Variable Displacement Axial Piston Pump

VPA10VSO
Series 31

Strength in Products, Strength in Service
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Anfield VPA10V(S) series variable displacement axial piston pumps are designed for open loop circuits and can be used in both mobile and industrial applications. The output flow is proportional to the drive speed and the displacement.

The VPA10V(S) series pumps are available in six displacements, ranging from 1.10 in³/rev (18 cm³/rev) to 8.54 in³/rev (140 cm³/rev). They offer speeds up to 3,300 rpm, a rated working pressure of 4000 psi (280 bar), single pump or through drive pumps allowing for multi-circuit systems. Offered in SAE or Metric mounting with side or rear porting.

Available in a variety of controls with short control response times. These variable pumps offer the benefit of providing power only when needed.

**DESCRIPTION**

- Variable pump with axial piston rotary group in swashplate design
- Series 31 in sizes 18, 28, 45, 71, 100, 140
- Designed for open loop circuits
- Output flow is proportional to the drive speed and displacement and can be infinitely varied by adjusting the swashplate angle.
- Versatile controller range
- Short control time

**FEATURES**

- Excellent suction performance
- Low noise nine-piston design
- Long service life
- Favorable power/weight ratio
- Offered with Buna-N or Viton seal options
- End or side inlet and outlet ports for design flexibility
- Multiple case drain ports for various mounting orientations
- Full power through drive capability

**TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Displacement Vgmax/cm³/r</th>
<th>Max. Speed nmax/rpm</th>
<th>Max. Flow qvmax/gpm</th>
<th>Pressure PSI</th>
<th>Max. Power hp kW</th>
<th>Suction Port</th>
<th>Pressure Port</th>
<th>Drain Port L, L1</th>
<th>Pilot Port X</th>
<th>Weight (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPA10V(S)-O-18</td>
<td>18</td>
<td>1.10</td>
<td>3300</td>
<td>15.7</td>
<td>59.4</td>
<td>4000 5000</td>
<td>38</td>
<td>28</td>
<td>SAE-6</td>
<td>28.7 kg 13 lbs</td>
</tr>
<tr>
<td>VPA10V(S)-O-28</td>
<td>28</td>
<td>1.71</td>
<td>3000</td>
<td>22.2</td>
<td>84</td>
<td>4000 5000</td>
<td>52</td>
<td>39</td>
<td>SAE-8</td>
<td>37.5 kg 17 lbs</td>
</tr>
<tr>
<td>VPA10V(S)-O-45</td>
<td>45</td>
<td>2.75</td>
<td>2600</td>
<td>30.9</td>
<td>117</td>
<td>4000 5000</td>
<td>74</td>
<td>55</td>
<td>SAE-10</td>
<td>50.7 kg 23 lbs</td>
</tr>
<tr>
<td>VPA10V(S)-O-71</td>
<td>71</td>
<td>4.33</td>
<td>2200</td>
<td>41.2</td>
<td>156</td>
<td>4000 5000</td>
<td>98</td>
<td>73</td>
<td>SAE-10</td>
<td>79.4 kg 36 lbs</td>
</tr>
<tr>
<td>VPA10V(S)-O-100</td>
<td>100</td>
<td>6.10</td>
<td>2000</td>
<td>52.8</td>
<td>200</td>
<td>4000 5000</td>
<td>125</td>
<td>93</td>
<td>SAE-12</td>
<td>110.2 kg 50 lbs</td>
</tr>
<tr>
<td>VPA10V(S)-O-140</td>
<td>140</td>
<td>8.54</td>
<td>1800</td>
<td>66.5</td>
<td>251</td>
<td>4000 5000</td>
<td>158</td>
<td>118</td>
<td>SAE-12</td>
<td>143.3 kg 65 lbs</td>
</tr>
</tbody>
</table>

**Notes:**
1. Absolute pressure at suction port S (inlet): Ps min: 11.6 psi (0.8 bar), Ps max: 435 psi (30 bar)
2. Viscosity: optimal range 16 to 36 mm²/s (80 to 170 SUS)
3. Temperature: T min = -20°C (-4°F), T max = +80°C (+176°F)
4. Filtration of the hydraulic fluid: A cleanliness level of at least 20/18/15 is to be maintained according to ISO 4406. At very high hydraulic fluid temperatures (maximum 230 °F (110 °C), measured at Drain port L, L1), at least a cleanliness level of 19/17/14 according to ISO 4406 is necessary.
5. Cold start: Allow pump to run ≤ 3 minutes without load (p ≤ 725 psi (50 bar)), Speed ≤ 1000 rev/min. Permissible temperature difference between axial piston unit and hydraulic fluid in the system maximum 45 °F (7.2°C).
6. Weight: indicated in the table correspond to units without through drive and are approximate.
FEATURES

Anfield VPA10V series variable piston pump with axial piston rotary group in swashplate design for hydrostatic drives in open circuit. Flow is proportional to drive speed and displacement and by adjusting the position of the swashplate it is possible to smoothly vary the flow.

- Flange connections to SAE (UNC) or ISO (metric)
- Two case drain ports
- Excellent suction characteristics
- High permissible speeds
- Axial and radial loading of drive shaft possible
- Wide range of controllers with short control response time
  - DR – Pressure controller
  - DRG – Pressure controller, remotely controlled
  - DFR/DFR1 – Pressure flow controller
  - DFLR – Pressure, flow and power controller
- Low noise nine-piston design
- Long service life
- Good power to weight ratio
- Through drive option for multi-circuit systems, allows adding gear and axial piston pumps up to the same size (100% through drive)

Flange connections to SAE (UNC) or ISO (metric)
Two case drain ports
Excellent suction characteristics
High permissible speeds
Axial and radial loading of drive shaft possible
Wide range of controllers with short control response time

- DR – Pressure controller
- DRG – Pressure controller, remotely controlled
- DFR/DFR1 – Pressure flow controller
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Low noise nine-piston design
Long service life
Good power to weight ratio
Through drive option for multi-circuit systems, allows adding gear and axial piston pumps up to the same size (100% through drive)
ANFIELD Variable Piston Pump VPA10VSO / Rev. B (05/02/2022)

**TECHNICAL DATA**

### Input operating pressure range

<table>
<thead>
<tr>
<th>Absolute Pressure at inlet Port S</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P\textsubscript{abs} min</td>
<td>11.6 psi (0.8 bar)</td>
</tr>
<tr>
<td>P\textsubscript{abs} max</td>
<td>435 psi (30 bar)</td>
</tr>
</tbody>
</table>

### Output operating pressure range

<table>
<thead>
<tr>
<th>Pressure at Port B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure p\textsubscript{N}</td>
<td>4000 psi (280 bar)</td>
</tr>
<tr>
<td>Peak Pressure p\textsubscript{max}</td>
<td>5000 psi (350 bar)</td>
</tr>
</tbody>
</table>

### Case drain pressure

Maximum pressure of leakage fluid (at ports L, L1) is 7 psi (0.5 bar) higher than input pressure at port S, but not higher than 30 psi (2 bar) absolute.

### Direction of flow

“S” inlet port to “B” pressure port

### Table of values (theoretical values, without considering \( \eta\textsubscript{mh} \) and \( \eta\textsubscript{v} \); values rounded)

<table>
<thead>
<tr>
<th>Size</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement ( V\textsubscript{g,max} )</td>
<td>1.10 (18)</td>
<td>1.71 (28)</td>
<td>2.75 (45)</td>
<td>4.33 (71)</td>
<td>6.10 (100)</td>
<td>8.54 (140)</td>
</tr>
<tr>
<td>Max. Speed ( n\textsubscript{max} )</td>
<td>3300 rpm</td>
<td>3000 rpm</td>
<td>2600 rpm</td>
<td>2200 rpm</td>
<td>2000 rpm</td>
<td>1800 rpm</td>
</tr>
<tr>
<td>Max. Flow ( q\textsubscript{v,max} )</td>
<td>15.7 (59.4 gpm)</td>
<td>22.2 (84 lpm)</td>
<td>30.9 (117 lpm)</td>
<td>41.2 (156 lpm)</td>
<td>52.8 (200 lpm)</td>
<td>66.5 (251 lpm)</td>
</tr>
<tr>
<td>Max. Power ( P_{omax} )</td>
<td>( \Delta p = 4000 \text{ psi} ) (280 bar)</td>
<td>( \Delta p = 4000 \text{ psi} ) (280 bar)</td>
<td>( \Delta p = 4000 \text{ psi} ) (280 bar)</td>
<td>( \Delta p = 4000 \text{ psi} ) (280 bar)</td>
<td>( \Delta p = 4000 \text{ psi} ) (280 bar)</td>
<td>( \Delta p = 4000 \text{ psi} ) (280 bar)</td>
</tr>
<tr>
<td>Max. Torque ( T_{omax} )</td>
<td>58 (80 ft-lb)</td>
<td>91 (125 ft-lb)</td>
<td>146 (200 ft-lb)</td>
<td>230 (316 ft-lb)</td>
<td>324 (445 ft-lb)</td>
<td>453 (623 ft-lb)</td>
</tr>
<tr>
<td>Weight w/o fluid</td>
<td>lbs (kg)</td>
<td>28.7 (13)</td>
<td>37.5 (17)</td>
<td>50.7 (23)</td>
<td>79.4 (36)</td>
<td>110.2 (50)</td>
</tr>
</tbody>
</table>

**Notes:**

1. Values shown are valid for an absolute pressure of 1 bar at suction port. If the flow is reduced or if the inlet pressure is increased, the speed may be increased.

Determining the operating characteristics

- **Flow:**
  \[ q\textsubscript{v} = \frac{V\textsubscript{g} \cdot n \cdot \eta\textsubscript{v}}{230} \text{ gpm} \]
- **Torque:**
  \[ T = \frac{V\textsubscript{g} \cdot \Delta p}{24 \cdot \pi \cdot \eta\textsubscript{mh}} \text{ lb-ft} \]
- **Power:**
  \[ P = \frac{q\textsubscript{v} \cdot \Delta p}{1714 \cdot \eta\textsubscript{t}} \text{ hp} \]

**Key:**

- \( V\textsubscript{g} \) = Displacement per revolution in in\(^3\) (cm\(^3\))
- \( \Delta p \) = Differential pressure in psi (bar)
- \( n \) = Speed in rpm (min\(^{-1}\))
- \( \eta\textsubscript{v} \) = Volumetric efficiency
- \( \eta\textsubscript{mh} \) = Mechanical-hydraulic efficiency
- \( \eta\textsubscript{t} \) = Total efficiency (\( \eta\textsubscript{t} = \eta\textsubscript{v} \cdot \eta\textsubscript{mh} \))

**Notes:**

1. Theoretical values, without efficiency and tolerances; values rounded
2. Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Anfield recommends checking the load by means of test or calculation / simulation and comparison with the permissible values.
### Designation & Ordering Code

**VPA10V(S) - O - 100 - DFR1 - 31 - R - P - K - C - 62 - N00**

1. **Axial Piston Unit**
   - **VPA10V** Swashplate Design, Variable Pump
   - **VPA10VS** Swashplate Design, Variable Pump (Industrial)

2. **Operating Mode**
   - **O** Pump, Open Circuit

3. **Displacement**
   - **cm³/rev** | **in³/rev**
     - 18  | 18  | 1.10
     - 28  | 28  | 1.71
     - 45  | 45  | 2.75
     - 71  | 71  | 4.33
     - 100 | 100 | 6.10
     - 140 | 140 | 8.54

4. **Control Device**
   - **DR** Pressure Control
   - **DRG** Pressure Remote Control
   - **DFR** Pressure & Flow Control (X-T open)
   - **DFR1** Pressure & Flow Control (X-T plugged)
   - **DFLR** Pressure, Flow & Power Control

5. **Series**
   - **31** Series

6. **Direction of Rotation**
   - **R** Clockwise
   - **L** Counter-clockwise

7. **Seal Material**
   - **P** Buna-N
   - **V** FKM Fluorocarbon Viton®

8. **Drive Shaft**
   - **K** SAE Parallel Keyed Shaft
   - **S** SAE Splined Shaft
   - **R** SAE Splined Shaft, Reinforced
   - **U** SAE Splined Shaft, Smaller size
   - **W** SAE Splined Shaft, Reinforced U-type shaft
   - **P** Metric Parallel Keyed Shaft DIN 6885

9. **Mounting Flange**
   - **C** SAE 2-Bolt
   - **A** ISO 2-Bolt
   - **D** SAE 4-Bolt
   - **B** ISO 4-Bolt

10. **Service Ports**
    - **Pressure Port B & Suction Port S**
    - **61** Rear Ports, UNC Mounting Screws
    - **62** Opposite Side Ports, UNC Mounting Screws
    - **11** Rear Ports, Metric Mounting Screws
    - **12** Opposite Side Ports, Metric Mounting Screws

11. **Through Drive**
    - **N00** Without Through Drive
    - With through drive to accept axial piston or gear pump

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**ANFIELD Variable Piston Pump VPA10VSO / Rev. B (05/02/2022)**

**USA:** www.anfieldind.com  
**Canada:** www.mpfiltricanada.com
DR - PRESSURE CONTROLLER

The DR pressure controller maintains the maximum pressure at the pump outlet within the control range of the pump. The pump will therefore only supply as much hydraulic fluid as is required by the actuators. If the working pressure exceeds the pressure setting at the pressure valve, the pump will regulate to a smaller displacement to reduce the control differential.

- **Basic position in depressurized state:**
  - Vg max. (Max. displacement)

- **Setting range for pressure control:**
  - 50 to 280 bar. Standard is 280 bar.

**Static characteristic**

at n = 1450 rpm ; t$_{fluid}$ = 50°C (122°F)

<table>
<thead>
<tr>
<th>Ports</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Pressure port</td>
</tr>
<tr>
<td>S</td>
<td>Suction port</td>
</tr>
<tr>
<td>L, L1</td>
<td>Case drain ports (L1 plugged)</td>
</tr>
</tbody>
</table>

**DR Controller Data**

<table>
<thead>
<tr>
<th>Size</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δp psi (bar)</td>
<td>58 (4)</td>
<td>58 (4)</td>
<td>87 (6)</td>
<td>116 (8)</td>
<td>145 (10)</td>
<td>174 (12)</td>
</tr>
<tr>
<td>Hysteresis and repeatability accuracy Δp</td>
<td>Max. 45 psi (3 bar)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot oil consumption</td>
<td>0.8 gpm (3 lpm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DRG - PRESSURE CONTROLLER, REMOTE CONTROLLED

For the DRG remote controlled pressure controller, the load sense LS pressure limitation is performed using a separately arranged pressure relief valve*. Therefore any pressure control value under the pressure set on the pressure controller can be regulated.

*The separate pressure relief valve and the line are not included in the scope of delivery.

The standard setting on the remote controlled pressure cut-off of LS is 290 psi (20 bar), the amount of control fluid at port is X approx. 0.4 gpm (1.5 l/min). If a different setting (range 145 to 320 psi (10 to 22 bar)) is required, please state in plain text.

Static characteristic
at n = 1450 rpm ; \( t_{\text{fluid}} = 50^\circ\text{C} (122^\circ\text{F}) \)

![Static characteristic graph]

**Operating Parameters**

<table>
<thead>
<tr>
<th>Size</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta p ) psi (bar)</td>
<td>58 (4)</td>
<td>58 (4)</td>
<td>87 (6)</td>
<td>116 (8)</td>
<td>145 (10)</td>
<td>174 (12)</td>
</tr>
<tr>
<td>Hysteresis and repeatability accuracy ( \Delta p )</td>
<td>Max. 45 psi (3 bar)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot oil consumption</td>
<td>1.19 gpm (4.5 lpm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DFR/DFR1 - PRESSURE AND FLOW CONTROLLER

In addition to the pressure control function, the pump flow may be varied by means of a differential pressure at the actuator (e.g. an orifice).

In model DFR1 the X orifice is plugged.

FLOW CONTROL/DIFFERENTIAL PRESSURE \( \Delta p \)

Standard setting: 14 bar (203psi). If a different setting is required, please state in clear text.

When port X is unloaded to tank, a zero stroke pressure (“stand by”) of \( p = 260 +/- 30 \) psi (18 +/- 2 bar) results.

DFR/DFR1 Controller Data

- For pressure control technical data see DR Pressure Control.

<table>
<thead>
<tr>
<th>Size</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta Q_{\text{max}} ) lpm (gpm)</td>
<td>0.9 (0.24)</td>
<td>1.0 (0.26)</td>
<td>1.8 (0.48)</td>
<td>2.8 (0.74)</td>
<td>4.0 (1.06)</td>
<td>6.0 (1.6)</td>
</tr>
<tr>
<td>Hysteresis &amp; repeatability ( \Delta p ) bar (psi)</td>
<td>Max. 60 psi (4 bar)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot oil consumption</td>
<td>DFR: Max. approx. 0.70-1.19 gpm (3-4, 5 lpm)</td>
<td>DFR1: Max approx. 0.70 gpm (3 lpm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ports**
- B Pressure port
- S Suction port
- L, L1 Case drain ports (L1 plugged)
- X Pilot pressure port
DFLR - PRESSURE, FLOW AND POWER CONTROLLER

In order to achieve a constant drive torque with a varying operating pressure, the swivel angle and with it the output flow from the axial piston unit is varied so that the product of flow and pressure remain constant.

Flow control is possible below the limit of the power curve.

Execution of the pressure control like DR(G), see page 6. Execution of the flow control like DFR, DFR1, see page 8.

The power characteristic is factory-set, so please enter details in clear text, e.g. 20kW at 1450 rpm (5 hp, 1800 rpm).

DFLR Controller Data

- For pressure control technical data see DR Pressure Control.
- For flow control technical data see DFR Control.

<table>
<thead>
<tr>
<th>Size</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of control</td>
<td>From 80 bar (1,160 psi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot oil consumption</td>
<td>Max. approx. 5.5 lpm (1.45 gpm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Circuit diagram, Sizes 28 to 100**

1. Customer supplied

**Circuit diagram, Size 140**

1. Customer supplied

---

**Ports**

- **B**: Pressure port
- **S**: Suction port
- **L, L1**: Case drain ports (L1 plugged)
- **X**: Pilot pressure port

---

**Maximum power curve**

**Flow Q**

- 100
- 75
- 50
- 25

**Minimum power curve**

- 05
- 50
- 100
- 150
- 200
- 250
- 300
DIMENSIONS DR
Service Ports at Rear; Models 61N00 and 11N00

Sizes 18 to 140

<table>
<thead>
<tr>
<th>Sizes</th>
<th>A1 max. mm (in)</th>
<th>A2 mm (in)</th>
<th>A3 max. mm (in)</th>
<th>A4 mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>-</td>
<td>-</td>
<td>110 (4.33)</td>
<td>126 (4.96)</td>
</tr>
<tr>
<td>28</td>
<td>113 (4.45)</td>
<td>226 (8.90)</td>
<td>110 (4.33)</td>
<td>136 (5.35)</td>
</tr>
<tr>
<td>45</td>
<td>110 (4.33)</td>
<td>226 (8.90)</td>
<td>110 (4.33)</td>
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Service Ports at Side; Models 62N00 and 12N00

Sizes 18 to 140

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## DIMENSIONS DRG / DFR / DFR1

### Service Ports at Rear; Models 61N00 and 11N00

Sizes 18 to 140

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Sizes 18 to 140

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**DIMENSIONS DFLR**

Service Ports at Rear; Models 61N00 and 11N00

Sizes 18 to 140

- 61 (Rear Ports, UNC Mtg Thread)
- 11 (Rear Ports, Metric Mtg Thread)
- N00 (Without Through Drive)

Service Ports at Side; Models 62N00 and 12N00

Sizes 18 to 140

- 62 (Side Ports, UNC Mtg Thread)
- 12 (Side Ports, Metric Mtg Thread)
- N00 (Without Through Drive)

### Sizes

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<td>183 (7.29)</td>
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DIMENSIONS, SIZE 18, SERIES 31
Service Ports on Side; Non Through Drive, Models 62N00 and 12N00
Without Considering Adjustment

VPA10V(S)O-18

Ports VPA10V(S)O-18

Designation | Port For | Standard | Size | Peak Pressure [psi (bar)] | Tightening Torque Max [lbf ft (Nm)] | State
---|---|---|---|---|---|---
B | Pressure port (standard pressure range) | SAE J518 ISO 68 | 3/4 in (3/4" Code 61) 3/8-16 UNC-2B; 0.79 (20) deep | 5100 (350) | 29 (40) | O
S | Inlet port (standard pressure range) | SAE J518 ISO 68 | 1 in (1" Code 61) 3/8-15 UNC-2B; 0.79 (20) deep | 75 (5) | 29 (40) | O
L, L1 | Case drain ports (L1 plugged) | ISO 11926 | 9/16-18 UNF-2B (SAE-6) | 30 (2) | 59 (80) | O
X | Pilot pressure port | ISO 11926 | 7/16-20 UNF-2B; 0.39 (10) deep (SAE-4) | 5100 (350) | 29 (40) | O
X | Control pressure for DG control | DIN 3852 | R 1/4 in | 1740 (120) | 48 (70) | O

O = Must be connected (plugged on delivery)

1) Depending on the installation position, L or L1 must be connected (also see installation instructions on page 27).
DIMENSIONS, SIZE 28, SERIES 31
Service Ports on Side and Rear; Non Through Drive
Without Considering Adjustment

VPA10V(S)O-28

PORT BLOCK 62/12; N00

Valve mounting for counter clockwise rotation

PORT BLOCK 61/11; N00

Valve mounting for counter clockwise rotation

ANFIELD Variable Piston Pump VPA10VSO / Rev. B (05/02/2022)
Canada: www.mpfiltricanada.com USA: www.anfieldind.com
DIMENSIONS, SIZE 28, SERIES 31
Drive Shafts VPA10V(S)O-28, Metric Mount, and Port Dimensions
Without Considering Adjustment

Drive Shafts VPA10V(S)O-28

K  SAE Parallel Keyed Shaft
7/8 in Parallel shaft with key
ISO 3019-1 22-1

S  SAE Splined Shaft
Splined shaft 7/8 in 13T 16/32 DP
SAE J744 - 22-4 (B)

R  SAE Splined Shaft, Reinforced
(Similar to shaft S suitable for higher input torque)
Splined shaft 7/8 in 13T 16/32 DP
SAE J744 - 22-4 (B)

U  SAE Splined Shaft, Smaller size
(Reduced diameter, not for through drive)
Splined Shaft 3/4 in 11T 16/32 DP
SAE J744 - 19-4 (A-B)

W  SAE Splined Shaft, Reinforced U-type shaft
Splined Shaft 3/4 in 11T 16/32 DP
SAE J744 - 19-4 (A-B)

P  Metric Parallel Keyed Shaft
22 mm Parallel shaft w/ key
DIN 6885; Key: A6×6×32
Flange: ISO 2-Bolt (100 mm)

1) ANSI B92.1a-1976, 30° pressure angle, flat root side fit, flank centering, tolerance class 5

Ports VPA10V(S)O-28

<table>
<thead>
<tr>
<th>Designation</th>
<th>Port For</th>
<th>Standard</th>
<th>Size</th>
<th>Peak Pressure [psi (bar)]</th>
<th>Tightening Torque Max [lbft (Nm)]</th>
<th>State</th>
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<td>SAE J518 ISO 68</td>
<td>3/4 in (3/4&quot; Code 61) 3/8-16 UNC-2B; 0.79 (20) deep</td>
<td>5100 (350) 29 (40)</td>
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<td>S</td>
<td>Inlet port (standard pressure range)</td>
<td>SAE J518 ISO 68</td>
<td>1 1/4 in (1 1/4&quot; Code 61) 7/16-14 UNC-2B; 0.94 (24) deep</td>
<td>75 (5) 48 (85)</td>
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<td>L, L1</td>
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O = Must be connected (plugged on delivery)

1) Depending on the installation position, L or L1 must be connected (also see installation instructions on page 27).
VPA10V(S)O-45

**DIMENSIONS, SIZE 45, SERIES 31**

Service Ports at Side and Rear; Non Through Drive
Without Considering Adjustment

**VPA10V(S)O-45**

**PORT BLOCK 62/12; N00**

View V
Pressure Port
B 1" Code 61

View W
Suction Port
S 1 1/2" Code 61

View Z

Control valve mounting for counter clockwise rotation

Model 11/12
4xM10x1.5; 17 deep

Model 11/12
4xM12x1.75; 20 deep

**PORT BLOCK 61/11; N00**

View V

Pressure Port
B 1" Code 61

View W
Suction Port
S 1 1/2" Code 61

View Z

Control valve mounting for counter clockwise rotation

Model 11/12
4xM10x1.5; 17 deep

Model 11/12
4xM12x1.75; 20 deep

**View B**

Side Ports, UNC Mtg Thread
62

**View C**

Mounting Flange SAE B 2-Bolt SAE J744 101-2 (SAE B) Ø 101.6 mm (4”)

**View D**

Flange SAE J744 101-2 (B)

**View E**

Control valve mounting for counter clockwise rotation

Model 11/12
4xM10x1.5; 17 deep

Model 11/12
4xM12x1.75; 20 deep

**View F**

Front Ports, UNC Mtg Thread
N00

**View G**

Model 11/12
4xM10x1.5; 17 deep

Model 11/12
4xM12x1.75; 20 deep

**View H**

Control valve mounting for counter clockwise rotation

Model 11/12
4xM10x1.5; 17 deep

Model 11/12
4xM12x1.75; 20 deep

**View I**

Front Ports, Metric Mtg Thread
N00

**View J**

Control valve mounting for counter clockwise rotation

Model 11/12
4xM10x1.5; 17 deep

Model 11/12
4xM12x1.75; 20 deep
## DIMENSIONS, SIZE 45, SERIES 31
### Drive Shafts VPA10V(S)O-45, Metric Mount, and Port Dimensions

### Drive Shafts VPA10V(S)O-45

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1 in Parallel shaft with key
ISO 3019-1 22-1

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### S | SAE Splined Shaft

Splined shaft 1 in 15T 16/32 DP
SAE J744 - 22-4 (B-B)

0.63 (16)

1.18 (3 0)

1.50 (3 8)

1.81 (45 9)

### R | SAE Splined Shaft, Reinforced

(Similar to shaft S suitable for higher input torque)

25 mm Parallel shaft w/ key
DIN 6885; Key: A8x7x36
Flange: ISO 2-Bolt (100 mm)

0.63 (16)

1.16 (29 5)

### U | SAE Splined Shaft, Smaller size

(Reduced diameter, not for through drive)

0.63 (16)

0.98 (25 1)

1.61 (41)

### W | SAE Splined Shaft, Reinforced U-type shaft

1 in 15T 16/32 DP
SAE J744 - 22-4 (B)

0.63 (16)

0.98 (25)

1.61 (41)

### Ports VPA10V(S)O-45

<table>
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<th>Port For</th>
<th>Standard</th>
<th>Size</th>
<th>Peak Pressure</th>
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<td>Pressure port (standard pressure range)</td>
<td>SAE J518 ISO 68</td>
<td>1 in (1” Code 61) 3/8-16 UNC-2B; 0.71 (17) deep</td>
<td>5100 (350)</td>
<td>29 (40)</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>Inlet port (standard pressure range)</td>
<td>SAE J518 ISO 68</td>
<td>1 1/2 in (1 1/2” Code 61) 1/2-13 UNC-2N; 0.87 (22) deep</td>
<td>75 (5)</td>
<td>66 (90)</td>
</tr>
<tr>
<td><strong>L, L1</strong></td>
<td>Case drain ports (L1 plugged)</td>
<td>ISO 11926 7/8-14 UNF-2B (SAE-10)</td>
<td>0.39 (10) deep (SAE-4)</td>
<td>5100 (350)</td>
<td>29 (40)</td>
</tr>
<tr>
<td><strong>X</strong></td>
<td>Pilot pressure port</td>
<td>ISO 11926 7/16-20 UNF-2B</td>
<td>1740 (120)</td>
<td>48 (70)</td>
<td></td>
</tr>
</tbody>
</table>

- **O** = Must be connected (plugged on delivery)
- **O** = Depending on the installation position, L or L1 must be connected (also see installation instructions on page 27).

### Notes:
1) ANSI B92.1a-1976, 30° pressure angle, flat root side fit, flank centering, tolerance class 5

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**USA:** www.anfieldind.com

**Canada:** www.mpfiltricanada.com
**VPA10V(S)O-71**

**PORT BLOCK 62/12; N00**

(Others available)

- Flange SAE J744 127-2 (C)
- **L**
  - 0.50 (12.7)
  - 0.24 (6)
  - 4.53 (115)
- **L1**
  - 8.54 (217)
  - 10.12 (257)
- **B**
  - 4.09 (104)
- **V(E)**
  - 0.71 (18)
  - 2.09 (53)
- **W(F)**
  - 2.06 (52.4)
  - 0.98 (25)
- **1.69**
  - (42.9)
- **3.06**
  - (77.8)
- **1.97**
  - (50)
- **2.28**
  - (58)
- **2.09**
  - (53)
- **2.06**
  - (52.4)
- **1.97**
  - (50)
- **2.28**
  - (58)

**Valve mounting for counter clockwise rotation**

**Model 12**
- 8xM10x1.5
- 24 deep
- 3.62 (92)
- max. 4.33 (110)

**Model 62**
- 4x7/16-14UNC-2B
- 17 deep
- 2.06 (52.4)
- 1.03 (26.2)
- 0.98 (25)
- 45°

**PORT BLOCK 61/11; N00**

(Without Through Adjustments)

- **B**
  - 0.50 (12.7)
  - 0.24 (6)
  - 4.53 (115)
- **S**
  - 10.31 (262)
- **X**
  - 10.12 (257)
- **L**
  - 8.78 (223)
- **L1**
  - 2.28 (58)
- **S**
  - 3.06 (77.8)
- **1.97**
  - (50)
- **1.69**
  - (42.9)
- **2.06**
  - (52.4)
- **2.28**
  - (58)
- **2.09**
  - (53)

**Valve mounting for counter clockwise rotation**

**Model 12**
- 4x12x1.75
- 17 deep
- 2.06 (53)
- 0.71 (18)

**Model 62**
- 4x1/2-13UNC-2B
- 17 deep
- 2.06 (53)
- 0.71 (18)

**Flange SAE J744 127-2 (C) Ø 127 mm (5")**

**Mounting Flange SAE C 2-Bolt**

**View V**
- Pressure Port
  - B
  - 1" Code 61

**View W**
- Suction Port
  - S
  - 2" Code 61

**View E**
- Pressure Port
  - B
  - 1" Code 61
  - 1 1/4" Code 61

**View F**
- Suction Port
  - S
  - 2" Code 61

**View Z**
- Rear Ports, UNC Mtg Thread
  - 62
  - B
  - 2" Code 61

**ANFIELD** Variable Piston Pump VPA10V(S)O / Rev. B (05/02/2022)
DIMENSIONS, SIZE 71, SERIES 31
Drive Shafts VPA10V(S)O-71, Metric Mount, and Port Dimensions

Drive Shafts VPA10V(S)O-71

K SAE Parallel Keyed Shaft
1 1/4 in Parallel shaft with key
ISO 3019-1 32-1

S SAE Splined Shaft
Splined shaft 1 1/4 in 14T 12/24 DP
SAE J744 - 32-4 (C)

R SAE Splined Shaft, Reinforced
(Similar to shaft S suitable for higher input torque)
Splined shaft 1 1/4 in 14T 12/24 DP
SAE J744 - 32-4 (C)

U SAE Splined Shaft, Smaller size
(Reduced diameter, not for through drive)

W SAE Splined Shaft, Reinforced U-type shaft

P Metric Parallel Keyed Shaft
32 mm Parallel shaft w/ key
DIN 6885; Key: A10x8x45
Flange: ISO 2-Bolt (125 mm)

1) ANSI B92.1a-1976, 30° pressure angle, flat root side fit, flank centering, tolerance class 5

Ports VPA10V(S)O-71

<table>
<thead>
<tr>
<th>Designation</th>
<th>Port For</th>
<th>Standard</th>
<th>Size</th>
<th>Peak Pressure [psi (bar)]</th>
<th>Tightening Torque Max [lbft (Nm)]</th>
<th>State</th>
</tr>
</thead>
</table>
| B           | Pressure port (standard pressure range) Threading in bolt holes | SAE J518 ISO 68 | 1 in (1” Code 61) ●
3/8-16 UNC-2B; 0.71 (18) deep
1 1/4 (1 1/4” Code 61) ●
7/16-14 UNC-2B; 0.94 (24) deep | 5100 (350) | 29 (40) | ○ |
| S           | Inlet port (standard pressure range) Threading in bolt holes | SAE J518 ISO 68 | 2 in (2” Code 61)
1/2-13 UNC-2B; 0.87 (22) deep | 75 (5) | 66 (90) | ○ |
| L, L1       | Case drain ports (L1 plugged) | ISO 11926 | 7/8-14 UNF-2B (SAE-10) | 30 (2) | 177 (240) | ○† |
| X           | Pilot pressure port | ISO 11926 | 7/8-14 UNF-2B; 0.39 (10) deep (SAE-4) | 5100 (350) | 29 (40) | ○ |
| X           | Control pressure for DG control | DIN 3852 | R 1/4 in | 1740 (120) | 48 (70) | ○ |

O = Must be connected (plugged on delivery)
1) Depending on the installation position, L or L1 must be connected (also see installation instructions on page 27).

ANFIELD Variable Piston Pump VPA10VSO / Rev. B (05/02/2022)

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21
**VPA10V(S)O-100**

**PORT BLOCK 62/12; N00**

- Flange SAE J744 127-2 (SAE C) Ø 127 mm (5”)
- Mounting Flange SAE C 2-Bolt
- Valve mounting for counter clockwise rotation

**PORT BLOCK 61/11; N00**

- Flange SAE J744 127-2 (SAE C) Ø 127 mm (5”)
- Valve mounting for counter clockwise rotation

**DIMENSIONS, SIZE 100, SERIES 31**

Service Ports on Side and Rear; Non Through Drive

Without Considering Adjustment

**VPA10VSO Series 31**

Variable Displacement Axial Piston Pump

**DIMENSIONS, SIZE 100, SERIES 31**

Service Ports on Side and Rear; Non Through Drive

Without Considering Adjustment

Model 11/12; N00

4x M14×2; 19 deep

Model 11/12; N00

4x M12 × 1.75; 17 deep

**PORT BLOCK 62/12; N00**

- Flange SAE J744 127-2 (SAE C) Ø 127 mm (5”)
- Mounting Flange SAE C 2-Bolt
- Valve mounting for counter clockwise rotation

**PORT BLOCK 61/11; N00**

- Flange SAE J744 127-2 (SAE C) Ø 127 mm (5”)
- Valve mounting for counter clockwise rotation

**USA: www.anfieldind.com**

**Canada: www.mpfiltricanada.com**
DIMENSIONS, SIZE 100, SERIES 31
Drive Shafts VPA10V(S)O-100

Drive Shafts VPA10V(S)O-100

K  SAE Parallel Keyed Shaft
1 1/2 in Parallel shaft with key
ISO 3019-1 38-1

S  SAE Splined Shaft
1 1/2 in 17T 12/24 DP1) SAE
J744 - 38-4 (C-C) 1)

U  SAE Splined Shaft, Smaller size
(Reduced diameter, not for through drive)
1 1/4 in 14T 12/24 DP1)
SAE J744 - 32-4 (C)

W  SAE Splined Shaft, Reinforced U-type shaft
1 1/4 in 14T 12/24 DP1)
SAE J744 - 32-4 (C)

P  Metric Parallel Keyed Shaft
40 mm Parallel shaft with key
DIN 6885; Key: A12×8×68
Flange: ISO 2-Bolt (125 mm)

1) ANSI B92.1a-1976, 30° pressure angle, flat root side fit, flank centering, tolerance class 5

Ports VPA10V(S)O-100

<table>
<thead>
<tr>
<th>Designation</th>
<th>Port For</th>
<th>Standard</th>
<th>Size</th>
<th>Peak Pressure [psi (bar)]</th>
<th>Tightening Torque Max [lbft (Nm)]</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Pressure port (standard pressure range)</td>
<td>SAE J518</td>
<td>1 1/4 in (1 1/4&quot; Code 62)</td>
<td>5100 (350)</td>
<td>66 (90)</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Threading in bolt holes</td>
<td>ISO 68</td>
<td>1/2-13 UNC-2B; 0.75 (19) deep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Inlet port (standard pressure range)</td>
<td>SAE J518</td>
<td>2 1/2 in (2 1/2&quot; Code 61)</td>
<td>75 (5)</td>
<td>66 (90)</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Threading in bolt holes</td>
<td>ISO 68</td>
<td>1/2-13 UNC-2B; 1.06 (17) deep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L, L1</td>
<td>Case drain ports (L1 plugged)</td>
<td>ISO 11926</td>
<td>1 1/16-12 UNF-2B (SAE-12)</td>
<td>30 (2)</td>
<td>265 (360)</td>
<td>O1)</td>
</tr>
<tr>
<td>X</td>
<td>Pilot pressure port</td>
<td>ISO 11926</td>
<td>7/16-20 UNF-2B; 0.39 (10) deep (SAE-4)</td>
<td>5100 (350)</td>
<td>59 (80)</td>
<td>O</td>
</tr>
<tr>
<td>X</td>
<td>Control pressure for DG control</td>
<td>DIN 3852</td>
<td>R 1/4 in</td>
<td>1740 (120)</td>
<td>59 (80)</td>
<td>O</td>
</tr>
</tbody>
</table>

O = Must be connected (plugged on delivery)
1) Depending on the installation position, L or L1 must be connected (also see installation instructions on page 27).
**VPA10VSO Series 31**

**Variable Displacement Axial Piston Pump**

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**DIMENSIONS, SIZE 140, SERIES 31**

**Service Ports on Side; Non Through drive, Models 62N00 and 12N00**

**Drive Shafts VPA10V(S)-140**

**Ports VPA10V(S)-140**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Port For</th>
<th>Standard</th>
<th>Size</th>
<th>Peak Pressure [psi (bar)]</th>
<th>Tightening Torque Max [lbft (Nm)]</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Pressure port (standard pressure range) Threading in bolt holes</td>
<td>SAE J518 ISO 68</td>
<td>1 1/4 in (1 1/4&quot; Code 62) 1/2-13 UNC-2B; 0.75 (24) deep</td>
<td>5100 (350)</td>
<td>66 (90)</td>
<td>○</td>
</tr>
<tr>
<td>S</td>
<td>Inlet port (standard pressure range) Threading in bolt holes</td>
<td>SAE J518 ISO 68</td>
<td>2 1/2 in (2 1/2&quot; Code 61) 1/2-13 UNC-2B; 0.94 (24) deep</td>
<td>75 (5)</td>
<td>66 (90)</td>
<td>○</td>
</tr>
<tr>
<td>L, L1</td>
<td>Case drain ports (L1 plugged)</td>
<td>ISO 11926</td>
<td>1 1/16-12 UNF-2B (SAE-12)</td>
<td>30 (2)</td>
<td>265 (360)</td>
<td>○¹</td>
</tr>
<tr>
<td>X</td>
<td>Pilot pressure port</td>
<td>ISO 11926</td>
<td>9/16-18 UNF-2B; 0.51 (13) deep (SAE-4)</td>
<td>5100 (350)</td>
<td>59 (80)</td>
<td>○</td>
</tr>
<tr>
<td>X</td>
<td>Control pressure for DG control</td>
<td>DIN 3852 M14 x 1.5; 0.47 (12) deep</td>
<td>1740 (120)</td>
<td>59 (80)</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

O = Must be connected (plugged on delivery)

1) Depending on the installation position, L or L1 must be connected (also see installation instructions on page 27).
THROUGH DRIVE MOUNTING OPTIONS

Shaft Torque Data

Axial piston units VPA10V can be supplied with a through drive as shown in the ordering code on page 32. The type of through drive is determined by codes (K40-K...). If the combination pump is not mounted in the factory, the simple type code is sufficient.

Maximum permissible input and through drive torque

The drive torques for pump 1 and pump 2 can be split up as required. However the max. permissible input torque $T_{tot}$ as well as the max. permissible through drive torque $T_{thr}$ may not be exceeded.

<table>
<thead>
<tr>
<th>Max. perm. input torque $T_{tot}$</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>With shaft $U$ $T_{tot}$ lb.ft (Nm)</td>
<td>43 (59)</td>
<td>- (-)</td>
<td>139 (188)</td>
<td>- (-)</td>
<td>439 (595)</td>
<td>- (-)</td>
</tr>
<tr>
<td>With shaft $K$ $T_{tor}$ lb.ft (Nm)</td>
<td>77 (104)</td>
<td>107 (145)</td>
<td>156 (212)</td>
<td>319 (433)</td>
<td>553 (750)</td>
<td>875 (1186)</td>
</tr>
<tr>
<td>With shaft $S$ $T_{tor}$ lb.ft (Nm)</td>
<td>92 (124)</td>
<td>146 (198)</td>
<td>235 (319)</td>
<td>462 (626)</td>
<td>814 (1104)</td>
<td>1195 (1620)</td>
</tr>
<tr>
<td>With shaft $R$ $T_{tor}$ lb.ft (Nm)</td>
<td>111 (150)</td>
<td>166 (225)</td>
<td>295 (400)</td>
<td>475 (644)</td>
<td>- (-)</td>
<td>- (-)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. perm. through drive torque $T_{thr}$</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>With shaft $K$ $T_{thr}$ lb.ft (Nm)</td>
<td>77 (104)</td>
<td>107 (145)</td>
<td>156 (212)</td>
<td>319 (433)</td>
<td>553 (750)</td>
<td>875 (1186)</td>
</tr>
<tr>
<td>With shaft $S$ $T_{thr}$ lb.ft (Nm)</td>
<td>80 (108)</td>
<td>118 (160)</td>
<td>235 (319)</td>
<td>363 (492)</td>
<td>574 (778)</td>
<td>934 (1266)</td>
</tr>
<tr>
<td>With shaft $R$ $T_{thr}$ lb.ft (Nm)</td>
<td>88 (120)</td>
<td>130 (176)</td>
<td>269 (365)</td>
<td>404 (548)</td>
<td>- (-)</td>
<td>- (-)</td>
</tr>
<tr>
<td>Keyed shaft $T_{thr}$ keyed lb.ft (Nm)</td>
<td>53 (72)</td>
<td>83 (112)</td>
<td>132 (178)</td>
<td>209 (283)</td>
<td>293 (398)</td>
<td>411 (557)</td>
</tr>
</tbody>
</table>

$T_{tot} =$ max. permissible input torque pump 1
$T_{thr} =$ max. permissible through drive torque
$T_{thr}$ keyed = max. permissible through drive torque at through drive to keyed shaft

Permissible overhang moment

$$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{12} \quad [\text{lb.ft.}]$$

$$... \cdot \frac{1}{102} \quad [\text{Nm}]$$

<table>
<thead>
<tr>
<th>Size</th>
<th>18</th>
<th>28</th>
<th>45</th>
<th>71</th>
<th>100</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible overhang moment $T_m$ lb.ft. (Nm)</td>
<td>369 (500)</td>
<td>649 (880)</td>
<td>1010 (1370)</td>
<td>1593 (2160)</td>
<td>2213 (3000)</td>
<td>3319 (4500)</td>
</tr>
<tr>
<td>at dyn. acceleration $10g = 98.1 \text{ m/s}^2$</td>
<td>37 (50)</td>
<td>65 (88)</td>
<td>101 (137)</td>
<td>159 (216)</td>
<td>221 (300)</td>
<td>332 (450)</td>
</tr>
<tr>
<td>Weight $m$ lbs (kg)</td>
<td>26.5 (12)</td>
<td>33 (15)</td>
<td>46 (21)</td>
<td>73 (33)</td>
<td>99 (45)</td>
<td>132 (60)</td>
</tr>
<tr>
<td>Distance to center of gravity $l_1$ in (mm)</td>
<td>3.54 (90)</td>
<td>4.33 (110)</td>
<td>5.12 (130)</td>
<td>5.91 (150)</td>
<td>6.30 (160)</td>
<td>6.30 (160)</td>
</tr>
</tbody>
</table>
THROUGH DRIVE MOUNTING OPTIONS

<table>
<thead>
<tr>
<th>Through Drives - VPA10V</th>
<th>Code</th>
<th>Mounting Options - 2nd Pump</th>
<th>Available on size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through Drives - VPA10V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flange SAE J744</td>
<td>Hub</td>
<td>Keyed</td>
<td>Code</td>
</tr>
<tr>
<td>82-2 (A)</td>
<td>keyed (A-B)</td>
<td>K40</td>
<td>18 (K)</td>
</tr>
<tr>
<td>101-2 (B)</td>
<td>keyed (B)</td>
<td>K03</td>
<td>28 (K)</td>
</tr>
<tr>
<td>101-2 (B-B)</td>
<td>keyed (B-B)</td>
<td>K05</td>
<td>45 (K)</td>
</tr>
<tr>
<td>127-2 (C)</td>
<td>keyed (C)</td>
<td>K08</td>
<td>71 (K)</td>
</tr>
<tr>
<td>127-2 (C)</td>
<td>keyed (C)</td>
<td>K38</td>
<td>100 (K)</td>
</tr>
<tr>
<td>152-4 (D)</td>
<td>keyed (D)</td>
<td>K21</td>
<td>140 (K)</td>
</tr>
</tbody>
</table>

SAE J744 Splined

<table>
<thead>
<tr>
<th>SAE J744</th>
<th>Splined</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-2 (A)</td>
<td>5/8 in (A)</td>
</tr>
<tr>
<td>82-2 (A)</td>
<td>3/4 in (A-B)</td>
</tr>
<tr>
<td>101-2 (B)</td>
<td>7/8 in (B)</td>
</tr>
<tr>
<td>101-2 (B)</td>
<td>1 in (B-B)</td>
</tr>
<tr>
<td>127-2 (C)</td>
<td>1 1/4 in (C)</td>
</tr>
<tr>
<td>127-2 (C)</td>
<td>1 1/2 in (C-C)</td>
</tr>
<tr>
<td>152-4 (D)</td>
<td>1 3/4 in (D)</td>
</tr>
</tbody>
</table>

1) Not with K08 through drive on main pump size 28
2) Not with K04 through drive on main pump size 45
3) Not with K07 through drive on main pump size 71

DIMENSIONS OF THROUGH DRIVES

K01 Flange - SAE J744 82-2 (SAE A) Ø 82.55 mm

K01 Mounting Flange 82-2 (SAE-A) Hub for splined shaft 1) 5/8 in 9T 16/32DP (SAE A)

Can use with VPA10V18(S,R)

<table>
<thead>
<tr>
<th>Size</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>7.17 (182)</td>
<td>0.39 (10)</td>
<td>1.70 (43.3)</td>
<td>M10; 0.57 (14.5) deep</td>
</tr>
<tr>
<td>28</td>
<td>8.03 (204)</td>
<td>0.39 (10)</td>
<td>1.33 (33.7)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
<tr>
<td>45</td>
<td>9.02 (229)</td>
<td>0.42 (10.7)</td>
<td>2.10 (53.4)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
<tr>
<td>100</td>
<td>13.80 (350)</td>
<td>0.43 (10.8)</td>
<td>3.04 (77.3)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
<tr>
<td>140</td>
<td>13.80 (350)</td>
<td>0.43 (10.8)</td>
<td>3.04 (77.3)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
</tbody>
</table>

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to DIN 13, see instruction manual for maximum tightening torques.
DIMENSIONS OF THROUGH DRIVES

**K52 Flange - SAE J744 82-2 (SAE A) Ø 82.55 mm**

<table>
<thead>
<tr>
<th>Size</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4²</th>
</tr>
</thead>
<tbody>
<tr>
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<td>7.17 (182)</td>
<td>0.74 (18.8)</td>
<td>1.52 (38.7)</td>
<td>M10; 0.57 (14.5) deep</td>
</tr>
<tr>
<td>28</td>
<td>8.03 (204)</td>
<td>0.74 (18.8)</td>
<td>1.52 (38.7)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
<tr>
<td>45</td>
<td>9.02 (229)</td>
<td>0.74 (18.9)</td>
<td>1.52 (38.7)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
<tr>
<td>71</td>
<td>10.50 (267)</td>
<td>0.84 (21.3)</td>
<td>1.63 (41.4)</td>
<td>M10; 0.79 (20) deep</td>
</tr>
<tr>
<td>100</td>
<td>13.30 (338)</td>
<td>0.75 (19)</td>
<td>1.53 (38.9)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
<tr>
<td>140</td>
<td>13.80 (350)</td>
<td>0.74 (18.9)</td>
<td>1.52 (38.6)</td>
<td>M10; 0.63 (16) deep</td>
</tr>
</tbody>
</table>

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to DIN 13, see instruction manual for maximum tightening torques.

**K68 Flange - SAE J744 101-2 (SAE B) Ø 101.6 mm**

<table>
<thead>
<tr>
<th>Size</th>
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<th>A3</th>
<th>A4²</th>
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<tr>
<td>28</td>
<td>8.03 (204)</td>
<td>0.70 (17.8)</td>
<td>1.64 (41.7)</td>
<td>M12; ³</td>
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<td>9.02 (229)</td>
<td>0.70 (17.9)</td>
<td>1.64 (41.7)</td>
<td>M12; 0.71 (18) deep</td>
</tr>
<tr>
<td>71</td>
<td>10.50 (267)</td>
<td>0.70 (17.9)</td>
<td>1.64 (41.7)</td>
<td>M12; 0.71 (18) deep</td>
</tr>
<tr>
<td>100</td>
<td>13.30 (338)</td>
<td>0.71 (18)</td>
<td>1.65 (41.9)</td>
<td>M12; 0.79 (20) deep</td>
</tr>
<tr>
<td>140</td>
<td>13.80 (350)</td>
<td>0.70 (17.8)</td>
<td>1.64 (41.6)</td>
<td>M12; 0.79 (20) deep</td>
</tr>
</tbody>
</table>

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to DIN 13, see instruction manual for maximum tightening torques.
3) Continuous

**K04 Flange - SAE J744 101-2 (SAE B) Ø 101.6 mm**

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<td>1.81 (45.1)</td>
<td>M12; 0.79 (20) deep</td>
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</table>

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to DIN 13, see instruction manual for maximum tightening torques.
DIMENSIONS OF THROUGH DRIVES

K07 Flange - SAE J744 127-2 (SAE C) Ø 127 mm

K07 Mounting Flange 127-2 (SAE C)  Hub for splined shaft 1 1/4 in 14T 12/24DP (SAE C)

<table>
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<td>2.21 (56.1)</td>
<td>M16; 0.94 (24) deep</td>
</tr>
</tbody>
</table>

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to DIN 13, see instruction manual for maximum tightening torques.
3) Continuous

K24 Flange - SAE J744 127-2 (SAE C) Ø 127 mm

K24 Mounting Flange 127-2 (SAE C)  Hub for splined shaft 1 1/2 in 17T 12/24DP (SAE C-C)

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<tr>
<td>140</td>
<td>13.80 (350)</td>
<td>0.38 (9.7)</td>
<td>-</td>
<td>2.72 (69.1)</td>
<td>M16; 0.94 (24) deep</td>
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</table>

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to DIN 13, see instruction manual for maximum tightening torques.
3) Continuous

K17 Flange - SAE J744 152-4 (SAE D) Ø 152.4 mm

K17 Mounting Flange 152-4 (SAE D)  Hub for splined shaft 1 3/4 in 13T 8/16DP (SAE D)

<table>
<thead>
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<th>A4³</th>
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<tbody>
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<td>0.53 (11)</td>
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</tbody>
</table>

Only available with housing with mounting flange D.
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to DIN 13, see instruction manual for maximum tightening torques.
3) Continuous
PERFORMANCE DATA - DRIVE POWER AND FLOW

Size 18

Operating at
\[ n = 1800 \text{ rpm} \]
\[ n_{\text{max}} = 3300 \text{ rpm} \]

Q Flow
P Power

Size 28

Operating at
\[ n = 1500 \text{ rpm} \]
\[ n = 1800 \text{ rpm} \]
\[ n_{\text{max}} = 3300 \text{ rpm} \]

Q Flow
P Power

Size 45

Operating at
\[ n = 1500 \text{ rpm} \]
\[ n = 1800 \text{ rpm} \]
\[ n_{\text{max}} = 2600 \text{ rpm} \]

Q Flow
P Power
PERFORMANCE DATA - DRIVE POWER AND FLOW

Size 71

Operating at
\[ n = 1500 \text{ rpm} \]
\[ n = 1800 \text{ rpm} \]
\[ n_{\text{max}} = 2200 \text{ rpm} \]

Q Flow
P Power

Size 100

Operating at
\[ n = 1500 \text{ rpm} \]
\[ n = 1800 \text{ rpm} \]
\[ n_{\text{max}} = 2200 \text{ rpm} \]

Q Flow
P Power
PERFORMANCE DATA - DRIVE POWER AND FLOW

Size 140

**Operating at**

<table>
<thead>
<tr>
<th>Flow Rate</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n = 1500 \text{ rpm} )</td>
<td>50</td>
</tr>
<tr>
<td>( n_{\text{max}} = 1800 \text{ rpm} )</td>
<td>100</td>
</tr>
</tbody>
</table>

**Flow**

1 gallon/minute [gpm] = 3.7854 liters/minute [lpm]
1 liters/minute [lpm] = 0.26417 gallon/minute [gpm]

**Pressure**

1 pounds/square inch [psi] = 0.06895 [bar]
1 [bar] = 14.5038 pounds/square inch [psi]

**Power**

1 horsepower [HP] = 0.7457 kilowatt [kW]
1 kilowatt [kW] = 1.3410 horsepower [hp]

**Efficiency**

**Total efficiency**

\[ n_t = \frac{Q \times p}{P_{\text{max}} \times 1714(600)^*} \]

**Volumetric efficiency**

\[ n_v = \frac{Q_{\text{act}}}{Q_{\text{theor}}} \]

* **Imperial:** \( Q \) (gpm), \( p \) (psi), \( P \) (hp)
  Use 1714
* **Metric:** \( Q \) (lpm), \( p \) (bar), \( P \) (kW)
  Use 600
**NOISE LEVEL**

**Characteristics for pump**
- Measured in an sound chamber
- Distance from microphone to pump = 3.3 ft (1m)

**Measuring error:** + 2 dB(A)

Hydraulic oil to ISO VG 46 DIN 51519, t=122° F(50°C)

---

### SIZE 18

<table>
<thead>
<tr>
<th>Operating Pressure (p)</th>
<th>Noise Level LA [dB (A)]</th>
</tr>
</thead>
<tbody>
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<tr>
<td>100</td>
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<tr>
<td>250</td>
<td>68</td>
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<tr>
<td>280</td>
<td>70</td>
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</tbody>
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<th>Operating Pressure (p)</th>
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<td>250</td>
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<td>250</td>
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</tr>
<tr>
<td>280</td>
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</tbody>
</table>

*Sound data representative of piston pumps of this design.*

**ANFIELD** Variable Piston Pump VPA10VSO / Rev. B (05/02/2022)
PUMP INSTALLATION NOTES

Optional installation position. The pump housing must be filled with fluid during commissioning and remain full when operating. In order to attain the lowest noise level, all connections (suction, pressure, case drain ports) must be linked by flexible couplings to tank. Avoid placing a check valve in the case drain line. This may, however, be permissible in individual cases, after consultation with us.

1. Vertical installation (shaft end upwards)
The following installation conditions must be taken into account:

1.1. Arrangement in tank
Before installation fill pump housing, keeping it in a horizontal position.
   a) If the minimum fluid level is equal to or above the pump mounting surface leave ports “L”, “L1” and “S” open (see Fig. 1).
   b) If the minimum fluid level is below the pump mounting surface pipe port “L1”, and possibly “S” according to Fig. 2. Close port “L” with respect to conditions in 1.2.1.

1.2. Arrangement outside tank
Before installation fill pump housing, keeping it in a horizontal position. For mounting above tank see Fig. 2.
   Limiting condition:
   1.2.1. Minimum pump inlet pressure $p_{\text{inlet min}} = 0.8$ bar under static and dynamic loading.
   Note: Avoid mounting above tank wherever possible in order to attain a low noise level.
   pressure loss, but may not be greater than $h_{\text{max}} = 800$ mm (immersion depth $h_{\text{min}} = 200$ mm).

   The permissible suction height $h$ is a result of the overall Total pressure loss $\Delta p_{\text{total}} = \Delta p_1 + \Delta p_2 + \Delta p_3 \leq (1 - p_{\text{inlet min}}) = 0.2$ bar
   $\Delta p_1$: Pressure loss in pipe due to accelerating column of fluid
   $\Delta p_1 = \rho \cdot l \cdot \frac{dv}{dt} \cdot 10^{-5}$ (bar) $\rho = \text{density (kg/m}^3)$
   $l = \text{pipe length (m)}$
   $\frac{dv}{dt} = \text{change in rate of suction (m/s)}$

   $\Delta p_2$: Pressure loss due to static head
   $\Delta p_2 = h \cdot \rho \cdot g \cdot 10$ (bar) $h = \text{height (m)}$
   $\rho = \text{density (kg/m}^3)$
   $g = \text{acc. due to gravity} = 9.81 \text{ m/s}$

   $\Delta p_3$: Line losses (elbows etc.)

Horizontal installation
The pump must be installed so that either “L” or “L1” is at the top.

2.1. Arrangement in tank
a) If the minimum fluid level is above the top of the pump leave ports “L”, “L1” and “S” open (see Fig. 3)
   b) If the minimum fluid level is equal to or below the top of the pump pipe ports “L”, “L1” and possibly “S” according to Fig. 4. Conditions according to 1.2.1.

2.2. Arrangement outside tank

Fill pump housing before commissioning.
Pipe port “S” and the higher of the two case drain ports “L” and “L1”.
   a) For mounting above tank see Fig. 4. Conditions according to 1.2.1.
   b) Position below tank

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5
Strength in Products, Strength in Service

- Pressure Switches
- Temperature Switches
- Differential Switches
- Level Switches
- Vacuum Switches
- Transducers
- Gear Pumps
- Vane Pumps
- Dump Pumps
- Variable Piston Pumps
- Orbital Motors
- Vane Motors
- Gear Motors
- Monoblock Valves
- High Pressure Ball Valves
- Flow Controls & Needle Valves
- Drive Couplings
- Flanges
- Gauges
- Test Points