Hydraulic operated directional valves
ISO 4401 size 06, 10, 16, 25 and 32

Hydraulic operated directional valves are spool type, three or four way, two or three position, designed to operate in oil hydraulic systems. Available with single or double hydraulic actuator.

Valve sizes and max flow:
- **DH-0** = size 06, flow up to 50 l/min
- **DK-1** = size 10, flow up to 160 l/min
- **DP-1** = size 10, flow up to 160 l/min
- **DP-2** = size 16, flow up to 300 l/min
- **DP-4** = size 25, flow up to 700 l/min
- **DP-6** = size 32, flow up to 1000 l/min

Max pressure:
- 350 bar for DH-0, DP-1, DP-2, DP-4, DP-6
- 315 bar for DK-1

Table E225-2/E

<table>
<thead>
<tr>
<th>Model Code</th>
<th>DH-0</th>
<th>DK-1</th>
<th>DP-1</th>
<th>DP-2</th>
<th>DP-4</th>
<th>DP-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spool type, see section 3</td>
<td><strong>3</strong></td>
<td><strong>1</strong></td>
<td><strong>A</strong></td>
<td><strong>2</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

Seals material:
- **NBR**
- **FKM**
- **HNBR** (only for DP)

Options:
- **A** = actuator device mounted on side of port B
- **H** = adjustable chokes for controlling the main spool shifting time (meter-out to the pilot chambers of the main valve)
- **H9** = adjustable chokes for controlling the main spool shifting time (meter-in to the pilot chambers of the main valve)
- **R** = with check valve on port P (not available for DP-1*)
- **S** = main spool stroke adjustment (not available for DP-1*)

Spool type, see section 4

Table 1: Model Code

<table>
<thead>
<tr>
<th>DH-0</th>
<th>4</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spool type, see section 3</td>
<td><strong>3</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

- **0** = free, without springs
- **1** = spring centered, without detent
- **2** = spring offset external position
- **5** = 2 external positions, with detent (only for DH and DK)
- **7** = center and external positions

Table 2: Hydraulic Characteristics

<table>
<thead>
<tr>
<th>Valve model</th>
<th>DH-0</th>
<th>DK-1</th>
<th>DP-1</th>
<th>DP-2</th>
<th>DP-4</th>
<th>DP-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max recommended flow [l/min]</td>
<td>50</td>
<td>160</td>
<td>160</td>
<td>300</td>
<td>700</td>
<td>1000</td>
</tr>
<tr>
<td>Max pressure on port P, A, B [bar]</td>
<td>350</td>
<td>315</td>
<td>350</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max pressure on port T (also X, Y for DP) [bar]</td>
<td>see note (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum pilot pressure [bar]</td>
<td>3 (min)</td>
<td>5 (suggested)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max recommended pressure on piloting line [bar]</td>
<td>70</td>
<td>250</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) The max pressure on port T has to be not over 50% of pilot pressure
3 MAIN CHARACTERISTICS, SEALS AND FLUIDS - for other fluids not included in below table, consult our technical office

Assembly position / location | any position except for valves type DH-050, DK-150, DP-*50 (without springs) that must be installed with their longitudinal axis horizontal
Subplate surface finishing | roughness index Ra 0.4 - flatness ratio 0.01/100 (ISO 1101)
MTTFd values according to EN ISO 13849 | 150 years, for further details see technical table P007
Ambient temperature range | standard execution = -30°C + 70°C; PE option = -20°C + 70°C; BT option = -40°C + 70°C
Seals, recommended fluid temperature | NBR seals (standard) = -20°C + 60°C, with FC hydraulic fluids = -20°C + 50°C
FKM seals (PE option) = -20°C + 80°C
HBR seals (BT option) = -40°C + 60°C, with FC hydraulic fluids = -40°C + 50°C
Recommended viscosity | 15 to 100 mm²/s - max allowed range 2.8 to 500 mm²/s
Fluid contamination class | ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 μm (≥25 ≥75 recommended)

<table>
<thead>
<tr>
<th>Hydraulic fluid</th>
<th>Suitable seals type</th>
<th>Classification</th>
<th>Ref. Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils</td>
<td>NBR, FKM, HNB</td>
<td>HL, HLP, HLPD, HLPV, HLPD</td>
<td>DIN 51524</td>
</tr>
<tr>
<td>Flame resistant without water</td>
<td>FKM</td>
<td>HFDU, HFD</td>
<td>ISO 12922</td>
</tr>
<tr>
<td>Flame resistant with water</td>
<td>NBR, HNB</td>
<td>HFC</td>
<td></td>
</tr>
</tbody>
</table>

4 CONFIGURATIONS and SPOOLS valves type DH-*, DK-*

<table>
<thead>
<tr>
<th>Configurations</th>
<th>Spools</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td><img src="image5" alt="Diagram" /></td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
</tbody>
</table>

NOTES:
- spools type 0 and 3 are also available as 0/1 and 3/1 with restricted oil passages in central position, from user ports to tank.
- spools type 1, 4, 5 and 58 are also available as 1/1, 4/8, 5/1 and 58/1. They are properly shaped to reduce water-hammer shocks during the switching.
- spools type 1, 1/2, 3, 8 are available as 1P, 1/2P, 3P, 8P (only for DH-0) to limit valve internal leakages.

5 CONFIGURATIONS and SPOOLS valves type DP-*

<table>
<thead>
<tr>
<th>Configurations</th>
<th>Spools</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7" alt="Diagram" /></td>
<td><img src="image8" alt="Diagram" /></td>
</tr>
<tr>
<td><img src="image9" alt="Diagram" /></td>
<td><img src="image10" alt="Diagram" /></td>
</tr>
<tr>
<td><img src="image11" alt="Diagram" /></td>
<td><img src="image12" alt="Diagram" /></td>
</tr>
</tbody>
</table>

NOTES (see also section 4.2 for special shaped spools):
- For DP*-1 are available only spools: 0, 0/2, 1, 1/2, 3, 4, 5, 58, 6, 7
- For DP*-6 are available only spools: 0, 1, 1/2, 2, 3, 4, 5, 58, 6, 7, 8, 19, 91

Special shaped spools:
- spools type 0 and 3 are also available as 0/1 and 3/1 with restricted oil passages in central position, from user ports to tank.
- spools type 1, 4, 5, 58, 6 and 7 are also available as 1/1, 4/8, 5/1, 58/1, 6/1 and 7/1 are properly shaped to reduce water-hammer shocks during the switching.
DIMENSIONS OF HYDRAULIC OPERATED VALVES ISO 4401 size 06 and 10 [mm]

ISO 4401: 2005
Mounting surface: 4401-03-02-0-05 (see table P005)
Fastening bolts: 4 socket head screws M5x50 class 12.9
Tightening torque = 8 Nm
Diameter of ports A, B, P, T: Ø = 7.5 mm (max)
Seals: 4 O R 106

Mass: 1.6 Kg

ISO 4401: 2005
Mounting surface: 4401-05-05-0-05 (see table P005) (without X port)
Fastening bolts: 4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Diameter of port Y: Ø = 5 mm
Diameter of ports A, B, P, T: Ø = 11.2 mm (max)
Seals: 5 O R 2050, 1 O R 108

Mass: 3.4 Kg

Mounting subplates: see tab. E010

Note: Line Y must be always present and no counter pressure are allowed on this line.

DIAGRAMS

DH-0
See note and diagrams on table E010 relating the DH* valve from which DH-0* are derivated

DK-1
See note and diagrams on table E025 relating the DK* valve from which DK-1* are derivated

DP-1
See note and diagrams on table E085 relating the DP* valve from which DP-1* are derivated

DP-2
See note and diagrams on table E085 relating the DP* valve from which DP-2* are derivated

DP-4
See note and diagrams on table E085 relating the DP* valve from which DP-4* are derivated

DP-6
See note and diagrams on table E085 relating the DP* valve from which DP-6* are derivated
DP-1
ISO 4401: 2005
Mounting surface: 4401-05-05-0-05
(see table P005)
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Diameter of ports A, B, P, T: Ø = 11
Diameter of ports X, Y: Ø = 5 mm
Seals: 5 OR 2050, 2 OR 108

DP-2
ISO 4401: 2005
Mounting surface: 4401-07-07-0-05
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Diameter of ports A, B, P, T: Ø = 11
Diameter of ports X, Y: Ø = 5 mm
Seals: 5 OR 2050, 2 OR 108

DP-4
ISO 4401: 2005
Mounting surface: 4401-08-08-0-05
Fastening bolts:
6 socket head screws M12x60 class 12.9
Tightening torque = 125 Nm
Diameter of ports A, B, P, T: Ø = 24
Diameter of ports X, Y: Ø = 7 mm
Diameter of port L: Ø = 5 mm
Seals: 4 OR 4112, 2 OR 3056

DP-6
ISO 4401: 2005
Mounting surface: 4401-10-09-0-05
(port L optional)
Fastening bolts:
6 socket head screws M20x80 class 12.9
Tightening torque = 600 Nm
Diameter of ports A, B, P, T: Ø = 34 mm
Diameter of ports X, Y: Ø = 7 mm
Diameter of port L: Ø = 5 mm
Seals: 4 OR 144, 2 OR 3056

Mounting subplates: see tab. K280