2/2-way Directional Control Valves
VDH
For inline mounting and Cetop 3 flange mounting (ISO 4401)

Directional valves are used to control water flow direction. The valves are designed for tap water, i.e. without additives (EU-Directive 98/83/EC).

**Application**

**Function**

The directional valves are pilot operated On/Off 2/2-way seat valves electrically activated by 1 coil.

**Advantages**

- Corrosion resistant surfaces
- Easy to clean surfaces
- The seat valve design ensures zero leakage
- High degree of protection, IP 67
- Cetop valve installable on all cetop 3 blocks

The valve housing comes in standard version in stainless steel AISI 304 (W. nr. 1.4301). The valve is available as a normally closed valve (NC) or as a normally open valve (NO). On request the valve housing is obtainable in stainless steel AISI 316 L (W. nr. 1.4401), please contact the Danfoss Sales Organization for Water Hydraulics.

The water supplied to the valve must be filtered: 10 µm absolute, β10-value > 5000 filter is recommended. For further information on filters, please contact the Danfoss sales department for water hydraulics.
1. Introduction

The VDH directional control valves are designed for applications with tap water, i.e. without additives (EU-Directive 98/83/EC).

The directional valves are used to control water flow direction.

Function

The directional valves are pilot operated On/Off 2/2-way seat valves electrically activated by 1 coil.

Features

• Corrosion resistant surfaces
• Easy to clean surfaces
• The seat valve design ensures zero leakage
• High degree of protection, IP 67
• Cetop valve installable on all cetop 3 blocks

Filtration

The water supplied to the valve must be filtered: 10 µm absolute, β₁₀-value > 5000 filter is recommended.

For further information on filters, please contact the Danfoss sales department for High Pressure Pumps.

2. VDH valve selection overview

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Straight flow direction</td>
</tr>
<tr>
<td>EC</td>
<td>Cetop manifold</td>
</tr>
</tbody>
</table>

Temperature

Operation on (clean) water:
Fluid temperature and ambient temperature: 3 °C – 50 °C.

Operation on water containing antifreeze:
Fluid temperature and ambient temperature: -30 ºC – 50 ºC.

Storage temperature:
-40 ºC – 70 ºC provided that the valve is drained of fluid and stored "plugged".

Antifreeze protection1)

If a system requires antifreeze protection, Danfoss recommends Dowcall N or Chillsafe mono propylene glycol from the Dow Chemical Company and Arco Chemical Company, respectively. Both antifreezes are biologically degradable and must be used together with demineralized water. Mixing ratio must be:
• Min. 30% antifreeze and 70% demineralize water providing frost protection to -13 ºC and preventing biofilm in the system.
• Max. 50% antifreeze and 50% demineralize water due to increased viscosity, providin frost protection to -30 ºC.

Versions

Inline versions:
• VDH 30 E 2/2
• VDH 60E 2/2
• VDH 120 E 2/2

Cetop 3 block version:
• VDH 30 EC 2/2

The valve housing comes in standard version in stainless steel AISI 304 (W.no. 1.4301).
The valve is available as a normally closed valve (NC) or as a normally open valve (NO).

On request the valve housing is obtainable in stainless stel AISI 316L (W.no. 1.4401), please contact the Danfoss Sales Organization for High Pressure Pumps.
### 3. Code numbers and technical data

#### 2/2-way directional control valves, type VDH 30 E

Pressure loss at max. flow: 6 barg (87 psig)
Max. opening/closing time: 150 ms/350 ms
Leakage at pressure higher than 10 barg (145 psig): 0 ml/min (0 GPM) drip proof
Degree of protection: IP 67

<table>
<thead>
<tr>
<th>Type</th>
<th>Function symbol</th>
<th>Code number</th>
<th>Connection</th>
<th>Max. inlet pressure cont. barg (psig)</th>
<th>Max. inlet pressure peak barg (psig)</th>
<th>Operation pressure 1) barg (psig)</th>
<th>Max. flow l/min (GPM)</th>
<th>Min. flow l/min (GPM)</th>
<th>Weight incl. coil kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDH 30 E 2/2 NC</td>
<td>180L0002</td>
<td>G 3/8&quot;</td>
<td>140 (2.030)</td>
<td>200 (2,900)</td>
<td>3.5 (50.7)</td>
<td>30 (7.9)</td>
<td>1 (0.3)</td>
<td>1.6 (3.8)</td>
<td></td>
</tr>
<tr>
<td>VDH 30 E 2/2 NO</td>
<td>180L0003</td>
<td>G 1/8&quot;</td>
<td>140 (2.030)</td>
<td>170 (2,465)</td>
<td>3.5 (50.7)</td>
<td>30 (7.9)</td>
<td>1 (0.3)</td>
<td>1.6 (3.8)</td>
<td></td>
</tr>
</tbody>
</table>

1) The pressure in port P must always be higher than the pressure in port A (Pp>Pa)

#### 2/2-way directional control valves, type VDH 30 EC

Pressure loss at max. flow: 7 barg (101.5 psig)
Max. opening/closing time: 150 ms/350 ms
Leakage at pressure higher than 10 barg (145 psig): 0 ml/min (0 GPM) drip proof
Degree of protection: IP 67

<table>
<thead>
<tr>
<th>Type</th>
<th>Function symbol</th>
<th>Code number</th>
<th>Connection</th>
<th>Max. inlet pressure cont. barg (psig)</th>
<th>Max. inlet pressure peak barg (psig)</th>
<th>Operation pressure 1) barg (psig)</th>
<th>Max. flow l/min (GPM)</th>
<th>Min. flow l/min (GPM)</th>
<th>Weight incl. coil kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDH 30 EC 2/2 NC</td>
<td>180L0048</td>
<td>Cetop 3</td>
<td>140 (2.030)</td>
<td>200 (2,900)</td>
<td>3.5 (50.7)</td>
<td>30 (7.9)</td>
<td>1 (0.3)</td>
<td>1.2 (2.1)</td>
<td></td>
</tr>
<tr>
<td>VDH 30 EC 2/2 NO</td>
<td>180L0049</td>
<td>Cetop 3</td>
<td>140 (2.030)</td>
<td>170 (2,465)</td>
<td>3.5 (50.7)</td>
<td>30 (7.9)</td>
<td>1 (0.3)</td>
<td>1.2 (2.1)</td>
<td></td>
</tr>
</tbody>
</table>

1) The pressure in port P must always be higher than the pressure in port A (Pp>Pa)
VDH 30EC 2/2-way valves are supplied with screws and O-rings.

#### 2/2-way directional control valves, type VDH 60 E

Pressure loss at max. flow: 8 barg (116 psig)
Max. opening/closing time: 150 ms/350 ms
Leakage at pressure higher than 10 barg (145 psig): 0 ml/min (0 GPM) drip proof
Degree of protection: IP 67

<table>
<thead>
<tr>
<th>Type</th>
<th>Function symbol</th>
<th>Code number</th>
<th>Connection</th>
<th>Max. inlet pressure cont. barg (psig)</th>
<th>Max. inlet pressure peak barg (psig)</th>
<th>Operation pressure 1) barg (psig)</th>
<th>Max. flow l/min (GPM)</th>
<th>Min. flow l/min (GPM)</th>
<th>Weight incl. coil kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDH 60 E 2/2 NC</td>
<td>180L0011</td>
<td>G ½&quot;</td>
<td>140 (2.030)</td>
<td>200 (2,900)</td>
<td>3.5 (50.7)</td>
<td>60 (15.8)</td>
<td>1 (0.3)</td>
<td>1.6 (3.8)</td>
<td></td>
</tr>
<tr>
<td>VDH 60 E 2/2 NO</td>
<td>180L0015</td>
<td>G ½&quot;</td>
<td>140 (2.030)</td>
<td>170 (2,465)</td>
<td>3.5 (50.7)</td>
<td>60 (15.8)</td>
<td>1 (0.3)</td>
<td>1.6 (3.8)</td>
<td></td>
</tr>
</tbody>
</table>

1) The pressure in port P must always be higher than the pressure in port A (Pp>Pa)
### 2/2-way directional control valves, type VDH 120 E

Pressure loss at max. flow: 6 barg (87 psig)
Max. opening/closing time: 150 ms/400 ms
Leakage at pressure higher than 10 barg (145 psig): 0 ml/min (0 GPM) drip proof
Degree of protection: IP 67

<table>
<thead>
<tr>
<th>Type</th>
<th>Function symbol</th>
<th>Code number</th>
<th>Connection</th>
<th>Max. inlet pressure cont. barg (psig)</th>
<th>Max. inlet pressure peak barg (psig)</th>
<th>Operation pressure 1) barg (psig)</th>
<th>Max. flow l/min (GPM)</th>
<th>Min. flow l/min (GPM)</th>
<th>Weight incl. coil kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDH 120 E 2/2 NC</td>
<td>![Image]</td>
<td>180L0001</td>
<td>G ½”</td>
<td>140 (2.030)</td>
<td>200 (2.900)</td>
<td>1 (14.5)</td>
<td>120 (31.6)</td>
<td>5 (1.5)</td>
<td>1.8 (3.9)</td>
</tr>
<tr>
<td>VDH 120 E 2/2 NO</td>
<td>![Image]</td>
<td>180L0005</td>
<td>G ½”</td>
<td>140 (2.030)</td>
<td>170 (2.465)</td>
<td>1 (14.5)</td>
<td>120 (31.6)</td>
<td>5 (1.5)</td>
<td>1.8 (3.9)</td>
</tr>
</tbody>
</table>

1) The pressure in port P must always be higher than the pressure in port A (Pp>Pa)

All valves are supplied without coils which must be ordered separately.

### 3. Code numbers for CETOP block

<table>
<thead>
<tr>
<th>Cetop 3 block</th>
<th>Steel type</th>
<th>Weight kg (lb)</th>
<th>Code number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block for Cetop 2 valves</td>
<td>AISI 304</td>
<td>1.8 (3.9)</td>
<td>180L0062</td>
</tr>
<tr>
<td>Block for Cetop 3 valves</td>
<td>AISI 304</td>
<td>2.6 (5.7)</td>
<td>180L0063</td>
</tr>
<tr>
<td>Block for Cetop 4 valves</td>
<td>AISI 304</td>
<td>3.4 (7.5)</td>
<td>180L0064</td>
</tr>
</tbody>
</table>

### 4. Code numbers for Coils

<table>
<thead>
<tr>
<th>Coil voltage</th>
<th>Code number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil 24V-50Hz-12W-IP 67</td>
<td>018F7920</td>
</tr>
<tr>
<td>Coil 220-230V-50Hz-12W-IP 67</td>
<td>018F7921</td>
</tr>
<tr>
<td>Coil 240V-50Hz-11W-IP 67</td>
<td>018F7924</td>
</tr>
<tr>
<td>Coil 24V-60Hz-14W-IP 67</td>
<td>018F7922</td>
</tr>
<tr>
<td>Coil 220V-60Hz-13W-IP 67</td>
<td>018F7925</td>
</tr>
<tr>
<td>Coil 240V-60Hz-15W-IP 67</td>
<td>018F7926</td>
</tr>
<tr>
<td>Coil 110V-50-60 Hz-15/13W-IP 67</td>
<td>018F7923</td>
</tr>
<tr>
<td>Coil 12V-DC-16W-IP 67</td>
<td>018F7913</td>
</tr>
<tr>
<td>Coil 24V-DC-16W-IP67</td>
<td>018F7914</td>
</tr>
</tbody>
</table>

ATEX - please consult the Danfoss salesorganization for High Pressure Pumps.
5. Pressure losses at different flows

**VDH 30 E 2/2 and VDH 30 EC 2/2**

![Graph showing pressure losses for VDH 30 E 2/2 and VDH 30 EC 2/2](image)

**VDH 60 E 2/2 and VDH 120 E 2/2**

![Graph showing pressure losses for VDH 60 E 2/2 and VDH 120 E 2/2](image)
6. Cross-section of valves

VDH 30 E 2/2 and VDH 60 E 2/2

1. Armature
2. O-ring
3. Orifice
4. Spring
5. Poppet

VDH 120 E 2/2

1. Armature
2. O-ring
3. O-ring
4. Orifice
5. Spring
6. Poppet
VDH 30 E C 2/2 (Cetop)

1. Armature
2. O-ring
3. O-ring
4. Orifice
5. O-ring
6. Plug
7. Spring
8. Poppet
9. O-ring
10. Screw

7. Dimensions

VDH 30 E 2/2 and VDH 60 E 2/2

All dimensions in mm

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDH 30</td>
<td>142</td>
<td>68</td>
<td>101</td>
</tr>
<tr>
<td>VDH 60</td>
<td>142</td>
<td>68</td>
<td>124</td>
</tr>
</tbody>
</table>
VDH 120 E 2/2

All dimensions in mm

VDH 30 EC 2/2 (Cetop)

All dimensions in mm
8. **Mounting of in-line valves**

Inline valves are mounted in line in flow direction (follow the arrow on the valve) and fixed either directly in the pipe connections or with bolts in the fixation holes on the valve.

9. **Mounting of valve on Cetop block**

The valve is designed to be mounted on a block with CETOP 3-port connection. Four stainless steel screws and four O-rings are supplied with the valve for mounting. Remember to smear/spray the threads on the screws with Molykote® D paste from Dow Corning, or Klüber UH1 84-201 from Klüber lubrication, before mounting the valve.

10. **Mounting of coil on valve**

Coil on valves with short armature tubes (NC and NO valves)

1. Place the o-ring on the armature tube.
2. The coil is clicked on by means of a light pressure by hand – without using tools.
11. Dismounting of coil

![](image)

12. Accessories
Code numbers

<table>
<thead>
<tr>
<th>Spare parts</th>
<th>Code number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poppet kit for VDH 30E 2/2, VDH 30 EC2/2 and 2/2 VDH 60E 2/2</td>
<td>180L5005</td>
</tr>
<tr>
<td>Poppet kit for VDH120E 2/2 (pos. 6)</td>
<td>180L5001</td>
</tr>
<tr>
<td>Armature kit, NC (pos. 1)</td>
<td>180L5002</td>
</tr>
<tr>
<td>Armature kit, NO (pos. 1)</td>
<td>180L5010</td>
</tr>
<tr>
<td>Orifice kit VDH 30 E 2/2</td>
<td>180Z0099</td>
</tr>
<tr>
<td>Orifice kit VDH 60 E 2/2</td>
<td>180Z0099</td>
</tr>
<tr>
<td>Orifice kit VDH 120 E 2/2</td>
<td>180Z0098</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tools</th>
<th>Application</th>
<th>Code number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special tool for orifice insert</td>
<td>Mounting/dismounting of orifice insert</td>
<td>180Z0034</td>
</tr>
<tr>
<td></td>
<td>Orifice insert in valve housing: 12 Nm ± 2 Nm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Armature to be screwed into the valve housing: 60 Nm ± 2 Nm</td>
<td></td>
</tr>
<tr>
<td>Spool tool included in 180L5005</td>
<td>Mounting of spool</td>
<td></td>
</tr>
<tr>
<td>Permanent magnet</td>
<td>For manual activation of valve</td>
<td>180Z0212</td>
</tr>
</tbody>
</table>

For further details on coils, please see data sheet S21B0980