shows an integrated check valve not present in VPV 16, 25 and 32. All controls leave the factory pre-set at 500 PSI.

Single Stage Compensator

The single stage control for normal pressure compensation is a good choice where speed is important and remote capability is not required. This control available on VPV 16, 25 and 32.

Two Stage Compensator

The two stage pressure compensators are the platform for most VPV controls. A remote port is standard and may, or may not be enabled according to the circuit design. This is the smoothest of the standard pressure controls, and is the standard pressure compensator for VPV 45–164.

Load Sense Compensator

Load sense allows the user to maintain constant flow regardless of changes in load or in pump shaft rotational speed. The Whisper™ Pump load sense accomplishes this by using an external orifice and continually senses a pressure drop of 100 PSI across this orifice. The minimum ∆P is 100 PSI, however the pressure drop can be adjusted to meet circuit requirements. Consult factory.
VPV Controls (continued)

Two Pressure Compensator
Solenoid two-pressure compensators are available in normally open (normally low, energize to high) and normally closed (normally high, energize to low) versions. These two-pressure controls can greatly reduce horsepower demand and heat generation during periods of idle cycle time, or when the machine operating cycle does not require maximum pressure.

Solenoid Vent Compensator
Solenoid vented compensators are similar to the two-pressure controls, except that there is no adjustment possible. By venting the compensator the pump will go to minimum deadhead.
## Comparison of Sound Levels

<table>
<thead>
<tr>
<th>Source of Sound</th>
<th>Intensity (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold</td>
<td>0</td>
</tr>
<tr>
<td>Rustling leaves</td>
<td>10</td>
</tr>
<tr>
<td>Broadcast studio</td>
<td>20</td>
</tr>
<tr>
<td>Typical bedroom at night</td>
<td>30</td>
</tr>
<tr>
<td>Typical living room</td>
<td>40</td>
</tr>
<tr>
<td>Office, classroom</td>
<td>50</td>
</tr>
<tr>
<td>Normal conversation</td>
<td>60</td>
</tr>
<tr>
<td>Automobile interior</td>
<td>70</td>
</tr>
<tr>
<td>Urban street</td>
<td>80</td>
</tr>
<tr>
<td>Heavy truck (15 m)</td>
<td>90</td>
</tr>
<tr>
<td>Shout (1.5 m)</td>
<td>100</td>
</tr>
<tr>
<td>Construction site</td>
<td>110</td>
</tr>
<tr>
<td>Loud rock music</td>
<td>120</td>
</tr>
<tr>
<td>Jet airplane</td>
<td>150</td>
</tr>
<tr>
<td>Rocket engine</td>
<td>180</td>
</tr>
</tbody>
</table>
Trouble Shooting for VPV “Whisper Pumps™”

Some of the most common difficulties that could be experienced in the field are listed here with potential causes and their remedies.

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Potential Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive pump noise</td>
<td>1) Coupling misalignment</td>
<td>1) Align the pump and motor shaft to within .006 of an inch total indicator reading. The tighter the alignment, the quieter the pump will be.</td>
</tr>
<tr>
<td></td>
<td>2) The continuous pressure is significantly below 200 psi for 140 bar pumps, or 300 psi for 210 bar pumps.</td>
<td>2) The pumps have been sound tuned at rated pressure. Consult factory or raise minimum pressure 200 psi for single stage compensators in 2000 psi rated pumps, or 300 psi for 3000 psi rated pumps.</td>
</tr>
<tr>
<td></td>
<td>3) Fluid in the reservoir is low and the pump is sucking air.</td>
<td>3) Fill the reservoir so that the fluid level is well above the end of the suction line during all of the working cycle.</td>
</tr>
<tr>
<td></td>
<td>4) Restricted inlet.</td>
<td>4) If a suction strainer is used, check it for obstructions or dirt. We do not recommend the use of strainers as they tend to be a leading cause of cavitation which manifests as excessive noise. Check also for shop rags left in the reservoir.</td>
</tr>
<tr>
<td></td>
<td>5) Air leak in the suction line.</td>
<td>5) Tighten all fittings. If it still leaks, smear grease over the joints to locate the leak.</td>
</tr>
<tr>
<td></td>
<td>6) Suction line has too many elbows, or is too long.</td>
<td>6) The suction line should be as short and as straight as possible to reduce the resistance to flow.</td>
</tr>
<tr>
<td></td>
<td>7) Air in the fluid.</td>
<td>7) The return line should terminate below the fluid level to prevent splashing.</td>
</tr>
<tr>
<td></td>
<td>8) Suction line is too small.</td>
<td>8) Suction line should always be equal in size to the suction port. Never reduce it.</td>
</tr>
<tr>
<td></td>
<td>9) Vane does not move freely.</td>
<td>9) Contamination in the fluid or a burr in the vane slot can cause a vane to bind up. Proper filtration and/or deburring of the vane slots is required.</td>
</tr>
<tr>
<td></td>
<td>10) Vane is installed incorrectly.</td>
<td>10) In vane pumps built up to and including SV series 62 and VPV series 00 and A02, vanes must be mounted with the rounded edge toward the ring. In SV series 72 and VPV series B01 and later, the leading edge of the vanes must be oriented in the direction of rotation. The leading edge is identified as the low side of the vane taper.</td>
</tr>
<tr>
<td></td>
<td>11) A vane is missing.</td>
<td>11) Make sure all vane slots have a vane in them.</td>
</tr>
<tr>
<td></td>
<td>12) Port plates installed incorrectly.</td>
<td>12) Plates must be installed so that the arrows point in the same direction as the rotational arrows on the pump body. Port plates with ratio valves may not be installed in pump bodies prior to series 74, and VPV series B01. VPV series B01 requires the use of port plates with ratio valves for 45cc and larger pumps.</td>
</tr>
<tr>
<td>Pump will not prime</td>
<td>1) Shaft rotation in the wrong direction.</td>
<td>1) When installing a pump, always jog the electric motor to check for proper shaft rotation. Rotation should only be clockwise (right hand) for VPV pumps.</td>
</tr>
<tr>
<td></td>
<td>2) Air leak in the suction line.</td>
<td>2) Make sure all fittings are tight.</td>
</tr>
<tr>
<td></td>
<td>3) Pump is air bound.</td>
<td>3) Use an air bleed valve to void the pump and suction line of air.</td>
</tr>
<tr>
<td></td>
<td>4) Fluid level in the reservoir is too low.</td>
<td>4) Fill the reservoir so that the fluid level is well above the end of the suction line.</td>
</tr>
<tr>
<td></td>
<td>5) Stroke limiter is turned in too far.</td>
<td>5) Flow should not be reduced more than 50% of maximum. Turn CW to restrict flow, (see page 80).</td>
</tr>
<tr>
<td></td>
<td>6) Suction port dust plug left in place.</td>
<td>6) Remove plug.</td>
</tr>
<tr>
<td>Pump is unstable</td>
<td>1) Contamination in the compensator.</td>
<td>1) Thoroughly clean the control orifices and check filtration.</td>
</tr>
<tr>
<td></td>
<td>2) Pressure ring is not moving properly.</td>
<td>2) Control piston should be checked for freedom of movement.</td>
</tr>
<tr>
<td>Pump is too hot</td>
<td>1) Case drain line is installed too close to the pump inlet line.</td>
<td>1) The case drain and pump inlet should be separated by a baffle in the reservoir.</td>
</tr>
<tr>
<td></td>
<td>2) Reservoir is undersized. Rule of thumb is a minimum or 2 to 3 times pump output flow.</td>
<td>2) Add a cooler.</td>
</tr>
</tbody>
</table>
Adapter Kits for VPV Combinations Using “P1” Pumps

**ADAPTER KITS**

<table>
<thead>
<tr>
<th>REF</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>Coupling half, spline</td>
</tr>
<tr>
<td>33</td>
<td>Coupling disc</td>
</tr>
<tr>
<td>34</td>
<td>Retaining ring</td>
</tr>
<tr>
<td>35</td>
<td>Coupling half, combo</td>
</tr>
<tr>
<td>36</td>
<td>Set screw</td>
</tr>
<tr>
<td>37</td>
<td>Roll pin</td>
</tr>
<tr>
<td>38</td>
<td>Adapter</td>
</tr>
<tr>
<td>39</td>
<td>Washer</td>
</tr>
<tr>
<td>40</td>
<td>Hex head cap screw</td>
</tr>
<tr>
<td>41</td>
<td>Jam nut</td>
</tr>
<tr>
<td>42</td>
<td>Support</td>
</tr>
<tr>
<td>43</td>
<td>Soc. head cap screw</td>
</tr>
<tr>
<td>44</td>
<td>O-ring, ASA-043</td>
</tr>
<tr>
<td>45</td>
<td>O-ring</td>
</tr>
</tbody>
</table>

**LIST NUMBER**

- 9 511 230 520 VPV 16 to VPV 16 Metric
- 9 511 230 518 VPV 16 to VPV 16 SAE
- R978711779 VPV 16 to “F” Gear SAE Key
- 9 511 230 673 VPV 16 to “F” Gear SAE Spline
- 9 511 230 522 VPV 25/32 to VPV 25/32 Metric
- 9 511 230 523 VPV 25/32 to VPV 25/32 SAE
- 9 511 230 524 VPV 25/32 to VPV 16 Metric
- 9 511 230 525 VPV 25/32 to VPV 16 SAE
- R978711780 VPV 25/32 to “F” Gear SAE Key
- 9 511 230 674 VPV 25/32 to “F” Gear SAE Spline
- 9 511 230 531 VPV 45/63/80 to VPV 16 Metric
- 9 511 230 532 VPV 45/63/80 to VPV 16 SAE
- 9 511 230 529 VPV 45/63/80 to VPV 25/32 Metric
- 9 511 230 530 VPV 45/63/80 to VPV 25/32 SAE
- 9 511 230 527 VPV 45/63/80 to VPV 45/63/80 Metric
- 9 511 230 528 VPV 45/63/80 to VPV 45/63/80 SAE
- R978711781 VPV 45/63/80 to “F” Gear SAE Key
- 9 511 230 675 VPV 45/63/80 to “F” Gear SAE Spline
- R978711782 VPV 45/63/80 to “G” Gear SAE Key
- 9 511 230 541 VPV 100/130/164 to VPV 16 Metric
- 9 511 230 542 VPV 100/130/164 to VPV 16 SAE
- 9 511 230 539 VPV 100/130/164 to VPV 25/32 Metric
- 9 511 230 540 VPV 100/130/164 to VPV 25/32 SAE
- 9 511 230 537 VPV 100/130/164 to VPV 45/63/80 Metric
- 9 511 230 538 VPV 100/130/164 to VPV 45/63/80 SAE
- 9 511 230 535 VPV 100/130/164 to VPV 100/130/164 Metric
- 9 511 230 536 VPV 100/130/164 to VPV 100/130/164 SAE
- R978711804 VPV 100/130/164 to SAE “B” Spline
- R978711783 VPV 100/130/164 to “F” Gear SAE Key
- R978711808 VPV 100/130/164 to “G” Gear SAE Key

**Torque Note #1**

- Torque to 2000 lb/in (Torque to 225 Nm) “VPV 100/130/164”
- Torque to 1800 lb/in (Torque to 204 Nm) “VPV 45/63/80”
- Torque to 1050 lb/in (Torque to 119 Nm) “VPV 25/32”
- Torque to 780 lb/in (Torque to 88 Nm) “VPV 16” & Type ‘G’ gear pump
- Torque to 550 lb/in (Torque to 62 Nm) Type ‘F’ gear pump

**Torque Note #2**

- Torque to 2300 lb/in (Torque to 260 Nm) “VPV 100/130/164”
- Torque to 850 lb/in (Torque to 96 Nm) “VPV 45/63/80”
- Torque to 550 lb/in (Torque to 62 Nm) “VPV 25/32” & Type ‘G’ gear pump
- Torque to 400 lb/in (Torque to 46 Nm) “VPV 16” & Type ‘F’ gear pump

**Torque Note #3**

- Torque to 800 lb/in (Torque to 90 Nm) “VPV 100/130/164”
- Torque to 330 lb/in (Torque to 37 Nm) “VPV 45/63/80”
- Torque to 280 lb/in (Torque to 31.5 Nm) “VPV 25/32” & Type ‘G’ gear pump
- Torque to 200 lb/in (Torque to 22.5 Nm) Type ‘F’ gear pump
Through Drive Horsepower Limitations

The VPV pumps can be coupled with other VPV pumps, Bosch Rexroth gear pumps or other pumps with standard SAE or metric mounting patterns. (VPV pumps can be coupled without losing use of stroke limiter.) VPV combination pumps are rated to carry the load of an additional pump(s) equal to the maximum load the lead VPV pump can generate (see chart).

<table>
<thead>
<tr>
<th>Pump</th>
<th>Flow @ 1750 RPM (gpm)</th>
<th>Maximum Pressure (psig)</th>
<th>Pump #1 Input Horsepower</th>
<th>Maximum Input Power for other pumps</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPV 16</td>
<td>8.03</td>
<td>3000</td>
<td>17.6</td>
<td>17.6</td>
</tr>
<tr>
<td>VPV 25</td>
<td>12.6</td>
<td>3000</td>
<td>25.3</td>
<td>25.3</td>
</tr>
<tr>
<td>VPV 32</td>
<td>15.4</td>
<td>3000</td>
<td>30.7</td>
<td>30.7</td>
</tr>
<tr>
<td>VPV 45</td>
<td>21.8</td>
<td>3000</td>
<td>43.3</td>
<td>43.3</td>
</tr>
<tr>
<td>VPV 63</td>
<td>29.6</td>
<td>3000</td>
<td>58.5</td>
<td>58.5</td>
</tr>
<tr>
<td>VPV 80</td>
<td>37.2</td>
<td>3000</td>
<td>74.6</td>
<td>74.6</td>
</tr>
<tr>
<td>VPV 100</td>
<td>46.2</td>
<td>3000</td>
<td>88.8</td>
<td>88.8</td>
</tr>
<tr>
<td>VPV 130</td>
<td>60.0</td>
<td>3000</td>
<td>117.6</td>
<td>117.6</td>
</tr>
<tr>
<td>VPV 164</td>
<td>75.8</td>
<td>3000</td>
<td>156.5</td>
<td>156.5</td>
</tr>
</tbody>
</table>

EXAMPLES:

VPV 100 @ 3045 psig + VPV 63 @ 3045 psig + VPV 25 @ 3045 psig
88.8 hp  58.5 hp + 23.3 hp

VPV 116 @ 3045 psig + VPV 16 @ 1500 psig + VPV 16 @ 1500 psig
17.6 hp  8.7 hp + 8.7 hp
VPV Stroke Limiter Adjustment

![Diagram of VPV Stroke Limiter Adjustment](image)

<table>
<thead>
<tr>
<th>Pump Model</th>
<th>Nominal Stroke</th>
<th>Decrease in Flow Per Turn</th>
<th>Minimum Flow Attainable</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPV 16</td>
<td>1.9 mm (0.075&quot;)</td>
<td>53%</td>
<td>&lt;0%</td>
</tr>
<tr>
<td>VPV 25</td>
<td>2.0 mm (0.080&quot;)</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>VPV 32</td>
<td>2.5 mm (0.099&quot;)</td>
<td>40%</td>
<td>20%</td>
</tr>
<tr>
<td>VPV 45</td>
<td>1.9 mm (0.077&quot;)</td>
<td>80%</td>
<td>&lt;0%</td>
</tr>
<tr>
<td>VPV 63</td>
<td>2.7 mm (0.106&quot;)</td>
<td>56%</td>
<td>8%</td>
</tr>
<tr>
<td>VPV 80</td>
<td>3.4 mm (0.132&quot;)</td>
<td>44%</td>
<td>26%</td>
</tr>
<tr>
<td>VPV 100</td>
<td>3.0 mm (0.117&quot;)</td>
<td>50%</td>
<td>17%</td>
</tr>
<tr>
<td>VPV 130</td>
<td>3.8 mm (0.150&quot;)</td>
<td>40%</td>
<td>34%</td>
</tr>
<tr>
<td>VPV 164</td>
<td>4.7 mm (0.186&quot;)</td>
<td>32%</td>
<td>47%</td>
</tr>
</tbody>
</table>

- During initial start-up, volume should be at least 50% of maximum flow.
- Only make adjustments to volume control with pump running at full flow and low pressure while observing output flow.
3000 PSI Cutaway – VPV 45 – 164

**TYPE “P1” VANE PUMP COMBO CAPABLE**

- Torque to 350 lb/in (Torque to 39.5 Nm)
- Torque to 1800 lb/in (Torque to 204 Nm)
- Torque to 850 lb/in (Torque to 96 Nm)
- Torque to 12 lb/in (Torque to 1.4 Nm)
- Torque to 4970 lb/in (Torque to 562 Nm)
- Torque to 850 lb/in (Torque to 96 Nm)
### 3000 PSI Repair Parts – VPV 16/25/32

**Volume Control Assembly**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Square cut seal ring</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Back up ring</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Piston</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Body</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Adjusting screw</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Jam nut</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>O-ring (-011/75)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Viton seal kits consist of:**

<table>
<thead>
<tr>
<th>Description, VPV16/(VPV25/32)</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-ring, ASA-111 / (ASA-111)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring, ASA-110 / (ASA-110)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring, ASA-127 / (ASA-136)</td>
<td>2</td>
</tr>
<tr>
<td>O-ring, ASA-128 / (ASA-128)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring, ASA-026 / (ASA-028)</td>
<td>2</td>
</tr>
<tr>
<td>O-ring, ASA-151 / (ASA-152)</td>
<td>2</td>
</tr>
<tr>
<td>O-ring, ASA-031 / (ASA-031)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring, ASA-156 / (ASA-160)</td>
<td>1</td>
</tr>
<tr>
<td>Back up ring</td>
<td>2</td>
</tr>
<tr>
<td>Shaft seal</td>
<td>1</td>
</tr>
<tr>
<td>O-ring, ASA-011</td>
<td>1</td>
</tr>
<tr>
<td>Back up ring</td>
<td>1</td>
</tr>
</tbody>
</table>

All o-rings durometer rating ≥ 75

*Not for use on water glycol fluid (includes seal kit).

**Repair Kits**

<table>
<thead>
<tr>
<th>Size</th>
<th>SAE</th>
<th>Metric</th>
<th>SAE “P1”</th>
<th>Metric “P1”</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>R978711812</td>
<td>R978711813</td>
<td>R978711814</td>
<td>R978711815</td>
</tr>
<tr>
<td>25</td>
<td>R978711809</td>
<td>R978711810</td>
<td>R978711825</td>
<td>R978711824</td>
</tr>
<tr>
<td>32</td>
<td>R978711809</td>
<td>R978711810</td>
<td>R978711825</td>
<td>R978711824</td>
</tr>
</tbody>
</table>

**Repair kits consists of:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key</td>
<td>1</td>
</tr>
<tr>
<td>Rotor shaft</td>
<td>1</td>
</tr>
<tr>
<td>Vane kit</td>
<td>1</td>
</tr>
<tr>
<td>Port plate, cover side</td>
<td>1</td>
</tr>
<tr>
<td>Roll pin</td>
<td>4</td>
</tr>
<tr>
<td>Thrust screw kit</td>
<td>1</td>
</tr>
<tr>
<td>Bearing</td>
<td>2</td>
</tr>
<tr>
<td>Spacer ring</td>
<td>1</td>
</tr>
<tr>
<td>Pressure ring</td>
<td>1</td>
</tr>
<tr>
<td>Port plate, body side</td>
<td>1</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>1</td>
</tr>
</tbody>
</table>
3000 PSI Repair Parts – VPV 16/25/32

ATTENTION: These compensators are rated for 210 bar (3000 psi) operation. Install only on pumps rated at 210 bar (3000 psi). Activating shock clipper is highly recommended on all applications greater than 140 bar (2000 psi). Install unrestricted line back to tank.

SINGLE STAGE COMPENSATOR

COMPLETE ASSEMBLY FOR SINGLE STAGE COMPENSATOR

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-ring (-011 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>Plug w/ O-ring</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-110 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-018 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-128 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>Back up ring</td>
<td>1</td>
</tr>
<tr>
<td>O-ring</td>
<td>1</td>
</tr>
</tbody>
</table>

BOLT KIT FOR MOUNTING SINGLE STAGE TO VPV 16/25/32 (M8 X 1.25 X 25)

R978713971

TWO-STAGE COMPENSATOR

COMPLETE ASSEMBLY FOR TWO-STAGE COMPENSATOR

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-ring (-111 / 75)</td>
<td>2</td>
</tr>
<tr>
<td>Plug w/ O-ring</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-110 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-128 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-111 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>Poppet second stage</td>
<td>1</td>
</tr>
<tr>
<td>Plug w/ O-ring</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-910 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>O-ring (-908 / 75)</td>
<td>1</td>
</tr>
<tr>
<td>Back up ring</td>
<td>1</td>
</tr>
<tr>
<td>O-ring</td>
<td>1</td>
</tr>
<tr>
<td>Poppet seat w/ O-ring</td>
<td>1</td>
</tr>
</tbody>
</table>

BOLT KIT FOR MOUNTING TWO STAGE & SOLENOID COMPENSATORS TO VPV 16/25/32 (M8 X 1.25 X 45)

R978713972
3000 PSI Repair Parts – VPV 16/25/32

INSTALLATION NOTES

INSTALL BEARINGS FLUSH ±0.25mm with LUBRICATING OIL (For cover & body)

VPV 16
Pack grease into space between oil lip & dust lip. Rec. MOBILUX EP2 #44-002=-0011 (VPV16 ONLY)

VPV 25/32
Apply loctite sealant #569 to bore & install to depth shown.

Orientation of bearing seam assembly slot

Orientation of bearing lube slot

COVER BEARING

BODY BEARING

TORQUE RATINGS

TORQUE TO
960 in-lb. (108 Nm)

VPV 16
TORQUE TO
700 in-lb. (79 Nm)

VPV 25/32
TORQUE TO
1200 in-lb. (140 Nm)

TORQUE TO
350 in-lb. (41 Nm)

TORQUE TO
350 in-lb. (41 Nm)
3000 PSI Repair Parts – VPV 45 – 164

**SINGLE-STAGE COMPENSATOR**

- Pressure adjustment lock-nut
- Torque to 442 - 531 lb/in 
  (Torque to 50 - 60 Nm)

**TWO-STAGE COMPENSATOR**

- Pressure adjustment lock-nut
- Torque to 442 - 531 lb/in 
  (Torque to 50 - 60 Nm)
- Torque to 150 - 186 lb/in 
  (Torque to 17 - 21 Nm)

**REPAIR KIT FOR TWO-STAGE COMPENSATOR**

<table>
<thead>
<tr>
<th>REF</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O-ring ASA-113</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Back up ring</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>O-ring</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>O-ring ASA-111</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>O-ring ASA-143</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>O-ring 15.3, i.d. x 2.4mm c.s.</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>O-ring ASA-111</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Back up ring</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>O-ring ASA-011</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Poppet</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Poppet seat w/ O-ring</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Plug w/ O-ring</td>
<td>1</td>
</tr>
</tbody>
</table>

**COMPLETE ASSEMBLY FOR SINGLE STAGE COMPENSATOR**

Consult factory.

**COMPLETE ASSEMBLY FOR TWO STAGE COMPENSATOR**

<table>
<thead>
<tr>
<th></th>
<th>SAE</th>
<th>METRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPLETE ASSEMBLY FOR TWO STAGE COMPENSATOR</td>
<td>9 511 230 610</td>
<td>9 511 230 611</td>
</tr>
<tr>
<td>COMPLETE ASSEMBLY FOR LOAD SENSE</td>
<td>9 511 230 612</td>
<td>9 511 230 613</td>
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</tbody>
</table>

**REPAIR KIT FOR TWO-STAGE COMPENSATOR**

<table>
<thead>
<tr>
<th></th>
<th>SAE</th>
<th>METRIC</th>
</tr>
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<tbody>
<tr>
<td>REPAIR KIT FOR TWO-STAGE COMPENSATOR</td>
<td>R978711857</td>
<td>R978711858</td>
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**BOLT KIT FOR MOUNTING TWO STAGE & SOLENOID COMPENSATORS TO VPV 45/164 (M10 X 1.5 X 40)**

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>BOLT KIT FOR MOUNTING TWO STAGE &amp; SOLENOID COMPENSATORS TO VPV 45/164</td>
<td>R978713973</td>
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</table>

**ATTENTION:** These compensators are rated for 210 bar (3000 psi) operation. Install only on pumps rated at 210 bar (3000 psi).
### 3000 PSI Repair Parts – VPV 45 – 164

#### Volume Control Assembly

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description, VPV45/80/(VPV100/164)</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>O-ring (ASA-146)</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>Adjusting screw</td>
<td>1</td>
</tr>
<tr>
<td>27</td>
<td>Jam nut</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>Body</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>Piston</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>Back up ring</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td>O-ring (ASA-113)</td>
<td>1</td>
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</table>

#### Seal Kits*

<table>
<thead>
<tr>
<th>SIZE</th>
<th>SAE/METRIC</th>
<th>SAE “P1”</th>
<th>METRIC “P1”</th>
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</thead>
<tbody>
<tr>
<td>45-80</td>
<td>9 511 230 668</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100-164</td>
<td>9 511 230 659</td>
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</table>

*Not for use on water glycol fluids.

#### Repair Kits

<table>
<thead>
<tr>
<th>SIZE</th>
<th>SAE</th>
<th>METRIC</th>
<th>SAE “P1”</th>
<th>METRIC “P1”</th>
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<tbody>
<tr>
<td>45</td>
<td>R978711838</td>
<td>R978711843</td>
<td>R978711841</td>
<td>R978711845</td>
</tr>
<tr>
<td>63</td>
<td>R978711838</td>
<td>R978711843</td>
<td>R978711841</td>
<td>R978711845</td>
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<tr>
<td>80</td>
<td>R978711840</td>
<td>R978711844</td>
<td>R978711842</td>
<td>R978711846</td>
</tr>
<tr>
<td>100</td>
<td>R978711849</td>
<td>R978711853</td>
<td>R978711851</td>
<td>R978711855</td>
</tr>
<tr>
<td>130</td>
<td>R978711849</td>
<td>R978711853</td>
<td>R978711851</td>
<td>R978711855</td>
</tr>
<tr>
<td>164</td>
<td>R978711850</td>
<td>R978711854</td>
<td>R978711852</td>
<td>R978711856</td>
</tr>
</tbody>
</table>

#### Viton seal kits consist of:

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description, VPV45/80/(VPV100/164)</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>O-ring, ASA-031 / (ASA-035)</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>O-ring, ASA-162 / (ASA-265)</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>O-ring, ASA-130 / (ASA-229)</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>O-ring, ASA-146 / (ASA-146)</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Shaft seal</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>O-ring, ASA-332 / (ASA-340)</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>O-ring, ASA-110 / (ASA-110)</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>O-ring, ASA-111 / (ASA-111)</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>O-ring, ASA-143 / (ASA-143)</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>O-ring, ASA-157 / (ASA-160) PHASE-OUT</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>O-ring, ASA-155 (New VPV 45/63/80 ONLY)</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>O-ring, ASA-158 (New VPV 100/130/164 ONLY)</td>
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</tr>
<tr>
<td>23</td>
<td>Back-up ring (Pressure) PHASE-OUT</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>Back-up ring (Modified VPV 45-164 port plate design)</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>O-ring, ASA-139 / (ASA-152)</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>O-ring, ASA-043 / (ASA-043) Phase-out</td>
<td>2</td>
</tr>
<tr>
<td>*</td>
<td>O-ring, ASA-109 / (ASA-109)</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>Back-up washer</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>O-ring, ASA-237 / (ASA-237) Replaces ASA-043</td>
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</tr>
<tr>
<td>*</td>
<td>Back-up ring (Root seal)</td>
<td>2</td>
</tr>
</tbody>
</table>

*Not shown (All o-rings durometer rating ≥ 75)
Vane Tip Orientation

Orient vanes as shown when servicing VPV Whisper™ Pumps.
Reacton Characteristics and Shock Clipper Function

VPV 16, Single stage compensator, plot with shock clipper inactive. (Response overshoot of 950 PSI, response undershoot of 700 PSI)

VPV 16, Single stage compensator, plot with shock clipper active. (Response overshoot of 500 PSI, response undershoot of 450 PSI)