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Introduction

- Axial piston pumps with swash plate design for reliable operation and long life.
- Pressure up to 420 bar.
- Rated speed up to 1800 rev/min. Higher speeds possible.
- Oversize shafts and bearings.
- Rotating and pressure-loaded parts are pressure balanced.
- Through-drive enables multiple pump installations from a single shaft. Multiple pump combinations are also available.
- Integrated pilot pump, filter and pressure relief valves available.
- Modular design gives these pumps a wide range of applications.
- Fast response times.

Available Displacement Sizes

<table>
<thead>
<tr>
<th>Displacement</th>
<th>in³/rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>130 cm³</td>
<td>8.0</td>
</tr>
<tr>
<td>180 cm³</td>
<td>11.0</td>
</tr>
<tr>
<td>250 cm³</td>
<td>15.0</td>
</tr>
<tr>
<td>360 cm³</td>
<td>22.0</td>
</tr>
<tr>
<td>500 cm³</td>
<td>30.5</td>
</tr>
<tr>
<td>750 cm³</td>
<td>45.0</td>
</tr>
</tbody>
</table>

Displacement Controls

DF - Pressure compensator controlled
LR - Power control with pressure limiter
SP - Displacement proportional to electric signal
DP - Displacement proportional to pressure signal
PQ - Digital controller
ES - Displacement adjustment via electric motor

Extra functions available for DP & SP:
Pressure limitation and/or power control overriding function.

Note
Dimensional data provided in this catalog is subject to change without notice.
<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P * W</strong></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
</tr>
</tbody>
</table>

### Pump Size

<table>
<thead>
<tr>
<th>Pump</th>
<th>Displacement</th>
<th>Configuration</th>
<th>Separator</th>
<th>Pump Series</th>
<th>Configuration</th>
<th>Main Ports</th>
<th>Main Drive Shaft End</th>
<th>Drive Shaft Seal Configuration</th>
<th>Seal Material</th>
<th>Yoke Position Indicator</th>
<th>Surface Coating</th>
<th>Control Model Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P</strong></td>
<td><strong>W</strong></td>
<td><strong>M</strong></td>
<td><strong>1</strong></td>
<td><strong>R</strong></td>
<td><strong>S</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

#### Displacement cm³/rev (in³/rev)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>130 – 130 cm³/rev (8 in³/rev)</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>180 – 180 cm³/rev (11 in³/rev)</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>250 – 250 cm³/rev (15.3 in³/rev)</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>360 – 360 cm³/rev (22.0 in³/rev)</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>500 – 500 cm³/rev (30.5 in³/rev)</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>750 – 750 cm³/rev (45.8 in³/rev)</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

#### Non-standard displacements (cm³/rev):

- 250 | 220/200
- 360 | 310
- 500 | 465/365
- 750 | 710

#### Basic Standard

<table>
<thead>
<tr>
<th>M</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

#### Mounting Flange

<table>
<thead>
<tr>
<th><strong>M</strong></th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>05</strong></td>
<td>ISO 3019/2-160B4HW</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>07</strong></td>
<td>ISO 3019/2-200B4HW</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>08</strong></td>
<td>ISO 3019/2 8 bolt metric</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>09</strong></td>
<td>Special 8-bolt flange</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>0D</strong></td>
<td>SAE D 4-hole flange</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>0E</strong></td>
<td>SAE E 4-hole flange</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>0F</strong></td>
<td>SAE F 4-hole flange</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

#### Rotation

<table>
<thead>
<tr>
<th><strong>R</strong></th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R</strong></td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Maximum Displacement Screws

<table>
<thead>
<tr>
<th><strong>R</strong></th>
<th>31</th>
<th>32</th>
<th>33</th>
<th>34</th>
<th>35</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R</strong></td>
<td>37</td>
<td>38</td>
<td>39</td>
<td>40</td>
<td>41</td>
<td>42</td>
</tr>
</tbody>
</table>

#### Maximum Displacement Screws (cont.)

<table>
<thead>
<tr>
<th><strong>R</strong></th>
<th>43</th>
<th>44</th>
<th>45</th>
<th>46</th>
<th>47</th>
<th>48</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R</strong></td>
<td>49</td>
<td>50</td>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
</tr>
</tbody>
</table>

#### Control Model Code

See fields 24 to 54 on following pages.
### Model Code

Open Loop Pumps  
**W Series - DF Control**

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Type</td>
<td>DF</td>
<td>DF</td>
<td>DF</td>
<td>DF</td>
<td>DF</td>
<td>DF</td>
</tr>
<tr>
<td>Displacement Adjustment Options</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Electronic Controls</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yoke Displacement Zone</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Additional Functions</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pressure Control Options</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Power Control</td>
<td>000</td>
<td>000</td>
<td>000</td>
<td>000</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>Pilot Oil Filter</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Venting Valve</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Position Monitoring</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Electric Motor Type</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage</td>
<td>0</td>
<td>B</td>
<td>D</td>
<td>G</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>Customer Adjustment Specification</td>
<td>0000-</td>
<td>0000-</td>
<td>0000-</td>
<td>0000-</td>
<td>0000-</td>
<td>0000-</td>
</tr>
<tr>
<td>Special Features</td>
<td>0</td>
<td>***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Number</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

**DF000A**

---

**Example for Customer Adjustment Specifications**

<table>
<thead>
<tr>
<th>Special Pressure Adjustment</th>
<th>Main Stage Pressure Control</th>
<th>Pilot Valve Pressure Control</th>
<th>Load Sense Δp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard setting (bar)</td>
<td>20</td>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>Max. setting (bar)</td>
<td>40</td>
<td>350</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer-specified adjustment (bar)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

**Note:** Setting must be at least 30 bar.

<table>
<thead>
<tr>
<th>Special Max. Displ. Adjustment</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>0 cm³/rev</td>
<td>100%</td>
</tr>
</tbody>
</table>

| Customer-specified adjustment (cm³/rev) | | |
|-----------------------------------------|-----------------------------|-----------------------------|---------------|

**Note:** Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.
## Pump Size

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
</table>

### Control Type

- **LR** – Power control

### Displacement Adjustment Options

- **0** – Not applicable

### Electronic Controls

- **0** – Not applicable

### Yoke Displacement Zone

- **A** – Single side of centre “A”

### Additional Functions

- **2** – Pressure limiter
- **3** – Load sensing and pressure limiter (standard Δp = 15 bar)

#### Example for Customer Adjustment Specifications

**Special Pressure Adjustments**

<table>
<thead>
<tr>
<th>Main Stage</th>
<th>Pressure Control</th>
<th>Pilot Valve</th>
<th>Load Sense Δp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard setting (bar)</td>
<td>20</td>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>Max. setting (bar)</td>
<td>40</td>
<td>350</td>
<td>40</td>
</tr>
</tbody>
</table>

**Customer-specified adjustment (bar)**

- **Note:** Setting must be at least 30 bar.

**Special Max. Displ. Adjustment**

<table>
<thead>
<tr>
<th>Minimum Displacement</th>
<th>Maximum Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>0 cm³/rev</td>
</tr>
</tbody>
</table>

**Customer-specified adjustment (cm³/rev)**

- **Note:** Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.
**Model Code**

Open Loop Pumps
W Series - SP Control

- ✐ = P, M, R or S mandatory (electrical yoke position indicator)

### Displacement Adjustment Options

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Control Type

- SP = Displacement adjustment via proportional valve

#### Displacement Adjustment Options

- A – CETOP 3 interface only
- B – CETOP 5 interface only
- C – CETOP 3 proportional valve KDG4V-3
- D – CETOP 3 proportional valve KBSDG4V-3 with OBE
- E – CETOP 5 proportional valve KBSDG4V-5 with OBE
- F – CETOP 5 servo-valve

#### Electronic Amplifier Control

- 03 – ER 9.3-10
- 04 – ER 9.4-10 (CETOP 3) servo
- 00 – No amplifier card

#### Yoke Displacement Zone

- A – Single side of centre "A"

#### Additional Functions

- 0 = None
- 4 = Pressure limiter override
- 5 = Pressure limiter and power limiter override

#### Pressure Control Options

- 0 = None i.e. pilot operated with remote port (standard arrangement)
- F = Remote port without pilot valve
- K = Electro-proportional relief valve, complete with electronic card

#### Power Control Specification

- *** = 3-digit value in kW at 1500 rev/min

#### Pilot Oil Filter

- 0 = None
- V = Filter with visual indicator
- E = Filter with electrical indicator

#### Venting Valve

- 0 = Not applicable

---

**Example for Customer Adjustment Specifications**

<table>
<thead>
<tr>
<th>Special Pressure</th>
<th>Main Stage</th>
<th>Pilot Valve</th>
<th>Load Sense Δp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment</td>
<td>Pressure Control</td>
<td>Pressure Control</td>
<td>Note: Setting must be at least 30 bar.</td>
</tr>
<tr>
<td>Standard setting (bar)</td>
<td>20</td>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>Max. setting (bar)</td>
<td>40</td>
<td>350</td>
<td>40</td>
</tr>
</tbody>
</table>

Note: Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.
### Model Code

Open Loop Pumps  
**W Series - DP Control**

<table>
<thead>
<tr>
<th>Control Type</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Displacement Adjustment Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>CETOP 3 interface only</td>
</tr>
<tr>
<td>H</td>
<td>Remote port G/”</td>
</tr>
<tr>
<td>J</td>
<td>Proportional KCG relief valve including EEA-PAM amplifier card</td>
</tr>
</tbody>
</table>

#### Control Electronics

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Not applicable</td>
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</tbody>
</table>

#### Yoke Displacement Zone

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Single side of centre “A”</td>
</tr>
</tbody>
</table>

#### Additional Functions

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>Pressure limiter override</td>
</tr>
<tr>
<td>5</td>
<td>Pressure limiter and power limiter override</td>
</tr>
</tbody>
</table>

#### Pressure Control Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None i.e. pilot operated with remote port (standard arrangement)</td>
</tr>
<tr>
<td>F</td>
<td>Remote port without pilot valve</td>
</tr>
<tr>
<td>K</td>
<td>Electro-proportional relief valve, complete with electronic card</td>
</tr>
</tbody>
</table>

#### Power Control Specification

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>3-digit value in kW at 1500 rev/min</td>
</tr>
</tbody>
</table>

#### Electric Motor Type

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

#### Venting Valve Control Voltage

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

#### Customer Adjustment Specification

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>None (standard)</td>
</tr>
</tbody>
</table>

#### Special Features

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
</tbody>
</table>

#### Design Number

<table>
<thead>
<tr>
<th>Option</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>10-99 assigned by Eaton</td>
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</tbody>
</table>

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### Example for Customer Adjustment Specifications

<table>
<thead>
<tr>
<th>Special Pressure Adjustment</th>
<th>Main Stage Pressure Control</th>
<th>Pilot Valve Pressure Control</th>
<th>Lead Sense Δp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard setting (bar)</td>
<td>20</td>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>Max. setting (bar)</td>
<td>40</td>
<td>350</td>
<td>40</td>
</tr>
</tbody>
</table>

Customer-specified adjustment (bar) | | | |

Note: Setting must be at least 30 bar.

<table>
<thead>
<tr>
<th>Special Max. Displ. Adjustment</th>
<th>Minimum Displacement</th>
<th>Maximum Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>0 cm³/rev</td>
<td>100%</td>
</tr>
</tbody>
</table>

Customer-specified adjustment (cm³/rev) | | |

Note: Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.
## Model Code

### Open Loop Pumps

**W Series - PQ Control**

- **P, M, R or S** mandatory (electrical yoke position indicator)

### Control Type

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>PQ</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Proportional valve multifunctional control (PpQ controller)

### Displacement Adjustment Options

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>E</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- CETOP 3 proportional valve + OBE
- CETOP 5 proportional valve + OBE

### Control Electronic

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Without electronics (to be ordered separately)

### Yoke Displacement Zone

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>C</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- No pressure sensor one side
- No pressure sensor either side

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>E</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Pressure sensor 4-20 mA one side
- Pressure sensor 4-20 mA both sides

- Without pressure sensor but with G1/2" thread to fit user-provided pressure sensor.

### Additional Functions

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Not required

### Pressure Control Options

<table>
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<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Not required for this control type

### Power Control Specification

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Not applicable for this control type

### Pilot Oil Filter

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- No filter (standard)

### Failsafe Valve

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
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<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
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<tbody>
<tr>
<td>000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Not applicable

### Pressure Control Options

- Not required for this control type

### Customer Adjustment Specification

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Not required

- Eaton assigned number as per data specified in table below

### Example for Customer Adjustment Specifications

<table>
<thead>
<tr>
<th>Special Max. Displ. Adjustment</th>
<th>Minimum Displacement</th>
<th>Maximum Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 cm³/rev</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

- Customer-specified adjustment (cm³/rev) not applicable

- Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.

---

**Note:** Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.
### Model Code

Open Loop Pumps
**W Series - ES Control**

*Available to special order only*

#### Pump Size
130 180 250 360 500 750

#### Control Type
- **ES**: Displacement adjustment via electric motor

#### Displacement Adjustment Options
- **M**: Electric motor, fast response
- **N**: Electric motor, medium response
- **P**: Electric motor, slow response

#### Control Electronics
- **00**: Not applicable

#### Yoke Displacement Zone
- **A**: Single side of centre “A”

#### Additional Functions
- **0**: Not applicable

#### Power Control Specification
- **000**: Not applicable

#### Pilot Oil Filter
- **0**: Not applicable

#### Venting Valve
- **0**: Not applicable

#### Position Monitoring
- **A**: 4 limit switches
- **B**: 8 limit switches
- **P**: 4 limit switches with sensor
- **T**: 8 limit switches with sensor

#### Electric Motor Type
- **2**: Motor with brake (IP54)
- **3**: Motor without brake (explosion-proof)

#### Pressure Control Options
- **0**: Not applicable

#### Venting Valve Control Voltage
- **0**: Not applicable

#### Customer Adjustment Specification
- **0000**: None (standard)

#### Special Features
- **000**: None

#### Design Number
- ****: 10-99 assigned by Eaton

---

### Example for Customer Adjustment Specifications

<table>
<thead>
<tr>
<th>Special Maximum</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement Adjustment</td>
<td>0 cm³/rev</td>
<td>100%</td>
</tr>
</tbody>
</table>

Customer-specified adjustment (cm³/rev): ........

**Note:** Special response times (*see table in ES section of Control Options*) and/or maximum displacement adjustments are the most common reasons for using this option.
# Model Code

**Open Loop Pumps**

**W Series - No control:** 

**Fixed Displacement PFW Models**

<table>
<thead>
<tr>
<th>Control Type</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
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<tbody>
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<table>
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<th>Displacement Adjustment Options</th>
<th>Pump Size</th>
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<th>250</th>
<th>360</th>
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<table>
<thead>
<tr>
<th>Control Electronics</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
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<th>360</th>
<th>500</th>
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<table>
<thead>
<tr>
<th>Yoke Displacement Zone</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
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<tbody>
<tr>
<td>A</td>
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<table>
<thead>
<tr>
<th>Additional Functions</th>
<th>Pump Size</th>
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<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
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<table>
<thead>
<tr>
<th>Pressure Control Options</th>
<th>Pump Size</th>
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<th>180</th>
<th>250</th>
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<table>
<thead>
<tr>
<th>Power Control Specification</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
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</table>

<table>
<thead>
<tr>
<th>Pilot Oil Filter</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
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<table>
<thead>
<tr>
<th>Bypass/Venting Valve</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Position Monitoring</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
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<table>
<thead>
<tr>
<th>Electric Motor Type</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
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</table>

<table>
<thead>
<tr>
<th>Control Voltage</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Adjustment Specification</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
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<table>
<thead>
<tr>
<th>Special Features</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
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</table>

<table>
<thead>
<tr>
<th>Design Number</th>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
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</thead>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
- **Preferred standard option**
- Other standard option
- Special option on request
- Not available
# Model Code

## Combination Pump Unit

<table>
<thead>
<tr>
<th>Combination Unit</th>
<th>Pump</th>
<th>FV</th>
<th>W Series</th>
<th>C</th>
<th>Separator</th>
<th>First Displacement cm³/rev (in³/rev)</th>
<th>First Control Type</th>
<th>Second Displacement cm³/rev (in³/rev)</th>
<th>Second Control Type</th>
<th>Third Displacement Options as second displacement</th>
<th>Third Control Type</th>
<th>Fourth Displacement Options as second control</th>
<th>Fourth Control Type</th>
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</thead>
<tbody>
<tr>
<td>P</td>
<td></td>
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<td>C</td>
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<td>066</td>
<td>DF</td>
<td>Options as second control</td>
<td>Options as second control</td>
<td>Options as second control</td>
<td>Options as second control</td>
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<td></td>
</tr>
</tbody>
</table>

## Typical Combination Units

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Front Unit</th>
<th>Rear Unit</th>
<th>Combination Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVVF-500M08R0041R02SV/MASPC03A000000000000000000000010</td>
<td>PVWR-250M07R0001R02SV/MASPC03A000000000000000000000010</td>
<td>PVWC-500SP250SP000000000000H811**********</td>
<td></td>
</tr>
<tr>
<td>PVMM-250M07R00E1R02SV0ADF000A000000000000000000000010</td>
<td>PFXR-1300M02R00P1A02SV0A000000000000000000000010</td>
<td>TVWC-500SP250DF1300000000000000H811**********</td>
<td></td>
</tr>
</tbody>
</table>

## Specifying Combination Pumps

- For a combination of two or more units, a Combination Model Code should be compiled in addition to the individual Model Codes of each unit.
- The first displacement represents the largest unit, and so on.
- For each unit included in the combination, a separate Model Code should be compiled using the Form page at the beginning of the Model Codes section.
- Characters 26 to 39 of the Combination Model Code will be part number of the combination, defined by Eaton and stated on the order acknowledgement.
- Front and middle units must each feature the through-drive option of the following unit in the combination.

## Note:

ISO spline shafts should be specified for combination units due to their higher torque capability.
Form Page

The 48-digit coding system has been developed to identify all configuration options for the “W” series (Open Loop) fixed and variable displacement pumps. The Model Code lets you specify a unit with the desired features. All 48 digits must be present when ordering.

You may wish to photocopy the matrix below to ensure that each number is entered in the correct box. If adjustments other than the standard setting (40 to 43) or special features (44 to 46) are needed, please provide the information when ordering.

For combination units, you may need to provide an additional model code. In such a case, each single pump section must be specified separately using this or other Eaton catalog information. Where characters are already stated in the blank Model Code, there is no option available.

<table>
<thead>
<tr>
<th>Explanation for each character</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Pump Model Code</td>
<td>1 to 23</td>
</tr>
<tr>
<td>Control Options</td>
<td>24 to 39</td>
</tr>
<tr>
<td>Customer Adjustment Specification</td>
<td>40 to 43</td>
</tr>
<tr>
<td>Special Features</td>
<td>44 to 46</td>
</tr>
<tr>
<td>Design Number</td>
<td>47 &amp; 48</td>
</tr>
<tr>
<td>Combination Units Model Code</td>
<td>1 to 23</td>
</tr>
</tbody>
</table>

Specify Non Standard Adjustment Below

Specify Special Feature Below
# Pump Specifications

## Metric

<table>
<thead>
<tr>
<th>Model</th>
<th>PF/VW 130/180</th>
<th>PF/VW 250</th>
<th>PF/VW 360</th>
<th>PF/VW 500</th>
<th>PF/VW 750</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design</strong></td>
<td>Swashplate – Axial piston pump</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of mounting</strong></td>
<td>Flange or foot-mounted - Combination units foot mounted only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SAE Flange ISO 6162-2 (SAE J518) A</strong></td>
<td>P32M (1 1/2” - 6000)</td>
<td>P32M (1 1/2” - 6000)</td>
<td>P32M (1 1/2” - 6000)</td>
<td>P12M (5” - 500)</td>
<td>P12M (5” - 500)</td>
</tr>
<tr>
<td><strong>Direction of rotation</strong></td>
<td>Clockwise or counterclockwise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mounting attitude</strong></td>
<td>Optional, see relevant Dimensions page</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ambient temperature range</strong></td>
<td>min °C</td>
<td>-20</td>
<td>+50</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max. pressure to ISO 5598:2008</strong></td>
<td>p2 max bar</td>
<td>420</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydraulic fluid</strong></td>
<td>Hydraulic oil to DIN 51524 part 2</td>
<td>See Fluid Recommendations in Application Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydraulic fluid temperature range</strong></td>
<td>min °C</td>
<td>-25</td>
<td>+90</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Viscosity range for continuous operation</strong></td>
<td>min cSt</td>
<td>10</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum permissible start viscosity</strong></td>
<td>max cSt</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cleanliness</strong></td>
<td>ISO 4406 18/15/13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum geometric displacement at shaft speed</strong></td>
<td>Vg cm³/rev</td>
<td>130 / 180</td>
<td>250</td>
<td>360</td>
<td>500</td>
</tr>
<tr>
<td>n = 1200 rev/min</td>
<td>130 / 180</td>
<td>250</td>
<td>360</td>
<td>500</td>
<td>410/500 ▲</td>
</tr>
<tr>
<td>n = 1500 rev/min</td>
<td>130 / 180</td>
<td>250</td>
<td>270</td>
<td>500</td>
<td>160/310</td>
</tr>
<tr>
<td>n = 1800 rev/min</td>
<td>130 / 180</td>
<td>250</td>
<td>270</td>
<td>500</td>
<td>160/310</td>
</tr>
<tr>
<td><strong>Case pressure (overpressure)</strong></td>
<td>pcase bar</td>
<td>3,2</td>
<td>2,8</td>
<td>2,8</td>
<td>2,35</td>
</tr>
<tr>
<td>n = 1200 rev/min</td>
<td>2,6</td>
<td>2,2</td>
<td>2,2</td>
<td>1,85</td>
<td>1,7</td>
</tr>
<tr>
<td>n = 1500 rev/min</td>
<td>2,0</td>
<td>1,6</td>
<td>1,6</td>
<td>1,35</td>
<td>1,35</td>
</tr>
<tr>
<td><strong>Drive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Driving torque</strong></td>
<td>M1 Nm</td>
<td>724/1002</td>
<td>1392</td>
<td>2005</td>
<td>2785</td>
</tr>
<tr>
<td><strong>Vg at 1500 rev/min, η = 100%</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>P1 Nm</td>
<td>113 / 157</td>
<td>218</td>
<td>315</td>
<td>437</td>
</tr>
<tr>
<td><strong>Vg at 1500 rev/min, η = 100%</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Combination Units</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum driving torque</strong></td>
<td>M1 Nm</td>
<td>2x870/2x1204</td>
<td>2 x 1670</td>
<td>2 x 2405</td>
<td>5000</td>
</tr>
<tr>
<td><strong>ISO splined shaft only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


▲ Larger displacement / higher speed on request only. Contact Eaton Technical Support.
## Pump Specifications

### US

<table>
<thead>
<tr>
<th>Model</th>
<th>PF/VW 130/180</th>
<th>PF/VW 250</th>
<th>PF/VW 360</th>
<th>PF/VW 500</th>
<th>PF/VW 750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Swashplate – Axial piston pump</td>
<td>Flange or foot-mounted - Combination units foot mounted only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of mounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe connection ISO 6162-1 (SAE J518) B</td>
<td>psi</td>
<td>P64M (2(\frac{1}{2})&quot; - 500)</td>
<td>P89M (3(\frac{1}{2})&quot; - 500)</td>
<td>P89M (3(\frac{1}{2})&quot; - 500)</td>
<td>P127M (6&quot; - 500)</td>
</tr>
<tr>
<td>Pipe connection ISO 6162-2 (SAE J518) A</td>
<td>psi</td>
<td>P32M (1(\frac{1}{4})&quot; - 6000)</td>
<td>P32M (1(\frac{1}{4})&quot; - 6000)</td>
<td>P32M (1(\frac{1}{4})&quot; - 6000)</td>
<td>P51M (2&quot; - 6000)</td>
</tr>
<tr>
<td>Type of mounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Clockwise or counterclockwise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting attitude</td>
<td>Optional, see relevant Dimensions page</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material</th>
<th>PF/VW 130/180</th>
<th>PF/VW 250</th>
<th>PF/VW 360</th>
<th>PF/VW 500</th>
<th>PF/VW 750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>lb</td>
<td>215</td>
<td>467</td>
<td>485</td>
<td>750</td>
</tr>
<tr>
<td>Moment of inertia</td>
<td>lb ft(^2)</td>
<td>3.46</td>
<td>3.46</td>
<td>3.61</td>
<td>11.9</td>
</tr>
</tbody>
</table>

### Hydraulic Characteristics

<table>
<thead>
<tr>
<th>Hydraulic Characteristics</th>
<th>PF/VW 130/180</th>
<th>PF/VW 250</th>
<th>PF/VW 360</th>
<th>PF/VW 500</th>
<th>PF/VW 750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated pressure (100% duty cycle)</td>
<td>psi</td>
<td>5075</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inlet pressure</td>
<td>p1, min psi</td>
<td>14.5 abs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>p1, max psi</td>
<td>290</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. pressure to ISO 5598:2008</td>
<td>psi</td>
<td>6090</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic fluid</td>
<td>Hydraulic oil to DIN 51524 part 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>See Fluid Recommendations in Application Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic fluid temperature range</td>
<td>°F</td>
<td>-13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>°F</td>
<td>+194</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity range for continuous operation</td>
<td>cSt</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cSt</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum permissible start viscosity</td>
<td>cSt</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleanliness</td>
<td>ISO 4406</td>
<td>18/15/13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum geometric displacement at shaft speed n = 1200 rev/min</td>
<td>Vg in/rev</td>
<td>7.9 / 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 1500 rev/min</td>
<td>7.9 / 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 1800 rev/min</td>
<td>7.9 / 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case pressure (overpressure)</td>
<td>psi</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 1200 rev/min</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 1500 rev/min</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 1800 rev/min</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive</td>
<td>PF/VW 130/180</td>
<td>PF/VW 250</td>
<td>PF/VW 360</td>
<td>PF/VW 500</td>
<td>PF/VW 750</td>
</tr>
<tr>
<td>Driving torque (p(_n) = 5075 psi, Vg at 1500 rev/min, η = 100%)</td>
<td>lb ft</td>
<td>534/739</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption (p(_n) = 5075 psi, Vg at 1500 rev/min, η = 100%)</td>
<td>hp</td>
<td>152/211</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum driving torque</td>
<td>ISO splined shaft only</td>
<td>lb ft</td>
<td>2x642/2x888</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 x 1232</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 x 1774</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>3688</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>3688</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

▲ Larger displacement / higher speed on request only. Contact Eaton Technical Support.
Performance Curves
130 & 180 Series

Power Efficiency Performance Curve
Size 130

![Power Efficiency Performance Curve Size 130](image1)

Power Efficiency Performance Curve
Size 180

![Power Efficiency Performance Curve Size 180](image2)

Roller Bearing Life Size 130

![Roller Bearing Life Size 130](image3)

Roller Bearing Life Size 180

![Roller Bearing Life Size 180](image4)

Double pumps
- For pumps operating in tandem, typical values are as for the individual units.
- Variable tandem units have two controls, i.e. one for each single unit.

For reduced swash angle
\[ L_h = (L \text{ at } V_{\text{max}}) \times \left( \frac{V}{V_{\text{max}}} \right)^{\frac{1}{3}} \]

Note
Performance data is measured under specific conditions and may vary according to application and operating conditions. Eaton therefore shall not be held legally responsible for any deviation from published figures.
Performance Curves
250 & 360 Series

**Power Efficiency Performance Curve**
Size 250

**Power Efficiency Performance Curve**
Size 360

**Roller Bearing Life**
Size 250

**Roller Bearing Life**
Size 360

**Combination units**
- For combination pumps, typical values are as for individual units.

**For reduced swash angle**
\[
L_h = (L \text{ at } V_{max}) \times \frac{1}{\left( \frac{V}{V_{max}} \right)^{\frac{10}{3}}}
\]

**Note**
Performance data is measured under specific conditions and may vary according to application and operating conditions.
Eaton therefore shall not be held legally reponsible for any deviation from published figures.
Performance Curves
500 & 750 Series

Power Efficiency
Performance Curve
Size 500

Roller Bearing Life
Size 500

Power Efficiency
Performance Curve
Size 750

Roller Bearing Life
Size 750

Combination units
- For combination pumps, typical values are as for individual units.

For reduced swash angle
\[ L_h = (L \text{ at } V_{\text{max}}) \times \left( \frac{V}{V_{\text{max}}} \right)^{\frac{10}{3}} \]

Note
Performance data is measured under specific conditions and may vary according to application and operating conditions. Eaton therefore shall not be held legally responsible for any deviation from published figures.
Installation and Start-up

**Warning:** Care should be taken that mechanical and hydraulic resonances are avoided in the application of the pump. Such resonances can seriously compromise the life and/or safe operation of the pump.

**Drive Data**
Mounting attitude should be horizontal using the appropriate case drain ports to ensure that the case remains full of fluid at all times. Consult your local Eaton Representative if a different arrangement is required.

In those cases where geometric tolerances of mounting are critical, or where specific tolerance ranges are required and not specified, consult Eaton Engineering for specific limits.

Direction of shaft rotation, viewed from the prime mover end, must be as indicated in the model designation on the pump – either right hand (clockwise) or left hand (counterclockwise).

Direct coaxial drive through a flexible coupling is recommended. If drives imposing radial shaft loads are considered, please consult your Eaton Representative.

**Start-up Procedure**
Make sure the reservoir and circuit are clean and free of dirt/debris prior to filling with hydraulic fluid.

Fill the reservoir with filtered oil and fill to a level sufficient enough to prevent vortexing at the suction connection to pump inlet. It is good practice to clean the system by flushing and filtering, using an external slave pump.

**Caution:** Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and must terminate below the oil level.

Once the pump is started, it should prime within a few seconds. If the pump does not prime, check to make sure that there are no restrictions between the reservoir and the inlet to the pump, and that the pump is being rotated in the proper direction, and that there are no air leaks in the inlet line and connections. Also check to make sure that trapped air can escape at the pump outlet.

After the pump is primed, tighten the loose outlet connections, then operate for five to ten minutes (unloaded) to remove all trapped air from the circuit.

If the reservoir has a sight gage, make sure the fluid is clear – not milky.

**Fluid Cleanliness**
Hydrokraft pumps are rated in anti-wear petroleum fluids with a contamination level of 18/15/13 per ISO 4066. Operation in fluids with levels more contaminated than this is not recommended. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these codes. Please contact your Eaton Representative for specific duty cycle recommendation.

Eaton Hydrokraft pumps, as with any variable displacement piston pumps, will operate with apparent satisfaction in fluids up to the rating specified here. Experience has shown however, that pump and hydraulic system life is not optimized with high fluid contamination levels (high ISO cleanliness codes).

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561 "Eaton Guide to Systemic Contamination Control" available from your local Eaton distributor. In this publication, filtration and cleanliness levels for extending the life of axial piston pumps and other system components are listed. Included is an excellent discussion of the selection of products needed to control fluid condition.
# Application Data and Fluid Recommendations

<table>
<thead>
<tr>
<th>Fluid Type</th>
<th>DIN/ISO Classification</th>
<th>Rated Pressure (p_N) (bar)</th>
<th>Maximum Speed (rev/min)</th>
<th>Recommended Seal Material</th>
<th>Maximum Operating Temperature (°C)</th>
<th>Bearing Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Glycol ▲</td>
<td>HFC</td>
<td>250</td>
<td>1800</td>
<td>1500</td>
<td>1250</td>
<td>NBR</td>
</tr>
<tr>
<td>HFDR (phosphate ester based)</td>
<td>HFDR</td>
<td>350</td>
<td>1500</td>
<td>1200</td>
<td>1000</td>
<td>FKM</td>
</tr>
<tr>
<td>HFDU (glycol based)</td>
<td>HFDU</td>
<td>350</td>
<td>1500</td>
<td>1200</td>
<td>1000</td>
<td>FKM</td>
</tr>
<tr>
<td>HFDU (ester based)</td>
<td>HFDU</td>
<td>350</td>
<td>1800</td>
<td>1500</td>
<td>1250</td>
<td>FKM</td>
</tr>
<tr>
<td>HEES (synthetic ester)</td>
<td>HEES</td>
<td>350</td>
<td>1800</td>
<td>1500</td>
<td>1250</td>
<td>FKM</td>
</tr>
</tbody>
</table>

■ See general specifications for speed limitation depending on displacement.
▲ For HFDR operation, bearing flushing is mandatory. Highest speed only recommended at optimized application conditions. Use Model Code 21 = “C” for seal option, and contact your Eaton Representative for validation.
Seal material can differ on an individual pump depending on specific seal function.
Bearing life with HFDR fluid depends significantly on fluid temperature, cleanliness, quality, flushing and application parameters. Typical values vary between 25% and 100% compared to mineral oil.
▼ Only fluids with fully saturated esters (iodine value <10) should be used.
HFDR and HEES fluids can be used at full ratings, but need to be monitored continuously to maintain quality and performance. The following important values should always be checked:
- Water content \((<= 500 \text{ ppm})\)
- Fluid cleanliness \((18/15/13 \text{ per ISO 4406})\)
- TAN value (no significant change from new oil)
- Viscosity (no significant change from new oil)
- Additives (no significant change from new oil)

Under harsh operation conditions, especially with regard to temperature and water content, ester-based HFDR and HFDU fluids are prone to hydrolysis, the resulting chemical processes and products of which could damage seals and other pump components. In general, the susceptibility to temperature and contamination is significantly higher than with standard mineral oils.
In line with Eaton Germany GmbH T&C warranty conditions covering use of HFDR/HFDR/HEES fluids, fluid-related damage is excluded.

---

### Case/Bearing Flushing

Case and bearing flushing are mandatory for HFDR fluid operation, and recommended for all other conditions where the pump is operating for longer intervals at low pressure i.e. <20 bar (<300 psi) and/or low flow at high pressure (compensated mode).

### Estimated Flushing Flow Values at 1500 rev/min

<table>
<thead>
<tr>
<th>Pump Size ((\text{cm}^3/\text{rev}))</th>
<th>Flushing Flow ((\text{l/min}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>130/180</td>
<td>4/5,5</td>
</tr>
<tr>
<td>250/360</td>
<td>7,5/11</td>
</tr>
<tr>
<td>500</td>
<td>15</td>
</tr>
<tr>
<td>750</td>
<td>20</td>
</tr>
</tbody>
</table>

### Vertical Mounting

Vertical mounting of Hydrokraft pumps is possible, but venting and lubrication of shaft bearings can require special flushing and installation procedures. For details, please refer to the Hydrokraft Application Guideline Presentation available from your Eaton Representative.

### High pressure lubrication / Hydrostatic Balancing for Yoke Bearings (half-cup bearings)

High-pressure bearing lubrication and balancing (Model Code 21 = “K”) is recommended for operating conditions with either high cycle frequencies (very short up/downstroke times) and/or where the swashplate is constantly maintained at a certain angle for long periods of time (compensated mode).

For details and additional information, please refer to the "Hydrokraft Application Guideline Presentation" available from your Eaton Representative.
General Dimensions
PVW 130 Pumps

Options illustrated:
12 = R (clockwise rotation)
14/15 = 00 (no thru drive)
18/19 = 01 (ISO keyed shaft)
27 = V (visual indicator)
48/49 = DF control (pressure compensator)

A – System pressure port ISO 6162-2 P32M [SAE J518 code 62, 1¼", 6000 psi]
B – Inlet port ISO 6162-1 P64M (SAE J518 code 62, 2½", 500 psi)
L1 – Drain port 1½"-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G1" (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G3/8" [shaft upward]
L3.1 – Port G1/4"
L5 – Oil filling plug 1/8"-12 UNF-2B
L8 – Air bleed port G1/8"
MA – System pressure gauge port G1/4"
ML – Case pressure gauge port G1/4"
X1 – Remote port pressure compensator G1/4"-12.5 deep
... – Connection with plug
Shaft and Mounting Options
PVW 130 Pumps

Mounting Flanges & Shaft Ends

**ISO splined shaft:**
- 10 11 = 05 & 10 12 = 02

**SAE D keyed shaft:**
- 10 13 = 0D & 10 14 = D1

**SAE D splined shaft:**
- 10 11 = 0D & 10 12 = D2

**Main Ports**

Port A

Port B
View X
General Dimensions
PVW 180 Pumps

Options illustrated:
- 12 = R (clockwise rotation)
- 14 15 = 00 (no thru drive)
- 18 19 = 01 (ISO keyed shaft)
- 27 = V (visual indicator)
- 24 25 = DF control (pressure compensator)
Shaft and Mounting Options
PVW 180 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: \( L_1 \) = 05 & \( L_2 \) = 02

SAE D keyed shaft: \( L_1 \) = 0D & \( L_2 \) = D1

SAE D splined shaft: \( L_1 \) = 0D & \( L_2 \) = D2

Main Ports

Port A

Port B View X
General Dimensions
PVW 250 Pumps

Options illustrated:
12 = R (clockwise rotation)
14 15 = 00 (no thru drive)
18 19 = 01 (ISO keyed shaft)
27 = V (visual indicator)
24 25 = DF control (pressure compensator)
Shaft and Mounting Options
PVW 250 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft:  10 11 = 07 &  18 19 = 02

SAE E splined shaft:  10 11 = 0E &  18 19 = E2

SAE E keyed shaft:  10 11 = 0E &  18 19 = E1

SAE E keyed shaft:  10 11 = 0F &  18 19 = F1

SAE F splined shaft:  10 11 = 0F &  18 19 = F2

Main Ports

Port A

Port B
View X
General Dimensions
PVW 360 Pumps

Options illustrated:
- 12 = R (clockwise rotation)
- 14 15 = 00 (no thru drive)
- 18 19 = 01 (ISO keyed shaft)
- 27 = V (visual indicator)
- 29 30 = DF control (pressure compensator)

---

A – System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1\(\frac{1}{2}\), 6000 psi)
B – Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3\(\frac{1}{2}\), 500 psi)
L1 – Drain port 1\(\frac{1}{2}\)-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G1\(\frac{1}{4}\), (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G1\(\frac{1}{4}\) (shaft upward)
L3.1 – Port G1\(\frac{1}{4}\)

L5 – Oil filling plug 1\(\frac{1}{4}\)-12 UNF-2B
L8 – Air bleed port G1\(\frac{1}{4}\)
MA – System pressure gauge port G1\(\frac{1}{4}\)
ML – Case pressure gauge port G1\(\frac{1}{4}\)
X1 – Remote port pressure compensator G1\(\frac{1}{4}\)-12.5 deep

* – Connection with plug
Shaft and Mounting Options
PVW 360 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: 10 11 = 07 & 10 19 = 02

SAE E keyed shaft: 10 11 = 0E & 10 19 = E1

SAE E splined shaft: 10 11 = 0E & 10 19 = E2

SAE E keyed shaft: 10 11 = 0F & 10 19 = F1

SAE F splined shaft: 10 11 = 0F & 10 19 = F2

Main Ports

Port A

Port B
View X
General Dimensions
PVW 500 Pumps

Options illustrated:
12 = R (clockwise rotation)
14-15 = 00 (no thru drive)
18-19 = 01 (ISO keyed shaft)
22 = V (visual indicator)
24-25 = DF control (pressure compensator)

A – System pressure port ISO 6162-2 P51M [SAE J518 code 62, 2", 6000 psi]
B – System pressure port ISO 6162-1 P127M [SAE J518 code 61, 5", 500 psi]
L1 – Drain port 1\(\frac{1}{4}\)/\(\frac{2}{2}\)-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port 1\(\frac{1}{2}\)/\(\frac{1}{2}\) (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G\(\frac{3}{4}\)" [shaft upward]
L3.1 – Port G\(\frac{3}{8}\)"

L5 – Oil filling plug 1\(\frac{1}{4}\)/\(\frac{2}{2}\)-12 UNF-2B
L8 – Air bleed port G\(\frac{3}{4}\)"
MA – System pressure gauge port G\(\frac{3}{4}\)"
ML – Case pressure gauge port G\(\frac{3}{4}\)"
X1 – Remote port pressure compensator G\(\frac{3}{4}\)"-12.5 deep
...* – Connection with plug
Shaft and Mounting Options
PVW 500 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: 10 11 = 08 & 18 19 = 02
ISO special splined shaft: 10 11 = 09 & 18 19 = 05

Main Ports

Port A

Port B
View X
General Dimensions
PVW 750 Pumps

Options illustrated:
12 = R (clockwise rotation)
14-15 = 00 (no thru drive)
18-19 = 02 (ISO splined shaft)
27 = V (visual indicator)
32-35 = DF control (pressure compensator)

A – System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2”, 6000 psi)
B – System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5”, 500 psi)
L1 – Drain port 1½”-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G1½” (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G¼” (shaft upward)
L3.1 – Port G¼”

L5 – Oil filling plug 1¼”-12 UNF-2B
L8 – Air bleed port G¼”
MA – System pressure gauge port G¼”
ML – Case pressure gauge port G¼”
X1 – Remote port pressure compensator G¼”-12.5 deep
... – Connection with plug
Mounting Flanges and Shaft Ends

ISO splined shaft: $\Box = 08 \ & \ \Box = 02$

as illustrated on the previous page is the only arrangement suitable for Hydrokraft pumps PVW 750.

Main Ports

- Port A
- Port B View X
**General Description**

Energy-saving hydraulic drives are possible with pressure compensated and/or power controlled pumps, especially in combination with the load sensing option.

**DF Controls**

System pressure remains constant for the entire volume flow rate. System pressure can be set manually, hydraulically or electronically.

The standard Hydrokraft pressure compensator is pilot operated, has a remote port and is very stable.

**LR Controls**

The typical p/Q curve is a hyperbola. For constant speed, the drive torque, i.e. the power used, is held constant.

The power hyperbola can be continuously adjusted between $P_{\text{min}}$ and $P_{\text{max}}$. $P_{\text{min}}$ is given by the minimum setting of the control main stage (20 bar approx.) and power loss of the pump.

Both controller types can be combined with another or with additional options; for available options, see Model Code.

Maximum pump flow can be limited mechanically to between 50% and 100% by a screw.

As an additional option, maximum (or minimum) flow can also be limited by a spacer inside the control cylinder (Model Code position 13, options 4, 5 or 6, in combination with customer adjustment specified in positions 40 to 43). This solution is also recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation.
Control Options DF

For pump details, see general Installation Dimensions.

**DF000A0**
Options illustrated:
- \( \square \) = **DF** (pressure compensator)
- \( \square \) = **A** (yoke angle 1 side of centre)

For pump details, see general Installation Dimensions.
Control Options DF (cont.)

For pump details, see general Installation Dimensions.

DF000A0K
Options illustrated:
- DF = pressure compensator
- A = yoke angle 1 side of centre
- K = proportional relief valve

<table>
<thead>
<tr>
<th>Ref. dim. for size 130-750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional relief valve</td>
</tr>
<tr>
<td>Pressure compensator main stage</td>
</tr>
</tbody>
</table>

P - System port
B - Inlet port
L1, L2 - Drain port
L3 - Vent port for vertical mounting
L3.1, L8 - Air bleed port
L5 - Oil filling plug
MA - Gauge port, system pressure
ML - Gauge port, case pressure
X1 - Remote port pressure compensator

1 - Basic pump
2 - Connection plate for DF-control
3 - Pressure compensator, main stage
4 - Proportional relief valve
Control Options DF (cont.)

For pump details, see general Installation Dimensions.

**DF000A1**

Options illustrated:
- **DF** = DF (pressure compensator)
- **A** = A (yoke angle 1 side of centre)
- **1** = 1 (load sensing)

---

![Diagram of pump control options](image)

**Ref. dim. for size 130-750**

**A, B** — System port

**L1, L2** — Drain port

**L3** — Port for front bearing flushing (vent port for vertical mounting)

**L3.1, L8** — Air bleed port

**L5** — Oil filling plug

**MA** — Gauge port, system pressure

**ML** — Gauge port, case pressure

**X1** — Remote port pressure limiter override G/√

**X2** — Remote port, load sense

---

**1** — Basic pump

**2** — Connection plate for DF-control

**3.1** — Pressure limiter override, load sense stage

**3.2** — Pressure limiter override, main stage

**3.3** — Pressure limiter override, pilot stage
Control Options DF (cont.)

For pump details, see general Installation Dimensions.

DF000AA/DF000AB

Options illustrated:
 DF = DF (pressure compensator)
 A = A yoke angle 1 side of centre
 B = B (2-level pressure compensator)

DF000AA

DF000AB

A, B – System port
L1, L2 – Drain port
L3 – Vent port for vertical mounting
L3.1, L8 – Air bleed port
L5 – Oil filling plug
MA – Gauge port, system pressure
ML – Gauge port, case pressure
X1 – Remote port pressure limiter override G\(^{\circ}/_{4}\)

1 – Basic pump
2 – Connection plate for DF-control
3.1 – Pressure limiter override, main stage
3.2 – Double relief stack valve
3.3 – Solenoid valve
3.4 – 4/3 directional valve
Control Options DF (cont.)

For pump details, see general Installation Dimensions.

DF000A1-100H

Options illustrated:

- **DF** = Pressure compensator
- **A** = Yoke angle 1 side of centre
- **1** = Load-sensing
- **1** = Venting valve
- **H** = 24V DC

Pressure compensator pilot stage

Pressure compensator main stage

Load-sensing valve

Ref. dim. for size 130/750

Legend:

- **A, B** – System port
- **L1, L2** – Drain port
- **L3** – Vent port for vertical mounting
- **L3.1, L8** – Air bleed port
- **L5** – Oil filling plug
- **MA** – Gauge port, system pressure
- **ML** – Gauge port, case pressure
- **X1** – Remote port pressure limiter override G1/4
- **X2** – Remote port load sense

1  – Basic pump
2  – Connection plate for DF-control
3.1 – Pressure limiter override, load sense stage
3.2 – Pressure limiter override, main stage
3.3 – Venting valve
3.4 – Pressure limiter override, pilot stage
Control Options LR

For pump details, see general Installation Dimensions.

**LR00A20**

Options illustrated:
- LR = LR (power control)
- A = yoke angle 1 side of centre
- 2 = (pressure limiter)
- 0 = (standard)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Width (mm)</td>
<td>451</td>
<td>451</td>
<td>446</td>
<td>484</td>
<td>505</td>
<td>574</td>
</tr>
<tr>
<td>LR Control Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A20</td>
<td>215</td>
<td>215</td>
<td>219</td>
<td>219</td>
<td>219</td>
<td>219</td>
</tr>
<tr>
<td>A2F</td>
<td>188</td>
<td>188</td>
<td>185</td>
<td>185</td>
<td>185</td>
<td>185</td>
</tr>
<tr>
<td>A30</td>
<td>215</td>
<td>215</td>
<td>219</td>
<td>219</td>
<td>219</td>
<td>219</td>
</tr>
</tbody>
</table>

Legend:
- A = System port
- B = Inlet port
- L1, L2 = Drain port
- L3 = Vent port for vertical mounting
- L3.1, L8 = Air bleed port
- L5 = Oil filling plug
- MA = Gauge port, system pressure
- ML = Gauge port, case pressure
- X1 = Remote port pressure compensator

1 = Basic pump
2 = Connection plate for LR-control
3 = Pressure and power compensator, main stage
4 = Pressure compensator, pilot stage
5 = Power compensator, pilot stage
Control Options LR (cont.)

For pump details, see general Installation Dimensions.

LR00A2F
Options illustrated:

- LR = LR (power control)
- A = A (yoke angle 1 side of centre)
- 2 = 2 (pressure limiter)
- F = F (remote pilot port)

Pump Size  | 130 | 180 | 250 | 360 | 500 | 750
---|---|---|---|---|---|---
Total Width (mm) | 451 | 451 | 446 | 484 | 505 | 574
LR Control Type  | A20 | A2F | A30

- LR Control Type A20: 215, 219, 219, 219, 219
- LR Control Type A2F: 188, 185, 185, 185, 185
- LR Control Type A30: 215, 219, 219, 219, 219

A – System port
B – Inlet port
L1, L2 – Drain port
L3 – Vent port for vertical mounting
L3.1, L8 – Air bleed port
L5 – Oil filling plug
MA – Gauge port, system pressure
ML – Gauge port, case pressure
X1 – Remote port pressure compensator

1 – Basic pump
2 – Connection plate for LR-control
3 – Pressure and power compensator, main stage
4 – Closing plate
5 – Power compensator, pilot stage
Control Options LR (cont.)

For pump details, see general
Installation Dimensions.

LR00A30

Options illustrated:

- **LR** = LR (power control)
- **A** = yoke angle 1 side of centre
- **3** = (load sensing + pressure limiter)
- **0** = (standard)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>130</th>
<th>180</th>
<th>250</th>
<th>360</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Width (mm)</td>
<td>451</td>
<td>451</td>
<td>446</td>
<td>484</td>
<td>505</td>
<td>574</td>
</tr>
<tr>
<td>LR Control Type</td>
<td>A20</td>
<td>A2F</td>
<td>A30</td>
<td></td>
<td></td>
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<td>LR Control Type</td>
<td>215</td>
<td>215</td>
<td>219</td>
<td>219</td>
<td>219</td>
<td>219</td>
</tr>
<tr>
<td>LR Control Type</td>
<td>188</td>
<td>188</td>
<td>185</td>
<td>185</td>
<td>185</td>
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<td>LR Control Type</td>
<td>215</td>
<td>215</td>
<td>219</td>
<td>219</td>
<td>219</td>
<td>219</td>
</tr>
</tbody>
</table>

A = System port
B = Inlet port
L1, L2 = Drain port
L3 = Vent port for vertical mounting
L3.1, L8 = Air bleed port
L5 = Oil filling plug
MA = Gauge port, system pressure
ML = Gauge port, case pressure
X1 = Remote port pressure compensator
X2 = Remote port load sense

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic pump</td>
<td>Connection plate for LR-control</td>
<td>Pressure and power compensator, main stage</td>
<td>Closing plate</td>
<td>Power compensator, pilot stage</td>
</tr>
</tbody>
</table>
Control Options SP

General Description
The energy-saving electrohydraulic displacement control type SP efficiently adjusts pump output by acting on the swashplate within electrically adjustable limits. The swashplate angle value is fed back to the controller unit via an electrical closed loop system.

A proportional valve and servo piston use the controller output signal to apply the required setting, resulting in a highly accurate dynamic control system.

Hysteresis is approximately 1% of end value. The SP control can also be combined with hydromechanical relief valves for pressure and/or power control.

Maximum pump flow can be limited mechanically to between 50% and 100% by a screw. As an additional option, maximum (or minimum) flow can be set by a spacer inside the control cylinder (Model Code position 2, options 4, 5 or 6, in combination with customer adjustment specified in positions 40 to 43).

This solution is recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation.

Pump Dimensions with SPC03A0 Control
For basic pump details, see general Installation Dimensions.

Options illustrated:

- SP (displacement adjustment via proportional valve)
- C (CETOP 3 proportional valve KDG4V-3)
- O (no additional function)
- E (filter with electrical indicator)
- 0 (no venting valve)

Pump Dimensions with Control SPC03A0 (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>346</td>
<td>192</td>
<td>234</td>
<td>282</td>
<td>368</td>
<td>183</td>
<td>490</td>
<td>113</td>
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<tr>
<td>180</td>
<td>446</td>
<td>346</td>
<td>192</td>
<td>234</td>
<td>282</td>
<td>368</td>
<td>183</td>
<td>490</td>
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<td>250</td>
<td>461</td>
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<td>236</td>
<td>278</td>
<td>326</td>
<td>412</td>
<td>212</td>
<td>535</td>
<td>125</td>
</tr>
<tr>
<td>360</td>
<td>475</td>
<td>375</td>
<td>236</td>
<td>278</td>
<td>326</td>
<td>412</td>
<td>212</td>
<td>551</td>
<td>125</td>
</tr>
<tr>
<td>500</td>
<td>520</td>
<td>420</td>
<td>268</td>
<td>310</td>
<td>358</td>
<td>444</td>
<td>212</td>
<td>659</td>
<td>166</td>
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<tr>
<td>750</td>
<td>562</td>
<td>462</td>
<td>270</td>
<td>312</td>
<td>460</td>
<td>446</td>
<td>212</td>
<td>689</td>
<td>166</td>
</tr>
</tbody>
</table>

Response Time @ 1500 rev/min, SP Control with Pilot Pump Option (...OOP)

<table>
<thead>
<tr>
<th>Main Pump Size</th>
<th>Pilot Pump Size (cm³/rev)</th>
<th>Pilot Pressure (bar)</th>
<th>Up/Downstroke time 0-100% displ. (ms) approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>8</td>
<td>60</td>
<td>450</td>
</tr>
<tr>
<td>180</td>
<td>8</td>
<td>60</td>
<td>450</td>
</tr>
<tr>
<td>250</td>
<td>8</td>
<td>60</td>
<td>550</td>
</tr>
<tr>
<td>360</td>
<td>8</td>
<td>60</td>
<td>700</td>
</tr>
<tr>
<td>500</td>
<td>8</td>
<td>90</td>
<td>650</td>
</tr>
<tr>
<td>750</td>
<td>8</td>
<td>90</td>
<td>850</td>
</tr>
</tbody>
</table>
Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.

Pump dimensions with SPC03A0 control (cont.)

A – System port
B – Inlet port
L1, L2 – Drain port
L3 – Vent port for vertical mounting
L3.1, L8 – Air bleed port
L5 – Oil filling plug
MA – Gauge port, system pressure
ML – Gauge port, case pressure
PSt1 – Pilot pressure inlet port
PSt2 – Pilot pump outlet port
MSt – Pilot pressure gauge port
S – Pilot pump inlet port
1 – Basic pump
2 – Connection plate for SP-control
2.1 – Pilot pressure relief valve
3 – Pilot oil filter
4 – Proportional control valve
5 – Pilot pump
Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.

SPC03A4

Options illustrated:

- **24** = SP (displacement adjustment via proportional valve)
- **25** = C (CETOP 3 proportional valve KDG4V3)
- **30** = 4 (pressure limiter override)
- **35** = E (filter with electrical indicator)
- **36** = 0 (no venting valve)

Pump Overall Dimensions with Control SPC03A4 (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>274</td>
<td>322</td>
<td>408</td>
</tr>
<tr>
<td>180</td>
<td>446</td>
<td>274</td>
<td>322</td>
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<td>250</td>
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<td>360</td>
<td>475</td>
<td>318</td>
<td>366</td>
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<tr>
<td>500</td>
<td>520</td>
<td>350</td>
<td>398</td>
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<tr>
<td>750</td>
<td>562</td>
<td>352</td>
<td>400</td>
<td>486</td>
</tr>
</tbody>
</table>

Proportional control valve
Pressure filter
Pressure limiter override
Main stage
Pressure limiter override
Pilot stage

A — System port
B — Inlet port
L1, L2 — Drain port
L3 — Vent port for vertical mounting
L3, L8 — Air bleed port
L5 — Oil filling plug
MA — Gauge port, system pressure
ML — Gauge port, case pressure
PSt1 — Pilot pressure inlet port
PSt2 — Pilot pump outlet port
MS1 — Pilot pressure gauge port
X1 — Remote port pressure limiter override
S — Pilot pump inlet port

1 — Basic pump
2 — Connection plate for SP-control
2.1 — Pilot pressure relief valve
3 — Subplate
4 — Pilot oil filter
5 — Proportional control valve
6 — Pressure limiter override, main stage
7 — Pressure limiter override, pilot stage
8 — Pilot pump
Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.

**SPC03A5**

Options illustrated:
- 24 = SP (displacement adjustment via proportional valve)
- 25 = C (CETOP 3 proportional valve KDG4V-3)
- 26 = S (pressure and power limiter override)
- 30 = E (filter with electrical indicator)
- 35 = O (no venting valve)

**Pump Overall Dimensions with Control SPC03A5 (mm)**

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>516</td>
<td>274</td>
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</tr>
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<td>750</td>
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<td>352</td>
<td>406</td>
<td>486</td>
</tr>
</tbody>
</table>

**Control Options SP (cont.)**

For basic pump details, see general Installation Dimensions.

<table>
<thead>
<tr>
<th>A</th>
<th>System port</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Inlet port</td>
</tr>
<tr>
<td>L1, L2</td>
<td>Drain port</td>
</tr>
<tr>
<td>L3</td>
<td>Vent port for vertical mounting</td>
</tr>
<tr>
<td>L3.1, L8</td>
<td>Air bleed port</td>
</tr>
<tr>
<td>L5</td>
<td>Oil filling plug</td>
</tr>
<tr>
<td>MA</td>
<td>Gauge port, system pressure</td>
</tr>
<tr>
<td>ML</td>
<td>Gauge port, case pressure</td>
</tr>
<tr>
<td>PS1</td>
<td>Pilot pressure inlet port</td>
</tr>
<tr>
<td>PS2</td>
<td>Pilot pump outlet port</td>
</tr>
<tr>
<td>MSt</td>
<td>Pilot pressure valve on port</td>
</tr>
<tr>
<td>X1</td>
<td>Remote port pressure limiter override</td>
</tr>
<tr>
<td>S</td>
<td>Pilot pump inlet port</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>Basic pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Connection plate for SP-control</td>
</tr>
<tr>
<td>2.1</td>
<td>Pilot pressure relief valve</td>
</tr>
<tr>
<td>3</td>
<td>Subplate</td>
</tr>
<tr>
<td>4</td>
<td>Pilot oil filter</td>
</tr>
<tr>
<td>5</td>
<td>Proportional control valve</td>
</tr>
<tr>
<td>6</td>
<td>Pressure and Power limiter override, main stage</td>
</tr>
<tr>
<td>7</td>
<td>Pressure limiter override, pilot stage</td>
</tr>
<tr>
<td>8</td>
<td>Power limiter override, pilot stage</td>
</tr>
<tr>
<td>9</td>
<td>Pilot pump</td>
</tr>
</tbody>
</table>
Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.

**SPD0**

Options illustrated:
- **24** = SP (displacement adjustment via proportional valve)
- **25** = D (CETOP 3 proportional valve KBS-3 with OBE)
- **0** = 0 (no additional function)
- **0** = 0 (no pilot oil filter)
- **0** = 0 (no venting valve)

**Pump Overall Dimensions**

With Control SPD0 (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>350</td>
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<tr>
<td>180</td>
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<tr>
<td>250</td>
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<tr>
<td>500</td>
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<td>426</td>
</tr>
<tr>
<td>750</td>
<td>562</td>
<td>428</td>
</tr>
</tbody>
</table>

Diagram:

Proportional control valve

Legend:

- **A** = System port
- **B** = Inlet port
- **L1, L2** = Drain port
- **L3** = Vent port for vertical mounting
- **L3.1, L8** = Air bleed port
- **L5** = Oil filling plug
- **MA** = Gauge port, system pressure
- **ML** = Gauge port, case pressure
- **PSt1** = Pilot pressure inlet port
- **PSt2** = Pilot pump outlet port
- **MS1** = Pilot pressure gauge port
- **S** = Pilot pump inlet port

**Min. Response Time @ 1500 rev/min with SPD Control**

<table>
<thead>
<tr>
<th>Main Pump Size</th>
<th>Pilot Flow Required (l/min)</th>
<th>Pilot Pressure Required (bar)</th>
<th>Up/Downstroke time 0-100% displ. (ms) approx.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>150</td>
</tr>
<tr>
<td>750</td>
<td>65</td>
<td>200</td>
<td>150</td>
</tr>
</tbody>
</table>

**Min. Response Time @ 1500 rev/min with SPE Control**

<table>
<thead>
<tr>
<th>Main Pump Size</th>
<th>Pilot Flow Required (l/min)</th>
<th>Pilot Pressure Required (bar)</th>
<th>Up/Downstroke time 0-100% displ. (ms) approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>50</td>
<td>150</td>
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<td>500</td>
<td>55</td>
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</tr>
<tr>
<td>750</td>
<td>70</td>
<td>250</td>
<td>135</td>
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</tbody>
</table>
Control Options DP

General Description
Pump output flow is proportional to pilot pressure. A separate pilot oil circuit is required to reduce control pressure to the set value, using a suitable relief valve in line P-T and throttle valve in line P, Ø 0.8 (0.03 in).

The DP control can be used for stepless flow control with standard requirements for dynamics and accuracy. No feedback signal is needed; an optical indicator is recommended (Model Code position 12. = V).

Maximum pump flow can be limited mechanically to between 50% and 100% by a screw. As an additional option, maximum (or minimum) flow can be set by a spacer inside the control cylinder (Model Code position 13. options 4, 5 or 6, in combination with customer adjustment specified in positions 40 to 43.).

This solution is recommended for severe operating conditions and the need for high repeatability over a long period of time. The setting must be defined before ordering since it cannot be modified in operation.

Pump Dimensions with DPJ...A0 Control

For basic pump details, see general Installation Dimensions.

Options illustrated:

24 = DP (pilot pressure adjusted displacement)
25 = J (proportional KCG relief valve)
30 = 0 (no additional function)
35 = 0 (no pilot oil filter)

Pump Overall Dimensions With Control DPJ00A0 (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>K</th>
<th>L</th>
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<td>192</td>
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<td>374</td>
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<td>276</td>
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<td>360</td>
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<td>500</td>
<td>520</td>
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<td>268</td>
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<td>388</td>
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<td>450</td>
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<td>300</td>
<td>659</td>
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<td>562</td>
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<td>270</td>
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<td>452</td>
<td>247</td>
<td>307</td>
<td>689</td>
<td>166</td>
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</tbody>
</table>

Response Time @ 1500 rev/min, DP Control with Pilot Pump Option (OP)

<table>
<thead>
<tr>
<th>Main Pump Size</th>
<th>Pilot Pump Size (cm³/rev)</th>
<th>Pilot Pressure (bar)</th>
<th>Up/Downstroke time 0-100% displ. (ms) approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
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<tr>
<td>750</td>
<td>8</td>
<td>90</td>
<td>2000</td>
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</table>
Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.

Pump dimensions with DPJ...A0 control (cont.)
Control Options DP (cont.)

For basic pump details, see general installation dimensions.

**DPJ...A4**

Options illustrated:
- 24 = DP (pilot pressure adjusted displacement)
- 25 = J (proportional KCG relief valve)
- 26 = 4 (pressure limiter override)
- 30 = 0 (no pilot oil filter)

**Pump Overall Dimensions with Control DPJ4 (mm)**

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
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<th>G</th>
<th>M</th>
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<tr>
<td>130</td>
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<td>374</td>
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<tr>
<td>250</td>
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<td>500</td>
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<tr>
<td>750</td>
<td>562</td>
<td>444</td>
<td>452</td>
<td>176</td>
</tr>
</tbody>
</table>

**Legend**

- **A, B** – System port
- **L1, L2** – Drain port
- **L3** – Vent port for vertical mounting
- **L3.1, L8** – Air bleed port
- **L5** – Oil filling plug
- **L7** – External port oil return line (Optional)
- **MA** – Gauge port, system pressure
- **ML** – Gauge port, case pressure
- **PSt1** – Pilot pressure inlet port
- **PSt2** – Pilot pump inlet port
- **MSt** – Pilot pressure gauge port
- **X1** – Remote port pressure limiter override
- **S** – Pilot pump inlet port

1. Basic pump
2. Connection plate for DP-control
3. DP control
3.1. Pilot pressure relief valve
4. Connection plate for proportional valve
5. Pressure limiter override, main stage
6. Pressure limiter override, pilot stage
7. Proportional relief valve
8. Pilot pump
Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.

**Options illustrated:**
- **24** = DP (pilot pressure adjusted displacement)
- **25** = J (proportional KCG relief valve)
- **30** = 5 (pressure and power limiter override)
- **35** = 0 (no pilot oil filter)

### Pump Overall Dimensions with Control DPJ5 (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
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<td>130</td>
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</tbody>
</table>

**Diagram notes:**
- **A, B** – System port
- **L1, L2** – Drain port
- **L3** – Vent port for vertical mounting
- **L3.1, L8** – Air bleed port
- **L5** – Oil filling plug
- **L7** – External port oil return line (Optional)
- **MA** – Gauge port, system pressure
- **ML** – Gauge port, case pressure
- **PSt1** – Pilot pressure inlet port
- **PSt2** – Pilot pump outlet port
- **MSt** – Pilot pressure gauge port
- **X1** – Remote port pressure limiter override
- **S** – Pilot pump inlet port

### Port Descriptions:
- **1** – Basic pump
- **2** – Connection plate for DP-control
- **3** – DP control
- **3.1** – Pilot pressure relief valve
- **4** – Connection plate for proportional valve
- **5** – Pressure and power limiter limiter override, main stage
- **6** – Pressure limiter override, pilot stage
- **7** – Power limiter override, pilot stage
- **8** – Proportional relief valve
- **9** – Pilot pump
Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.

DPG...A0

Options illustrated:
24 25 = DP (pilot pressure adjusted displacement)
26 = G (CETOP 3 interface)
27 = 0 (no additional function)
28 = 0 (no pilot oil filter)

Pump Overall Dimensions with Control DPG (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>F</th>
<th>G</th>
<th>M</th>
</tr>
</thead>
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<td>360</td>
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<tr>
<td>750</td>
<td>562</td>
<td>439</td>
<td>452</td>
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</tbody>
</table>
Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.

**DPH...A0**

Options illustrated:
- **24** = **DP** (pilot pressure adjusted displacement)
- **25** = **H** (Remote port G\(\frac{1}{4}\)"
- **30** = **O** (no additional function)
- **35** = **O** (no pilot oil filter)

**Pump Overall Dimensions with Control DPG (mm)**

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>F</th>
<th>G</th>
<th>M</th>
</tr>
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<tbody>
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<tr>
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<tr>
<td>750</td>
<td>562</td>
<td>439</td>
<td>452</td>
<td>82</td>
</tr>
</tbody>
</table>

**Diagram Notes:**
- **A, B** – System port
- **L1, L2** – Drain port
- **L3** – Vent port for vertical mounting
- **L3.1, L8** – Air bleed port
- **L5** – Oil filling plug
- **MA** – Gauge port, system pressure
- **ML** – Gauge port, case pressure
- **PSt1** – Pilot pressure inlet port
- **PSt2** – Pilot pump outlet port
- **MSt** – Pilot pressure gauge port
- **S** – Pilot pump inlet port
- **ASt** – G\(\frac{3}{4}\)"
- **BSt** – G\(\frac{1}{2}\)"
- **P** – G\(\frac{1}{2}\)"
- **T** – G\(\frac{1}{4}\)"

1 – Basic pump
2 – Connection plate for DP-control
3 – DP control
3.1 – Pilot pressure relief valve
4 – Plate with 4x G\(\frac{1}{4}\)" ports
5 – Pilot pump
Control Options PQ

General Description
Flow Control
The ER9.X-10 digital controller measures the actual swash-plate position from sensor data, comparing the swash-plate angle with the set value and driving the servo or proportional valve accordingly. Swash plate angle as well as pump displacement and outlet flow are regulated to match set values.

Pressure Cut-Off Control
The ER9.X-10 controller measures pressure in both lines, as indicated by pressure sensors, reducing output levels in the event of actual pressure exceeding the command signal.

Power Cut-Off Control
The ER9.X-10 calculates actual power by measuring pressures and swash plate angle, which is directly proportional to flow. Should power exceed command signal levels, the controller generates a maximum internal flow command signal in line with maximum input power.

Mooring Control
(on request only)
Pressure Cut-Off control is designed to operate to full 100% overcentre. This allows for intelligent Mooring Control.

Master-Slave Function
A number of pumps operate in parallel, one set as master and the others as slaves. The master pump is fitted with a fully active PpQ controller, while the slave units, running in flow-control mode, follow the displacement response of the master unit.

PpQ Controller Model Code

<table>
<thead>
<tr>
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<th>5</th>
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<th>15</th>
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</tbody>
</table>

1. Digital Controller Series
ER9.X – Amplifier card for PpQ control functions

5. Customer Adjustment Specification for Customized Parameter Settings
0000 – Standard parameters

10. Special Features for Special Design Options
000 – Standard features
P00 – ProfiBus version

15. Design Number
10 – Subject to change

Note: ER9.X-10 Digital Controllers must be ordered as separate items from pumps.

ER9.X Controller Card Functionality

The digital amplifier and controller card assembly ER9.X-10 is used for the electronic PpQ control of displacement, pressure and power on Eaton PVW variable piston pumps (W design). The swash plate is positioned by either an Eaton KBS proportional valve or one of a range of suitable servovalves. The digital amplifier and controller card have been designed and tested to comply with the provisions of European Directive 2004/108/EC governing Electromagnetic Compatibility (EMC), which ensure high interference immunity coupled with low interference emission. The electronic card is tested to DIN EN 60068-2-6 (vibration) and DIN EN 60068-2-27 (mechanical shock). It features a display and six buttons to adjust card parameters. Configuring the digital amplifier and controller card is also possible via an RS232 serial interface and the ER9.X-Tool software included.

- Controls displacement-Q, power-P and pressure-p.
- Multilingual.
- Easy parameter setting and documentation.
- 4 channel oscilloscope function included.
- Differential amplifier input (flow command) for set points in the range of 0 to ±10V, 14-bit resolution.
- Single ended, independent set point input (pressure command) for the range of 0 to +10V, 14-bit resolution.
- 2 single ended, independent set point inputs (Power command) for the range of 0 to +10V, 14-bit resolution.
- 3 sensor inputs for 0-20 mA or 4-20 mA sensor signals (swashplate feedback, pressure in A+B), 14-bit resolution.
- Integrated reference supply voltage of ±10V (10 mA max), to supply external devices.
- Four storable and adjustable digital set points (one additional point is optional).
- Direction externally set through “+” and “-” inputs.
- Enable signal for output stages.
- Ramp function and Reset-Ramp for fast ramp function zeroing.
- Status outputs: Error and Comparator.
- All digital inputs and outputs are optically isolated for functional security.
- Four 7-segment displays and six buttons for display and functionality ease.
- Function indication through front panel by LEDs.
- Additional switching output (24V, max 1A) to directly disable safety valve.
- Additional front panel test jacks for easy commissioning.
- Serial interface RS232.
- 12/14 bit digital controller.
Control Options PQ (cont.)

For basic pump details, see general Installation Dimensions.

Pump Dimensions with PQD0 Control

Options illustrated:
- 24 = PQ (displacement adjustment via proportional valve)
- 26 = D (CETOP 3 proportional valve KBS-3 with OBE)
- 30 = 0 (no additional function)
- 35 = 0 (no pilot oil filter)
- 36 = 0 (no venting valve)

Pump Overall Dimensions with Control PQD0 (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>350</td>
</tr>
<tr>
<td>180</td>
<td>446</td>
<td>350</td>
</tr>
<tr>
<td>250</td>
<td>461</td>
<td>394</td>
</tr>
<tr>
<td>360</td>
<td>475</td>
<td>394</td>
</tr>
<tr>
<td>500</td>
<td>520</td>
<td>426</td>
</tr>
<tr>
<td>750</td>
<td>562</td>
<td>428</td>
</tr>
</tbody>
</table>
Control Options ES

Available to special order only.

General Description
This unit is used for flow adjustment. It has a 3-phase electric servo-motor, worm-gear and a switchbox with 4 or (optional) 8 limit switches for different positions.

A potentiometer for stepless adjustment and/or position monitoring is also available. Response times from zero to maximum depend on the ratio selected and on the (fixed) speed of the servo-motor, with the result that once the control is specified and built, response time are not variable in operation. Explosion Protection versions are also available.

No Pressure/Power Limiter possible!

Pump Dimensions with ESN...A2 Control
For other options and sizes, please contact Eaton Technical Support for individual pump drawings.

Options illustrated:
- ES = electric motor adjusted displacement
- N = electric motor, medium response
- A = 4 limit switches
- Z = motor with brake, IP54

Theoretical Response Time for Maximum Displacement
Response time from 0 to 100% displacement can vary between 5s and 70s depending on pump size, motor type and supply voltage. Contact Eaton Technical Support for details.

Dimensions shown for PVW 250 only.
Control Options ES (cont.)

Available to special order only.
For basic pump details, see general Installation Dimensions.

Pump Dimensions with ESN...A2 Control (cont.)

For other options and sizes, please contact Eaton Technical Support for individual pump drawings.

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Diagram with labels:
- **A** – System port
- **B** – Inlet port
- **L1, L2** – Drain port
- **L3** – Vent port for vertical mounting
- **L3.1, L8** – Air bleed port
- **L5** – Oil filling plug
- **MA** – Gauge port, system pressure
- **ML** – Gauge port, case pressure

1 – Basic pump
2 – Electric Motor for ES-control
General Dimensions
PFW 250 Pumps

Options illustrated:

- 12 = R (clockwise rotation)
- 14 15 = 00 (no thru drive)
- 18 19 = 01 (ISO keyed shaft)
- 22 = 0 (no yoke position indicator)
- 24 25 = 00 (without control)

A – System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1/2", 6000 psi)
B – Inlet pressure port ISO 6162-1 P89M (SAE J518 code 61, 3/8", 500 psi)
L1 – Drain port 1\(\frac{1}{4}\)"-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G\(\frac{1}{4}\)" (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G\(\frac{1}{4}\)" [shaft upward]
L3.1 – Port G\(\frac{1}{4}\)"
L5 – Oil filling plug 1\(\frac{1}{4}\)"-12 UNF-2B
L8 – Air bleed port G\(\frac{1}{4}\)"
MA – System pressure gauge port G\(\frac{1}{4}\)"
...* – Connection with plug
Shaft and Mounting Options
PFW 250 Pumps

### Mounting Flanges and Shaft Ends

#### ISO splined shaft:
- Tolerance: [07] and [02]

#### SAE E keyed shaft:
- Tolerance: [0E] and [E1]

#### SAE E splined shaft:
- Tolerance: [0E] and [E2]

#### SAE F splined shaft:
- Tolerance: [0F] and [F2]

### Main Ports

Port A
- Diameter: 36.7
- M16-30 deep
- Port View X

Port B
- Diameter: 120.7
- M16-40 deep
- View X
General Dimensions
PFW 360 Pumps

Options illustrated:
12 = R (clockwise rotation)
14-15 = 00 (no thru drive)
18-19 = 01 (ISO keyed shaft)
22 = 0 (no yoke position indicator)
24-25 = 00 (without control)

- System pressure port ISO 6162-2 P38M (SAE J518 code 62, 1 1/4", 6000 psi)
- Inlet pressure port ISO 6162-1 P99M (SAE J518 code 61, 3 1/2", 500 psi)
- Drain port 1 1/4"-12 UNF-2B (depending on mounting position, use upper port)
- Drain port G1 1/4" (depending on mounting position, use upper port)
- Vent port for vertical mounting G1/2" (shaft upward)
- Port G1/4"
- Oil filling plug 1 1/4"-12 UNF-2B
- Air bleed port G1/4"
- System pressure gauge port G1/4"
- Connection with plug
Shaft and Mounting Options
PFW 360 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: 10 11 = 07 & 10 18 = 02

SAE E keyed shaft: 10 11 = 0E & 10 19 = E1

SAE E splined shaft: 10 11 = 0E & 18 19 = E2

SAE E keyed shaft: 10 11 = 0F & 10 19 = F1

SAE F splined shaft: 10 11 = 0F & 18 19 = F2

Main Ports

Port A

Port B
View X
General Dimensions
PFW 500 Pumps

Options illustrated:
- \( R \) = clockwise rotation
- \( 00 \) = no thru drive
- \( 01 \) = ISO keyed shaft
- \( 0 \) = no yoke position indicator
- \( 00 \) = without control

A – System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
B – System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
L1 – Drain port 1\(\frac{1}{4}\)-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G1\(\frac{1}{4}\), (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G1\(\frac{3}{4}\) (shaft upward)
L3.1 – Port G1\(\frac{3}{4}\)
MA – System pressure gauge port G1\(\frac{3}{4}\)
...* – Connection with plug
Shaft and Mounting Options
PFW 500 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: $10 \times 11 = 08$ & $18 \times 19 = 02$

ISO special splined shaft: $10 \times 11 = 09$ & $18 \times 19 = 05$

Main Ports

Port A

Port B
View X
General Dimensions
PFW 750 Pumps

Options illustrated:
12 = R (clockwise rotation)
14/15 = 00 (no thru drive)
18/19 = 02 (ISO splined shaft)
27 = 0 (no yoke position indicator)
45/46 = 00 (without control)

A – System pressure port ISO 6162-2 P51M (SAE J518 code 62, 2", 6000 psi)
B – System pressure port ISO 6162-1 P127M (SAE J518 code 61, 5", 500 psi)
L1 – Drain port 1\(\frac{1}{8}\)-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G1\(\frac{1}{4}\), (depending on mounting position, use upper port)

L3 – Vent port for vertical mounting G1\(\frac{1}{4}\)* (shaft upward)
MA – System pressure gauge port G\(\frac{1}{4}\)*
...* – Connection with plug
Shaft and Mounting Options
PFW 750 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: 10 11 = 08 & 10 19 = 02
as illustrated on the previous page is the only arrangement suitable for Hydrokraft pumps PFW 750.
Thru-Drive Options
130 and 180 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request. For basic pump details, see general Installation Dimensions.

Option illustrated:

\[ LSL = 0A \text{ (SAE A)} \]

Option illustrated:

\[ LSL = 0B \text{ (SAE B)} \]

Option illustrated:

\[ LSL = 0C \text{ (SAE C)} \]
Thru-Drive Options
250 and 360 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request.
For basic pump details, see general Installation Dimensions.

Option illustrated:

\[
\begin{array}{c}
\text{Option illustrated:} \\
\text{\[
\begin{array}{c}
\text{14} \\
\text{15}
\end{array}
\]} = 0A (SAE A)
\end{array}
\]

Option illustrated:

\[
\begin{array}{c}
\text{Option illustrated:} \\
\text{\[
\begin{array}{c}
\text{14} \\
\text{15}
\end{array}
\]} = 0B (SAE B)
\end{array}
\]

Option illustrated:

\[
\begin{array}{c}
\text{Option illustrated:} \\
\text{\[
\begin{array}{c}
\text{14} \\
\text{15}
\end{array}
\]} = 0C (SAE C)
\end{array}
\]
Thru-Drive Options
500 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request. For basic pump details, see general Installation Dimensions.

Option illustrated:

\[14 \times 15 = 0A\] (SAE A)

Option illustrated:

\[14 \times 15 = 0B\] (SAE B)

Option illustrated:

\[14 \times 15 = 0C\] (SAE C)
Thru-Drive Options
750 Series

All thru-drives accept DIN ISO 3019-2 (SAE J744) mounting interface. Other thru-drive interfaces available on request. For basic pump details, see general Installation Dimensions.

Option illustrated:

Option illustrated:

Option illustrated:
Swash Angle and Flow Direction

Optically indicated swash angle

Pressure control setting