Axial piston pumps type PVPC
variable displacement, by a full line of mechanical controls

PVPC are variable displacement axial piston pumps for high pressure operation, with low noise level, suitable for hydraulic oils or synthetic fluids having similar lubricating characteristics. The actual displacement is dependent on the length of stroke of the pumping pistons. This length of stroke is determined by the position of the swash plate that is achieved by two servo pistons with differential areas, against a spring. The rotating barrel forces the pistons in a circular path in and out of the barrel and fluid displacement takes place.

Typical section on side shows version L with manual pressure compensator and flow regulation. The available hydraulic controls are shown in sections [8]. The wide range of electrohydraulic proportional controls is shown in tab. 1.70. SAE J744 mounting flange and shaft (see note 1).

Max displacement: 29-46-73-88 cm³/rev.
Max pressure: 280 bar working 350 bar peak.

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>PVPC</th>
<th>X2E - C - 4 / 31044 / 1 - D - X</th>
<th>24DC 10 /</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable displacement axial piston pump</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional suffix for pumps with through shaft:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XA = intermediate flange SAE A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XB = intermediate flange SAE B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XC = intermediate flange SAE C (only for size 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional suffix for double pumps:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XE = with a fixed displacement pump type PFE (see tab. A005)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = for displacement 029</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 = for displacement 046</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = for displacement 073 and 090</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Type of control (see section [8]):
C = manual pressure compensator
CH = manual pressure compensator, with venting
R = remote pressure compensator
L = load sensing (pressure & flow)
LV = constant power (combined pressure & flow)

External load position:
F_{ax} = axial load
F_{rad} = radial load

Notes:
For speeds over 1800 rpm the inlet port must be under oil level with adequate pipes.
Maximum pressure for all models with water glycol fluid is 160 bar, with option PFE is 190 bar.
Max speed with options PFE and for water glycol fluid is 2000/1900/1800/1500 rpm respectively for the four sizes.
3 MAIN CHARACTERISTICS OF VARIABLE DISPLACEMENT AXIAL PISTON PUMP TYPE PVPC

Installation position
Any position. The drain port must be on the top of the pump. Drain line must be separated and unrestricted to the reservoir and extended below the oil level as far from the inlet as possible. Suggested maximum line length is 3 m.

Ambient temperature
from -20°C to +70°C

Fluid
Hydraulic oil as per DIN 51524...535, for other fluids see section 1

Recommended viscosity
15÷100 mm²/sec at 40°C (ISO VG 15÷100). Maximum start-up viscosity: 1000 mm²/sec

Fluid contamination class
ISO 4401 class 21/19/16 NAS 1638 class 10 (filters at 25 µm value with 825 ≥ 75 recommended)

Fluid temperature
-20°C +60°C, -20°C +50°C (water glycol), -20°C +80°C (seals PE)

3.1 Coils characteristics (for version CH)

<table>
<thead>
<tr>
<th>Insulation class</th>
<th>Connector protection degree</th>
<th>Relative duty factor</th>
<th>Supply voltage and frequency</th>
<th>Supply voltage tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>IP 65</td>
<td>100%</td>
<td>See electric feature</td>
<td>± 10%</td>
</tr>
</tbody>
</table>

4 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 FOR VERSION CH

The connectors must be ordered separately

Code of connector | Function
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-666</td>
<td>Connector IP-65, suitable for direct connection to electric supply source</td>
</tr>
<tr>
<td>SP-667</td>
<td>As SP-666 connector IP-65 but with built-in signal led, suitable for direct connection to electric supply source</td>
</tr>
</tbody>
</table>

5 ELECTRIC FEATURES FOR VERSION CH

<table>
<thead>
<tr>
<th>External supply nominal voltage ±10%</th>
<th>Power consumption</th>
<th>Nominal current</th>
<th>Coil characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIRECT CURRENT</td>
<td>12 DC</td>
<td>1,61 A</td>
<td>Insulation Class:</td>
</tr>
<tr>
<td></td>
<td>24 DC</td>
<td>0,80 A</td>
<td>H</td>
</tr>
<tr>
<td>ALTERNATE CURRENT</td>
<td>24/50 AC</td>
<td>0,89 A</td>
<td>Protection degree:</td>
</tr>
<tr>
<td></td>
<td>110/50 AC</td>
<td>0,19 A</td>
<td>IP65</td>
</tr>
<tr>
<td></td>
<td>220/50 AC</td>
<td>0,09 A</td>
<td></td>
</tr>
</tbody>
</table>

Average values based ambient/coil temperature of 20°C.

6 INSTALLATION POSITION

The pump is supplied with drain D2 open, and D1 plugged. Before installation fill the pump with hydraulic oil for at least 3/4 of its volume, keeping it in horizontal position. With exception of pump mounted below the oil level, we recommend to interpose a baffle plate between inlet and drain line.

INSIDE THE TANK
Minimum oil level equal or above the pump mounting surface. A ≥ 200mm

OUTSIDE THE TANK, above oil level
Minimum initial pressure = 0,9 bar absolute
B ≤ 800mm, C= 200mm

OUTSIDE THE TANK, below oil level
Minimum initial pressure = 0,8 bar (absolute)
B ≤ 800mm, C= 200mm

IN: inlet line - D1: drain line - A: minimum distance between inlet and drain line - B+C: permissible suction height - C: inlet line immersion dept
7.1 Noise level curves
Ambient noise levels measured in compliance with ISO 4412-1 oleohydraulics - Test procedure to define the ambient noise level - Pumps
Shaft speed: 1450 rpm.

\[ \bar{Q}_{\text{max}} = \bar{Q}_{\text{min}} \]

7.2 Operating limits
- Volumetric efficiency
- Overall efficiency
- Flow versus pressure curve
- Power consumption with full flow
- Power consumption at pressure compensation

7.3 Response times
7.3.1 Response times and pressure peak due to variation 0% Ø 100% Ø 0% of the pump displacement, obtained with an instantaneously opening and shut-off of the delivery line.

<table>
<thead>
<tr>
<th>Pump type</th>
<th>T1 (ms)</th>
<th>T2 (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVPC-^*3029</td>
<td>31</td>
<td>19</td>
</tr>
<tr>
<td>PVPC-^*4046</td>
<td>44</td>
<td>20</td>
</tr>
<tr>
<td>PVPC-^*5073</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>PVPC-^*5090</td>
<td>53</td>
<td>28</td>
</tr>
</tbody>
</table>

7.3.2 Variation of inlet pressure and reduction of displacement with increasing speed rating
**Manual pressure compensator**

The pump displacement decreases when the line pressure approaches the setting pressure of the compensator. The pump supplies only the fluid required by the system. Pressure may be steplessly adjusted at the pilot valve.

Compensator setting range: 20 ÷ 350 bar (315 bar for 090)
Compensator standard setting: 280 bar (250 bar for 090)

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**Remote pressure compensator**

As C, but with remote setting of the compensator by means of a pressure relief valve on the piloting line X. This version can be obtained from version L using a blind plug UNI 5923 M4x12 in pos. ① and a restrictor M4 drilled ø 0.75 mm in pos. ②.

Compensator setting range: 20 ÷ 350 bar (315 bar for 090)
Compensator standard setting: 280 bar (250 bar for 090)

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**Load sensing**

The pump displacement is automatically adjusted to maintain a constant (load independent) pressure drop across an external throttle. Changing the throttle regulation, the pump flow is consequently adjusted.

Load sensing control always incorporates an hydraulic compensator to limit the maximum pressure.

Compensator setting range: 20 ÷ 350 bar (315 bar for 090)
Compensator standard setting: 280 bar (250 bar for 090)
Differential pressure setting range: 10 ÷ 40 bar
Differential pressure standard setting: 14 bar

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**Constant power**

In order to achieve a constant drive torque with varying operating pressure. The swashing angle and therefore the outlet flow is varied so that the product of flow and pressure remains constant.

For the best regulation, minimum working pressure is 80 bar.
While selecting LW control, the required value of power must be communicated with the order (ex. 10 kW at 1450 rpm).
PORTS DIMENSION
IN = Flange SAE 3000 1 1/4"
OUT = Flange SAE 6000 3/4"
D1, D2 = 1/2" BSPF

1 = Regulation screw for max displacement 1.5 cm³/rev per turn. Adjustable range 50% to 100% of max displacement.
In case of double pump the regulation screw is not always available, please contact our technical office.

Mass: 18 kg

INTERMEDIATE FLANGE SAE “A” FOR PFE-31
INTERMEDIATE FLANGE SAE “B” FOR PFE-41

Drawing shows pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted.
PORTS DIMENSION

IN = Flange SAE 3000 1 1/2”
OUT = Flange SAE 6000 1”

D1, D2 = 1/2” BSP PP

= Regulation screw for max displacement 2.2 cm³/rev per turn. Adjustable range 50% to 100% of max displacement.
In case of double pump the regulation screw is not always available, please contact our technical office.

SHAFT TYPE “1”

SAE “B” SPLINED
15 TEETH 16/32 PITCH
30˚ INVOLUTE SPINE

SHAFT TYPE “5”

INTERMEDIATE FLANGE SAE “A” FOR PFE-31

SAE “A” SPLINED
9 TEETH 16/32 PITCH
135 Nm MAX

INTERMEDIATE FLANGE SAE “B” FOR PFE-41

SAE “B” SPLINED
13 TEETH 16/32 PITCH
250 Nm MAX

Drawing shows pumps with clockwise rotation (option D): pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted
DIMENSIONS OF PVPC-^5073 and PVPC-^5090: BASIC VERSION “C” CONTROL

PORTS DIMENSION
IN = Flange SAE 3000 2”
OUT = Flange SAE 6000 1 1/4”
D1, D2 = 3/4” BSPP
① = Regulation screw for max displacement 9.2 cm/rev per turn.
Adjustable range 50% to 100% of max displacement.
In case of double pump the regulation screw is not always available, please contact our technical office.

INLET PORT
IN
INLET PORT
OUT
OUT
DRAIN PORT
DRAIN PORT

SHAFT TYPE “1”
SHAFT TYPE “5”

INTERMEDIATE FLANGE SAE “A” FOR PFE-31

INTERMEDIATE FLANGE SAE “B” FOR PFE-41

INTERMEDIATE FLANGE SAE “C” FOR PFE-51

Mass: 33 kg

Drawing shows pumps with clockwise rotation (option D); pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted.
In case of double pump the regulation screw is not always available, please contact our technical office.

Drawing shows pumps with clockwise rotation (option D); pumps with counterclockwise rotation (option S) will have inlet and outlet ports inverted and also the consequently position of the control groups.

<table>
<thead>
<tr>
<th>Pump type</th>
<th>Version</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVPC-*3029</td>
<td>CH</td>
<td>144</td>
<td>111</td>
<td>-</td>
<td>-</td>
<td>102</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>L-R</td>
<td>144</td>
<td>111</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>19.2</td>
</tr>
<tr>
<td></td>
<td>LW</td>
<td>144</td>
<td>111</td>
<td>-</td>
<td>211</td>
<td>104</td>
<td>20</td>
</tr>
<tr>
<td>PVPC-*4046</td>
<td>CH</td>
<td>153</td>
<td>111</td>
<td>-</td>
<td>-</td>
<td>102</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>L-R</td>
<td>153</td>
<td>111</td>
<td>109</td>
<td>-</td>
<td>-</td>
<td>25.2</td>
</tr>
<tr>
<td></td>
<td>LW</td>
<td>153</td>
<td>111</td>
<td>-</td>
<td>235</td>
<td>111</td>
<td>26</td>
</tr>
<tr>
<td>PVPC-*5073</td>
<td>CH</td>
<td>166</td>
<td>111</td>
<td>-</td>
<td>-</td>
<td>102</td>
<td>36.9</td>
</tr>
<tr>
<td></td>
<td>L-R</td>
<td>166</td>
<td>111</td>
<td>122</td>
<td>-</td>
<td>-</td>
<td>34.2</td>
</tr>
<tr>
<td></td>
<td>LW</td>
<td>166</td>
<td>111</td>
<td>-</td>
<td>258</td>
<td>129</td>
<td>35</td>
</tr>
</tbody>
</table>