Variable Vane Pump
Type V4 / Series 2X, 3X and 4X
with controls

- variable displacement
- low noise level
- good bearing life by virtue of hydrodynamically lubricated plain bearings
- bronze-coated start and control plates giving good frictional characteristics
- single control device for all sizes (C, D W and E)
- optional control of pressure and flow
- low hysteresis
- very short control times
- high reliability by virtue of automatic bleeding
- test point
- can also be supplied as combination pump

Table of Contents

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional description, section, symbols</td>
<td>2</td>
</tr>
<tr>
<td>Controls</td>
<td>3</td>
</tr>
<tr>
<td>Ordering codes, preferred types</td>
<td>4</td>
</tr>
<tr>
<td>Size codes</td>
<td>5</td>
</tr>
<tr>
<td>Operating curves (average values)</td>
<td>6 / 7</td>
</tr>
<tr>
<td>Noise levels (average values)</td>
<td>8 / 9</td>
</tr>
<tr>
<td>Test set-up, dynamic characteristics</td>
<td>10</td>
</tr>
<tr>
<td>Installation notes</td>
<td>11</td>
</tr>
<tr>
<td>Unit dimensions</td>
<td>12 / 13</td>
</tr>
<tr>
<td>Control programme</td>
<td>14 to 19</td>
</tr>
<tr>
<td>Combination pump</td>
<td>20</td>
</tr>
</tbody>
</table>
Hydraulic pumps type V4 are variable displacement vane pumps.

Construction
They basically consist of the housing (1), the rotor (2), vanes (3), stator ring (4), pressure regulator (5), setting screw (6), automatic bleed valve (7) and cover (17).

The circular stator ring is held between the small positioning piston (10) and the large positioning piston (11). The third contact point for the ring is the height adjustment screw (13).

The rotor (2) rotates inside the stator ring (4). The vanes within the rotor (3) are pressed against the stator ring (4) by centrifugal force.

Pressure control
System pressure is fed continuously to the back of the small positioning piston (10) via an internal a channel.

As pressure builds up in the system, oil flows via the drilling in the pressure control spool (14) into the chamber behind piston (11). Pressure behind the large piston (11) then holds the stator ring (4) in the offset position.

At all pressures below the stall pressure set on the pressure controller (5). Control spool (14) is held down by the spring (15). This causes system pressure to pass to the rear of the large positioning piston (11) holding the stator ring (4) in the pumping position.

Removal of the plug (16) allows the automatic bleed valve point to be used as a test point.

Suction and pumping process
Chambers (8) required for transportation of the fluid are formed by the vanes (3), the rotor (2), the stator ring (4), the control plate (9.1) and the cover plate (9.2).

To ensure the operation of the pump on start-up the stator ring (4) is held in the eccentric position (maximum displacement position) by spring (12) behind the large positioning piston (11).

As the rotor rotates, chambers (8) increase in size due to the rotation of the rotor (2) and at the same time fill with fluid via the suction channel (S).

When maximum chamber volume is reached chambers (8) are disconnected from the suction port. As the rotor (2) continues to rotate they are connected to the pressure port, become smaller and pump oil into the system via the pressure channel (P).

Symbols

- **P**: System pressure
- **S**: Suction
- **L**: Oil

Principal Parts
1 Housing
2 Rotor
3 Vane
4 Stator ring
5 Pressure controller
10 Small positioning piston
11 Large positioning piston
13 Height adjustment screw
17 Cover

Single pump

Pump combination
Control (decreasing flow)

If force $F_P$ arising from the product of $P$ (pressure) x $A$ (area) exceeds counter force $F_F$ of the spring, control piston (14) will be moved against the spring (15). In this way the area behind the large positioning piston (11) is connected to tank and is therefore at zero pressure.

The small positioning piston (10) which is constantly under system pressure moves the stator ring (4) into almost mid-position. The pump maintains the pressure, at almost zero flow, with only leakage losses being replaced.

Control (increasing flow)

When the pressure in the system falls below the set stall pressure, spring (15) pushes the control spool (14) back into its original position.

This reaction means that power losses and heating of the fluid are kept at a low level.

As adjustment of the stator ring (4) takes place hydraulically the flow/pressure curve is vertical and moves parallel to the axes of the performance curve as higher pressures are set.

The large positioning piston (11) is now pressurised and moves the stator ring (4) into the eccentric position causing fluid to flow into the system.
**Ordering Code, Preferred Types**

<table>
<thead>
<tr>
<th>Series</th>
<th>Size</th>
<th>Code</th>
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<tbody>
<tr>
<td>Series 20 to 29</td>
<td>20</td>
<td>1PV2V4-2X/R 20RA01MC1-16A1 584 653</td>
</tr>
<tr>
<td>Series 30 to 39</td>
<td>30</td>
<td>1PV2V4-3X/R 32RA01MC1-16A1 584 655</td>
</tr>
<tr>
<td>Series 40 to 49</td>
<td>40</td>
<td>1PV2V4-4X/R 50RA01MC1-16A1 585 159</td>
</tr>
<tr>
<td>Series 32 to 39</td>
<td>32</td>
<td>1PV2V4-3X/R 80RA37MC1-16A1 585 039</td>
</tr>
<tr>
<td>Series 40 to 49</td>
<td>40</td>
<td>1PV2V4-4X/R 125RA07MC1-16A1 584 657</td>
</tr>
</tbody>
</table>

**Preferred types = available ex stock**

<table>
<thead>
<tr>
<th>Type</th>
<th>Ordering code</th>
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<tbody>
<tr>
<td>1PV2V4-2X/20RA01MC1-16A1</td>
<td>584 653</td>
</tr>
<tr>
<td>1PV2V4-3X/32RA01MC1-16A1</td>
<td>584 655</td>
</tr>
<tr>
<td>1PV2V4-2X/50RA01MC1-16A1</td>
<td>585 159</td>
</tr>
<tr>
<td>1PV2V4-3X/80RA37MC1-16A1</td>
<td>585 039</td>
</tr>
<tr>
<td>1PV2V4-4X/125RA07MC1-16A1</td>
<td>584 657</td>
</tr>
</tbody>
</table>

**Further details in clear text**

1  = automatic bleed valve

2  = Displacement control without setting screw for displacement control

3  = with setting screw for displacement control

4  = Stall pressure range

5  = up to 160 bar

6  = optimum range 40 to 160 bar

7  = Other stall pressure settings

8  = Details in clear text

9  = Control settings

3  = setting screw

4  = lockable rotary hand knob with scale

5  = lockable rotary hand knob with scale and K-plate for start at lowest stall pressure (refer page 16)

9  = Controls

C  = Pressure control with mechanical pressure setting

D  = Pressure control with remote hydraulic pressure setting

W  = Pressure control with electrical 2 stage pressure setting

E  = Pressure control with electrical remote pressure setting

M  = NBR-seals, suitable for use with mineral oils (HLP) to DIN 51 524 part 2

V  = Viton-seals, suitable for use with phosphate-ester (HFD-R)

Please note the data on fluids published in our data sheet RE 07 075

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**Sample order**

1. **Standard pump**

   1PV2V4-3X/32RA01MC1-16A1

   (Flow Q_max bei 1450 min^-1/10 bar

   46.4 L/min; p_{stall} = 160 bar)

2. **Pump with settings specified by customers**

   1PV2V4-3X/80RA37MD1-16A1

   Details in clear text:

   Q_max = 60 L/min p_{stall} = 100 bar

   Pump set at required flow and stall pressure values.

   Optimum operating noise level set for required stall pressure.

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1) Size 50 from Series 22; Size 80 from Series 32

2) for other controllers see page 14

3) only available with controls C,D,W or E

4) Key (ident. number 008158) included in supply
### Technical Data (For operation outside these parameters, please consult us!)

#### General

<table>
<thead>
<tr>
<th>Construction</th>
<th>Variable vane pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>V4</td>
</tr>
<tr>
<td>Mounting</td>
<td>Flange mounting</td>
</tr>
<tr>
<td>Connections</td>
<td>Threaded or flanged, dependent on size of unit</td>
</tr>
<tr>
<td>Installation position</td>
<td>Optional, preferably horizontal (see page 8)</td>
</tr>
<tr>
<td>Shaft loading</td>
<td>Radial and axial forces <strong>cannot</strong> be accepted</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Clockwise (viewed on shaft end)</td>
</tr>
</tbody>
</table>

#### Speed range

<table>
<thead>
<tr>
<th>Size</th>
<th>20</th>
<th>32</th>
<th>50</th>
<th>80</th>
<th>125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive power ($n = 1450 \text{ min}^{-1}$)</td>
<td>$P_{\text{eff}}$</td>
<td>kW</td>
<td>8,5</td>
<td>14,5</td>
<td>23</td>
</tr>
<tr>
<td>Torque</td>
<td>$T_{\text{max}}$</td>
<td>Nm</td>
<td>228</td>
<td>294</td>
<td>510</td>
</tr>
<tr>
<td>Weight (with pressure control C1)</td>
<td>$m$</td>
<td>kg</td>
<td>23,5</td>
<td>31</td>
<td>42,8</td>
</tr>
</tbody>
</table>

#### Hydraulic

<table>
<thead>
<tr>
<th>Size</th>
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<th>32</th>
<th>50</th>
<th>80</th>
<th>125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement</td>
<td>$V_{\text{eff}}$</td>
<td>cm$^3$</td>
<td>20,7</td>
<td>34,5</td>
<td>55,2</td>
</tr>
<tr>
<td>Max. flow (at $n = 1450 \text{ min}^{-1}$; $p = 10$ bar)</td>
<td>$Q$</td>
<td>L/min</td>
<td>29</td>
<td>46,4</td>
<td>72,5</td>
</tr>
<tr>
<td>Nominal pressure</td>
<td>$p_{\text{in}}$</td>
<td>bar</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure (absolute)</td>
<td>$p$</td>
<td>bar</td>
<td>0.8 to 2.5</td>
<td>up to 160</td>
<td></td>
</tr>
<tr>
<td>Inlet</td>
<td>$p$</td>
<td>bar</td>
<td>0.8 to 2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outlet</td>
<td>$p$</td>
<td>bar</td>
<td>up to 160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>stall pressure range</td>
<td>$p_{\text{stall}}$</td>
<td>bar</td>
<td>40 to 160 $^1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage outlet, max</td>
<td>$p$</td>
<td>bar</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Fluid

- HLP-mineral oils to DIN 51 524 part 2 or HM and HV to ISO 6074; phosphate-ester (HFD-R)

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**Please observe the specifications in our data sheet RE 07 075!**

**Fluid temperature range**

| °C | -10 to +70 (note permissible viscosity range) |

**Viscosity range**

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>mm$^2$/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 to 160 at operating temperature and stall pressure &lt; 63 bar</td>
<td></td>
</tr>
<tr>
<td>25 to 160 at operating temperature and stall pressure &gt; 63 bar</td>
<td></td>
</tr>
<tr>
<td>max. 800 when starting under flow conditions</td>
<td></td>
</tr>
<tr>
<td>max. 200 when starting at zero flow (stalled)</td>
<td></td>
</tr>
</tbody>
</table>

**Fluid cleanliness**

Max. permissible degree of contamination of fluid to NAS 1638 Class 9.

We therefore recommend a filter of a minimum retention rate of $\beta_{10} \geq 75$.

In order to achieve a longer service life, we recommend fluid cleanliness to NAS 1638 Class 8. For this, we recommend a filter with a minimum retention rate of $\beta_{10} \geq 100$.

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$^1$ for stall pressure < 40 bar required, please consult us
Operating curves (mean values) measured at $n = 1450 \text{ min}^{-1}$, $\nu = 41 \text{ mm}^2/\text{s}$ and $t = 50^\circ \text{C}$

Size 20

Size 32

Size 50
Operating curves (mean values) measured at $n = 1450 \, \text{min}^{-1}$, $v = 41 \, \text{mm}^2/\text{s}$ and $t = 50^\circ\text{C}$

Size 80

[Graph showing operating curves for Size 80]

Size 125

[Graph showing operating curves for Size 125]
Operating curves (mean values) measured at $n = 1450 \text{ min}^{-1}$, $\nu = 41 \text{ mm}^2/\text{s}$ and $t = 50^\circ\text{C}$

Case drain flow $Q_c$ at zero stroke

![Graph showing case drain flow $Q_c$ vs. stall pressure $p\text{sat}$ for different sizes.]

Noise level (mean values) measured at $n = 1450 \text{ min}^{-1}/950 \text{ min}^{-1}$, $\nu = 41 \text{ mm}^2/\text{s}$ and $t = 50^\circ\text{C}$

Noise level measured in an anechoic chamber to DIN 45 635 sheet 1 in dB(A). Distance of microphone to pump = 1 m.

Please note when selecting stall pressure: The setting is made so that the best sound level is achieved at the highest stall pressure required!

- Noise level when pumping
- Noise level when stalled (set at 160 bar)

Size 20

![Graph showing noise level $L_p$ vs. operating pressure (outlet) $p$ for different speeds.]

Operating pressure (outlet) $p$ in bar
Noise level (mean values) measured at $n = 1450 \text{ min}^{-1}/950 \text{ min}^{-1}$, $v = 41 \text{ mm}^2/\text{s}$ and $t = 50^\circ \text{C}$

### Size 32

![Graph showing noise level $L_p$ in dB (A) vs. operating pressure (outlet) $p$ in bar for size 32.](image)

### Size 50

![Graph showing noise level $L_p$ in dB (A) vs. operating pressure (outlet) $p$ in bar for size 50.](image)

### Size 80

![Graph showing noise level $L_p$ in dB (A) vs. operating pressure (outlet) $p$ in bar for size 80.](image)

### Size 125

![Graph showing noise level $L_p$ in dB (A) vs. operating pressure (outlet) $p$ in bar for size 125.](image)
Dynamic characteristics

Test set up

1. Directional valve (duration of operating time 30 ms)
2. Pressure relief valve for limiting pressure peaks
   - max. permissible pressure:
     - Size 20 and 32: 240 bar
     - Size 50, 80 and 125: 220 bar
3. Throttle for setting pressure when pumping
4. Hydraulic pump
5. Pressure measurement point

### Control towards zero displacement (C-control)

\[ Q_{\text{pumping}} \rightarrow Q_{\text{zero stroke}} \]

### Control towards maximum displacement (C-control)

\[ Q_{\text{zero stroke}} \rightarrow Q_{\text{pumping}} \]

#### Dynamic characteristics

**Control towards zero stroke** in ms (average values)

<table>
<thead>
<tr>
<th>Q_{\text{pumping}} \rightarrow Q_{\text{zero stroke}}</th>
<th>at operating pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time in ms</td>
<td>( t_{\text{down}} )</td>
</tr>
<tr>
<td>20</td>
<td>110</td>
</tr>
<tr>
<td>32</td>
<td>110</td>
</tr>
<tr>
<td>50</td>
<td>110</td>
</tr>
<tr>
<td>80</td>
<td>200</td>
</tr>
<tr>
<td>125</td>
<td>200</td>
</tr>
</tbody>
</table>

#### Control towards maximum stroke** in ms (average values)

<table>
<thead>
<tr>
<th>Q_{\text{zero stroke}} \rightarrow Q_{\text{pumping}}</th>
<th>at operating pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time in ms</td>
<td>( t_{\text{up}} )</td>
</tr>
<tr>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>32</td>
<td>70</td>
</tr>
<tr>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>125</td>
<td>70</td>
</tr>
</tbody>
</table>
**Installation notes**

**Installation position**
- horizontal preferred

**Drive**
- no rigid coupling permitted between motor and pump!
- pump and motor shaft ends must be aligned correctly!
- no axial or radial loads are permitted on the pump shaft!

**Oil Tank**
- The usable volume of the tank must meet requirements.
  **CAUTION!** The permitted fluid temperature may not be exceeded!
  → Fit cooler if required

**Pipes and connections**
- cut off at 45 degrees
- for min. clearances see “Suggested piping layout” below
  → Dirt deposits are not sucked up or disturbed.
  → Under no circumstances may the leakage and return flow be sucked up immediately.
  → Foaming is avoided
  → Fluid temperature is kept low

**Pump mounting brackets**
- See RE 32 110

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**Permissible installation position**

- B3
- B5
- V1

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**Suggested piping layout**

- Flexible coupling
- Pump mounting brackets with silencer

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- Case drain line
- Suction line
- min 200
- min 50
- lowest permissible fluid level
Unit Dimensions *): Pump - all sizes

*) shown pump: 1 PV 2 V4-3X/80 RA 37 ... $C_3^{1 - 16} A_1$
### Unit dimensions: Pump - all sizes

**Note:**
Unit dimensions for version 1 PV 2 V4–.X/..RA..MC $\frac{1}{3}$–16 $N_1^A$

<table>
<thead>
<tr>
<th>Size</th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>B5</th>
<th>B6</th>
<th>B7</th>
<th>D1</th>
<th>T1</th>
<th>D2</th>
<th>T2</th>
<th>D3</th>
<th>T3</th>
<th>øD4±0.2</th>
<th>øD5±0.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>V4-2X/20</td>
<td>150</td>
<td>151</td>
<td>120</td>
<td>8</td>
<td>100</td>
<td>129</td>
<td>99</td>
<td>1/2&quot; BSP</td>
<td>14</td>
<td>1&quot; BSP</td>
<td>18</td>
<td>3/8&quot; BSP</td>
<td>12</td>
<td>125</td>
<td>28</td>
</tr>
<tr>
<td>V4-3X/32</td>
<td>157</td>
<td>162</td>
<td>152</td>
<td>10</td>
<td>83</td>
<td>136</td>
<td>110</td>
<td>3/4&quot; BSP</td>
<td>16</td>
<td>1 1/4&quot; BSP</td>
<td>20</td>
<td>3/8&quot; BSP</td>
<td>12</td>
<td>160</td>
<td>32</td>
</tr>
<tr>
<td>V4-2X/50</td>
<td>163</td>
<td>176</td>
<td>150</td>
<td>10</td>
<td>100</td>
<td>142</td>
<td>124</td>
<td>1&quot; BSP</td>
<td>18</td>
<td>1 1/2&quot; BSP</td>
<td>22</td>
<td>1/2&quot; BSP</td>
<td>14</td>
<td>160</td>
<td>38</td>
</tr>
<tr>
<td>V4-3X/80</td>
<td>176</td>
<td>182</td>
<td>200</td>
<td>10</td>
<td>108</td>
<td>155</td>
<td>130</td>
<td>1 1/4&quot; BSP</td>
<td>20</td>
<td>2&quot; SAE</td>
<td>3/4&quot; BSP</td>
<td>16</td>
<td>200</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>V4-4X/125</td>
<td>214</td>
<td>265</td>
<td>224</td>
<td>14</td>
<td>156</td>
<td>193</td>
<td>165</td>
<td>1 1/2&quot; SAE</td>
<td>20</td>
<td>2 1/2&quot; SAE</td>
<td>1&quot; BSP</td>
<td>18</td>
<td>250</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>øD6</th>
<th>øD7</th>
<th>D8</th>
<th>T8</th>
<th>D9</th>
<th>T9</th>
<th>D10</th>
<th>D11</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>V4-2X/20</td>
<td>12</td>
<td>100</td>
<td>1/4&quot; BSP</td>
<td>12</td>
<td>20</td>
<td>2,5</td>
<td>–</td>
<td>60</td>
<td>79</td>
<td>99</td>
<td>184</td>
<td>31</td>
<td>215</td>
<td>163</td>
<td>167,5</td>
</tr>
<tr>
<td>V4-3X/32</td>
<td>14</td>
<td>125</td>
<td>3/8&quot; BSP</td>
<td>12</td>
<td>23</td>
<td>12,5</td>
<td>–</td>
<td>60</td>
<td>93</td>
<td>108</td>
<td>206</td>
<td>35</td>
<td>237</td>
<td>168,5</td>
<td>171,5</td>
</tr>
<tr>
<td>V4-2X/50</td>
<td>14</td>
<td>125</td>
<td>3/8&quot; BSP</td>
<td>12</td>
<td>23</td>
<td>4</td>
<td>–</td>
<td>60</td>
<td>92</td>
<td>115</td>
<td>220</td>
<td>41</td>
<td>283</td>
<td>215</td>
<td>193,5</td>
</tr>
<tr>
<td>V4-3X/80</td>
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<td>160</td>
<td>3/8&quot; BSP</td>
<td>12</td>
<td>23</td>
<td>8</td>
<td>48</td>
<td>60</td>
<td>109</td>
<td>123</td>
<td>243</td>
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<td>288</td>
<td>220</td>
<td>199,5</td>
</tr>
<tr>
<td>V4-4X/125</td>
<td>22</td>
<td>200</td>
<td>3/8&quot; BSP</td>
<td>12</td>
<td>23</td>
<td>7</td>
<td>63</td>
<td>60</td>
<td>118</td>
<td>130</td>
<td>291</td>
<td>53,5</td>
<td>375</td>
<td>282,5</td>
<td>221,5</td>
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<th>L10</th>
<th>L11</th>
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<th>L15</th>
<th>S1</th>
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<td>50,8</td>
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</table>

**BSP threads to ISO 228/1**

1. Pressure port
2. Suction port
3. Maximum displacement setting via adjustment screw
   - Type code A.
   - Clockwise rotation: reduces replacement
   - Anti-clockwise rotation: increases displacement
4. Stall pressure setting via adjustment screw mit internal hexagon 3 A/F
   - Ordering code see controller
   - Clockwise rotation: increases set pressure
   - Anti-clockwise rotation: reduces set pressure
5. Stall pressure setting via lockable adjustment device
   - Ordering code see controller
   - (key: ordering no. 008158)
6. Drain port
7. Drive shaft
   - (clockwise rotation)
8. Cap nut
9. **without** setting screw for adjusting displacement

**For mounting brackets see RE 32 110**

**Note:**
Unit dimensions for version 1 PV 2 V4–.X/..RA..MC $\frac{1}{3}$–16 $N_1^A$
Control programme

C-control
Pressure controller
with manual pressure adjustment
Order code.... C1 ..
(lockable version
Order code .... C3 ..)

Symbol

Sample order:
1 Pump: 1 PV2V4–3X/80 RA 37 MC1–16A1
or 1 PV2V4–2X/50 RA 01 MC1–16A1

D-control
Pressure controller
with hydraulic remote
control adjustment
Order code.... D1 ..
(lockable version
Order code .... D3 ..)

Symbol

Typical order:
1 Pump: 1 PV2 V4–3X/80 RA 37 MD1–16 A1
2 Optional pressure relief valve;
pressure relief valve must be ordered separately.
The remote control line between the controller
and the pressure relief valve (2) should be no longer than 2 metres.
Controller

W-control  Pressure controller
with electrical 2-stage
pressure adjustment
Order code.... W1 ...
(lockable version
Order code.... W3 ..)

Sample order:
1 Pump 1 PV2V4–3X/80 RA 37 MW1–16 A1
2 Pressure relief valve fitted to item 1
DBWT A
2–3X/315 (G24 NZ4) SO 206
3 The pressure relief valve DBWT must be ordered separately. The unit is supplied completely assembled and tested as a unit.

E-control  Pressure control
with electrical remote
pressure setting
order code.... E1 ...
(lockable version
order code.... E3 ..)

Sample order:
1 Pump: 1 PV2 V4–3X/80 RA 37 ME1–16 A1
2 Pressure relief valve fitted to item 1
DBWT 2–3X/315 SO 206
3 Pressure relief valve fitted to item 2
RS 415–1X/200/1,0/1,0/Y

RS-valve and DBWT must be ordered separately. The unit is supplied completely assembled and tested as a unit.
Fluid flowing from valve (3) must be piped separately to tank.
**K-plate**

_Sandwich plate_

- with unloading valve for starting up at minimum stall pressure
- min. stall pressure 25 bar
- Order code ... 5 ...  \(^1\)
- (lockable version
- Order code ... 7 ...  \(^1\)
- Unit dimensions on request

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**Symbol**

![Symbol Diagram]

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**Sample order:**

1. Pump 1 PV2 V4–3X/80 RA 37 MC5–16 A1
2. 3/2-way directional cartridge valves to RD 23 140; e.g.: Type 3 WE 4 C1XK/AG26Z4
   - 3/2-way directional cartridge valves must be ordered separately
   - The unit is supplied completely assembled and tested as a unit.
3. Optional C-, D-, E- or W-control

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\(^1\) only available with C-, D-, E- or W-control
Control programme

U-Control

Flow and pressure control
with electrical control of flow
and hydraulic remote pressure
setting
Order code .... U1 ...
(lockable version
not available)

Sample order:
1 Pump 1 PV2V4–3X/80 RA 38 MU1–16 A1
2 Servo orifice size 25, order no. 300 745 fitted on item 1
3 Selected pressure relief valve

The servo orifice must be ordered separately.
The unit is supplied completely assembled and tested as a unit.
The pressure relief valve must be ordered separately, but will not be fitted and tested together with the unit.
The control line between the control and the pressure relief valve (3) must be piped on site. The T-port of the relief valve (integral with the servo orifice) must be connected to tank.
Control programme

F-Control

Flow and pressure control
with electrical remote of flow and pressure
Order code .... F1 ...
(lockable version not available)

Sample order:
1 Pump 1 PV2V4–3X/80 RA 38 MF1–16 A1
2 Servo orifice size 25, order no. 300 745 fitted on item 1
3 Pressure relief valve fitted on item 4; RS 415-1X/200/1,0/1,0/Y
4 Pressure relief valve fitted on item 1; DBWT. 2-3X/315 SO 206

Servo orifice and pressure relief valves RS and DBWT must be ordered separately.
The unit is supplied completely assembled and tested as a unit.
The T-connections of items 2 and 3 are to be piped to tank.
Control programme

V-Control  Flow and pressure control
with electrical setting of flow
and mechanical setting of
pressure
Order code .... V1 ..
(lockable version
not available)

Symbol

Sample order:
1 Pump: 1 PV2V4–3X/80 RA 38 MV1–16 A1
2 Servo orifice size 25, order no. 300 745 fitted on item 1

The servo orifice must be ordered separately.
The unit is supplied completely assembled and tested as a unit.
The T-connection of pressure relief valve (integral with the servo orifice) (2) must be piped separately.
Combination pumps

Combination pumps V4 + V4
Any V4 regardless of size can also be supplied as a double or triple pump. The splined pump shafts are connected by means of a muff coupling (lubricated by internal leakage oil).

Important notes:
- The same general size codes apply as for the single pumps (see pages 5 to 10)
- The individual pumps are separated from each other on the suction side by means of a shaft seal. (The pumps may suck from separate tanks).
- Where several V4 pumps are combined the torques may attain unacceptable high levels. The sum of the torques may not exceed the permitted values (see page 5).
- The pumps are supplied assembled as one unit.
- Dimensions on request.

Note: for triple combination, order code for middle pump 1PV2V4-.X/..R

Pump combination V4 + other series
V4 + V3 (variable vane pump / with spring compensator – up to 47 cm³ / up to 100 bar)
V4 + G2 (external gear pump – up to 22 cm³ / up to 250 bar)
V4 + R4 (radial piston pump – up to 20 cm³ / up to 700 bar)
Further information on request.

1 PV2 V4-.X/..RE ....16..1 + 1 PV2 V4-.X/..RG....16..1

Note: for triple combination, order code for middle pump 1PV2V4-.X/..RF...16..1