Shuttle valve type WV and WVC

Product documentation

Operating pressure $p_{\text{max}}$: 700 bar
Flow rate $Q_{\text{max}}$: 125 lpm
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Overview of shuttle valve type WV and WVC

Shuttle valves are a type of check valve. They have two inlets and one outlet. As soon as a pressure signal is present on at least one of the two inlets, an outlet signal is generated. The inlet with the higher pressure is automatically connected to the outlet. The other inlet with lower pressure is blocked by a ball (OR operator).

The shuttle valve type WV is integrated in a T-fitting for pipe connection. The type WVC is a screw-in valve. The shuttle valves can withstand pressures up to 700 bar and have low flow resistances. They can be used for transmitting control pressures or control and operating volumetric flows.

Features and benefits:
- Pressures up to 700 bar
- Insert and housing versions

Intended applications:
- Load sensing systems
- Construction and construction materials machinery
- Cranes and lifting equipment
- Road vehicle
- General mobile hydraulics
## Available versions, main data

### Circuit symbol:

1. Inflow
2. Outflow

### Order coding example:

**WV 10 - S**

### Table 1 Basic type and size

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>( d ) (mm)</th>
<th>Pressure ( p_{\text{max}} ) (bar)</th>
<th>Flow rate ( Q_{\text{max}} ) (lpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WV 6 - S</td>
<td>For pipe connection</td>
<td>6</td>
<td>700</td>
<td>6</td>
</tr>
<tr>
<td>WV 8 - S</td>
<td>S: heavy series</td>
<td>8</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>WV 10 - S</td>
<td>L: light series</td>
<td>10</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>WV 12 - S</td>
<td></td>
<td>12</td>
<td>500</td>
<td>40</td>
</tr>
<tr>
<td>WV 14 - S</td>
<td></td>
<td>14</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>WV 16 - S</td>
<td></td>
<td>16</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>WV 18 - L</td>
<td></td>
<td>18</td>
<td>315</td>
<td>125</td>
</tr>
<tr>
<td>WVVC 1</td>
<td>For screwing in</td>
<td>--</td>
<td>315</td>
<td>6</td>
</tr>
<tr>
<td>WVVC 11</td>
<td>(with PTFE thread seal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WVE 2</td>
<td></td>
<td>--</td>
<td>500</td>
<td>25</td>
</tr>
<tr>
<td>WVH 11</td>
<td></td>
<td>--</td>
<td>700</td>
<td>3</td>
</tr>
</tbody>
</table>

* For alternative locking tapped plug, see Chapter 4.3, "Locking tapped plugs."
3 Parameters

3.1 General data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>Shuttle valve</td>
</tr>
<tr>
<td>Design</td>
<td>Ball seated valve</td>
</tr>
<tr>
<td>Model</td>
<td>Screw-in valve, pipe connection</td>
</tr>
<tr>
<td>Material</td>
<td>Steel; nitrided valve housing, hardened and ground functional inner parts</td>
</tr>
<tr>
<td>Tightening torques</td>
<td>See Chapter 4, &quot;Dimensions&quot;</td>
</tr>
<tr>
<td>Installation position</td>
<td>as desired</td>
</tr>
<tr>
<td>Connections</td>
<td>1- Inflow, 2- Outflow</td>
</tr>
<tr>
<td>Hydraulic fluid</td>
<td>Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 10 to 68 according to DIN 51 519</td>
</tr>
<tr>
<td></td>
<td>Viscosity range: min. approx. 4; max. approx. 1500 mm²/s</td>
</tr>
<tr>
<td></td>
<td>Optimal operation: approx. 3 x $p_{\text{max}}$</td>
</tr>
<tr>
<td>Cleanliness level</td>
<td>ISO 4406 21/18/15...19/17/13</td>
</tr>
<tr>
<td>Temperatures</td>
<td>Ambient: approx. -40 ... +80°C, Fluid: -25 ... +80°C, Note the viscosity range!</td>
</tr>
<tr>
<td></td>
<td>Permissible temperature during start: -40°C (observe start-viscosity), as long as the service</td>
</tr>
<tr>
<td></td>
<td>temperature is at least 20K higher for the following operation.</td>
</tr>
<tr>
<td></td>
<td>Biologically degradable pressure fluids: Observe manufacturer's specifications. By considera-</td>
</tr>
<tr>
<td></td>
<td>tion of the compatibility with seal material not over +70°C.</td>
</tr>
<tr>
<td>Static overload capacity</td>
<td>&gt; 2 x $p_{\text{max}}$</td>
</tr>
<tr>
<td></td>
<td>Burst pressure: approx. 3 x $p_{\text{max}}$</td>
</tr>
<tr>
<td>Flow rate</td>
<td>According to type and size</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>According to type and size</td>
</tr>
<tr>
<td></td>
<td>WVE 2 - AT: $p_{\text{max}} = 400$ bar</td>
</tr>
</tbody>
</table>
Characteristic curves

Oil viscosity approx. 60 mm²/s

\[ \Delta p - Q \] characteristics

**WV 6-S to WV 16-S, WV 18-L**

**WVC 1, WVC 11**

**WVE 2**

**WVH 11**

Q flow rate (lpm); Δp flow resistance (bar)
## Weight

<table>
<thead>
<tr>
<th>Basic version</th>
<th>Type</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WV 6-S</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>WV 8-S</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>WV 10-S</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>WV 12-S</td>
<td>290</td>
</tr>
<tr>
<td></td>
<td>WV 14-S</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td>WV 16-S</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td>WV 18-L</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>WVC 1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>WHH 11</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>WVE 2</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>WVE 11</td>
<td>20</td>
</tr>
</tbody>
</table>
4 Dimensions

All dimensions in mm, subject to change.

4.1 Insert valves

WV 6-S to WV 16-S, WV 18-L

<table>
<thead>
<tr>
<th>Type</th>
<th>L</th>
<th>h</th>
<th>Ød</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>WV 6 - S</td>
<td>62</td>
<td>31</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>WV 8 - S</td>
<td>64</td>
<td>32</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>WV 10 - S</td>
<td>68</td>
<td>34</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>WV 12 - S</td>
<td>76</td>
<td>38</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>WV 14 - S</td>
<td>80</td>
<td>40</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>WV 16 - S</td>
<td>86</td>
<td>43</td>
<td>16</td>
<td>30</td>
</tr>
<tr>
<td>WV 18 - L</td>
<td>80</td>
<td>40</td>
<td>18</td>
<td>32</td>
</tr>
</tbody>
</table>
4.2 Screw-in valves

**Mounting hole**

1. Reamed depth
2. Milling cutter width

**WVC 1**

**WVC 11**

1. Reamed depth
2. Reamer lead

**WVE 2**

**WVH 11**

1. Reamed depth 6.3
2. Reamer lead
4.3 Locking tapped plugs

WVE 2-A

1

2

1.5 mm

19 mm

25 mm

22 mm

WVE 2-B

1

2

1.5 mm

19 mm

25 mm

22 mm

Mounting hole

1. Reamed depth
2. Milling cutter width
5 Assembly, operation and maintenance recommendations

5.1 Intended use

This valve is intended exclusively for hydraulic applications (fluid technology).

The user must observe the safety measures and warnings in this documentation.

Essential requirements for the product to function correctly and safely:
- All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- The product must only be assembled and put into operation by qualified personnel.
- The product must only be operated within the specified technical parameters. The technical parameters are described in detail in this documentation.
- The operating and maintenance manual of the components, assemblies and the specific complete system must also always be observed.

If the product can no longer be operated safely:
1. Remove the product from operation and mark it accordingly.
✓ It is then not permitted to continue using or operating the product.

5.2 Assembly information

The product must only be installed in the complete system with standard and compliant connection components (fitting, hoses, pipes, fixtures, etc.).

The product must be shut down correctly prior to dismounting (in particular in combination with hydraulic accumulators).

 Danger
Risk to life caused by sudden movement of the hydraulic drives when dismantled incorrectly!
- Risk of serious injury or death.
- Depressurise the hydraulic system.
- Perform safety measures in preparation for maintenance.

 Note
WVE 11: Ensure that the sealing rings do not shear off!
- Grease the threaded hole before assembly.
- Assembly speed ≤ 60 rpm.
- Carefully remove PTFE chips.

5.2.1 Creating the mounting hole

See description in Chapter 4, "Dimensions".
5.3 Operating instructions

Note product configuration and pressure / flow rate

The statements and technical parameters in this documentation must be strictly observed. The instructions for the complete technical system must also always be followed.

**Note**

- Read the documentation carefully before usage.
- The documentation must be accessible to the operating and maintenance staff at all times.
- Keep documentation up to date after every addition or update.

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the hydraulic component. Contamination can cause irreparable damage.

**Examples of fine contamination include:**

- Metal chips
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

**Note**

Fresh hydraulic fluid from the drum does not always have the highest degree of purity. Under some circumstances the fresh hydraulic fluid must be filtered before use.

To ensure smooth operation, pay attention to the cleanliness level of the hydraulic fluid. (also see cleanliness level in Chapter 3, "Parameters")

Other applicable document: D 5488/1 Oil recommendations

5.4 Maintenance information

Conduct a visual inspection at regular intervals, but at least once per year, to check if the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the device surface of dust deposits and dirt at regular intervals, but at least once per year.
6 Other information

Application examples

Mixed remote control of a proportional directional spool valve
(e.g. type PSL and PSV according to D7700 et seqq.) using pressure reducing valves type FB and KFB according to D 6600-01
Further information

Further versions

- Line rupture protection valves, type LB: D 6990
- Check valve type CRK, CRB and CRH: D 7712
- Check valve type RK and RB: D 7445
- Check valves, type RC: D 6969 R
- Check valve type RE: D 7555 R