PVG 128/256
Proportional Valve Group
## Revision history

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<tr>
<td>May 2020</td>
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<td>0508</td>
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<tr>
<td></td>
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<tr>
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Safety in Systems

All types and brands of control valves, including proportional valves, can fail. Therefore, the necessary protection against the serious consequences of a functional failure should always be built into the system.

**General safety considerations**

For each application an assessment should be made for the consequences of the system in case of pressure failure and uncontrolled or blocked movements.

⚠️ **Warning**

Because the proportional valve is used in many different applications and under different operating conditions, it is the sole responsibility of the manufacturer to ensure that all performance, safety and warning requirements of the application is met in his selection of products and complies with relevant machine specific and generic standards.

**Control system example**

An example of a control system using an aerial lift is shown below:

*Aerial lift*

This example breaks down the control system into smaller bits explaining the architecture in depth. Even though many Danfoss components are used in the PVG control system.

The function of the control system is to use the output from the PVE together other external sensors to ensure the PLUS+1 main controllers correct function of the aerial lift.
Warning

It is the responsibility of the equipment manufacturer that the control system incorporated in the machine is declared as being in conformity with the relevant machine directives.

Caution

A mix of electrical actuation and hydraulic actuation on the same valve stack is not safe. PVE and PVH are designed for different pilot pressure.

Cost-free repairs, as mentioned in Danfoss General Conditions of Sale, are carried out only at Danfoss or at service shops authorized by Danfoss.
General Information

PVG 128/256 Proportional Valve Group

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PVG general description

PVG is a hydraulic, load-sensing proportional valve, designed for optimal machine performance and maximum design flexibility.

The PVG valve design is based on a modular concept that enables machine designers to specify a valve solution suitable for multiple market segments across multiple applications.

The load independent proportional control valve and high performance actuator technology combined with a low pressure drop design improves the machine performance and efficiency – increasing productivity and reducing energy consumption.

Features of the PVG 128/256 valve

- Inlet flow up to 1200 l/min [317 US gal/min]
- Compact sectional platform solution for easy integration with PVG 16 and PVG 32
- Load-independent flow control:
  - Oil flow to an individual function is independent of the load pressure of this function
  - Oil flow to one function is independent of the load pressure of other functions
- Reliable regulation characteristics across the entire flow range
- Load sense relief valves for A and B port enables reduced energy loss at target pressure
- Optimized for lower pressure drop and higher efficiency
- Several options for connection threads and flange mount
- Compact design, easy installation and serviceability
- Static Load sense system when selecting pump control
- Internal T0 connection in all PVSI/PVG1
The Closed Center PVPV inlet with integrated pilot pressure reduction valve (PPRV) for PVE activation is intended for use with variable displacement pumps in applications where a valve group with electro-hydraulic or hydraulically controlled work sections is desired.

All Variants are prepared for 2xPVLP shock/anti-cavitation valves for pressure peak protection and anti-cavitation prevention.

PVLPs are for pressure peak protection in the system and pump.

Optional electrically actuated pilot shut off valve PVPP provides additional functional system safety by removing pilot oil from the electrical actuation or hydraulic actuation system, disabling main spool actuation.

All variants have internal T0 to tank connection in the PVSI and PVGI end plates.

The PVPV 256 inlet module variants are based on a generic platform with a selection of additional features, enabling you to tailor the PVPV inlet to suit the demands of any hydraulic system.

**Variable displacement pump symbol**

The generic PVPV 256 inlet module platform includes the following main variants:

- **Closed Center PVPV with PPRV PVE** - Closed center inlet module for variable displacement pumps.
- **Closed Center PVPV with PPRV for PVH/PVHC** - Closed center inlet module for variable displacement pumps.

Optional feature: PVPP Electrical Pilot Shut-Off Valve - Closed center inlet module for variable displacement pumps.
PVPV Inlet Modules

Closed Center PPRV for PVE Activation and/or Mechanical

The PVPV 256 inlet modules, also referred to as pump side modules, act as an interface between the PVG 128/256 proportional valve group and the hydraulic pump and tank reservoir.

Schematic

![Schematic Diagram]

Technical data

<table>
<thead>
<tr>
<th>Max. rated pressure</th>
<th>P-port continuous 350 bar [5076 psi]</th>
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<tr>
<td>P-port intermittent 400 bar [5800 psi]</td>
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<tr>
<td>T-port static/dynamic 25/40 bar [363/580 psi]</td>
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Rated Port P (PVPV/PVSI) P-port 600/600 l/min [159/159 US gal/min]

Oil temperature

Recommended 30 to 60°C [86 to 140°F]
Minimum -30°C [-22°F]
Maximum 90° [194°F]

Ambient temperature

Recommended -30 to 60°C [-22 to 140°F]

Oil viscosity

Operating range 12 to 75 mm²/s [65 to 347 SUS]
Minimum 4 mm²/s [39 SUS]
Maximum 460 mm²/s [2128 SUS]

Oil contamination according to ISO 4406

Maximum 23/19/16

Part numbers for Closed Center PVPV with PPRV for PVE

<table>
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<tr>
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<th>PPRV</th>
<th>P-port</th>
<th>T-port</th>
<th>LS-port Gauge-port</th>
<th>M-port Gauge-port</th>
<th>T- and Pp Gauge-port</th>
<th>Mounting feet</th>
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<td>PVE</td>
<td>Metric Flange 1-1/4&quot;</td>
<td>Metric Flange 1-1/2&quot;</td>
<td>G3/8&quot;BSP</td>
<td>G3/8&quot;BSP</td>
<td>G1/4&quot;BSP</td>
<td>M12</td>
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<td>Thread Ports G1-1/2&quot; BSP</td>
<td>Thread Ports G1-1/2&quot; BSP</td>
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PVPV Inlet Modules

Pilot Pressure Reduction Valve Performance

Accessory module for PVPV 256

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PVPV Inlet Modules

PPRV for PVH/PVHC Activation and/or Mechanical

The Closed Center PVPV inlet with integrated pilot pressure reduction valve (PPRV) for PVH/PVHC activation is intended for use with variable displacement pumps in applications where a valve group with PVH/PVHC controlled work sections is desired.

All Variants are prepared for 2xPVLP shock/anti-cavitation valves for pressure peak protection and anti-cavitation prevention.

Optional electrically actuated pilot shut off valve PVPP provides additional functional system safety by removing pilot oil from the electrical actuation or hydraulic actuation system, disabling main spool actuation.

Schematic

Technical data

Max. rated pressure
- P-port continuous: 350 bar [5076 psi]
- P-port intermittent: 400 bar [5800 psi]
- T-port static/dynamic: 25/40 bar [363/580 psi]

Rated Port P (PVPV/PVSI)
- P-port: 600/600 l/min [159/159 US gal/min]

Oil temperature
- Recommended: 30 to 60°C [86 to 140°F]
- Minimum: -30°C [-22°F]
- Maximum: 90° [194°F]

Ambient temperature
- Recommended: -30 to 60°C [-22 to 140°F]

Oil viscosity
- Operating range: 12 to 75 mm²/s [65 to 347 SUS]
- Minimum: 4 mm²/s [39 SUS]
- Maximum: 460 mm²/s [2128 SUS]

Oil contamination according to ISO 4406
- Maximum: 23/19/16

Part numbers for Closed Center PVPV with PPRV for PVH/PVHC

<table>
<thead>
<tr>
<th>Part number</th>
<th>PPRV</th>
<th>P-port</th>
<th>T-port</th>
<th>LS-port Gauge-port</th>
<th>M-port Gauge-port</th>
<th>T- and Pp Gauge-port</th>
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PVPV Inlet Modules

Pilot Pressure Reduction Valve Performance

![Graph showing pressure reduction valve performance](image)

Accessory module for PVPV 256

<table>
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<tr>
<th>Ordering information</th>
<th>12 V</th>
<th>24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVPP Pilot shut off valve</td>
<td>11160318</td>
<td>11160319</td>
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The PVG 128 Basic modules (PVB), also referred to as work sections, is the interface between the PVG 128 proportional valve group and the work function such as a cylinder or a motor.

The PVB basic module variants are based on a generic platform with a selection of additional features, enabling you to tailor the PVB to suit the demands of any hydraulic system.

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

Symbol - compensated PVB

The generic PVB basic module platform includes the following main variants:

- **PVB 128** Compensated basic module.
- **Compensated PVB 128 w LSA/B** Compensated basic module with LSA/B relief valve for each work port.
- **Compensated PVB 128 with LSA/B and PVLP** Compensated basic module with LSA/B relief valve for each work port and 2xPVLPs for each work port.

⚠️ **Warning**

Risk of leak
The module will leak if the flange mount screws are not properly secured.
Flange mount screws according to ISO 6162-2.
PVB 128 Variant Overview

PVB 128 3-way Compensator

The compensated PVB is intended for controlling a work function where the function behavior in terms of flow and pressures requires independency on the load pressure of other functions used simultaneously.

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

Schematic

![Schematic diagram](image)

Technical data

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<tr>
<th>Parameter</th>
<th>Specification</th>
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<td>Max. rated pressure</td>
<td>A/B port continuous: 350 bar (5076 psi)</td>
</tr>
<tr>
<td></td>
<td>A/B port intermittent: 400 bar (5800 psi)</td>
</tr>
<tr>
<td>Max. rated flow</td>
<td>A/B port: 250 l/min (66 US gal/min)</td>
</tr>
<tr>
<td>Oil temperature</td>
<td>Recommended: 30 to 60°C (-86 to 140°F)</td>
</tr>
<tr>
<td></td>
<td>Minimum: -30°C (-22°F)</td>
</tr>
<tr>
<td></td>
<td>Maximum: 90°C (194°F)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Recommended: -30 to 60°C (-22 to 140°F)</td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>Operating range: 12 to 75 mm²/s (65 to 347 SUS)</td>
</tr>
<tr>
<td></td>
<td>Minimum: 4 mm²/s (39 SUS)</td>
</tr>
<tr>
<td></td>
<td>Maximum: 460 mm²/s (2128 SUS)</td>
</tr>
<tr>
<td>Oil contamination according to ISO 4406</td>
<td>Maximum: 23/19/16</td>
</tr>
<tr>
<td>Max. internal leakage at 100 bar [1450 psi] and 21 mm²/s [102 SUS]</td>
<td>A/B→T without shock valve: 70 cm³/min [4.27 in³/min]</td>
</tr>
<tr>
<td></td>
<td>A/B→T with shock valve: 80 cm³/min [4.88 in³/min]</td>
</tr>
</tbody>
</table>

Rated flow at 15 bar margin pressure

Part numbers for Compensated PVB 128

<table>
<thead>
<tr>
<th>Part number</th>
<th>A/B-port</th>
<th>PVLP/PVLA</th>
<th>LS A/B-port</th>
</tr>
</thead>
<tbody>
<tr>
<td>11170522</td>
<td>Metric Flange 3/4&quot;</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11170528</td>
<td>G 1&quot; BSP</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11170524</td>
<td>SAE Flange 3/4&quot; UNF</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11170526</td>
<td>Thread Ports 1 5/16 UNF</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
PVB 128 Variant Overview

Oil flow as function of spool travel

Load Independent Oil Flow, Pressure Compensated
PVB 128 Variant Overview

**PVB 128 Upstream Performance**

Port P to Port A/B at full spool stroke

**PVB 128 Downstream Performance**

Port A/B to Tank at full spool stroke
PVB 128 Variant Overview

PVB 128 3-way Compensator with LS A/B

The compensated PVB is intended for controlling a work function where the function behavior in terms of flow and pressures requires independency on the load pressure of other functions used simultaneously.

The integrated LSA/B relief valves are used to limit the maximum work port pressure on the A and B-ports individually.

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

**Technical data**

| Max. rated pressure | A/B port continuous | 350 bar | [5076 psi] |
| A/B port intermittent | 400 | [5800 psi] |

| Max. rated flow* | A/B port | 250 l/min | [66 US gal/min] |

| Oil temperature | Recommended | 30 to 60°C | [86 to 140°F] |
| Minimum | -30°C | [-22°F] |
| Maximum | 90° | [194°F] |

| Ambient temperature | Recommended | -30 to 60°C | [-22 to 140°F] |

| Oil viscosity | Operating range | 12 to 75 mm²/s | [65 to 347 SUS] |
| Minimum | 4 mm²/s | [39 SUS] |
| Maximum | 460 mm²/s | [2128 SUS] |

| Oil contamination according to ISO 4406 | Maximum | 23/19/16 |

| Max. internal leakage at 100 bar [1450 psi] and 21 mm²/s [102 SUS] | A/B→T without shock valve | 70 cm³/min | [4.27 in³/min] |
| A/B→T with shock valve | 80 cm³/min | [4.88 in³/min] |

* Rated flow at 15 bar margin pressure

**Part numbers for Compensated PVB with LS A/B**

<table>
<thead>
<tr>
<th>Part number</th>
<th>A/B-port</th>
<th>PVLP/PVLA</th>
<th>LS A/B-port</th>
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</thead>
<tbody>
<tr>
<td>11176915</td>
<td>Metric Flange 3/4&quot;</td>
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<td>G1/4&quot;BSP</td>
</tr>
<tr>
<td>11176918</td>
<td>G 1&quot; BSP</td>
<td>-</td>
<td>G1/4&quot;BSP</td>
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<tr>
<td>11176916</td>
<td>SAE Flange 3/4&quot; UNF</td>
<td>-</td>
<td>7/16-20 UNF</td>
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<tr>
<td>11176917</td>
<td>Thread Ports 1 5/16 UNF</td>
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<td>7/16-20 UNF</td>
</tr>
</tbody>
</table>
PVB 128 Variant Overview

Oil flow as function of spool travel

Load Independent Oil Flow, Pressure Compensated
PVB 128 Variant Overview

**LS A/B Pressure Relief Valve**

Port P to Port A/B at full spool stroke

PVB 128 Upstream Performance

Port P to Port A/B at full spool stroke
PVB 128 Variant Overview

**PVB 128 Downstream Performance**

Port A/B to Tank at full spool stroke

E = Spool 240 l/min

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PVB 128 Variant Overview

PVB 128 3-way Compensator with LS A/B and PVLP

The compensated PVB is intended for controlling a work function where the function behavior in terms of flow and pressures requires independency on the load pressure of other functions used simultaneously.

The integrated LS A/B relief valves are used to limit the maximum work port pressure on the A and B-ports individually.

Featuring 2xPVLP shock/anti-cavitation valves on each work port for pressure peak protection and anti-cavitation prevention

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

Schematic

![Schematic Diagram](image)

Technical data

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. rated pressure</td>
<td>A/B port continuous</td>
<td>350 bar</td>
<td>[5076 psi]</td>
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<tr>
<td></td>
<td>A/B port intermittent</td>
<td>400</td>
<td>[5800 psi]</td>
</tr>
<tr>
<td>Max. rated flow*</td>
<td>A/B port</td>
<td>250 l/min</td>
<td>[66 US gal/min]</td>
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<td>Oil temperature</td>
<td>Recommended</td>
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<td>[86 to 140°F]</td>
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<tr>
<td></td>
<td>Minimum</td>
<td>-30°C</td>
<td>[-22°F]</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>90°</td>
<td>[194°F]</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Recommended</td>
<td>-30 to 60°C</td>
<td>[-22 to 140°F]</td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>Operating range</td>
<td>12 to 75 mm²/s</td>
<td>[65 to 347 SUS]</td>
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<tr>
<td></td>
<td>Minimum</td>
<td>4 mm²/s</td>
<td>[39 SUS]</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>460 mm²/s</td>
<td>[2128 SUS]</td>
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<tr>
<td>Oil contamination</td>
<td>Maximum</td>
<td>23/19/16</td>
<td></td>
</tr>
<tr>
<td>according to ISO 4406</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. internal leakage at 100 bar [1450 psi] and 21 mm²/s [102 SUS]</td>
<td>A/B→T without shock valve</td>
<td>70 cm³/min</td>
<td>[4.27 in³/min]</td>
</tr>
<tr>
<td></td>
<td>A/B→T with shock valve</td>
<td>80 cm³/min</td>
<td>[4.88 in³/min]</td>
</tr>
</tbody>
</table>

*Rated flow at 15 bar margin pressure

Part numbers for Compensated PVB 128 with LSA/B and PVLP

<table>
<thead>
<tr>
<th>Part number</th>
<th>A/B-port</th>
<th>PVLP/PVLA</th>
<th>LS A/B-port</th>
</tr>
</thead>
<tbody>
<tr>
<td>11165621</td>
<td>Metric Flange 3/4&quot;</td>
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<td>G1/4&quot;BSP</td>
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<tr>
<td>11170527</td>
<td>G 1&quot; BSP</td>
<td>2 PVLP/PVLA</td>
<td>G1/4&quot;BSP</td>
</tr>
<tr>
<td>11170523</td>
<td>SAE Flange 3/4&quot; UNF</td>
<td>2 PVLP/PVLA</td>
<td>7/16-20 UNF</td>
</tr>
<tr>
<td>11170525</td>
<td>Thread Ports 1 5/16 UNF</td>
<td>2 PVLP/PVLA</td>
<td>7/16-20 UNF</td>
</tr>
</tbody>
</table>
PVB 128 Variant Overview

Oil flow as function of spool travel

2xPVLP Shock Valve

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PVB 128 Variant Overview

2xPVALA Suction Valve

Load Independent Oil Flow, Pressure Compensated
PVB 128 Variant Overview

**LS A/B Pressure Relief Valve**

Port P to Port A/B at full spool stroke

PVB 128 Upstream Performance

Port P to Port A/B at full spool stroke
PVB 128 Variant Overview

**PVB 128 Downstream Performance**

Port A/B to Tank at full spool stroke

![Graph showing pressure (P) versus flow (Q) for Port A/B to Tank at full spool stroke.](image)

- **E = Spool 240 l/min**
- **Q (l/min)**
- **Q (US gal/min)**

P109241
The PVG 256 Basic modules (PVB), also referred to as work sections, is the interface between the PVG 256 proportional valve group and the work function such as a cylinder or a motor.

The PVB basic module variants are based on a generic platform with a selection of additional features, enabling you to tailor the PVB to suit the demands of any hydraulic system.

The compensator is a 3-way type which includes load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up.

The generic PVB basic module platform includes the following main variants.

- **Compensated PVB 256** Compensated basic module.
- **Compensated PVB 256 with LS A/B** Compensated basic module with LSA/B relief valve for each work port.
- **Compensated PVB 256 with LS A/B and PVLP** Compensated basic module with LSA/B relief valve for each work port and 3xPVLPs for each work port.
- **Compensated PVB 256 with Turbo compensator feature** Compensated basic module with LS A/B relief valve for each work port and 3xPVLPs for each work port.
PVB 256 Variant Overview

PVB 256 3-way Compensator

The compensated PVB is intended for controlling a work function where the function behavior in terms of flow and pressures requires independency on the load pressure of other functions used simultaneously.

The integrated LS A/B relief valves are used to limit the maximum work port pressure on the A and B-ports individually.

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

**Schematic**

![Schematic](image)

**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>A/B port continuous</th>
<th>350 bar</th>
<th>[5076 psi]</th>
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</thead>
<tbody>
<tr>
<td>Max. rated pressure</td>
<td>A/B port intermittent</td>
<td>400 bar</td>
<td>[5800 psi]</td>
</tr>
<tr>
<td>Max. rated flow</td>
<td>A/B port</td>
<td>450 l/min</td>
<td>[119 US gal/min]</td>
</tr>
<tr>
<td>Oil temperature</td>
<td>A/B port intermittent</td>
<td>400 bar</td>
<td>[5800 psi]</td>
</tr>
<tr>
<td>Recommended</td>
<td>30 to 60°C</td>
<td>[86 to 140°F]</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>-30°C</td>
<td>[-22°F]</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>90°C</td>
<td>[194°F]</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Recommended</td>
<td>-30 to 60°C</td>
<td>[-22 to 140°F]</td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>Operating range</td>
<td>12 to 75 mm²/s</td>
<td>[65 to 347 SUS]</td>
</tr>
<tr>
<td>Minimum</td>
<td>4 mm²/s</td>
<td>[39 SUS]</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>460 mm²/s</td>
<td>[2128 SUS]</td>
<td></td>
</tr>
<tr>
<td>Oil contamination according to ISO 4406</td>
<td>Maximum</td>
<td>23/19/16</td>
<td></td>
</tr>
<tr>
<td>Max. internal leakage at 100 bar [1450 psi] and 21 mm²/s [102 SUS]</td>
<td>A/B→T without shock valve</td>
<td>70 cm³/min</td>
<td>[4.27 in³/min]</td>
</tr>
<tr>
<td></td>
<td>A/B→T with shock valve</td>
<td>85 cm³/min</td>
<td>[5.19 in³/min]</td>
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**Part numbers for Compensated PVB 256**

<table>
<thead>
<tr>
<th>Part number</th>
<th>A/B port</th>
<th>PVLP/PVLA</th>
<th>LS A/B port</th>
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<tbody>
<tr>
<td>11169244</td>
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<td>-</td>
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<tr>
<td>11169252</td>
<td>G1 BSP</td>
<td>-</td>
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<td>11169248</td>
<td>SAE Flange 1&quot; UNF</td>
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<td>11177020</td>
<td>Thread Ports 1-5/16-12 UNF</td>
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</table>
PVB 256 Variant Overview

Oil Flow as Function of Spool Travel

Graph showing the relationship between spool travel and oil flow for different PVB variant options.
PVB 256 Variant Overview

Load Independent Oil Flow, Pressure Compensated

![Graph showing oil flow and pressure compensation](image)

PVB 256 Upstream Performance

Port P to Port A/B at full spool stroke

![Graph showing upstream performance](image)
PVB 256 Variant Overview

**PVB 256 Downstream Performance**

Port A/B to Tank at full spool stroke

G/H = Spool 400 l/min

Q [l/min]
Q [US gal/min]

P [psi] [bar]
PVB 256 Variant Overview

PVB 256 3-way Compensator with LS A/B

The compensated PVB is intended for controlling a work function where the function behavior in terms of flow and pressures requires independency on the load pressure of other functions used simultaneously.

The integrated LS A/B relief valves are used to limit the maximum work port pressure on the A and B-ports individually.

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

Schematic

```
```

Technical data

<table>
<thead>
<tr>
<th>Data type</th>
<th>A/B port continuous</th>
<th>A/B port intermittent</th>
<th>A/B port intermittent</th>
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<tbody>
<tr>
<td>Max. rated pressure</td>
<td>350 bar</td>
<td>400</td>
<td>5800 psi</td>
</tr>
<tr>
<td>Oil temperature</td>
<td>30 to 60°C</td>
<td>[-22 to 140°F]</td>
<td>[-22 to 140°F]</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-30°C to 90°C</td>
<td>[-39°F to 194°F]</td>
<td>[-39°F to 194°F]</td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>12 to 75 mm²/s</td>
<td>4 mm²/s</td>
<td>460 mm²/s</td>
</tr>
<tr>
<td>Oil contamination</td>
<td>23/19/16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. internal leakage at 100 bar (1450 psi) and 21 mm²/s [102 SUS]</td>
<td>70 cm³/min</td>
<td>85 cm³/min</td>
<td></td>
</tr>
</tbody>
</table>

Part numbers for Compensated PVB 256 with LSA/B

<table>
<thead>
<tr>
<th>Part number</th>
<th>A/B-port</th>
<th>PVLP/PVLA</th>
<th>LS A/B-port</th>
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</thead>
<tbody>
<tr>
<td>11177015</td>
<td>Metric Flange 1”</td>
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<td>G1/4”BSP</td>
</tr>
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<td>11177017</td>
<td>G1 BSP</td>
<td>-</td>
<td>G1/4”BSP</td>
</tr>
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<td>11177016</td>
<td>SAE Flange 1” UNF</td>
<td>-</td>
<td>7/16-20 UNF</td>
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<tr>
<td>11177019</td>
<td>Thread Ports 1-5/16-12 UNF</td>
<td>-</td>
<td>7/16-20 UNF</td>
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</table>
PVB 256 Variant Overview

Oil Flow as Function of Spool Travel
PVB 256 Variant Overview

Load Independent Oil Flow, Pressure Compensated

LS A/B Pressure Limitation
PVB 256 Variant Overview

**PVB 256 Upstream Performance**

Port P to Port A/B at full spool stroke

**PVB 256 Downstream Performance**

Port A/B to Tank at full spool stroke
PVB 256 Variant Overview

PVB 256 3-way Compensator with LSA/B and PVLP

The compensated PVB is intended for controlling a work function where the function behavior in terms of flow and pressures requires independency on the load pressure of other functions used simultaneously.

The integrated LS A/B relief valves are used to limit the maximum work port pressure on the A and B-ports individually.

Featuring 3xPVLP shock/anti-cavitation valves on each work port for pressure peak protection and anti-cavitation prevention.

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

![Diagram of PVB 256 3-way Compensator with LSA/B and PVLP](image)

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Max. rated pressure</td>
<td>A/B port continuous 350 bar</td>
</tr>
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<td></td>
<td>A/B port intermittent 400 bar</td>
</tr>
<tr>
<td>Max. rated flow</td>
<td>A/B port 450 l/min [119 US gal/min]</td>
</tr>
<tr>
<td>Oil temperature</td>
<td>Recommended 30 to 60°C [86 to 140°F]</td>
</tr>
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<td></td>
<td>Minimum -30°C [-22°F]</td>
</tr>
<tr>
<td></td>
<td>Maximum 90° [194°F]</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Recommended -30 to 60°C [-22 to 140°F]</td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>Operating range 12 to 75 mm²/s [65 to 347 SUS]</td>
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<tr>
<td></td>
<td>Minimum 4 mm²/s [39 SUS]</td>
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<tr>
<td></td>
<td>Maximum 460 mm²/s [2128 SUS]</td>
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<tr>
<td>Oil contamination according to ISO 4406</td>
<td>Maximum 23/19/16</td>
</tr>
<tr>
<td>Max. internal leakage at 100 bar [1450 psi] and 21 mm²/s [102 SUS]</td>
<td>A/B→T without shock valve 70 cm³/min [4.27 in³/min]</td>
</tr>
<tr>
<td></td>
<td>A/B→T with shock valve 85 cm³/min [5.19 in³/min]</td>
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Part numbers for Compensated PVB 256 with LSA/B and PVLP

<table>
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<th>Part number</th>
<th>A/B port</th>
<th>PVLP/PVLA</th>
<th>LS A/B port</th>
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</thead>
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<td>11169243</td>
<td>Metric Flange 1”</td>
<td>3 PVLP/PVLA</td>
<td>G1/4”BSP</td>
</tr>
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<td>11169251</td>
<td>G1 BSP</td>
<td>3 PVLP/PVLA</td>
<td>G1/4”BSP</td>
</tr>
<tr>
<td>11169247</td>
<td>SAE Flange 1” UNF</td>
<td>3 PVLP/PVLA</td>
<td>7/16-20 UNF</td>
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<td>3 PVLP/PVLA</td>
<td>7/16-20 UNF</td>
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</tbody>
</table>
PVB 256 Variant Overview

Oil Flow as Function of Spool Travel

3xPVLP Shock Valve
PVB 256 Variant Overview

3xPVLA Suction Valve

![Graph showing the relationship between pressure and flow rate for a 3xPVLA Suction Valve.](image)

**LS A/B Pressure Limitation**

![Graph showing the pressure limitation for LS A/B.](image)
PVB 256 Variant Overview

Load Independent Oil Flow, Pressure Compensated

PVB 256 Upstream Performance

Port P to Port A/B at full spool stroke
PVB 256 Variant Overview

**PVB 256 Downstream Performance**

Port A/B to Tank at full spool stroke

- **P** [psi] [bar]
- **Q** [l/min] [US gal/min]

G/H = Spool 400 l/min
PVB 256 Variant Overview

PVB 256 3-way Compensator with LS A/B, PVLP and Turbo

The compensated PVB is intended for controlling a work function where the function behavior in terms of flow and pressures requires independency on the load pressure of other functions used simultaneously.

The integrated LS A/B relief valves are used to limit the maximum work port pressure on the A and B-ports individually.

Featuring 3xPVLP shock/anti-cavitation valves on each work port for pressure peak protection and anti-cavitation prevention.

The compensator is a 3-way type which include load drop check valve functionality, compensator function and neutral relief which avoid A and B port pressure build up in neutral.

Schematic

Technical data

<table>
<thead>
<tr>
<th></th>
<th>A/B port continuous</th>
<th>350 bar</th>
<th>[5076 psi]</th>
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</thead>
<tbody>
<tr>
<td>Max. rated pressure</td>
<td>A/B port intermittent</td>
<td>400 bar</td>
<td>[5800 psi]</td>
</tr>
<tr>
<td>Max. rated flow</td>
<td>A/B port</td>
<td>500 l/min</td>
<td>[132 US gal/min]</td>
</tr>
<tr>
<td>Oil temperature</td>
<td>Recommended</td>
<td>30 to 60°C</td>
<td>[86 to 140°F]</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>-30°C</td>
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</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>90°</td>
<td>[194°F]</td>
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<tr>
<td>Ambient temperature</td>
<td>Recommended</td>
<td>-30 to 60°C</td>
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<tr>
<td>Oil viscosity</td>
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<tr>
<td></td>
<td>Maximum</td>
<td>460 mm²/s</td>
<td>[2128 SUS]</td>
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<tr>
<td>Oil contamination</td>
<td>Maximum</td>
<td>23/19/16</td>
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<tr>
<td>according to ISO 4406</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. internal leakage</td>
<td>A/B—T without shock valve</td>
<td>70 cm³/min</td>
<td>[4.27 in³/min]</td>
</tr>
<tr>
<td>at 100 bar [1450 psi]</td>
<td>A/B—T with shock valve</td>
<td>85 cm³/min</td>
<td>[5.19 in³/min]</td>
</tr>
<tr>
<td>and 21 mm²/s [102 SUS]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part numbers for Compensated PVB 256 with LSA/B, PVLP and Turbo

<table>
<thead>
<tr>
<th>Part number</th>
<th>A/B port</th>
<th>PVLP/PVLA</th>
<th>LS A/B port</th>
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</thead>
<tbody>
<tr>
<td>11183379</td>
<td>Metric Flange 1&quot;</td>
<td>3 PVLP/PVLA</td>
<td>G1/4&quot;BSP</td>
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<tr>
<td>11183406</td>
<td>G1 BSP</td>
<td>3 PVLP/PVLA</td>
<td>G1/4&quot;BSP</td>
</tr>
<tr>
<td>11183404</td>
<td>SAE Flange 1&quot; UNF</td>
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<td>7/16-20 UNF</td>
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<tr>
<td>11183402</td>
<td>Thread Ports 1-5/16-1 UNF</td>
<td>3 PVLP/PVLA</td>
<td>7/16-20 UNF</td>
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</tbody>
</table>
PVB 256 Variant Overview

Oil Flow as Function of Spool Travel

![Graph showing oil flow as a function of spool travel. The graph displays the relationship between PVM, PVEH, and PVEH-U in millimeters and inches, as well as their corresponding US gallons per minute (US gal/min) and liters per minute (l/min). The graph includes scale markings for PVM in millimeters and inches, and PVEH-U in volts (V).]
PVB 256 Variant Overview

3xPVLP Shock Valve

3xPVLA Suction Valve
Load Independent Oil Flow, Pressure Compensated
PVB 256 Variant Overview

**PVB 256 Turbo Upstream Performance**

Port P to Port A/B at full spool stroke

**PVB 256 Downstream Performance**

Port A/B to Tank at full spool stroke
PVLP Overview

PVLP is set at an oil flow of 10 l/min [2.6 US gal/min] per unit.

The shock valve PVLP is designed to absorb shock effects. Consequently, it should not be used as a pressure relief valve.

If the working function requires the use of a pressure relief valve, a PVB basic module with built-in LSA/B pressure limiting valve should be used.

PVLP Technical Data

<table>
<thead>
<tr>
<th>Technical data</th>
<th>Recommended</th>
<th>30 to 60°C</th>
<th>[86 to 140°F]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil temperature</td>
<td>Minimum</td>
<td>-30°C</td>
<td>[-22°F]</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>90°</td>
<td>[194°F]</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Recommended</td>
<td>-30 to 60°C</td>
<td>[-22 to 140°F]</td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>Operating range</td>
<td>12 to 75 mm²/s</td>
<td>[65 to 347 SUS]</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>4 mm²/s</td>
<td>[39 SUS]</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>460 mm²/s</td>
<td>[2128 SUS]</td>
</tr>
<tr>
<td>Oil contamination</td>
<td>Maximum</td>
<td>23/19/16</td>
<td></td>
</tr>
<tr>
<td>according to ISO 4406</td>
<td></td>
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### Part numbers for PVLP Shock and PVLA Suction Valves

<table>
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<tr>
<th>Description</th>
<th>Pressure setting in bar</th>
<th>Part number</th>
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<tbody>
<tr>
<td>PVLA</td>
<td>-</td>
<td>157B2001</td>
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<tr>
<td></td>
<td>380</td>
<td>157B2380</td>
</tr>
<tr>
<td>PLUG</td>
<td>-</td>
<td>157B2002</td>
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</table>
PVLP Shock and PVLA Suction Valves

3xPVLP Shock Valve

3xPVLA Suction Valve
PVBS Main Spool

The PVG 128/256 main spools (PVBS) determines the flow out of the work section.

The PVBS main spool variants are based on a generic platform with a wide selection of additional features, enabling you to tailor the PVBS to suit the demands of any hydraulic system and any function.

*The PVBS main spool can be activated in three different ways:*
  * Mechanically by a PVM lever
  * Electrically by either a PVE or a PVHC actuator
  * Hydraulically by a PVH actuator

All spools can be mechanically activated.

**PVBS Main Spool**

**PVBS Main Spool dimensions**

**PVBS Main Spools variant overview**

**Flow control spools**
  * Flow control spool closed neutral position
  * Flow control spool throttled open neutral position
  * Single acting cylinder flow control spool closed neutral position, flow control B port
  * Flow control spool closed neutral position with A-float

**PVBS main spools product details**

**Technical data**

<table>
<thead>
<tr>
<th></th>
<th>Recommended</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil temperature</td>
<td>30 to 60°C</td>
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<tr>
<td>Ambient temperature</td>
<td>-30 to 60°C</td>
<td>-30°C</td>
<td>-22 to 140°F</td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>12 to 75 mm²/s</td>
<td>4 mm²/s</td>
<td>460 mm²/s</td>
</tr>
<tr>
<td></td>
<td>[65 to 347 SUS]</td>
<td>[39 SUS]</td>
<td>[2128 SUS]</td>
</tr>
<tr>
<td>Oil contamination</td>
<td>23/19/16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>according to ISO 4406</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
PVBS Main Spool

Progressive Oil Flow as Function of Spool Travel
PVBS Main Spool

Pressure drop for open spool in neutral position

Progressive oil flow characteristic of spool with A-float

PVS Main spools part numbers
PVBS Main Spool

Flow control spools

Flow control spool closed neutral position

Schematic

<table>
<thead>
<tr>
<th>Part number</th>
<th>Actuation</th>
<th>Flow - l/min (US gal/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>240 [63.40]</td>
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<td>11178733</td>
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<td>320 [84.54]</td>
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<td>11177058*</td>
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<td>400 [105.67]</td>
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<td>11182643</td>
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<td>11182638</td>
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<td>240 [63.40]</td>
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<td>11182635</td>
<td>320 [84.54]</td>
<td>320 [84.54]</td>
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<tr>
<td>11182621*</td>
<td>400 [105.67]</td>
<td>400 [105.67]</td>
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</tbody>
</table>

* Up to 500 l/min in combination with PVB 256 3-way Turbo Compensator feature

Symmetric flow control spools

Asymmetric spools

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
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<td>**</td>
<td>65 [17.17]</td>
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<tr>
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<td>130 [34.34]</td>
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<tr>
<td>PVH/PVHC</td>
<td>180 [47.55]</td>
<td>180 [47.55]</td>
</tr>
<tr>
<td>PVH/PVHC</td>
<td>240 [63.40]</td>
<td>240 [63.40]</td>
</tr>
</tbody>
</table>

* Please contact your Danfoss Power Solutions representative if one of these variants is needed.

Flow control spool throttled open neutral position

Schematic
Symmetric flow control spools

<table>
<thead>
<tr>
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<th>Actuation</th>
<th>Flow - l/min (US gal/min)</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>11178310</td>
<td>PVE</td>
<td>180 [47.55]</td>
</tr>
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<td>11182619</td>
<td>PVE</td>
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</tr>
<tr>
<td>11182618</td>
<td>PVE</td>
<td>320 [84.54]</td>
</tr>
<tr>
<td>11182617</td>
<td>PVH/PVHC</td>
<td>400 [105.67]</td>
</tr>
<tr>
<td>11183602</td>
<td>PVH/PVHC</td>
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</tr>
<tr>
<td>11183441</td>
<td>PVH/PVHC</td>
<td>180 [47.55]</td>
</tr>
<tr>
<td>11178318</td>
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</tr>
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<tr>
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</table>

1 Please contact your Danfoss Power Solutions representative if one of these variants is needed.

2 Up to 500 l/min in combination with PVB 256 3-way Turbo Compensator feature

Asymmetric flow control spools

<table>
<thead>
<tr>
<th>Part number</th>
<th>Actuation</th>
<th>Flow - l/min (US gal/min)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A→T</td>
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<tr>
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<td></td>
<td>-</td>
<td>240 [63.40]</td>
</tr>
</tbody>
</table>

** Please contact your Danfoss Power Solutions representative if one of these variants is needed.

Single acting cylinder flow control spool closed neutral position, flow control B port

Schematic

```
+-------------------+
|                   |
|                   |
|                   |
|                   |
|                   |
+-------------------+
```

<table>
<thead>
<tr>
<th>Part number</th>
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<tr>
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<tr>
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<td>PVE</td>
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<tr>
<td>(1)</td>
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<td>(1)</td>
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<tr>
<td>(1)</td>
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<td>-</td>
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<td>(1)²</td>
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### PVBS Main Spool

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<td>(1)</td>
<td>PVH/PVHC</td>
<td>-</td>
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<tr>
<td>(1)</td>
<td>PVH/PVHC</td>
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<tr>
<td>(1)(2)</td>
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<td>-</td>
</tr>
</tbody>
</table>

1 Please contact your Danfoss Power Solutions representative if one of these variants is needed.

2 Up to 500 l/min in combination with PVB 256 3-way Turbo Compensator feature

### Flow control spool closed neutral position with A-float

#### Schematic

[Diagram of flow control spool]

#### Symmetric flow control spools

<table>
<thead>
<tr>
<th>Part number</th>
<th>Actuation</th>
<th>Flow - l/min (US gal/min)</th>
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<tbody>
<tr>
<td></td>
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<tr>
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<td>(1)</td>
<td>PVE</td>
<td>240 [63.40]</td>
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<tr>
<td>(1)</td>
<td>PVE</td>
<td>320 [84.54]</td>
</tr>
<tr>
<td>(1)</td>
<td>PVH/PVHC</td>
<td>130 [34.34]</td>
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<tr>
<td>(1)</td>
<td>PVH/PVHC</td>
<td>180 [47.55]</td>
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<tr>
<td>(1)</td>
<td>PVH/PVHC</td>
<td>240 [63.40]</td>
</tr>
<tr>
<td>(1)</td>
<td>PVH/PVHC</td>
<td>320 [84.54]</td>
</tr>
</tbody>
</table>

1 Please contact your Danfoss Power Solutions representative if one of these variants is needed.
PVM Manual Activation

PVM Lever dimensions

The PVM manual activation cover is intended for use on any work section where the operator has to have the ability to interact with the spool manually.

The adjustment screws are intended for limiting the spool travel and thereby the maximum achievable flow.

Weight: 1.5 kg [3.3 lbs]
PVM Technical Data

**Technical data**

<table>
<thead>
<tr>
<th>Spool displacement</th>
<th>Torque</th>
</tr>
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<tbody>
<tr>
<td>From neutral position</td>
<td>12 N·m</td>
</tr>
<tr>
<td>PVM+PVMD</td>
<td>12 N·m</td>
</tr>
<tr>
<td>PVM+PVE</td>
<td>12 N·m</td>
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<tr>
<td>PVM+PVH</td>
<td>30 N·m</td>
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<tr>
<td>Max. spool travel</td>
<td>30 N·m</td>
</tr>
<tr>
<td>PVM+PVMD</td>
<td>30 N·m</td>
</tr>
<tr>
<td>PVM+PVE</td>
<td>30 N·m</td>
</tr>
<tr>
<td>PVM+PVH</td>
<td>91 N·m</td>
</tr>
<tr>
<td>Standard Control Range</td>
<td>30°</td>
</tr>
<tr>
<td>Control lever range + float position</td>
<td>37°</td>
</tr>
</tbody>
</table>

**Part numbers for PVM Manual Activation**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Material</th>
<th>Adjustment screws</th>
<th>Lever base and lever</th>
<th>B-port Gauge</th>
</tr>
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<tbody>
<tr>
<td>11176644</td>
<td>Cast iron</td>
<td>-</td>
<td>Yes</td>
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<tr>
<td>11175317</td>
<td>Cast iron</td>
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<td>Yes</td>
<td>G1/8&quot; BSP</td>
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<td>11176635</td>
<td>Cast iron</td>
<td>Yes</td>
<td>Yes</td>
<td>3/8&quot;-24 UNF</td>
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</tbody>
</table>
PVH Hydraulic Actuation

**PVH dimensions**

The PVH hydraulic activation cover is intended for use on any work section where the operator wants to have a possibility to interact with the main spool via a hydraulic joystick.

Inlet with Hydraulic Pilot Pressure is needed.
PVH Hydraulic Actuation

PVH Technical Data

Technical data

| Main Spool Spring control pressure range | 5 – 15 bar | (73 – 218 psi) |
| Pilot oil pressure range between 20 and 25 bar | 20 – 25 bar | (290 – 362 psi) |
| Max. pressure on port T (the hydraulic remote control lever should be connected directly to tank) | 10 bar | (145 psi) |

Part numbers for PVH Hydraulic Actuation

<table>
<thead>
<tr>
<th>Part number</th>
<th>Material</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>11187777</td>
<td>Aluminum</td>
<td>G1/4” BSP</td>
</tr>
<tr>
<td>11187776</td>
<td>Aluminum</td>
<td>9/16”-18 UNF</td>
</tr>
</tbody>
</table>
The PVHC is an electrical actuator module for main spool control.
The PVHC control is done by dual Pulse Width Modulated (PVM) high current supply 100-400 Hz PWM control signals.
The hysteresis is affected by viscosity, friction, flow forces, dither frequency and modulation frequency. The spool position will shift when conditions are changed such as temperature change.
Inlet with Hydraulic Pilot Pressure is needed.
**Dither frequency with a certain amplitude is needed for optimal application performance.**

*Schematic*
PVHC Electro-Hydraulic Actuator type

Technical data

<table>
<thead>
<tr>
<th>Product</th>
<th>Power supply</th>
<th>Connector type</th>
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<td>12V</td>
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<td>11187774</td>
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<td>11187775</td>
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</table>

Part numbers for PVHC Electro-Hydraulic Actuator types
PVMD Cover Manual Actuation Only

The PVMD cover is used when work section is purely mechanical activated.

PVMD Part Numbers

<table>
<thead>
<tr>
<th>Part number</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>11187779</td>
<td>Aluminum</td>
</tr>
</tbody>
</table>
PVE Electrical Actuator

PVE Series 7 Electrical Actuator

The analog PVE Series 7 is an electro-hydraulic actuator used to control a single work section of a PVG proportional valve group. The PVE Series 7 actuator program includes variants with different performance levels and features for PVG 128/256.

The actuator positions the main spool in a PVG work section in order to control either the flow or the pressure of the oil distributed to/from the work function. The control signal to the actuator is an analog voltage signal, enabling the user to operate the work function remotely by means of a joystick, a controller or the similar.

The electro-hydraulic solenoid valve bridge of the actuator is available in different designs utilizing different regulation principles, depending on performance variant. The actuator positions the main spool by distributing pilot oil pressure to either side of it, pressurizing one side by pilot pressure while relieving the opposite side to tank and vice versa, as illustrated below. All proportional actuators feature a closed-loop spool control and continuous fault monitoring.

The analog PVE Series 7 actuator program for PVG 128/256 features two different main hydraulic principle variants (PVEO and PVEH). The different hydraulic principles combined with the different solenoid valve regulation principles determine whether the actuator controls the spool proportionally according to a demand signal or ON/OFF according to a voltage signal. The voltage control characteristic of the PVE Series 7 actuators is shown in the figure below to the left.
PVE Electrical Actuator

PVG 256 with PVEH
PVE Variant Overview

### PVEO Series 7

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
</table>
| P109195 | **PVEO**  
ON/OFF voltage control for non-proportional functions.  
• Neutral position or max. spool stroke according to control signal  
• Variants available with 12 V dc or 24 Vdc supply voltage  
• Variants available with DEUTSCH or DIN/Hirschmann connectors  
• To be used with standard PVE pilot oil pressure of 13.5 bar  
• LED only indicating Power ON or Power OFF |

### PVEH Series 7

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
</table>
| P109198 | **PVEH**  
Proportional spool control for functions with high performance and reaction demands.  
• All variants with 11-32 Vdc multi-voltage power supply  
• Variants available with DEUTSCH or DIN/Hirschmann connectors  
• To be used with standard PVE pilot oil pressure of 13.5 bar  
• All variants with LED indicating error state and active or passive fault monitoring  
• Variants available with Float (-F) or 0-10 V dc control signal (-U) functionality |

PVEO
PVE Variant Overview

PVEO

The PVEO actuator is a non-proportional ON/OFF control actuator with open-loop spool control primarily used to control simple ON/OFF work functions where a proportional control of speed or oil flow is not a requirement.

PVEO functionality

The standard PVEO functionality includes the simplest electric circuit of the PVG 128/256 actuator program, using a fixed 12 Vdc or 24 Vdc supply voltage or signal voltage and a simple LED circuit to control the LED light indicating Power ON/OFF.

An energization of solenoid valve SV1 and a simultaneous de-energization of SV2 will cause the main spool to move to the right direction and vice versa. If both SV1 and SV2 are energized or de-energized simultaneously, the main spool stays locked in its neutral position.
PVE Variant Overview

**PVEO Schematics and Dimensions**

**PVEO schematics**

<table>
<thead>
<tr>
<th>PVEO</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="PVEO Schematic" /></td>
</tr>
</tbody>
</table>

**Dimensions**

<table>
<thead>
<tr>
<th>Connector height</th>
<th>DEU = 30 mm [1.2 in]</th>
<th>DIN = 40 mm [1.6 in]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEU = 30 mm [1.2 in] Din = 40 mm [1.6 in]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Weight: 2 kg [4.4 lbs]

**PVEO Technical Data**

**Control Specification**

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (Udc)</td>
<td>Rated</td>
<td>12 Vdc</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>11 to 15 Vdc</td>
</tr>
<tr>
<td></td>
<td>Max. ripple</td>
<td>5%</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>Typical</td>
<td>480 mA</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>430 mA</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>950 mA</td>
</tr>
</tbody>
</table>

**Operating Conditions**

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Pressure</td>
<td>Nominal</td>
<td>13.5 bar</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>10.0 bar</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>15.0 bar</td>
</tr>
</tbody>
</table>
Operating Conditions (continued)

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Consumption</td>
<td>Neutral</td>
<td>0.0 l/min</td>
</tr>
<tr>
<td></td>
<td>Locked position</td>
<td>0.0 l/min</td>
</tr>
<tr>
<td></td>
<td>Actuating</td>
<td>0.9 l/min</td>
</tr>
<tr>
<td>Max T-port pressure</td>
<td>Static</td>
<td>25 bar</td>
</tr>
<tr>
<td></td>
<td>Intermittent</td>
<td>40 bar</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>Ambient</td>
<td>-50 to +90°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Ambient</td>
<td>-40 to +90°C</td>
</tr>
<tr>
<td>Oil Viscosity</td>
<td>Operating range</td>
<td>12 to 75 cSt</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>4 cSt</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>460 cSt</td>
</tr>
<tr>
<td>Oil Cleanliness</td>
<td>Maximum</td>
<td>18/16/13</td>
</tr>
</tbody>
</table>

LED characteristic

<table>
<thead>
<tr>
<th>Color</th>
<th>LED characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green constant</td>
<td></td>
<td>Power ON</td>
</tr>
</tbody>
</table>

PVEO 128/256 Reaction Times

![Graph showing reaction times](P109128)

PVEO

<table>
<thead>
<tr>
<th>Reaction</th>
<th>PVEO128</th>
<th>PVEO 256</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 A-port – Neutral to maximum spool stroke @ Constant Udc</td>
<td>375 ms</td>
<td>375 ms</td>
</tr>
<tr>
<td>T1 B-port – Neutral to maximum spool stroke @ Constant Udc</td>
<td>520 ms</td>
<td>520 ms</td>
</tr>
<tr>
<td>T2 A-port – Maximum spool stroke to neutral @ Constant Udc</td>
<td>350 ms</td>
<td>350 ms</td>
</tr>
<tr>
<td>T2 B-port – Maximum spool stroke to neutral @ Constant Udc</td>
<td>600 ms</td>
<td>600 ms</td>
</tr>
</tbody>
</table>

PVEO Variants for PVG

PVG 128/256 Variants

<table>
<thead>
<tr>
<th>Part number</th>
<th>Type</th>
<th>Connector</th>
<th>IP</th>
<th>Udc</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>11186328</td>
<td>PVEO</td>
<td>1x4 DEU</td>
<td>67</td>
<td>12 Vdc</td>
<td>Standard</td>
</tr>
<tr>
<td>11186330</td>
<td>PVEO</td>
<td>1x4 DEU</td>
<td>67</td>
<td>24 Vdc</td>
<td>Standard</td>
</tr>
</tbody>
</table>
PVE Variant Overview

<table>
<thead>
<tr>
<th>Part number</th>
<th>Type</th>
<th>Connector</th>
<th>IP</th>
<th>Udc</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>11186331</td>
<td>PVEO</td>
<td>1x4 DIN</td>
<td>65</td>
<td>12 Vdc</td>
<td>Standard</td>
</tr>
<tr>
<td>11186342</td>
<td>PVEO</td>
<td>1x4 DIN</td>
<td>65</td>
<td>24 Vdc</td>
<td>Standard</td>
</tr>
</tbody>
</table>

PVEH

PVEH Overview

The PVEH actuator is a proportional control actuator with closed-loop spool control primarily used to control work functions with high performance requirements.

The PVEH functionality includes an electric circuit with a closed-loop logic. An embedded microcontroller processes the signal voltage and the LVDT feedback signal and regulates the solenoid valves accordingly. Features such as active or passive fault monitoring, LED indicating fault state, error output pin and Power Save are all default PVEH features.

A continuous modulation of solenoid valves NC1 and NO4 together, with a simultaneous energization of NO2 and de-energization of NC3, causes the main spool to move to the right direction and vice versa. When the main spool is stroked to the far right, a simultaneous energization of both NO2 and NO4 and de-energization of both NC1 and NC3 locks the main spool in its stroked position. An emergency stop activated when the spool is stroked will cause all solenoid valves to de-energize causing the main spool to move back to its neutral position by means of the main spool neutral spring and the hydraulic principle.

Functionality
PVE Variant Overview

**PVEH Schematics and Dimensions**

**Schematics**

<table>
<thead>
<tr>
<th>PVEH</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Schematic Diagram" /></td>
</tr>
</tbody>
</table>

**Dimensions**

<table>
<thead>
<tr>
<th>PVEH</th>
<th>Connector height</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Dimensions Diagram" /></td>
<td>DEU = 30 mm [1.2 in]</td>
</tr>
<tr>
<td></td>
<td>DIN = 40 mm [1.6 in]</td>
</tr>
</tbody>
</table>

2 kg [4.4]

**PVEH Technical Data**

**Control Specification**

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage ($U_{DC}$)</td>
<td>Rated Range</td>
<td>11 to 32 $V_{DC}$</td>
</tr>
<tr>
<td></td>
<td>Max. ripple</td>
<td>5%</td>
</tr>
<tr>
<td>Signal Voltage PWM ($U_S$)</td>
<td>Neutral</td>
<td>$U_S = 0.5 U_{DC} = 50%$ DUT</td>
</tr>
<tr>
<td></td>
<td>Q: P to A</td>
<td>$U_S = (0.5\text{ to } 0.25) U_{DC} = 50%$ to 25% DUT</td>
</tr>
<tr>
<td></td>
<td>Q: P to B</td>
<td>$U_S = (0.5\text{ to } 0.75) U_{DC} = 50%$ to 75% DUT</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>Rated</td>
<td>12 k$\Omega$</td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>Rated</td>
<td>100 nF</td>
</tr>
</tbody>
</table>
### Current consumption

<table>
<thead>
<tr>
<th>Description</th>
<th>@ 12 V&lt;sub&gt;DC&lt;/sub&gt;</th>
<th>@ 24 V&lt;sub&gt;DC&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWM Frequency (U&lt;sub&gt;P&lt;/sub&gt;) recommended</td>
<td>&gt; 1000 Hz</td>
<td>&gt; 1000 Hz</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>540 mA</td>
<td>270 mA</td>
</tr>
<tr>
<td>Power Save</td>
<td>25 mA @ U&lt;sub&gt;DC&lt;/sub&gt; = 32 V&lt;sub&gt;DC&lt;/sub&gt;</td>
<td></td>
</tr>
</tbody>
</table>

### Pilot pressure

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Nominal</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0 bar [145 psi]</td>
<td>13.5 bar [196 psi]</td>
<td>15.0 bar [218 psi]</td>
</tr>
</tbody>
</table>

### Fluid consumption

<table>
<thead>
<tr>
<th>State</th>
<th>Neutral</th>
<th>Locked position</th>
<th>Actuating</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 l/min</td>
<td>0.0 l/min</td>
<td></td>
<td>0.7 l/min [0.18 US gal/min]</td>
</tr>
</tbody>
</table>

### Technical specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Recommended range</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid viscosity</td>
<td>4 mm&lt;sup&gt;2&lt;/sup&gt;/s [39 SUS]</td>
<td>12 to 75 mm&lt;sup&gt;2&lt;/sup&gt;/s [65 to 347 SUS]</td>
<td>460 mm&lt;sup&gt;2&lt;/sup&gt;/s [2128 SUS]</td>
</tr>
<tr>
<td>Fluid cleanliness</td>
<td>18/16/13 (according to ISO 4406)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Ambient: -50 to 90°C [-58 to 194°F]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Ambient: -40 to 90°C [-40 to 194°F]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. T-port pressure static / intermittent</td>
<td></td>
<td>25 / 40 bar [365 / 580 psi]</td>
<td></td>
</tr>
</tbody>
</table>

### LED Characteristic

<table>
<thead>
<tr>
<th>Color</th>
<th>LED Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green constant</td>
<td><img src="image" alt="LED Green" /></td>
<td>No error – Actuating</td>
</tr>
<tr>
<td>Green flashing @ 1.5 Hz</td>
<td><img src="image" alt="LED Green" /></td>
<td>Neutral – Power save</td>
</tr>
<tr>
<td>Red constant</td>
<td><img src="image" alt="LED Red" /></td>
<td>Internal error</td>
</tr>
<tr>
<td>Red flashing @ 1.5 Hz</td>
<td><img src="image" alt="LED Red" /></td>
<td>External or Float error</td>
</tr>
<tr>
<td>Yellow</td>
<td><img src="image" alt="LED Yellow" /></td>
<td>Disable mode</td>
</tr>
</tbody>
</table>
PVE Variant Overview

**PVE for PVG 128/256 Reaction Times**

![Graph showing reaction times](image)

<table>
<thead>
<tr>
<th>Reaction Description</th>
<th>PVG 128/256 Reaction Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 – Boot up</td>
<td>80</td>
</tr>
<tr>
<td>T1 – Neutral to maximum spool stroke @ Power ON</td>
<td>400</td>
</tr>
<tr>
<td>T2 – Maximum spool stroke to neutral @ Power OFF</td>
<td>300</td>
</tr>
<tr>
<td>T1 – Neutral to maximum spool stroke @ Constant Udc</td>
<td>380</td>
</tr>
<tr>
<td>T2 – Maximum spool stroke to neutral @ Constant Udc</td>
<td>270</td>
</tr>
<tr>
<td>T0 + Deadband</td>
<td>130</td>
</tr>
</tbody>
</table>

For more information on reaction times, see *Reaction Times*.

**PVEH Hysteresis and Ripple**

*Spool position vs. supply (%)*

![Graph showing hysteresis and ripple](image)

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>PVEH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysteresis (h)</td>
<td>Rated [%]</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Steady state ripple @ fixed Us (v)</td>
<td>Rated [mm]</td>
<td>0.0</td>
</tr>
</tbody>
</table>
PVE Variant Overview

*pveh variants for pvg*

PVG 128/256 variants

<table>
<thead>
<tr>
<th>Part number</th>
<th>Type</th>
<th>Connector</th>
<th>IP</th>
<th>Fault monitoring</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>11186325</td>
<td>PVEH</td>
<td>1x4 DEU</td>
<td>67</td>
<td>Passive</td>
<td>Standard</td>
</tr>
<tr>
<td>11186326</td>
<td>PVEH</td>
<td>1x4 DEU</td>
<td>67</td>
<td>Active</td>
<td>Standard</td>
</tr>
<tr>
<td>11186321</td>
<td>PVEH</td>
<td>1x4 DIN</td>
<td>65</td>
<td>Passive</td>
<td>Standard</td>
</tr>
<tr>
<td>11186322</td>
<td>PVEH</td>
<td>1x4 DIN</td>
<td>65</td>
<td>Active</td>
<td>Standard</td>
</tr>
</tbody>
</table>
Connector Overview

**PVEO 4-pin Connector**

<table>
<thead>
<tr>
<th>Pinout</th>
<th>Pin 1</th>
<th>Pin 2</th>
<th>Pin 3</th>
<th>Pin 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x4 DEUTSCH</td>
<td>UDC_A</td>
<td>GND</td>
<td>GND</td>
<td>UDC_B</td>
</tr>
<tr>
<td>1x4 DIN</td>
<td>UDC_A</td>
<td>UDC_B</td>
<td>-</td>
<td>GND</td>
</tr>
</tbody>
</table>

**PVEH/PVEH-U**

<table>
<thead>
<tr>
<th>Pinout</th>
<th>Pin 1</th>
<th>Pin 2</th>
<th>Pin 3</th>
<th>Pin 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x4 DEUTSCH</td>
<td>U_S</td>
<td>Error</td>
<td>GND</td>
<td>UDC</td>
</tr>
<tr>
<td>1x4 DIN</td>
<td>UDC</td>
<td>U_S</td>
<td>Error</td>
<td>GND</td>
</tr>
</tbody>
</table>

**PVEH-FLA 6-pin Connector**

<table>
<thead>
<tr>
<th>Pinout</th>
<th>Pin 1</th>
<th>Pin 2</th>
<th>Pin 3</th>
<th>Pin 4</th>
<th>Pin 5</th>
<th>Pin 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x6 DEUTSCH</td>
<td>U_S</td>
<td>Error</td>
<td>Float</td>
<td>-</td>
<td>GND</td>
<td>UDC</td>
</tr>
</tbody>
</table>

Connector diagrams

- 1x4 DEUTSCH
- 1x6 DEUTSCH
- 1x4 DIN
Fault Monitoring and Reaction

All proportional control PVG 128/256 actuators feature:
- Integrated fault monitoring
- Detecting spool stroke inconsistencies
- Detecting internal hardware defects
- Detecting demand signal inconsistencies
- Fault reaction depending on the type of fault monitoring
  - Generic
  - Specific

Passive and active fault monitoring refers to whether or not the actuator is reacting on the error when it is detected.

Active fault monitoring

No matter what kind of error is detected, the solenoid valves will be disabled and the operation that the valves/spool controls will stop immediately and spool will go to neutral position. Active fault monitoring keeps a “memory” of the error, even if it is no longer registered. The active fault monitoring does not have Auto Recovery because of this “memory” and a reboot/restart will therefore be required to reactivate the solenoid valves.

With an active fault monitoring the following scenarios will take place when an error is detected/occurs:
- The LED light will switch from green to red and the error pin output will go high
- The solenoid valves will be disabled and the operation that the valves/spool controls will stop immediately
- The active fault monitoring does not have Auto Recovery, so when the error is fixed/no longer is registered a reboot/restart of the PVE is required to reactivate it.

Passive fault monitoring

Passive fault monitoring does not disable the solenoid valves when an error is detected. It will continue to operate despite that an error was detected. When the error no longer is registered the passive fault monitoring will “forget” the error and continue as if the error was never there.

With a passive fault monitoring the following conditions will happen when an error is detected/occurs:
- The LED light will switch from green to red and the error pin output will go high
- The solenoid valves will continue operating at the set point given at the time of the error
  - Only exception is if the error is caused by the supply voltage (U_{DC}) being either above or below the allowed range or if the temperature measured on the internal electronics board is higher than allowed. In these cases, the solenoid valves will be disabled.

Generic Fault Reaction

All PVE actuators with fault monitoring are triggered by the following main events:

| Control Signal Monitoring | The Control signal voltage (U_S) is continuously monitored. The permissible range is between 15% and 85% of the supply voltage (U_{DC}). Outside this range the PVE will switch into an error state. A disconnected U_S pin (floating) is recognized as a neutral set point. |
| Transducer/LVDT Supervision | The internal LVDT wires are monitored. If the signals are interrupted or short-circuited, the PVE will switch into an error state. |
| Supervision of Spool Position | The actual position must always correspond to the demanded position (U_J). If the actual spool position is further out from neutral than the demanded spool position or in opposite direction, the PVE will switch into an error state. Spool position closer to neutral and in same direction will not cause an error state – the situation is considered in control. |
## Fault Monitoring and Reaction

<table>
<thead>
<tr>
<th>Float Position Monitoring</th>
<th>Float position must be entered or left within a time limit. A too high delay on the 1x6 pin float PVE will cause an error state – this is relevant for the 1x6 pin PVEH-F actuators only.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Monitoring</td>
<td>When the temperature is too high the PVE LED will light constant red and solenoid valves will be disabled.</td>
</tr>
</tbody>
</table>

### PVEH Fault Reaction Overview

<table>
<thead>
<tr>
<th>Description</th>
<th>Monitoring</th>
<th>LED</th>
<th>Solenoid valves</th>
<th>Error pin output</th>
<th>Fault reaction time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spool not at setpoint</td>
<td>Active*</td>
<td></td>
<td>Enabled</td>
<td>High</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td></td>
<td>Disabled</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Unable to reach float position</td>
<td>Active*</td>
<td></td>
<td>Disabled</td>
<td>High</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td></td>
<td>-</td>
<td>High</td>
<td>1000</td>
</tr>
<tr>
<td>U dc &gt; max.</td>
<td>Active</td>
<td></td>
<td>Disabled</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>U dc &lt; min.</td>
<td>Active</td>
<td></td>
<td>Disabled</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Us out of range</td>
<td>Active*</td>
<td></td>
<td>Disabled</td>
<td>High</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td></td>
<td>-</td>
<td>High</td>
<td>250</td>
</tr>
<tr>
<td>LVDT error</td>
<td>Active*</td>
<td></td>
<td>Disabled</td>
<td>High</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td></td>
<td>-</td>
<td>High</td>
<td>250</td>
</tr>
<tr>
<td>Temp &gt; max.</td>
<td>Active*</td>
<td></td>
<td>Disabled</td>
<td>High</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td></td>
<td>-</td>
<td>High</td>
<td>250</td>
</tr>
</tbody>
</table>

* Does not have Auto Recovery

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Functionality Overview

**Standard and Fixed US 0-10 Vdc**

All standard proportional actuator variants PVEH can be controlled by an analog signal voltage (Us) or a PWM controlled signal voltage (Us) proportional to the supply voltage (Udc).

### PVEO

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage (Udc)</td>
<td>Rated</td>
<td>12 Vdc, 24 Vdc</td>
</tr>
<tr>
<td>Range</td>
<td>11 to 15 Vdc, 22 to 30 Vdc</td>
<td></td>
</tr>
<tr>
<td>Max. ripple</td>
<td></td>
<td>5%</td>
</tr>
</tbody>
</table>

### PVEH

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage (Udc)</td>
<td>Rated</td>
<td>11 to 32 Vdc</td>
</tr>
<tr>
<td>Range</td>
<td>11 to 32 Vdc</td>
<td></td>
</tr>
<tr>
<td>Max. ripple</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Signal voltage (Us)</td>
<td>Neutral</td>
<td>Us = 0.5 ∙ Udc</td>
</tr>
<tr>
<td></td>
<td>Q: P to A</td>
<td>US = (0.5 to 0.25) ∙ Udc</td>
</tr>
<tr>
<td></td>
<td>Q: P to B</td>
<td>US = (0.5 to 0.75) ∙ Udc</td>
</tr>
</tbody>
</table>

The PVEH-U variants are controlled by a fixed 0-10 Vdc signal voltage (Us), directly compatible with standard PLC control.

### PVEH-U

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage (Udc)</td>
<td>Rated</td>
<td>11 to 32 Vdc</td>
</tr>
<tr>
<td>Range</td>
<td>11 to 32 Vdc</td>
<td></td>
</tr>
<tr>
<td>Max. ripple</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Signal voltage (Us)</td>
<td>Neutral</td>
<td>Us = 5 V</td>
</tr>
<tr>
<td></td>
<td>Q: P to A</td>
<td>5 V to 2.5 V</td>
</tr>
<tr>
<td></td>
<td>Q: P to B</td>
<td>5 V to 7.5 V</td>
</tr>
</tbody>
</table>

### PWM Voltage Control

The PVEH actuator variants can be controlled by a PWM controlled signal voltage (Us) proportional to the supply voltage (Udc).

The $V_1$ and $V_2$ must be symmetrical around $Udc/2$ and $V_1$ must be equal to or less than $Udc$. 

![PWM Voltage Control Diagram](image-url)
### Functionality Overview

#### PVEH Control specification

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (Udc)</td>
<td>Rated</td>
<td>11 to 32 Vdc</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>11 to 32 Vdc</td>
</tr>
<tr>
<td></td>
<td>Max. ripple</td>
<td>5%</td>
</tr>
<tr>
<td>Signal Voltage PWM (Us)</td>
<td>Neutral</td>
<td>Us = 50% DUT</td>
</tr>
<tr>
<td></td>
<td>Q: P to A</td>
<td>Us = 50% to 25% DUT</td>
</tr>
<tr>
<td></td>
<td>Q: P to B</td>
<td>Us = 50% to 75% DUT</td>
</tr>
<tr>
<td>PWM Frequency (Us)</td>
<td>Recommended</td>
<td>&gt; 1000 Hz</td>
</tr>
</tbody>
</table>

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Functionality Overview

Float A-Port (-FLA)

The Float A-Port functionality enables the proportional PVEH-FLA actuator variants to enter the main spool into a float position. The PVE actuators with Float A-Port functionality is compatible with the dedicated main spools with electronic float in A-port.

<table>
<thead>
<tr>
<th>PVE Type</th>
<th>PVBS Type</th>
<th>Standard Flow Control</th>
<th>Float Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVEH-FLA (1x6 pin)</td>
<td>Deadband 1.7 mm</td>
<td>$U_s = (0.25 \rightarrow 0.75) \cdot U_{dc}$</td>
<td>$U_{dc}$ to dedicated float pin</td>
</tr>
<tr>
<td></td>
<td>Max. B-port flow 8.0 mm</td>
<td></td>
<td>(UF)</td>
</tr>
</tbody>
</table>

PVE Power Save

All proportional actuator variants feature a Power Save mode, de-energizing the solenoid valve bridge. The Power Save mode is entered when the signal voltage ($U_s$) and the LVDT spool position has been in neutral for 750 ms. As soon as the signal voltage ($U_s$) or the LVDT spool position is out of neutral the PVE will leave its Power Save mode and re-energize the solenoid valve bridge as usual.

The Power Save mode results in increased power efficiency by reducing the current consumption of the PVE actuators in neutral position. The Power Save mode has no effect on the performance of the PVE actuator.
Special Features

Dedicated Float Pin (UF)

The Dedicated Float Pin (UF) feature is related to the PVEH-FLA actuator variant enabling the user to move the main spool into its float position by power. The PVEH-FLA uses 1x6 pin AMP or DEUTSCH connectors.

- Normal operation: Low or not connected
- High Float
- Input range: $U_{DC}$
- Max. voltage: 32 $V_{DC}$

PVEH-FLA functionality diagram

Disable Mode

The PVEH-U actuator variants controlled by a fixed 0-10 $V_{DC}$ signal voltage ($U_s$), feature the ability to enter a disable mode. This causes the counteracting force on the main spool created by the solenoid valve bridge to deactivate, when using Manual OverRide (MOR).

The disable mode is entered by sending a signal voltage ($U_s$) of 16.2% of 10 $V_{DC}$ when in Power Save.
Performance Overview

PVG 128/256 Reaction Times

<table>
<thead>
<tr>
<th>Reaction</th>
<th>PVG128</th>
<th>PVG 256</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 – Boot-up [ms]</td>
<td>375 ms</td>
<td>375 ms</td>
</tr>
<tr>
<td>T1 – Neutral to max. spool stroke @ Constant Udc</td>
<td>520 ms</td>
<td>520 ms</td>
</tr>
<tr>
<td>T2 – Max. spool stroke to neutral @ Constant Udc</td>
<td>350 ms</td>
<td>350 ms</td>
</tr>
<tr>
<td>T2 B-port – Maximum spool stroke to neutral @ Constant Udc</td>
<td>600 ms</td>
<td>600 ms</td>
</tr>
</tbody>
</table>

PVEH

<table>
<thead>
<tr>
<th>Reaction</th>
<th>PVG 128</th>
<th>PVG 256</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 – Boot up</td>
<td>80 ms</td>
<td>80 ms</td>
</tr>
<tr>
<td>T1 – Neutral to maximum spool stroke @ Power ON</td>
<td>400 ms</td>
<td>380 ms</td>
</tr>
<tr>
<td>T2 – Maximum spool stroke to neutral @ Power OFF</td>
<td>300 ms</td>
<td>270 ms</td>
</tr>
<tr>
<td>T1 – Neutral to maximum spool stroke @ Constant Udc</td>
<td>320 ms</td>
<td>320 ms</td>
</tr>
<tr>
<td>T2 – Maximum spool stroke to neutral @ Constant Udc</td>
<td>250 ms</td>
<td>250 ms</td>
</tr>
<tr>
<td>T0 + Deadband</td>
<td>130 ms</td>
<td>130 ms</td>
</tr>
</tbody>
</table>
Performance Overview

Hysteresis and Ripple

![Graph showing hysteresis and ripple]

<table>
<thead>
<tr>
<th>Type</th>
<th>Hysteresis (h) Rated (%)</th>
<th>Steady state ripple @ fixed Us (v) Rated [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVEH 256</td>
<td>1.5</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Oil Consumption

<table>
<thead>
<tr>
<th>Type</th>
<th>Neutral</th>
<th>Locked position</th>
<th>Actuating [l/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVEO</td>
<td>0.0</td>
<td>0.0</td>
<td>0.9</td>
</tr>
<tr>
<td>PVEH</td>
<td>0.0</td>
<td>0.0</td>
<td>0.7</td>
</tr>
</tbody>
</table>
The PVG PVGI Interface Plate act as an interface between the PVB 256/128 and PVB 32/16 basic modules which enables you to build a combo valve with PVB 256/128/32/16.

Optional the PVSI End Plate features additional P and T connection to accommodate an additional 600 l/min pump flow.

The PVS end plate variants are based on a generic platform with a selection of additional features, enabling you to tailor the PVSI/PVGI to suit the demands of any hydraulic system. Versions available with LX connection, and P and T connections. PVSI and PVGI are all in cast iron.

The generic PVSI/PVGI End and Interface Plates platform includes the following main variants:
- PVSI with or without LX-connection
- PVSI with P and T connections
- PVSI Interface plate

### Technical data

<table>
<thead>
<tr>
<th></th>
<th>Max. rated pressure</th>
<th>Oil temperature</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-port continuous</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td></td>
<td>350 bar</td>
<td>30 to 60°C</td>
<td>-30 to 60°C</td>
</tr>
<tr>
<td></td>
<td>[5076 psi]</td>
<td>[86 to 140°F]</td>
<td>[-22 to 140°F]</td>
</tr>
<tr>
<td></td>
<td>P-port intermittent</td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>400 bar</td>
<td>-30°C</td>
<td>90°</td>
</tr>
<tr>
<td></td>
<td>[5800 psi]</td>
<td>[-22°C]</td>
<td>[194°F]</td>
</tr>
<tr>
<td></td>
<td>T-port static/dynamic</td>
<td>25/40 bar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25/40 bar</td>
<td>25/40 bar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[363/580 psi]</td>
<td>[363/580 psi]</td>
<td></td>
</tr>
<tr>
<td>Oil viscosity</td>
<td>Operating range</td>
<td>12 to 75 mm²/s</td>
<td>12 to 75 mm²/s</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>4 mm²/s</td>
<td>[65 → 347 SUS]</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>460 mm²/s</td>
<td>[39 SUS]</td>
</tr>
<tr>
<td>Oil contamination</td>
<td>Maximum</td>
<td>23/19/16</td>
<td></td>
</tr>
<tr>
<td>according to ISO 4406</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more information about PVSI/PVGI End and Interface Plates, see:
- **PVSI with or without LX-connection** on page 83
- **PVSI with P and T port connections** on page 84
- **PVGI Interface Plate** on page 85
PVSI/PVGI End and Interface Plates

**PVSI with or without LX-connection**

The PVSI made of Cast Iron work as an End Plate.

The PVSI with LX connection enables another valves LS pressure to be shuttled to the pump when needed.

The LX port treads are with BSP or UNF tread.

![PVSI with or without LX connection](image)

**Dimensions**
- Weight: 7 kg (15.4 lb)

**Technical data**

<table>
<thead>
<tr>
<th></th>
<th>P-port continuous</th>
<th>350 bar</th>
<th>[5076 psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-port intermittent</td>
<td>400 bar</td>
<td></td>
<td>[5800 psi]</td>
</tr>
<tr>
<td>T-port static/dynamic</td>
<td>25/40 bar</td>
<td></td>
<td>[363/580 psi]</td>
</tr>
</tbody>
</table>

**Oil temperature**

- **Recommended**: 30 to 60°C (86 to 140°F)
- **Minimum**: -30°C (-22°F)
- **Maximum**: 90°C (194°F)

**Ambient temperature**

- **Recommended**: -30 to 60°C (-22 to 140°F)

**Oil viscosity**

- **Operating range**: 12 to 75 mm²/s ([65 → 347 SUS])
- **Minimum**: 4 mm²/s [39 SUS]
- **Maximum**: 460 mm²/s 23/19/16

**Oil contamination according to ISO 4406**

- **Maximum**: 23/19/16

**Part numbers for PVSI End Plate with or without LX connection**

<table>
<thead>
<tr>
<th>Part number</th>
<th>LX-port</th>
<th>Mounting feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>11171419</td>
<td></td>
<td>M12</td>
</tr>
<tr>
<td>11179950</td>
<td>G1/4&quot;BSP</td>
<td>M12</td>
</tr>
<tr>
<td>11179949</td>
<td>7/16-20 UNF</td>
<td>M12</td>
</tr>
</tbody>
</table>
PVSI/PVGI End and Interface Plates

PVSI with P and T port connections

The PVSI with P and T port connections enables an additional 600 l/min pump flow to a PVG 128/256 valve.

Metric and SAE flange connections as well as BSP and UNF threaded ports.

Schematic

Technical data

| Max. rated pressure | P-port continuous | 350 bar | [5076 psi] |
| P-port intermittent | 400 bar | [5800 psi] |
| T-port static/dynamic | 25/40 bar | [363/580 psi] |
| Oil temperature | Recommended | 30 to 60°C | [86 to 140°F] |
| Minimum | -30°C | [-22°F] |
| Maximum | 90° | [194°F] |
| Ambient temperature | Recommended | -30 to 60°C | [-22 to 140°F] |
| Oil viscosity | Operating range | 12 to 75 mm²/s | [65 → 347 SUS] |
| Minimum | 4 mm²/s | [39 SUS] |
| Maximum | 460 mm²/s | 23/19/16 |
| Oil contamination according to ISO 4406 | Maximum | 23/19/16 |

Part number | P-port | T-port | Width | Mounting feet |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11171418</td>
<td>Metric Flange 1&quot;</td>
<td>Metric Flange 1-1/4&quot;</td>
<td>37 mm</td>
<td>M12</td>
</tr>
<tr>
<td>11179952</td>
<td>Thread Ports G1&quot; BSP</td>
<td>Thread Ports G1-1/4&quot; BSP</td>
<td>44 mm</td>
<td>M12</td>
</tr>
<tr>
<td>11171421</td>
<td>SAE Flange 1&quot; UNF</td>
<td>SAE Flange 1-1/4&quot; UNF</td>
<td>37 mm</td>
<td>M12</td>
</tr>
<tr>
<td>11171416</td>
<td>Thread Ports 1-5/16 UNF</td>
<td>Thread Ports 1-5/8 UNF</td>
<td>44 mm</td>
<td>M12</td>
</tr>
</tbody>
</table>
PVGI Interface Plate

The PVGI Interface Plate connects the P-, T-, LS- and Pp-channels in PVB 128/256 to the corresponding channels in PVB 32 and/or 16 modules. T0 variant featured for PVB 32 modules equipped with T0.

Schematic

![Schematic](P109184)

Technical data

<table>
<thead>
<tr>
<th>Max. rated pressure</th>
<th>P-port continuous</th>
<th>350 bar [5076 psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-port intermittent</td>
<td>400 bar [5800 psi]</td>
<td></td>
</tr>
<tr>
<td>T-port static/dynamic</td>
<td>25/40 bar [363/580 psi]</td>
<td></td>
</tr>
</tbody>
</table>

Oil temperature

| Recommended               | 30 to 60°C [86 to 140°F] |
| Minimum                   | -30°C [-22°F] |
| Maximum                   | 90° [194°F] |

Ambient temperature

| Recommended               | -30 to 60°C [-22 to 140°F] |

Oil viscosity

| Operating range           | 12 to 75 mm²/s [65 → 347 SUS] |
| Minimum                   | 4 mm²/s [39 SUS] |
| Maximum                   | 460 mm²/s 23/19/16 |

Oil contamination according to ISO 4406

| Maximum                   | 23/19/16 |

Part number

<table>
<thead>
<tr>
<th>Part number</th>
<th>T0</th>
<th>PVGI width</th>
<th>Mounting feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>11171422</td>
<td>No</td>
<td>37 mm</td>
<td>M12</td>
</tr>
<tr>
<td>11171423</td>
<td>Yes</td>
<td>37 mm</td>
<td>M12</td>
</tr>
</tbody>
</table>
Stay Bolts for PVG 128 and 256 consists of 2 different kits:

1. PVAS containing 2 stay bolts – shall be placed in spec sheet under PVAS 1.
2. PVAS containing 3 stay bolts – shall be placed in spec sheet under PVAS 2.

Furthermore, O-rings is a part of the PVAS kits.

The table below shows which 2 PVAS kits required for the specification according to number of PVB 128 and/or PVB 256.

Table 1

<table>
<thead>
<tr>
<th>PVB 256</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>11187672+</td>
<td>11187673+</td>
<td>11187656+</td>
<td>11187675+</td>
<td>11187696+</td>
<td>11187697+</td>
<td>11187689+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11188215</td>
<td>15788003</td>
<td>11188208</td>
<td>15788026</td>
<td>15788028</td>
<td>11188197</td>
<td>15788062</td>
</tr>
<tr>
<td>1</td>
<td>11187320+</td>
<td>11187677+</td>
<td>11187668+</td>
<td>11187658+</td>
<td>11187685+</td>
<td>11187697+</td>
<td>11187690+</td>
<td>11187689+</td>
</tr>
<tr>
<td></td>
<td>11188216</td>
<td>15788022</td>
<td>11188205</td>
<td>15788008</td>
<td>15788008</td>
<td>11188198</td>
<td>15788081</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>11187617+</td>
<td>11187678+</td>
<td>11187682+</td>
<td>11187686+</td>
<td>11187691+</td>
<td>11187704+</td>
<td>11187704+</td>
<td>11187715+</td>
</tr>
<tr>
<td></td>
<td>11188213</td>
<td>15788004</td>
<td>11188206</td>
<td>15788027</td>
<td>11188199</td>
<td>11188195</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11187655+</td>
<td>11187679+</td>
<td>11187683+</td>
<td>11187705+</td>
<td>11187694+</td>
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<td>11187695+</td>
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Ex. For 2 PVB 256 and 1 PVB 128:

PVAS 1 = 11187681
PVAS 2 = 15788024

For PVG 128/256 in combination with PVG 16/32 please see PVAS for Combo.
PVAS

PVAS for Combo

Stay Bolts for PVG 128/256/16/32 consists of 2 different kits:
1. PVAS containing 2 stay bolts - please look in Table 2 and use P/N before + symbol.
2. PVAS containing 3 stay bolts – please look in Table 2 and write down the length in millimeters after the + symbol.

Furthermore, O-rings is a part of the PVAS kits – no additional P/N needed.

Table 2.

<table>
<thead>
<tr>
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<tbody>
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<td>0</td>
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<td>11187320+106</td>
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Table 3.

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Table 3.

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<tr>
<td>456</td>
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<td>504</td>
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</table>

Example

For 2 PVB 256 and 1 PVB 128 and 1 PVB 32 and 2 PVB 16:

PVAS 1 P/N = 11187681 from Table 2.
PVAS

PVAS 2 = 278 mm from Table 2 + 152 mm from Table 3 = 278+152 =430 mm which equals 157B8027 in Table 4.

PVAS Part Number Overview

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<thead>
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PVG Valve Schematics

PVG 128/256 with P- and T-connection end plate
Dimension Overview

Dimension Overview for PVG 128/256

PVEO

PVEH
## Dimension Overview

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# Dimension Overview

## Specifications example

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<th>Function Description</th>
<th>Specification Sheet</th>
<th>Valve Type</th>
<th>PVG 256 Combo</th>
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<td>Marine Crane</td>
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### PVG 128/256 Technical Information

#### Dimension Overview

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<th>C-Port</th>
<th>D-Port</th>
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- Hydrostatic pumps
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- Steering components and systems
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