Contents

Introduction
- Description .................................................. 3
- Typical Section ................................................ 3

Model Codes
- Basic Pumps ................................................. 4
- DF Control .................................................. 5
- LR Control .................................................. 6
- SP Control .................................................. 7
- DP Control .................................................. 8
- PQ Control .................................................. 9
- ES Control .................................................. 10
- No Control .................................................. 11
- Combination Units ......................................... 12
- Form Page .................................................. 13

Pump Specifications
- Metric ........................................................ 14
- US ............................................................. 15

Performance Curves
- 130 & 180 Series .......................................... 16
- 250 & 360 Series .......................................... 17
- 500 & 750 Series .......................................... 18

Installation and Start-up .................................... 20

Application Data and Fluid Recommendations ............. 21

General Dimensions + Shaft & Mounting Options
Variable Displacement PVW
- 130 Series .................................................. 22
- 180 Series .................................................. 24
- 250 Series .................................................. 26
- 360 Series .................................................. 28
- 500 Series .................................................. 30
- 750 Series .................................................. 32

Control Options
- DF & LR Controls ......................................... 34
- SP Control .................................................. 43
- DP Control .................................................. 48
- PQ Control .................................................. 54
- ES Control .................................................. 56

General Dimensions + Shaft & Mounting Options
Fixed Displacement PFW
- 250 Series .................................................. 58
- 360 Series .................................................. 60
- 500 Series .................................................. 62
- 750 Series .................................................. 64

Thru-Drive Options
- 130 & 180 Series ......................................... 66
- 250 & 360 Series ......................................... 67
- 500 Series .................................................. 68
- 750 Series .................................................. 69

Swash Angle & Flow Direction .................................. 70
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>US Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>130 cm³</td>
<td>8.0 in³/rev</td>
</tr>
<tr>
<td>180 cm³</td>
<td>(11.0 in³/rev)</td>
</tr>
<tr>
<td>250 cm³</td>
<td>(15.0 in³/rev)</td>
</tr>
<tr>
<td>360 cm³</td>
<td>(22.0 in³/rev)</td>
</tr>
<tr>
<td>500 cm³</td>
<td>(30.5 in³/rev)</td>
</tr>
<tr>
<td>750 cm³</td>
<td>(45.0 in³/rev)</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.
## Model Code

### Open Loop Pumps

**W Series - Basic Pumps**

### Maximum Displacement Screws (cont.)

<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>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Maximum Displacement Screws (continued)

**Pump Size** | **130** | **180** | **250** | **360** | **500** | **750**
--- | --- | --- | --- | --- | --- | ---
1 | Pump | | | | | |
2 | Displacement | | | | | |
3 | Pump Series | | | | | |
4 | Configuration | | | | | |
5 | Separator | | | | | |
6 | Non-standard displacements (cm³/rev): | | | | | |
7 | 130 – 130 cm³/rev (8 in³/rev) | | | | | |
8 | 180 – 180 cm³/rev (11 in³/rev) | | | | | |
9 | 250 – 250 cm³/rev (15.3 in³/rev) | | | | | |
10 | 360 – 360 cm³/rev (22.0 in³/rev) | | | | | |
11 | 500 – 500 cm³/rev (30.5 in³/rev) | | | | | |
12 | 750 – 750 cm³/rev (45.8 in³/rev) | | | | | |
13 | **–** – Non-standard (PFW only) | | | | | |
14 | **–** – Single shaft seal | | | | | |
15 | **–** – ISO D keyed 13/4" | | | | | |
16 | **–** – ISO D splined 8/16 13T | | | | | |
17 | **–** – ISO D keyed 1½" | | | | | |
18 | **–** – ISO D splined 8/16 13T | | | | | |
19 | **–** – ISO F splines 8/16 15T | | | | | |
20 | **–** – ISO C | | | | | |
21 | **–** – ISO F | | | | | |
22 | **–** – ISO E | | | | | |
23 | **–** – ISO D | | | | | |
24 | **–** – ISO A | | | | | |
25 | **–** – ISO B | | | | | |
26 | **–** – ISO D | | | | | |

### Main Ports

**Pump Size** | **130** | **180** | **250** | **360** | **500** | **750**
--- | --- | --- | --- | --- | --- | ---
1 | Main Port Orientation | | | | | |
2 | R – Radial (side ports) | | | | | |
3 | A – Axial (rear ports) | | | | | |

### Main Drive Shaft End

**Pump Size** | **130** | **180** | **250** | **360** | **500** | **750**
--- | --- | --- | --- | --- | --- | ---
4 | Main Drive Shaft End | | | | | |
5 | 01 – ISO straight key | | | | | |
6 | 02 – ISO splines | | | | | |
7 | 03 – ISO special splines | | | | | |
8 | 04 – SAE C | | | | | |
9 | 05 – SAE B | | | | | |
10 | 06 – SAE A | | | | | |
11 | 07 – None | | | | | |
12 | 08 – SAE C | | | | | |
13 | 09 – SAE B | | | | | |
14 | 10 – SAE A | | | | | |

### Drive Shaft Seal Configuration

**Pump Size** | **130** | **180** | **250** | **360** | **500** | **750**
--- | --- | --- | --- | --- | --- | ---
15 | Drive Shaft Seal Configuration | | | | | |
16 | S – Single shaft seal | | | | | |

### Seal Material

**Pump Size** | **130** | **180** | **250** | **360** | **500** | **750**
--- | --- | --- | --- | --- | --- | ---
17 | Seal Material | | | | | |
18 | V – FKM | | | | | |
19 | C – Special shaft seal, for HFC fluids | | | | | |
20 | F – FKM + front bearing flushing prepared | | | | | |
21 | K – FKM with HP lubrication | | | | | |

### Yoke Position Indicator

**Pump Size** | **130** | **180** | **250** | **360** | **500** | **750**
--- | --- | --- | --- | --- | --- | ---
22 | Yoke Position Indicator | | | | | |
23 | 0 – No position indicator | | | | | |
24 | P – Voltage indicator | | | | | |
25 | M – Voltage + visual indicator | | | | | |
26 | R – Current indicator | | | | | |
27 | S – Current + visual indicator | | | | | |

### Control Model Code

**Pump Size** | **130** | **180** | **250** | **360** | **500** | **750**
--- | --- | --- | --- | --- | --- | ---
28 | Control Model Code | | | | | |

---

<ref>Continued next column</ref>
## Eaton Hydrokraft W-Series Open Loop Piston Pumps

### V-PUPI-TM003-EN2  August 2016

#### Model Code

**Open Loop Pumps**

**W Series - DF Control**

<table>
<thead>
<tr>
<th><strong>Model Code</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>DF000A<em>0000</em>00********</td>
</tr>
</tbody>
</table>

### Technical Specifications

#### Control Type
- DF - Pressure compensator

#### Displacement Adjustment Options
- 0 - Not applicable

#### Electronic Controls
- 0 - Not applicable

#### Yoke Displacement Zone
- A - Single side of centre "A"

#### Additional Functions
- 0 - None
- 1 - Load sensing (standard Δp = 15 bar)
- A - 2-level pressure compensator, 4/2 solenoid valve
- B - 2-level pressure compensator, 4/3 solenoid valve

#### 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
- S - Slow upstroke screw adjustment

#### Power Control
- 000 - Not applicable

#### Venting Valve
- 0 - None
- 1 - Solenoid valve ▲

#### Design Number
- 000 - Not applicable
- 00 - Defined by Eaton
- 000 - Eaton assigned number as per data specified in table below

#### Customer Adjustment Specification
- 0000 - None
- 0000 - Eaton assigned number as per data specified in table below

### Control Voltage

<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>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Special Features

- 000 - None
- 000 - Defined by Eaton
- 000 - 10-99 assigned by Eaton

### 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>

**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>

**Note:** Special pressure adjustments and/or maximum displacement adjustments are the most common reasons for using this option.
## EATON Hydrokraft W-Series Open Loop Piston Pumps   V-PUPI-TM003-EN2   August 2016

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

### 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)

### 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
- S - Slow upstroke screw adjustment

### Power Control Specification
- *** - 3-digit value in kW at 1500 rev/min

### Pilot Oil Filter
- 0 - Not applicable

### Unloading Valve
- 0 - None
- 1 - Solenoid valve ▼

### Position Monitoring
- 0 - Not applicable

### Electric Motor Type
- 0 - Not applicable

### Control Voltage
- 0 - Not applicable
- B - 110V AC 50 Hz / 120V AC 60 Hz
- D - 220V AC 50 Hz / 240V AC 60 Hz
- G - 12V DC
- H - 24V DC

### Customer Adjustment Specification
- 0000 - None
- **** - Eaton assigned number as per data specified in table below

### Special Features
- 000 - None
- *** - Defined by Eaton

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

### Model Code
**LR000A**

### Special Pressure Adjustment
- Main Stage Pressure Control
- Pilot Valve Pressure Control
- Load Sense Δp

<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</td>
<td>Pressure</td>
<td>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>
<tr>
<td>Customer-specified adjustment (bar)</td>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
</tbody>
</table>

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

### Special Max. Displacement Adjustment
- Minimum Displacement
- Maximum Displacement

<table>
<thead>
<tr>
<th>Special Max. Displacement Adjustment</th>
<th>Minimum Displacement</th>
<th>Maximum Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard adjustment (cm³/rev)</td>
<td>0 cm³/rev</td>
<td>100%</td>
</tr>
<tr>
<td>Customer-specified adjustment (cm³/rev)</td>
<td>......</td>
<td>......</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 - SP Control**

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

| S P * * * A * * * * * * * 0 0 0 0 * * * * * * | P | 130 | 180 | 250 | 360 | 500 | 750 |
|---|---|---|---|---|---|---|
| **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 | – Remote 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 Pressure Control</th>
<th>Pilot Valve Pressure Control</th>
<th>Load Sense Δp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment</td>
<td>Standard setting (bar)</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Max. setting (bar)</td>
<td>40</td>
<td>350</td>
</tr>
<tr>
<td>Customer-specified adjustment (bar)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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>
<tr>
<td>Customer-specified adjustment (cm³/rev)</td>
<td></td>
<td></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></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Displacement adjustment proportional to pilot pressure

<table>
<thead>
<tr>
<th>Displacement Adjustment Options</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>G – CETOP 3 interface only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H – Remote port G 1/4”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J – Proportional KCG relief valve including EEA-PAM amplifier card</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Electronics</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>00 – Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<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>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – Single side of centre “A”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Functions</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>0 – None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 – Pressure limiter override</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 – Pressure limiter and power limiter override</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Power Control 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>*** – 3-digit value in kW at 1500 rev/min</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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>
<tr>
<td>Customer-specified adjustment (bar)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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>
<tr>
<td>Customer-specified adjustment (cm³/rev)</td>
<td></td>
<td></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 - PQ Control  
[P, M, R or S] mandatory  
(electrical yoke position indicator)

### Model Code 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>24</td>
<td>\textbf{PQ}</td>
<td>*</td>
<td>00</td>
<td>*</td>
<td>00</td>
<td>000000</td>
</tr>
</tbody>
</table>

#### Control Type
- PQ: Proportional valve multifunctional control (PpQ controller)

#### Displacement Adjustment Options
- D: CETOP 3 proportional valve + OBE
- E: CETOP 5 proportional valve + OBE

#### Control Electronic
- 00: Without electronics (to be ordered separately)

#### Yoke Displacement Zone
- A: No pressure sensor one side ▲
- C: No pressure sensor either side ▲
- D: Pressure sensor 4-20 mA one side
- E: Pressure sensor 4-20 mA both sides

#### Additional Functions
- 0: Not required

#### Pressure Control Options
- 0: Not required for this control type

#### Power Control Specification
- 000: Not applicable for this control type

#### Pilot Oil Filter
- 0: No filter (standard)

#### Failsafe Valve
- 0: Not applicable

**Note:** Not required, integrated in proportional valve with OBE.

---

**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>Standard</td>
<td>0 cm³/rev</td>
<td>100%</td>
</tr>
<tr>
<td>Customer-specified adjustment (cm³/rev)</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

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

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

## 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

## Pressure Control Options

- **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)

## Venting Valve Control Voltage

- **0** - Not applicable

## Customer Adjustment Specification

- **000** - None (standard)
- **0000** - Eaton assigned number as per data specified in table below

## Special Features

- **0** - None
- **00** - Defined by Eaton

## Design Number

- **0** - 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:** \( \square = F \)

### Fixed Displacement PFW Models

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Open Loop Pumps</th>
<th>( W ) Series - No control: ( \square = F )</th>
</tr>
</thead>
</table>

### Model Code 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>0000 A000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Type</th>
<th>00 – No control (PFW only, not available on sizes 130 &amp; 180)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement Adjustment Options</td>
<td>0 – Not applicable</td>
</tr>
<tr>
<td>Control Electronics</td>
<td>0 – Not applicable</td>
</tr>
<tr>
<td>Yoke Displacement Zone</td>
<td>A – Single side of centre “A”</td>
</tr>
<tr>
<td>Additional Functions</td>
<td>0 – Not applicable</td>
</tr>
<tr>
<td>Pressure Control Options</td>
<td>0 – Not applicable</td>
</tr>
<tr>
<td>Power Control Specification</td>
<td>000 – Not applicable</td>
</tr>
<tr>
<td>Pilot Oil Filter</td>
<td>0 – Not applicable</td>
</tr>
</tbody>
</table>

### Control Voltage

<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 A000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Bypass/Venting Valve | 0 – Not applicable |
| Position Monitoring | 0 – Not applicable |
| Electric Motor Type | 0 – Not applicable |
| Control Voltage | 0 – Not applicable |
| Customer Adjustment Specification | 0000 – Not applicable |
| Special Features | 000 – None, \*\*\* – Defined by Eaton |
| Design Number | \*\* – 10-99 assigned by Eaton |

### Proposed Model Code

<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 A000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proposed Model Code</th>
<th>0000 A000</th>
</tr>
</thead>
<tbody>
<tr>
<td>*** – Not available</td>
<td>*** – Not available</td>
</tr>
<tr>
<td>□ – Preferred standard option</td>
<td>□ – Other standard option</td>
</tr>
<tr>
<td>○ – Special standard option</td>
<td>□ – Not available</td>
</tr>
</tbody>
</table>

---

**EATON** Hydrokraft W-Series Open Loop Piston Pumps  V-PUPI-TM003-EN2  August 2016  11
### Model Code

**Combination Pump Unit**

<table>
<thead>
<tr>
<th>Model Code</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>**P * W C – ****<strong><strong><strong><strong><strong><strong>H C81</strong></strong></strong></strong></strong></strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Unit Position

- **1** Combination Unit
- **2** Displacement
- **3** Pump Series
- **4** Unit Type
- **5** Separator

#### First Displacement cm³/rev (in³/rev)

<table>
<thead>
<tr>
<th>Value</th>
<th>cm³/rev</th>
<th>in³/rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>130 (7.9)</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>180 (11.0)</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>250 (15.3)</td>
<td></td>
</tr>
<tr>
<td>360</td>
<td>360 (22.0)</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>500 (30.5)</td>
<td></td>
</tr>
<tr>
<td>750</td>
<td>750 (45.8)</td>
<td></td>
</tr>
</tbody>
</table>

#### Assembly Numbers

- **HC81** Defined by Eaton

---

### 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><strong>PVWF-500M08R0041R02SV/MASPC03A0000000000000000000010</strong></td>
<td>PVWR-250M07R0001R02SV/MASPC03A0000000000000000000010</td>
<td><strong>PVWC-500SP250SP0000000000000000000010</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### Assembly Numbers

- **HC81** Defined by Eaton

---

### 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 25 to 28 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.
Model Code
W-Series Open Loop Pumps

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>49 to 52</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>Pipe connection ISO 6162-1 (SAE J518)</strong></td>
<td>B</td>
<td>P64M (2%/&quot; - 500)</td>
<td>P89M (3%/&quot; - 500)</td>
<td>P89M (3%/&quot; - 500)</td>
<td>P127M (5&quot; - 500)</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>P32M (1%/&quot; - 6000)</td>
<td>P32M (1%/&quot; - 6000)</td>
<td>P32M (1%/&quot; - 6000)</td>
<td>P51M (2&quot; - 6000)</td>
</tr>
<tr>
<td><strong>SFE Flange ISO 6162-2 (SAE J518)</strong></td>
<td></td>
<td>B</td>
<td>P64M (2%/&quot; - 500)</td>
<td>P89M (3%/&quot; - 500)</td>
<td>P89M (3%/&quot; - 500)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>P32M (1%/&quot; - 6000)</td>
<td>P32M (1%/&quot; - 6000)</td>
<td>P32M (1%/&quot; - 6000)</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</td>
<td>-20</td>
<td>+50</td>
<td>+50</td>
<td>+50</td>
</tr>
<tr>
<td></td>
<td>max</td>
<td>+50</td>
<td>+50</td>
<td>+50</td>
<td>+50</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>m kg</td>
<td>130 / 140</td>
<td>212</td>
<td>220</td>
<td>340</td>
</tr>
<tr>
<td><strong>Moment of inertia</strong></td>
<td>J kg m²</td>
<td>0,045</td>
<td>0,146</td>
<td>0,152</td>
<td>0,5</td>
</tr>
</tbody>
</table>

#### Hydraulic Characteristics

<table>
<thead>
<tr>
<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>Rated pressure (100% duty cycle)</strong></td>
<td>pN</td>
<td>350</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inlet pressure</strong></td>
<td>p1</td>
<td>1 abs</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>p1</td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td><strong>Max. pressure to ISO 5598:2008</strong></td>
<td>p2</td>
<td>420</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>
</tr>
<tr>
<td><strong>Hydraulic fluid temperature range</strong></td>
<td>min</td>
<td>-25</td>
<td>+90</td>
<td>+90</td>
</tr>
<tr>
<td></td>
<td>max</td>
<td>+50</td>
<td>+50</td>
<td>+50</td>
</tr>
<tr>
<td><strong>Viscosity range for continuous operation</strong></td>
<td>min cSt</td>
<td>10</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>max cSt</td>
<td>1000</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>
</tr>
<tr>
<td><strong>Cleanliness</strong></td>
<td>ISO 4406</td>
<td>18/15/13</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum geometric displacement at shaft speed</strong></td>
<td>n = 1200 rev/min</td>
<td>130 / 180</td>
<td>250</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td>n = 1500 rev/min</td>
<td>130 / 180</td>
<td>250</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td>n = 1800 rev/min</td>
<td>130 / 180</td>
<td>250</td>
<td>270</td>
</tr>
<tr>
<td><strong>Case pressure (overpressure)</strong></td>
<td>p_case</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>n = 1200 rev/min</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 1500 rev/min</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 1800 rev/min</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Driving torque</strong></td>
<td>M_torque</td>
<td>724/1002</td>
<td>1392</td>
<td>2005</td>
</tr>
<tr>
<td></td>
<td>Vg at 1500 rev/min, η = 100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>P1</td>
<td>113 / 157</td>
<td>218</td>
<td>315</td>
</tr>
<tr>
<td></td>
<td>Vg at 1500 rev/min, η = 100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Combination Units</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum driving torque</strong></td>
<td>M1</td>
<td>2x870/2x1204</td>
<td>2 x 1670</td>
<td>2 x 2405</td>
</tr>
<tr>
<td>ISO splined shaft only</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><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>Pipe connection ISO 6162-1 (SAE J518)</strong></td>
<td>B psi P64M (2½” - 500) P32M (1½” - 600)</td>
<td>P89M (3½” - 500) P32M (1½” - 6000)</td>
<td>P89M (3½” - 500) P32M (1½” - 6000)</td>
<td>P127M (6” - 500) P51M (2” - 6000)</td>
<td>P127M (6” - 500) P51M (2” - 6000)</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>°F min-4 max+122</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>m lb 215 467 485 750 871</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Moment of inertia</strong></td>
<td>J lb ft² 3.46 3.46 3.61 750 871</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hydraulic Characteristics

<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>Rated pressure (100% duty cycle)</strong></td>
<td>p0 psi 5075</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inlet pressure</strong></td>
<td>p1min psi 14.5 abs max 290</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max. pressure to ISO 5598:2008</strong></td>
<td>p2max psi 6090</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydraulic fluid</strong></td>
<td>Hydraulic oil to DIN 51524 part 2 See Fluid Recommendations in Application Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydraulic fluid temperature range</strong></td>
<td>°F min-13 max+194</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Viscosity range for continuous operation</strong></td>
<td>cSt min 10 max 75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum permissible start viscosity</strong></td>
<td>max cSt 1000</td>
<td></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>n = 1200 rev/min Vg in³/rev 7.9 / 11 15.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drive</strong></td>
<td>M1 single lbf ft 534/739 1027 1479 2054 2567/3081</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong> (p0 = 5075 psi, Vg at 1500 rev/min, η = 100%)**</td>
<td>P1 single hp 152/211</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Combination Units</strong></td>
<td>M1 lbf ft 2x642/2x888</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 180

Roller Bearing Life
Size 130

Roller Bearing Life
Size 180

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

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.
Performance Curves
250 & 360 Series

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

Note
Performance data is measured under specific conditions and may vary according to application and operating conditions.

Eaton therefore shall not be held legally 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 $p_{\text{N}}$ (bar)</th>
<th>Maximum Speed (rev/min)</th>
<th>Recommended Seal Material</th>
<th>Maximum Operating Temperature ($^\circ$C)</th>
<th>Bearing Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Glycol ▲</td>
<td>HFC</td>
<td>250</td>
<td>1800 1500 1250</td>
<td>NBR</td>
<td>45</td>
<td>25-100%</td>
</tr>
<tr>
<td>HFDR (phosphate ester based)</td>
<td>HFDR</td>
<td>350</td>
<td>1500 1200 1000</td>
<td>FKM</td>
<td>60</td>
<td>100% ▼</td>
</tr>
<tr>
<td>HFDU (glycol based)</td>
<td>HFDU</td>
<td>350</td>
<td>1500 1200 1000</td>
<td>FKM</td>
<td>60</td>
<td>100% ▼</td>
</tr>
<tr>
<td>HEES (ester based)</td>
<td>HEES</td>
<td>350</td>
<td>1800 1500 1250</td>
<td>FKM</td>
<td>60</td>
<td>100% ▼</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 $21 = \text{"C"}$ 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. HFDU 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 ($\leq 500$ ppm)
- Fluid cleanliness (18/15/13 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 HFDU and HFDR 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/HFDU/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).

#### 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 $21 = \text{"K"}$) 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)
29-30 = DF control (pressure compensator)

A

- System pressure port ISO 6162-2 P32M [SAE J518 code 62, 1/2", 6000 psi]
- Inlet port ISO 6162-1 P64M (SAE J518 code 62, 2 1/8", 500 psi)
- Drain port 1 1/4"-12 UNF-2B (depending on mounting position, use upper port)
- Drain port G1" (depending on mounting position, use upper port)
- Vent port for vertical mounting G1/4" [shaft upward]
- Port G1/4"

B

- Oil filling plug 1 1/4"-12 UNF-2B
- Air bleed port G1/4"
- System pressure gauge port G1/4"
- Case pressure gauge port G1/4"
- 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 & 18/19 = 02

SAE D keyed shaft: 10/11 = 0D & 18/19 = D1

SAE D splined shaft: 10/11 = 0D & 18/19 = D2

Main Ports
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)

A – System pressure port ISO 6162-2 P32M [SAE J518 code 62, 1 1/4", 6000 psi]
B – Inlet port ISO 6162-1 P64M [SAE J518 code 62, 2 1/4", 500 psi]
L1 – Drain port 1 1/4"-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 G 3/4" (shaft upward)
L3.1 – Port G 1/2"
L5 – Oil filling plug 1 1/4"-12 UNF-2B
L8 – Air bleed port G 1/4"
MA – System pressure gauge port G 1/4"
ML – Case pressure gauge port G 1/4"
X1 – Remote port pressure compensator G 1/4"-12.5 deep
...* – Connection with plug
Shaft and Mounting Options
PVW 180 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: 10 = 05 & 11 = 02

SAE D keyed shaft: 10 = 0D & 11 = D1

SAE D splined shaft: 10 = 0D & 11 = 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: \[ \text{10} = 07 \text{ & } \text{11} = 02 \]

SAE E keyed shaft: \[ \text{10} = 0E \text{ & } \text{11} = E1 \]

SAE E splined shaft: \[ \text{10} = 0E \text{ & } \text{11} = E2 \]

SAE E keyed shaft: \[ \text{10} = 0F \text{ & } \text{11} = F1 \]

SAE F splined shaft: \[ \text{10} = 0F \text{ & } \text{11} = F2 \]

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)
24 25 = DF control (pressure compensator)
Shaft and Mounting Options
PVW 360 Pumps

Mounting Flanges and Shaft Ends

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

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

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

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 1/2"-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port 1 1/2"-12 UNF-2B (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G 3/8" (shaft upward)
L3.1 – Port G 3/8"
L5 – Oil filling plug 1/4",-12 UNF-2B
L8 – Air bleed port G 3/8"
MA – System pressure gauge port G 3/8"
ML – Case pressure gauge port G 3/8"
X1 – Remote port pressure compensator G 3/8",-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)
- **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 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 G½" (shaft upward)

**L3.1** – Port G½"

**L5** – Oil filling plug 1½"-12 UNF-2B

**L8** – Air bleed port G½"

**MA** – System pressure gauge port G½"

**ML** – Case pressure gauge port G½"

**X1** – Remote port pressure compensator G½"-12.5 deep

... – Connection with plug
Mounting Flanges and Shaft Ends

ISO splined shaft: [10] = 08 & [18] = 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
Control Options DF & LR

General Description
Energy-saving hydraulic drives are possible with pressure compensated and/or power controlled pumps, especially in combination with the loadsensing 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:

- DF (pressure compensator)
- A (yoke angle 1 side of centre)

For pump details, see general Installation Dimensions.

Diagram with labeled ports and connections:

1. Basic pump
2. Connection plate for DF-control
3. Pressure compensator, main stage
4. Pressure compensator, pilot stage

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

Reference dimensions for size 130-750:
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

![Diagram of DF000A0K options]

**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

**Connections:**
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:
- **24** = DF (pressure compensator)
- **25** = A (yoke angle 1 side of centre)
- **29** = 1 (load sensing)

![Diagram of pump connections]

- **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 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** = Pressure limiter override, pilot stage
Control Options DF (cont.)

For pump details, see general Installation Dimensions.

DF000AA/DF000AB
Options illustrated:
- = DF (pressure compensator)
- = A (yoke angle 1 side of centre)
- = A or B (2-level pressure compensator)

DF000AA X1

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/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:
- 24 = DF (pressure compensator)
- 25 = A (yoke angle 1 side of centre)
- 29 = 1 (venting valve)
- 30 = H (24V DC)

---

**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
- **X1** – Remote port pressure limiter override G/’
- **X2** – Remote port load sense

---

**Symbols:**
- 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>A20</td>
<td>A2F</td>
<td>A30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref. dim. for size 130-750</td>
<td>Power compensator pilot stage</td>
<td>Pressure and power compensator main stage</td>
<td>Power compensator main stage</td>
<td></td>
<td></td>
<td></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

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)

<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>215</td>
<td>215</td>
<td>219</td>
<td>219</td>
<td>219</td>
</tr>
<tr>
<td>Type</td>
<td>A2F</td>
<td>188</td>
<td>188</td>
<td>185</td>
<td>185</td>
<td>185</td>
</tr>
<tr>
<td>Type</td>
<td>A30</td>
<td>215</td>
<td>215</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, 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:
- **24** = LR (power control)
- **25** = A (yoke angle 1 side of centre)
- **30** = 3 (load sensing + pressure limiter)
- **31** = 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>A20</td>
<td>A20</td>
<td>A20</td>
<td>A20</td>
<td>A20</td>
</tr>
<tr>
<td>Type A20</td>
<td>215</td>
<td>215</td>
<td>219</td>
<td>219</td>
<td>219</td>
<td>219</td>
</tr>
<tr>
<td>Type A2F</td>
<td>188</td>
<td>188</td>
<td>185</td>
<td>185</td>
<td>185</td>
<td>185</td>
</tr>
<tr>
<td>Type A30</td>
<td>215</td>
<td>215</td>
<td>219</td>
<td>219</td>
<td>219</td>
<td>219</td>
</tr>
</tbody>
</table>

**Diagram:**

- **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

**Legend:**
- 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 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.

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

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

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 4, 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:

\( \square \) = SP (displacement adjustment via proportional valve)

\( \square \) = C (CETOP 3 proportional valve KDG4V-3)

\( \square \) = 0 (no additional function)

\( \square \) = E (filter with electrical indicator)

\( \square \) = 0 (no venting valve)

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>

Pump Overall 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>
</tr>
<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>
<td>113</td>
</tr>
<tr>
<td>250</td>
<td>461</td>
<td>361</td>
<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>
</tr>
<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>
Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.

Pump dimensions with SPC03A0 control (cont.)
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 KD4V3)
- 30 = 4 (pressure limiter override)
- 36 = 0 (no venting valve)
- 35 = E (filter with electrical indicator)

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>
<td>408</td>
</tr>
<tr>
<td>250</td>
<td>461</td>
<td>318</td>
<td>366</td>
<td>452</td>
</tr>
<tr>
<td>360</td>
<td>475</td>
<td>318</td>
<td>366</td>
<td>452</td>
</tr>
<tr>
<td>500</td>
<td>520</td>
<td>350</td>
<td>398</td>
<td>484</td>
</tr>
<tr>
<td>750</td>
<td>562</td>
<td>352</td>
<td>400</td>
<td>486</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
PSt1 — Pilot pressure inlet port
PSt2 — Pilot pump outlet port
MSpit — 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:

- = SP (displacement adjustment via proportional valve)
- = C (CETOP 3 proportional valve KDG4V-3)
- = 5 (pressure and power limiter override)
- = E (filter with electrical indicator)
- = 0 (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>
<td>322</td>
<td>408</td>
</tr>
<tr>
<td>180</td>
<td>516</td>
<td>274</td>
<td>322</td>
<td>408</td>
</tr>
<tr>
<td>250</td>
<td>514</td>
<td>318</td>
<td>366</td>
<td>452</td>
</tr>
<tr>
<td>360</td>
<td>540</td>
<td>318</td>
<td>366</td>
<td>452</td>
</tr>
<tr>
<td>500</td>
<td>573</td>
<td>350</td>
<td>398</td>
<td>484</td>
</tr>
<tr>
<td>750</td>
<td>624</td>
<td>352</td>
<td>400</td>
<td>488</td>
</tr>
</tbody>
</table>

---

**Diagram 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
- **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

- **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 and Power limiter override, main stage
- **7** – Pressure limiter override, pilot stage
- **8** – Power limiter override, pilot stage
- **9** – Pilot pump
Control Options SP (cont.)

For basic pump details, see general Installation Dimensions.

SPD0 Options illustrated:

- **SP** = displacement adjustment via proportional valve
- **D** = CETOP 3 proportional valve KBS-3 with OBE
- **0** = no additional function
- **0** = no pilot oil filter
- **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>
</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>

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>
<td>130</td>
<td>40</td>
<td>130</td>
<td>100</td>
</tr>
<tr>
<td>180</td>
<td>40</td>
<td>130</td>
<td>100</td>
</tr>
<tr>
<td>250</td>
<td>45</td>
<td>150</td>
<td>120</td>
</tr>
<tr>
<td>360</td>
<td>55</td>
<td>150</td>
<td>130</td>
</tr>
<tr>
<td>500</td>
<td>60</td>
<td>200</td>
<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>
<td>85</td>
</tr>
<tr>
<td>180</td>
<td>50</td>
<td>150</td>
<td>85</td>
</tr>
<tr>
<td>250</td>
<td>55</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>360</td>
<td>65</td>
<td>200</td>
<td>115</td>
</tr>
<tr>
<td>500</td>
<td>55</td>
<td>250</td>
<td>125</td>
</tr>
<tr>
<td>750</td>
<td>70</td>
<td>250</td>
<td>135</td>
</tr>
</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 $\mathbf{V}$).

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 $\mathbf{V}$, options 4, 5 or 6, in combination with customer adjustment specified in positions 49 to 53).

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:
- $\mathbf{24S} = \mathbf{DP}$ (pilot pressure adjusted displacement)
- $\mathbf{25} = \mathbf{J}$ (proportional KCG relief valve)
- $\mathbf{30} = \mathbf{0}$ (no additional function)
- $\mathbf{35} = \mathbf{0}$ (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>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>346</td>
<td>192</td>
<td>232</td>
<td>312</td>
<td>366</td>
<td>374</td>
<td>247</td>
<td>203</td>
<td>490</td>
<td>113</td>
</tr>
<tr>
<td>180</td>
<td>446</td>
<td>346</td>
<td>192</td>
<td>232</td>
<td>312</td>
<td>366</td>
<td>374</td>
<td>247</td>
<td>203</td>
<td>490</td>
<td>113</td>
</tr>
<tr>
<td>250</td>
<td>461</td>
<td>361</td>
<td>236</td>
<td>276</td>
<td>356</td>
<td>410</td>
<td>418</td>
<td>247</td>
<td>230</td>
<td>535</td>
<td>125</td>
</tr>
<tr>
<td>360</td>
<td>475</td>
<td>375</td>
<td>236</td>
<td>276</td>
<td>356</td>
<td>410</td>
<td>418</td>
<td>247</td>
<td>230</td>
<td>551</td>
<td>125</td>
</tr>
<tr>
<td>500</td>
<td>520</td>
<td>420</td>
<td>268</td>
<td>308</td>
<td>388</td>
<td>442</td>
<td>450</td>
<td>247</td>
<td>300</td>
<td>659</td>
<td>166</td>
</tr>
<tr>
<td>750</td>
<td>562</td>
<td>462</td>
<td>270</td>
<td>310</td>
<td>390</td>
<td>444</td>
<td>452</td>
<td>247</td>
<td>307</td>
<td>689</td>
<td>166</td>
</tr>
</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 (ms) approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>8</td>
<td>60</td>
<td>1100</td>
</tr>
<tr>
<td>180</td>
<td>8</td>
<td>60</td>
<td>1100</td>
</tr>
<tr>
<td>250</td>
<td>8</td>
<td>60</td>
<td>1200</td>
</tr>
<tr>
<td>360</td>
<td>8</td>
<td>60</td>
<td>1600</td>
</tr>
<tr>
<td>500</td>
<td>8</td>
<td>90</td>
<td>1600</td>
</tr>
<tr>
<td>750</td>
<td>8</td>
<td>90</td>
<td>2000</td>
</tr>
</tbody>
</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 25** = DP (pilot pressure adjusted displacement)
- **20** = J (proportional KCG relief valve)
- **30** = 4 (pressure limiter override)
- **35** = 0 (no pilot oil filter)

Pump Overall Dimensions with Control DPJ4 (mm)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>A</th>
<th>F</th>
<th>G</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>366</td>
<td>374</td>
<td>176</td>
</tr>
<tr>
<td>180</td>
<td>446</td>
<td>366</td>
<td>374</td>
<td>176</td>
</tr>
<tr>
<td>250</td>
<td>461</td>
<td>410</td>
<td>418</td>
<td>176</td>
</tr>
<tr>
<td>360</td>
<td>475</td>
<td>410</td>
<td>418</td>
<td>176</td>
</tr>
<tr>
<td>500</td>
<td>520</td>
<td>442</td>
<td>450</td>
<td>176</td>
</tr>
<tr>
<td>750</td>
<td>562</td>
<td>444</td>
<td>452</td>
<td>176</td>
</tr>
</tbody>
</table>

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
PSI1 – Pilot pressure inlet port
PSI2 – Pilot pump outlet 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 – Pressure limiter override, pilot stage
8 – Pilot pump
Control Options DP (cont.)

For basic pump details, see general Installation Dimensions.

DPJ...A5
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>
<th>A</th>
<th>F</th>
<th>G</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>516</td>
<td>366</td>
<td>374</td>
<td>176</td>
</tr>
<tr>
<td>180</td>
<td>516</td>
<td>366</td>
<td>374</td>
<td>176</td>
</tr>
<tr>
<td>250</td>
<td>514</td>
<td>410</td>
<td>418</td>
<td>176</td>
</tr>
<tr>
<td>360</td>
<td>537</td>
<td>410</td>
<td>418</td>
<td>176</td>
</tr>
<tr>
<td>500</td>
<td>575</td>
<td>442</td>
<td>450</td>
<td>176</td>
</tr>
<tr>
<td>750</td>
<td>624</td>
<td>444</td>
<td>452</td>
<td>176</td>
</tr>
</tbody>
</table>

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

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 = DP (pilot pressure adjusted displacement)
- 25 = G (CETOP 3 interface)
- 26 = 0 (no additional function)
- 25 = 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>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>361</td>
<td>374</td>
<td>82</td>
</tr>
<tr>
<td>180</td>
<td>446</td>
<td>361</td>
<td>374</td>
<td>82</td>
</tr>
<tr>
<td>250</td>
<td>461</td>
<td>405</td>
<td>418</td>
<td>82</td>
</tr>
<tr>
<td>360</td>
<td>475</td>
<td>405</td>
<td>418</td>
<td>82</td>
</tr>
<tr>
<td>500</td>
<td>520</td>
<td>437</td>
<td>450</td>
<td>82</td>
</tr>
<tr>
<td>750</td>
<td>562</td>
<td>439</td>
<td>452</td>
<td>82</td>
</tr>
</tbody>
</table>

### Diagram

- **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
- **PS1** – Pilot pressure inlet port
- **PS2** – Pilot pressure outlet port
- **MS** – Pilot pressure gauge port
- **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** – Pilot pump
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 G½")
- 30 = 0 (no additional function)
- 35 = 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>
<tbody>
<tr>
<td>130</td>
<td>446</td>
<td>361</td>
<td>374</td>
<td>82</td>
</tr>
<tr>
<td>180</td>
<td>446</td>
<td>361</td>
<td>374</td>
<td>82</td>
</tr>
<tr>
<td>250</td>
<td>461</td>
<td>405</td>
<td>418</td>
<td>82</td>
</tr>
<tr>
<td>360</td>
<td>475</td>
<td>405</td>
<td>418</td>
<td>82</td>
</tr>
<tr>
<td>500</td>
<td>520</td>
<td>437</td>
<td>450</td>
<td>82</td>
</tr>
<tr>
<td>750</td>
<td>562</td>
<td>439</td>
<td>452</td>
<td>82</td>
</tr>
</tbody>
</table>
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

ER9.X - 0000 - *00 - 10
1 - 5
6 - 10
11 - 14
15 - 18

Digital Controller Series
Customer Adjustment Specification for Customized Parameter Settings
0000 - Standard parameters
000 - P00 - Standard features ProfiBus version

Design Number
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:
- **PQ** = PQ (displacement adjustment via proportional valve)
- **D** = D (CETOP 3 proportional valve KBS-3 with OBE)
- **O** = O (no additional function)
- **F** = F (no pilot oil filter)
- **G** = G (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
Options illustrated:

- 24 = ES (electric motor
  adjusted displacement)
- 26 = N (electric motor,
  medium response)
- 37 = A (4 limit switches)
- 38 = Z (motor with brake, IP54)

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

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.
General Dimensions
PFW 250 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 P38M (SAE J518 code 62, 1/2", 6000 psi)
B – Inlet pressure port ISO 6162-1 P98M (SAE J518 code 61, 3/4", 500 psi)
L1 – Drain port 1\( \times \) 12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G1\( \times \) 1/2" (depending on mounting position, use upper port)
L3 – Vent port for vertical mounting G1/4" (shaft upward)
L3.1 – Port G1/4"
L5 – Oil filling plug 1/4"-12 UNF-2B
L8 – Air bleed port G1/4"
MA – System pressure gauge port G1/4"

...* – Connection with plug
Shaft and Mounting Options
PFW 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
PFW 360 Pumps

Options illustrated:

12 = R (clockwise rotation)
14-15 = 00 (no thru drive)
18-19 = 01 (ISO keyed shaft)
27 = 0 (no yoke position indicator)
05-06 = 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, 3/4", 500 psi)
L1 – Drain port 1 1/4"-12 UNF-2B (depending on mounting position, use upper port)
L2 – Drain port G1 1/4" (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 1/4"-12 UNF-2B
L8 – Air bleed port G1/4"
MA – System pressure gauge port G1/4"
* – Connection with plug

...
Shaft and Mounting Options
PFW 360 Pumps

Mounting Flanges and Shaft Ends

**ISO splined shaft:** \[10\,11 = 07\] & \[18\,19 = 02\]

**SAE E keyed shaft:** \[10\,11 = 0E\] & \[18\,19 = E1\]

**SAE E splined shaft:** \[10\,11 = 0E\] & \[18\,19 = E2\]

**SAE E keyed shaft:** \[10\,11 = 0E\] & \[18\,19 = F1\]

**Main Ports**

**Port A**

**Port B**

View X
General Dimensions
PFW 500 Pumps

Options illustrated:
- 12 = R (clockwise rotation)
- 14 15 = 00 (no thru drive)
- 16 17 = 01 (ISO keyed shaft)
- 18 19 = 01 (ISO keyed shaft)
- 22 = 0 (no yoke position indicator)
- 24 25 = 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 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 G1½" (shaft upward)
L3.1 – Port G1½"
MA – System pressure gauge port G1½"
... – Connection with plug
Shaft and Mounting Options
PFW 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
PFW 750 Pumps

Options illustrated:

- \( R \) = clockwise rotation
- \( 00 \) = no thru drive
- \( 02 \) = ISO splined 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\( \frac{1}{2}\)"-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)
MA – System pressure gauge port G1\( \frac{1}{4}\)

* – Connection with plug
Shaft and Mounting Options
PFW 750 Pumps

Mounting Flanges and Shaft Ends

ISO splined shaft: $\text{11 11} = 08 \& \text{18 18} = 02$
as illustrated on the previous page is the only arrangement suitable for Hydrokraft pumps PFW 750.

Main Ports

Port A

Port B

View X
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:
\[ L4S = 0A \text{ (SAE A)} \]

Option illustrated:
\[ L4S = 0B \text{ (SAE B)} \]

Option illustrated:
\[ L4S = 0C \text{ (SAE C)} \]
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:

Option illustrated:

Option illustrated:
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:

\[ \boxed{\text{14} \ 15} = \text{0A (SAE A)}\]

Option illustrated:

\[ \boxed{\text{14} \ 15} = \text{0B (SAE B)}\]

Option illustrated:

\[ \boxed{\text{14} \ 15} = \text{0C (SAE C)}\]
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