Directional spool valves, pilot-operated, with hydraulic or electro-hydraulic actuation

type WEH and WH

Features
- 4/3-, 4/2- or 3/2-way version
- Types of actuation (internal or external pilot control):
  - Electro-hydraulic (type WEH)
  - Hydraulic (type WH)
- For subplate mounting
- Porting pattern according to ISO 4401
- Spring or pressure centering, spring end position or hydraulic end position
- Wet-pin DC or AC solenoids, optional
- Electrical connection as individual or central connection
- Optional versions:
  - Manual override
  - Switching time adjustment
  - Preload valve in channel P of the main valve
  - Stroke setting and/or spool position monitoring

Contents
- Size 10 ... 32
- Component series 4X; 6X; 7X
- Maximum operating pressure 350 bar
- Maximum flow 1100 l/min
- Features 1
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- Technical data 15 ...
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### Ordering code

<table>
<thead>
<tr>
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<th>02</th>
<th>03</th>
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<table>
<thead>
<tr>
<th>01</th>
<th>Up to 280 bar</th>
<th>no code</th>
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<tbody>
<tr>
<td></td>
<td>Up to 350 bar</td>
<td>H –</td>
</tr>
<tr>
<td>02</td>
<td>3-way version</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4-way version</td>
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### Types of actuation

<table>
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| 03 | Electro-hydraulic | WE |
|    | Hydraulic | WH |

### Size

<table>
<thead>
<tr>
<th>04</th>
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<th>06</th>
<th>07</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG10</td>
<td>By means of springs</td>
<td>no code</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydraulic 1)</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>NG16</td>
<td>For symbols, see page 5 and 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NG25 (version &quot;W.H 22&quot;)</td>
<td>Component series 40 ... 49 (40 ... 49: unchanged installation and connection dimension) – NG10</td>
<td>4X</td>
<td></td>
</tr>
<tr>
<td>NG25 (version &quot;W.H 25&quot;)</td>
<td>Component series 60 ... 69 (60 ... 69: unchanged installation and connection dimension) – NG25 (&quot;W.H 25&quot;) and NG32</td>
<td>6X</td>
<td></td>
</tr>
<tr>
<td>NG32</td>
<td>Component series 70...79 (70...79: unchanged installation and connection dimensions) – NG16 (from series 72) and NG25 (&quot;W.H 22&quot;)</td>
<td>7X</td>
<td></td>
</tr>
</tbody>
</table>

### Control spool return in the main valve

<table>
<thead>
<tr>
<th>08</th>
<th>09</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>With spring return</td>
<td>High-power valve (data sheet 23178)</td>
<td></td>
</tr>
<tr>
<td>Without spring return</td>
<td>Direct voltage 24 V 2)</td>
<td></td>
</tr>
<tr>
<td>Without spring return with detent 2)</td>
<td>Alternating voltage 230 V 50/60 Hz 2)</td>
<td></td>
</tr>
</tbody>
</table>

### Control spool return in the pilot control valve with 2 spool positions and 2 solenoids

(Only possible with symbols A, B, C, D, K, Z and hydraulic control spool return in the main valve)

<table>
<thead>
<tr>
<th>08</th>
<th>09</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>With</td>
<td>High-power valve (data sheet 23178)</td>
<td></td>
</tr>
<tr>
<td>Without</td>
<td>Direct voltage 24 V 2)</td>
<td></td>
</tr>
<tr>
<td>Without</td>
<td>Alternating voltage 230 V 50/60 Hz 2)</td>
<td></td>
</tr>
</tbody>
</table>

### Pilot control valve (2)

<table>
<thead>
<tr>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without manual override</td>
<td>None (valve housing primed)</td>
</tr>
<tr>
<td>With manual override</td>
<td>Improved corrosion protection (240 h salt spray test according to EN ISO 9227)</td>
</tr>
<tr>
<td>With concealed manual override</td>
<td>J3</td>
</tr>
</tbody>
</table>

### Corrosion resistance (outside)

<table>
<thead>
<tr>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (valve housing primed)</td>
<td>Improved corrosion protection (240 h salt spray test according to EN ISO 9227)</td>
</tr>
</tbody>
</table>

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Bosch Rexroth AG, RE 24751, edition: 2020-03
Ordering code

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
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</tr>
</tbody>
</table>

Pilot oil flow

13 External pilot oil supply, external pilot oil return 3) no code
Internal pilot oil supply, external pilot oil return 3, 4) E
Internal pilot oil supply, internal pilot oil return 4) ET
External pilot oil supply, internal pilot oil return 4) T
(for type WH… only "no code":
Version "ET" and "T" with 3-spool position valve, pressure-centered only possible if $p_{st} \geq 2 \times p_{tank} + p_{st\ min}$)

Switching time adjustment

14 Without switching time adjustment no code
Switching time adjustment as supply control S
Switching time adjustment as discharge control S2

Electrical connection 2)

15 Individual connection
Without mating connector; connector DIN EN 175301-803 K4 5)
For further electrical connections, see data sheet 23178 and 08010

Spool position monitoring

16 Without position switch no code
Monitored spool position "a" QMAG24
Monitored spool position "b" QMBG24
Monitored spool position "a" and "b" QMABG24
Monitored rest position QM0G24
For more information, see data sheet 24830

Stroke setting

17 For ordering code, see page 35 and 36

Throttle insert 2)

18 Without throttle insert no code
Throttle Ø 0.8 mm B08
Throttle Ø 1.0 mm B10
Throttle Ø 1.2 mm B12
Throttle Ø 1.5 mm B15
Throttle Ø 2.0 mm B20
Throttle Ø 2.5 mm B25

$p_{st}$ = pilot pressure
$p_{st\ min}$ = minimum pilot pressure
$p_{tank}$ = tank pressure
$p_o$ = cracking pressure

RE 24751, edition: 2020-03, Bosch Rexroth AG
Ordering code

| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|    |    |    |    |    | /  |    |    |    |    |    |    |    |    |    |    |    |    |    |    | /  |

Preload valve (not for NG10) 2)

<table>
<thead>
<tr>
<th>19</th>
<th>Without preload valve</th>
<th>no code</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>With preload valve (p_o = 4.5) bar</td>
<td>P4,5</td>
</tr>
</tbody>
</table>

Seal material (observe compatibility of seals with hydraulic fluid used, see page 17)

<table>
<thead>
<tr>
<th>21</th>
<th>NBR seals</th>
<th>no code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FKM seals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recommended for operation with HFC hydraulic fluids together with high temperatures</td>
<td>MH</td>
</tr>
<tr>
<td></td>
<td>Low-temperature version (only with version &quot;Without manual override&quot;)</td>
<td>MT</td>
</tr>
</tbody>
</table>

22 For further information, see the plain text

1) ▶ 2 switching positions (hydraulic end position): only symbols C, D, K, Z, Y
   ▶ 3 switching positions (hydraulically centered): only NG16, NG25 ("4W.H 25") and NG32
2) With electro-hydraulic actuation only (type WEH)
3) Pilot oil supply X or return Y external:
   ▶ The maximum admissible operating parameters of the pilot control valve must be observed (see data sheet 23178).
   ▶ Minimum pilot pressure: please observe page 16.
   ▶ Maximum pilot pressure: please observe page 16.
4) Pilot oil supply internal (version "ET" and "E"):
   ▶ Minimum pilot pressure: please observe page 16.
   ▶ Maximum pilot pressure: please observe page 16.
   With a higher pilot pressure, use of a pressure reducing valve "D3" is required (if it is not used, pilot pressure = operating pressure at the port).
   ▶ In order to prevent inadmissibly high pressure peaks, a "B10" throttle insert has to be provided in port P of the pilot control valve (see page 14).
   ▶ In connection with version "H", the pressure reducing valve "D3" is also required.
5) Mating connectors, separate order, see data sheet 23178
6) In connection with the "B10" throttle insert only
Symbols: 2 spool positions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Control spool return</th>
<th>Type WH (hydraulic)</th>
<th>Type WEH (electro-hydraulic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>..../..</td>
<td>a,X</td>
<td>a, b</td>
<td>a</td>
</tr>
<tr>
<td>..H../..</td>
<td>a,X</td>
<td>a, b</td>
<td>a</td>
</tr>
<tr>
<td>..H./O</td>
<td></td>
<td></td>
<td>a</td>
</tr>
<tr>
<td>..H./OF</td>
<td></td>
<td></td>
<td>a</td>
</tr>
<tr>
<td>..../..</td>
<td>a,X</td>
<td>a, b</td>
<td>a</td>
</tr>
<tr>
<td>..H../..</td>
<td></td>
<td></td>
<td>a</td>
</tr>
</tbody>
</table>

1) Only for NG10 and 25 (*4W.H 22*) with 3/2-way version; if operating pressure > tank pressure, port T is to be used as a leakage port!
Symbols: 3 spool positions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Actuating side</th>
<th>Control spool return</th>
<th>Type WH (hydraulic)</th>
<th>Type WEH (electro-hydraulic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EART</td>
<td>a, X</td>
<td>a, b</td>
<td>A</td>
<td>a, b</td>
</tr>
<tr>
<td>E</td>
<td>.A</td>
<td>.B</td>
<td>A</td>
<td>a, b</td>
</tr>
<tr>
<td>H.A</td>
<td></td>
<td></td>
<td>A</td>
<td>a, b</td>
</tr>
<tr>
<td>H.B</td>
<td></td>
<td></td>
<td>A</td>
<td>a, b</td>
</tr>
</tbody>
</table>

1) Example: Symbol E with actuating side "a" → ordering code ..EA..
2) Symbol S only for NG16
### Symbols for valves with 2 spool positions

<table>
<thead>
<tr>
<th>Valve with spring end position</th>
<th>Valve with hydraulic end position</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type WEH.../..</strong></td>
<td><strong>Type WEH . H.../...</strong></td>
</tr>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
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<tr>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
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<tr>
<td><img src="image5.png" alt="Diagram" /></td>
<td><img src="image6.png" alt="Diagram" /></td>
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<tr>
<td><img src="image7.png" alt="Diagram" /></td>
<td><img src="image8.png" alt="Diagram" /></td>
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<tr>
<td><img src="image9.png" alt="Diagram" /></td>
<td><img src="image10.png" alt="Diagram" /></td>
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<tr>
<td><img src="image11.png" alt="Diagram" /></td>
<td><img src="image12.png" alt="Diagram" /></td>
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<tr>
<td><img src="image13.png" alt="Diagram" /></td>
<td><img src="image14.png" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>Type WEH.../...E...</strong></td>
<td><strong>Type WEH . H.../...E...</strong></td>
</tr>
<tr>
<td><img src="image15.png" alt="Diagram" /></td>
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<td><img src="image27.png" alt="Diagram" /></td>
<td><img src="image28.png" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>Type WEH.../...ET...</strong></td>
<td><strong>Type WEH . H.../...ET...</strong></td>
</tr>
<tr>
<td><img src="image29.png" alt="Diagram" /></td>
<td><img src="image30.png" alt="Diagram" /></td>
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<tr>
<td><img src="image31.png" alt="Diagram" /></td>
<td><img src="image32.png" alt="Diagram" /></td>
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<tr>
<td><img src="image33.png" alt="Diagram" /></td>
<td><img src="image34.png" alt="Diagram" /></td>
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<tr>
<td><img src="image35.png" alt="Diagram" /></td>
<td><img src="image36.png" alt="Diagram" /></td>
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<tr>
<td><img src="image37.png" alt="Diagram" /></td>
<td><img src="image38.png" alt="Diagram" /></td>
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<tr>
<td><img src="image39.png" alt="Diagram" /></td>
<td><img src="image40.png" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>Type WEH.../...OF...</strong></td>
<td><strong>Type WEH . H.../...OF...</strong></td>
</tr>
<tr>
<td><img src="image41.png" alt="Diagram" /></td>
<td><img src="image42.png" alt="Diagram" /></td>
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<tr>
<td><img src="image43.png" alt="Diagram" /></td>
<td><img src="image44.png" alt="Diagram" /></td>
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<td><img src="image45.png" alt="Diagram" /></td>
<td><img src="image46.png" alt="Diagram" /></td>
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<td><img src="image47.png" alt="Diagram" /></td>
<td><img src="image48.png" alt="Diagram" /></td>
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<tr>
<td><img src="image49.png" alt="Diagram" /></td>
<td><img src="image50.png" alt="Diagram" /></td>
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<tr>
<td><img src="image51.png" alt="Diagram" /></td>
<td><img src="image52.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>
Symbols for valves with 2 spool positions

<table>
<thead>
<tr>
<th>Valve with spring end position</th>
<th>Valve with hydraulic end position</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type WEH.../...T...</strong></td>
<td><strong>Type WEH . H../...T...</strong></td>
</tr>
<tr>
<td><img src="symbols1.png" alt="Symbols" /></td>
<td><img src="symbols2.png" alt="Symbols" /></td>
</tr>
<tr>
<td><strong>Type WEH . H../...O...T...</strong></td>
<td><strong>Type WEH . H../OF...T...</strong></td>
</tr>
<tr>
<td><img src="symbols3.png" alt="Symbols" /></td>
<td><img src="symbols4.png" alt="Symbols" /></td>
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</tbody>
</table>

Symbols for valves with 3 spool positions

<table>
<thead>
<tr>
<th>Valve with spring-centered zero position</th>
<th>Valve with pressure-centered zero position</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type WEH.../...</strong></td>
<td><strong>Type WEH . H../...</strong></td>
</tr>
<tr>
<td><img src="symbols5.png" alt="Symbols" /></td>
<td><img src="symbols6.png" alt="Symbols" /></td>
</tr>
<tr>
<td><strong>Type WEH.../...E...</strong></td>
<td><strong>Type WEH . H../...E...</strong></td>
</tr>
<tr>
<td><img src="symbols7.png" alt="Symbols" /></td>
<td><img src="symbols8.png" alt="Symbols" /></td>
</tr>
</tbody>
</table>

- X = external, Y = internal
- X = internal, Y = external

Bosch Rexroth AG, RE 24751, edition: 2020-03
## Symbols for valves with 3 spool positions

<table>
<thead>
<tr>
<th>Valve with spring-centered zero position</th>
<th>Valve with pressure-centered zero position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type WEH.../...ET...</td>
<td>only NG16, 25 (&quot;W.H 25&quot;) and 32</td>
</tr>
<tr>
<td><img src="image1.png" alt="Diagram 1" /></td>
<td><img src="image2.png" alt="Diagram 2" /></td>
</tr>
<tr>
<td>X = internal; Y = internal</td>
<td>X = external; Y = internal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Valve with spring-centered zero position</th>
<th>Valve with pressure-centered zero position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type WEH.../...T...</td>
<td>only NG16, 25 (&quot;W.H 25&quot;) and 32</td>
</tr>
<tr>
<td><img src="image3.png" alt="Diagram 3" /></td>
<td><img src="image4.png" alt="Diagram 4" /></td>
</tr>
<tr>
<td>X = internal; Y = external</td>
<td>X = external; Y = internal</td>
</tr>
</tbody>
</table>

**Notice:**

3-spool position valves, pressure-centered, preferably with external pilot oil supply and/or return ("no code", "E")

For preconditions for internal pilot oil supply and/or return ("ET", "T"), see page 4 and 15.
Function, section: Type WEH

Directional valves type WEH...
The valve type WEH is a directional spool valve with electro-hydraulic actuation. It controls the start, stop and direction of a flow.
The directional valves basically consist of the main valve with housing (1), the main control spool (2), one or two return springs (3.1) and (3.2), as well as the pilot control valve (4) with one or two solenoids "a" (5.1) and/or "b" (5.2).

For unobjectionable functioning, the hydraulic system has to be bled properly.
For valves with three spool positions, the main control spool (2) in the main valve is held in zero position or initial position by means of two springs, for valves with 2 spool positions by pressurization and spring. In the initial position, the two spring chambers (6) and (8) are connected with the tank in a depressurized form via the pilot control valve (4). Via the control line (7), the pilot control valve is supplied with pilot oil. Supply can be implemented internally or externally (externally via port X).
Upon actuation of the pilot control valve, e.g. solenoid "a", the pilot control spool (10) is moved to the left and thus, the spring chamber (8) is pressurized with pilot pressure. The spring chamber (6) remains depressurized.

The pilot pressure acts on the left side of the main control spool (2) and moves it against the spring (3.1). This connects port P with B and A with T in the main valve.
On switching off of solenoid, the pilot control spool (10) returns to its initial position (except impulse spool).
The spring chamber (8) is unloaded to the tank.
The pilot oil return is implemented internally (via channel T) or externally (via channel Y).
An optional manual override (9) allows for moving of the pilot control spool (10) without solenoid energization.

Notices:
The return springs (3.1) and (3.2) in the spring chambers (6) and (8) hold the main control spool (2) in central position without pilot pressure even with, for example, vertical valve positioning.
Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.

For pilot oil supply, see page 13 and 14.
**Function, section:** Type WH

**Directional valves type WH...**
Valve type WH is a directional spool valve with hydraulic actuation. It controls the start, stop and direction of a flow.

The directional valve basically consists of the valve housing (1), the main control spool (2), one or two return springs (3.1) and (3.2) at valves with spring return or spring centering as well as the diversion plate (11). The main control spool (2) is actuated directly by pressurization.

The main control spool (2) is held in zero or initial position by springs or pressurization. Pilot oil supply and return are external (see page 13).

**4/3 directional valve with spring centering of the control spool**
With this version, the main control spool (2) is held in zero position by two return springs (3.1) and (3.2). Via the diversion plate (11), the spring chamber (6) is connected to port Y, the spring chamber (8) to port X.

With pilot pressure loading of one of the two front sides of the main control spool (2), the spool is moved to the spool position. In the valve, the required ports are connected in this way.

The spring on the opposite side returns the spool to the zero or initial position at pressure relief of the pressurized control spool area.

For pilot oil supply, see page 13 and 14.
Function, section: Type WEH...H

4/3 directional valve with pressure centering of the main control spool, type WEH...H

The main control spool (2) in the main valve is kept in the zero position by pressurization of the two front faces. One centering bush (12) rests on the housing and fixes the control spool position. By pressure relief of one front face, the main control spool (2) is moved to the spool position. The unloaded control spool face displaces the returning pilot oil into channel Y (external) via the pilot control valve.

Notices:
The springs (3.1) and (3.2) do not have a return function in this version. They hold the main control spool (2) in central position in the depressurized condition and with horizontal installation.
Pilot oil supply (schematic illustration)

NG10

NG16

NG25 ("W.H 22")

NG25 ("W.H 25")

NG32

1 Plug screw M6 according to DIN 906, wrench size 3
- pilot oil return
2 Plug screw M6 according to DIN 906, wrench size 3
- pilot oil supply
3 Plug screw M12 x 1.5 according DIN 906, wrench size 6
- pilot oil supply

1 Plug, 2, 3 closed
2, 3 open

1 Plug screw M6 according to DIN 906, wrench size 3
- pilot oil return
2 Plug screw M6 according to DIN 906, wrench size 3
- pilot oil supply
3 Plug screw M12 x 1.5 according DIN 906, wrench size 6
- pilot oil supply

Further explanations on page 14.
Pilot oil supply

Type WH...
The pilot oil supply and return is implemented externally via channel X and Y.

Type WEH...
The pilot oil supply is implemented externally via channel X from a separate pressure supply.
The pilot oil return is implemented externally via channel Y into the tank.

Type WEH...E...
The pilot oil supply is implemented internally from channel P of the main valve. (see page 15, footnotes 5 and 6)
The pilot oil return is implemented externally via channel Y into the tank. In the subplate, port X is closed.

Type WEH...ET...
The pilot oil supply is implemented internally from channel P of the main valve.
The pilot oil return is implemented internally via channel T into the tank. In the subplate, ports X and Y are closed.

Type WEH...T...
The pilot oil supply is implemented externally via channel X from a separate pressure supply.
The pilot oil return is implemented internally via channel T into the tank. In the subplate, port Y is closed.

Throttle insert
Use of the throttle insert (5) is necessary if the pilot oil supply in channel P of the pilot control valve is to be limited (see below).
The throttle insert (5) is inserted in channel P of the pilot control valve.

 Notices:
The modification of the pilot oil supply may only be performed by authorized specialists or at the factory.

► Pilot oil supply X or return Y external:
  - The maximum admissible operating parameters of the pilot control valve must be observed (see data sheet 23178).
  - Maximum pilot pressure: please observe page 16.
► Pilot oil supply internal (version "ET" and "E"):
  - Minimum pilot pressure: please observe page 15.
  - In order to prevent inadmissibly high pressure peaks, a "B10" throttle insert has to be provided in port P of the pilot control valve (see above).
  - In connection with version "H", the pressure reducing valve "D3" (see page 37) is also required.

3 Pilot control valve
4 Main valve
5 Throttle insert
Technical data
(For applications outside these values, please consult us!)

<table>
<thead>
<tr>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes</td>
</tr>
<tr>
<td>▶ Valve with one solenoid kg</td>
</tr>
<tr>
<td>▶ Valve with two solenoids, spring-centered kg</td>
</tr>
<tr>
<td>▶ Valve with two solenoids, pressure-centered kg</td>
</tr>
<tr>
<td>▶ Valve with hydraulic actuation (type WH...) kg</td>
</tr>
<tr>
<td>▶ Switching time adjustment &quot;S&quot; and &quot;S2&quot; kg</td>
</tr>
<tr>
<td>▶ Pressure reducing valve &quot;D3&quot; kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation position</th>
</tr>
</thead>
<tbody>
<tr>
<td>With suspended installation, higher sensitivity to contamination, horizontal is recommended. For valves with hydraulic control spool return &quot;H&quot; and symbol C, D, K, Z, Y, horizontal is required.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Standard version °C</td>
</tr>
<tr>
<td>▶ Version for HFC hydraulic fluid °C</td>
</tr>
</tbody>
</table>

| Storage temperature range °C | +5 ... +40 |

<table>
<thead>
<tr>
<th>Surface protection (valve body)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coating, layer thickness max. 100 μm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MTTFd values according to EN ISO 13849 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 (type WEH), 150 (type WH)</td>
</tr>
<tr>
<td>(For further details, see data sheet 08012)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydraulic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating pressure</td>
</tr>
<tr>
<td>▶ Port P, A, B Type W.H bar</td>
</tr>
<tr>
<td>▶ Port T Pilot oil return Y external Type W.H bar</td>
</tr>
<tr>
<td>▶ Port T Pilot oil return Y internal Type WEH, WEH bar</td>
</tr>
<tr>
<td>▶ Port Y Pilot oil return external Type WEH, WEH bar</td>
</tr>
<tr>
<td>▶ Port Y Pilot oil return Y internal Type WEH, WEH bar</td>
</tr>
<tr>
<td>▶ Port Y Pilot oil return external Type WH, H-WH bar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydraulic fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>see table page 17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydraulic fluid temperature range (at the valve working ports) °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Type WEH, WEH °C</td>
</tr>
<tr>
<td>▶ Type WH, H-WH °C</td>
</tr>
<tr>
<td>▶ Type WH °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Viscosity range mm²/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8 ... 500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 20/18/15 2)</td>
</tr>
</tbody>
</table>

1) As a 3-spool position valve, pressure-centered only possible if \( P_{st} \geq 2 \times P_{tank} + P_{st \, min} \).

2) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components. For selecting the filters, see www.boschrexroth.com/filter.

3) If type WH is used in potentially explosion-proof areas, see data sheet 07011.
## Technical data
(For applications outside these values, please consult us!)

### Hydraulic

<table>
<thead>
<tr>
<th>Size</th>
<th>NG</th>
<th>10</th>
<th>16</th>
<th>25 &quot;W.H 22&quot;</th>
<th>25 &quot;W.H 25&quot;</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pilot pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bar</td>
<td>250</td>
<td>250</td>
<td>210</td>
<td>250</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Minimum pilot pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Pilot oil supply X external (all symbols),
- Pilot oil supply X internal (only symbols D, K, E, J, L, M, Q, R, U, W)

| 3-spool position valve, spring-centered | Type H-W.H... | bar | 12 | 14 | 12.5 | 13 | 8.5 |
|                                        | Type W.H...   | bar | 12 | 14 | 10.5 | 13 | 8.5 |

- 3-spool position valve, pressure-centered
- 2-spool position valve with spring end position

| 3-spool position valve, pressure-centered | Type H-W.H... | bar | 10 | 14 | 11 | 13 | 10 |
|                                        | Type W.H...   | bar | 10 | 14 | 11 | 13 | 10 |

| 2-spool position valve with hydraulic end position | bar | 7 | 14 | 8 | 8 | 5 |

- Pilot oil supply X internal (only type WEH)

| (with symbols C, F, G, H, P, T, V, Z, S) | bar | 7.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |

### Free flow cross-sections in zero position with symbols Q, V and W

| Symbol Q | A – T; B – T mm² | 13 | 32 | 78 | 83 | 78 |
| Symbol V | P – A; P – B mm² | 13 | 32 | 73 | 83 | 73 |

| Symbol W | A – T; B – T mm² | 2.4 | 6 | 10 | 14 | 20 |

### Pilot volume for switching process

| 3-spool position valve, spring-centered | cm³ | 2.04 | 5.72 | 7.64 | 14.2 | 29.4 |
| 2-spool position valve                | cm³ | 4.08 | 11.45 | 15.28 | 28.4 | 58.8 |

| 3-spool position valve, pressure-centered |
| from zero position in switching position "a" |

| Type WH | cm³ | – | 2.83 | – | 7.15 | 14.4 |
| Type WEH | cm³ | – | 2.83 | – | 7.15 | 14.4 |

| from switching position "a" in zero position |

| Type WH | cm³ | – | 5.72 | – | 14.18 | 29.4 |
| Type WEH | cm³ | – | 2.9 | – | 7.0 | 15.1 |

| from zero position in switching position "b" |

| Type WH | cm³ | – | 5.72 | – | 14.18 | 29.4 |
| Type WEH | cm³ | – | 5.72 | – | 14.15 | 29.4 |

| from switching position "b" in zero position |

| Type WH | cm³ | – | 8.55 | – | 19.88 | 43.8 |
| Type WEH | cm³ | – | 2.83 | – | 5.73 | 14.4 |

### Pilot flow for shortest switching time, approx.

| l/min | 35 | 35 | 35 | 35 | 45 |
## Technical data

(For applications outside these values, please consult us!)

<table>
<thead>
<tr>
<th>Hydraulic fluid</th>
<th>Classification</th>
<th>Suitable sealing materials</th>
<th>Standards</th>
<th>Data sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils</td>
<td>HL, HLP, HLPD, HVLP, HVLPD</td>
<td>NBR, FKM</td>
<td>DIN 51524</td>
<td>90220</td>
</tr>
<tr>
<td>Bio-degradable</td>
<td>Insoluble in water</td>
<td>HETG</td>
<td>FKM</td>
<td>ISO 15380</td>
</tr>
<tr>
<td></td>
<td>Soluble in water</td>
<td>HEES</td>
<td>FKM</td>
<td>ISO 15380</td>
</tr>
<tr>
<td>Flame-resistant</td>
<td>Water-free</td>
<td>HFDU (glycol base)</td>
<td>FKM</td>
<td>ISO 12922</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HFDU (ester base)</td>
<td>FKM</td>
<td>ISO 12922</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HFDU</td>
<td>FKM</td>
<td>ISO 12922</td>
</tr>
<tr>
<td></td>
<td>Containing water</td>
<td>HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)</td>
<td>NBR</td>
<td>ISO 12922</td>
</tr>
</tbody>
</table>

**Important notices on hydraulic fluids:**

- For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- **Bio-degradable and flame-resistant – containing water:** If this hydraulic fluid is used, small amounts of dissolved zinc may get into the hydraulic system.

**Flame-resistant – containing water:**

- Due to increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended - if possible specific to the installation - to back up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
- Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, a maximum duty cycle of 50% in continuous operation has to be set for on/off valves (measuring period 300 s). If this is impossible due to the function, an energy-reducing control of these components is recommended, e.g. via a PWM plug-in amplifier.

### 4. Internal pilot oil supply:

- With a higher pilot pressure, use of a **pressure reducing valve “D3”** is required (if it is not used, pilot pressure = operating pressure at the port).
- In connection with version “H-”, the **pressure reducing valve “D3”** is also required.

### 5. Symbol S only for NG16

### 6. For symbols C, F, G, H, P, T, V, Z, an internal pilot oil supply is only possible if the flow from P to T in the central position (for 3-spool position valve) or while crossing the central position (for 2-spool position valve) is so large that the pressure differential of P to T reaches a value of at least 7.5 bar. For a pressure differential below 7.5 bar, a check valve with a cracking pressure of 7.5 bar is to be provided in the return line to the tank. An external pilot oil supply Y is required.

### 7. Pilot oil supply X internal is only possible for a pressure at P of minimum 4.5 bar.

For symbols with negative overlap F, G, H, P, T, V, (S only NG16), a certain flow from P to T in the central position is necessary for this purpose (see “characteristic curves”). For symbols C, HC, Z, HZ, a flow of >160 l/min is required during passing over the central position for NG16, for NG22, 25 and 32 a flow of >180 l/min. If the required flows are not reached, a preload valve has to be used. When using a preload valve, the pressure differential of the preload valve of the corresponding size (see page 38) is to be added to the corresponding pressure differential in case of direction of flow P ("see characteristic curves").
### Switching times

<table>
<thead>
<tr>
<th>Pilot pressure</th>
<th>bar</th>
<th>70</th>
<th>210</th>
<th>250</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>NG10</td>
<td></td>
<td>ms</td>
<td>40 ... 60</td>
<td>–</td>
<td>40 ... 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ms</td>
<td>60 ... 90</td>
<td>–</td>
<td>50 ... 70</td>
</tr>
<tr>
<td>NG16</td>
<td></td>
<td>ms</td>
<td>50 ... 80</td>
<td>–</td>
<td>40 ... 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ms</td>
<td>110 ... 130</td>
<td>–</td>
<td>80 ... 100</td>
</tr>
<tr>
<td>NG25 (<em>4W.H 22²</em>)</td>
<td></td>
<td>ms</td>
<td>40 ... 70</td>
<td>40 ... 60</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ms</td>
<td>140 ... 160</td>
<td>80 ... 110</td>
<td>–</td>
</tr>
<tr>
<td>NG25 (<em>4W.H 25²</em>)</td>
<td></td>
<td>ms</td>
<td>70 ... 100</td>
<td>–</td>
<td>50 ... 70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ms</td>
<td>200 ... 250</td>
<td>–</td>
<td>120 ... 150</td>
</tr>
<tr>
<td>NG32</td>
<td></td>
<td>ms</td>
<td>80 ... 130</td>
<td>–</td>
<td>70 ... 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ms</td>
<td>420 ... 560</td>
<td>–</td>
<td>230 ... 350</td>
</tr>
</tbody>
</table>

### Notices:
- Switching times = Contacting at the pilot control valve until start of opening of the control edge in the main valve and change in the control spool stroke by 95%)
- The switching times are measured according to ISO 6403 with HLP46, \( \vartheta_{\text{oil}} = 40 \, ^\circ\text{C} \pm 5 \, ^\circ\text{C} \). With different oil temperatures, variations are possible.
- The switching times were determined using DC solenoids. They decrease by approx. 20 ms if AC solenoids are used.
- The shut-off of the solenoids creates voltage peaks, which can be reduced by the use of suitable diodes.
- The switching times increase by approx. 30 ms if the pressure reducing valve "D3" is used.
- The switching times were determined under ideal conditions and may differ in the system, depending on the application conditions.
**Characteristic curves:** NG10 
(measured with HLP46, $\theta_{\text{oil}} = 40 \pm 5 \, ^{\circ}\text{C}$)

---

**Flow in l/min →**

![Graph of characteristic curves](attachment:image.jpg)

**Performance limits:** NG10 
(measured with HLP46, $\theta_{\text{oil}} = 40 \pm 5 \, ^{\circ}\text{C}$)

### 2-spool position valves – $q_{\text{v max}}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\text{max}}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring end position in the main valve ¹) (at $p_{St , \text{min}} = 12$ bar)</td>
<td></td>
</tr>
<tr>
<td>C, D, K, Y, Z</td>
<td>160</td>
</tr>
<tr>
<td>X external – hydraulic end position in the main valve</td>
<td></td>
</tr>
<tr>
<td>HC, HD, HK, HZ, HY</td>
<td>160</td>
</tr>
</tbody>
</table>

¹) If the pilot pressure fails, the function of the return spring is no longer guaranteed with the specified flow values.

### 3-spool position valves – $q_{\text{v max}}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\text{max}}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring-centered</td>
<td></td>
</tr>
<tr>
<td>E, J, L, M, Q, U, V, W, R</td>
<td>160</td>
</tr>
<tr>
<td>F, P</td>
<td>160</td>
</tr>
<tr>
<td>G, T</td>
<td>160</td>
</tr>
<tr>
<td>H</td>
<td>160</td>
</tr>
</tbody>
</table>

¹) The pressure differential refers to the use of port T. If port T1 is used in addition, the pressure differential may be lower. If only port T1 is used, the relations $A \rightarrow T$ and $B \rightarrow T$ may be reversed.

---

# For important notices, see page 27.

RE 24751, edition: 2020-03, Bosch Rexroth AG
**Characteristic curves:** NG16
(measured with HLP46, $T_{\text{oil}} = 40 \pm 5 \, ^{\circ}\text{C}$)

### Δ$p$–$q_V$ characteristic curves

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Spool position</th>
<th>Zero position</th>
</tr>
</thead>
<tbody>
<tr>
<td>D, E, Y</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>G</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>C, H</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>K, J</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>L</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>M</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>P</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Spool position</th>
<th>Zero position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>R</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>S</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>T</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>U</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>V, Z</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>W</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
**Performance limits:** NG16
(measured with HLP46, $\theta_{\text{oil}} = 40 \pm 5$ °C)

### 2-spool position valves – $q_{V\max}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\max}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring end position in the main valve (at $p_{St\ min} = 12$ bar)</td>
<td></td>
</tr>
<tr>
<td>C, D, K, Y, Z</td>
<td>300</td>
</tr>
</tbody>
</table>

### 3-spool position valves – $q_{V\max}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\max}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring-centered</td>
<td></td>
</tr>
<tr>
<td>E, H, J, L, M, Q, U, W, R</td>
<td>300</td>
</tr>
<tr>
<td>F, P</td>
<td>300</td>
</tr>
<tr>
<td>G, T</td>
<td>300</td>
</tr>
<tr>
<td>S</td>
<td>300</td>
</tr>
<tr>
<td>V</td>
<td>300</td>
</tr>
</tbody>
</table>

X external – pressure-centered (at minimum pilot pressure 16 bar)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\max}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>all symbols</td>
<td>300</td>
</tr>
</tbody>
</table>

1) When the specified flow values are exceeded, the function of the return spring is no longer guaranteed if the pilot pressure fails.

2) For symbol V, the pilot control valve is not required for flows >160 l/min.

For important notices, see page 27.
Characteristic curves: NG25 ("W.H 22")
(measured with HLP46, $\theta_{oil} = 40 \pm 5 \, ^\circ C$)
**Performance limits:** NG25 ("W.H 22")
(measured with HLP46, \(T_{\text{oil}} = 40 \pm 5 \, ^\circ\text{C}\))

### 2-spool position valves – \(q_{\text{V max}} \) in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure (p_{\text{max}} ) in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
</tbody>
</table>
| X external – spring end position in the main valve  
(at \(p_{\text{St min}} = 11 \, \text{bar} / 14 \, \text{bar}\)) | C, D, K, Y, Z | 450    | 450    | 450    | 450    | 450    |
| X external – spring end position in the main valve  
1) | C | 450 | 450 | 320 | 250 | 200 |
|                                 | D, Y | 450 | 450 | 450 | 400 | 320 |
|                                 | K  | 450 | 215 | 150 | 120 | 100 |
|                                 | Z  | 350 | 300 | 290 | 260 | 160 |

**X external – hydraulic end position in the main valve**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure (p_{\text{max}} ) in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>HC, HD, HK, HZ, HY</td>
<td>450</td>
</tr>
<tr>
<td>HC./O..., HD./O..., HK./O..., HZ./O...</td>
<td>450</td>
</tr>
<tr>
<td>HC./OF..., HD./OF..., HK./OF..., HZ./OF...</td>
<td>450</td>
</tr>
</tbody>
</table>

### 3-spool position valves – \(q_{\text{V max}} \) in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure (p_{\text{max}} ) in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring-centered</td>
<td>E, J, L, M, Q, U, W, R</td>
</tr>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>P</td>
</tr>
</tbody>
</table>

1) When the specified flow values are exceeded, the function of the return spring is no longer guaranteed if the pilot pressure fails.

**For important notices, see page 27.**
**Characteristic curves:** NG25 ("W.H 25")
(measured with HLP46, $\theta_{oil} = 40 \pm 5$ °C)

![Graph showing characteristic curves](image)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>P – A</th>
<th>P – B</th>
<th>A – T 1)</th>
<th>B – T 1)</th>
<th>Zero position</th>
</tr>
</thead>
<tbody>
<tr>
<td>E, Y, D</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>G, T</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>–</td>
</tr>
<tr>
<td>H</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>J</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>K</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>M</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>P</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>–</td>
</tr>
<tr>
<td>Q</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>–</td>
</tr>
<tr>
<td>R</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>U</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>V</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Z</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>W</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

8 Symbol R, spool position B – A
**Performance limits:** NG25 ("W.H 25")
(measured with HLP46, $\vartheta_{\text{oil}} = 40 \pm 5 ^\circ \text{C}$)

### 2-spool position valves – $q_{V_{\text{max}}}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\text{max}}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring end position in the main valve (at $p_{St_{\text{min}}} = 13$ bar)</td>
<td></td>
</tr>
<tr>
<td>C, D, K, Y, Z</td>
<td>700</td>
</tr>
<tr>
<td>X external – spring end position in the main valve 1)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>700</td>
</tr>
<tr>
<td>D, Y</td>
<td>700</td>
</tr>
<tr>
<td>K</td>
<td>700</td>
</tr>
<tr>
<td>Z</td>
<td>700</td>
</tr>
<tr>
<td>X external – hydraulic end position in the main valve</td>
<td></td>
</tr>
<tr>
<td>HC, HD, HK, HZ, HY</td>
<td>700</td>
</tr>
<tr>
<td>HC./O..., HD./O..., HK./O..., HZ./O...</td>
<td>700</td>
</tr>
<tr>
<td>HC./OF..., HD./OF..., HK./OF..., HZ./OF...</td>
<td>700</td>
</tr>
</tbody>
</table>

1) When the specified flow values are exceeded, the function of the return spring is no longer guaranteed if the pilot pressure fails.

### 3-spool position valves – $q_{V_{\text{max}}}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\text{max}}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring-centered</td>
<td></td>
</tr>
<tr>
<td>E, L, M, Q, U, W</td>
<td>700</td>
</tr>
<tr>
<td>G, T</td>
<td>400</td>
</tr>
<tr>
<td>F</td>
<td>650</td>
</tr>
<tr>
<td>H</td>
<td>700</td>
</tr>
<tr>
<td>J</td>
<td>700</td>
</tr>
<tr>
<td>P</td>
<td>650</td>
</tr>
<tr>
<td>V</td>
<td>650</td>
</tr>
<tr>
<td>R</td>
<td>700</td>
</tr>
<tr>
<td>X external – pressure-centered</td>
<td></td>
</tr>
<tr>
<td>(at minimum pilot pressure 18 bar)</td>
<td></td>
</tr>
<tr>
<td>E, F, H, J, L, M, P, Q, R, U, V, W</td>
<td>700</td>
</tr>
<tr>
<td>G, T</td>
<td>400</td>
</tr>
<tr>
<td>X external – pressure-centered</td>
<td></td>
</tr>
<tr>
<td>(with pilot pressure &gt; 30 bar)</td>
<td></td>
</tr>
<tr>
<td>G, T</td>
<td>700</td>
</tr>
</tbody>
</table>

---

For important notices, see page 27.
**Characteristic curves**: NG32
(measured with HLP46, $T_{oil} = 40 \pm 5 \, ^\circ C$)

\[
\Delta p \cdot q_v \text{ characteristic curves} - \text{Symbol E, R and W}
\]

\[
\Delta p \cdot q_v \text{ characteristic curves} - \text{Symbol G and T}
\]

Symbol | Spool position
--- | ---
E | 4 4 3 2 –
R | 4 4 3 – 1
W | 4 4 3 2 –

Symbol | Spool position
--- | ---
G | 7 8 7 5 6
T | 7 8 7 5 6
Performance limits: NG32
(measured with HLP46, $\theta_{\text{oil}} = 40 \pm 5 \, ^{\circ}\text{C}$)

2-spool position valves – $q_{V \text{ max}}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\text{max}}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring end position in the main valve (at $p_{\text{St. min}} = 10 , \text{bar}$)</td>
<td></td>
</tr>
<tr>
<td>C, D, K, Y, Z</td>
<td>1100</td>
</tr>
<tr>
<td>X external – spring end position in the main valve 1)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1100</td>
</tr>
<tr>
<td>D, Y</td>
<td>1100</td>
</tr>
<tr>
<td>K</td>
<td>1100</td>
</tr>
<tr>
<td>Z</td>
<td>1100</td>
</tr>
<tr>
<td>X external – hydraulic end position in the main valve</td>
<td></td>
</tr>
<tr>
<td>HC, HD, HK, HZ, HY</td>
<td>1100</td>
</tr>
</tbody>
</table>

1) When the specified flow values are exceeded, the function of the return spring is no longer guaranteed if the pilot pressure fails.

3-spool position valves – $q_{V \text{ max}}$ in l/min

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating pressure $p_{\text{max}}$ in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>X external – spring-centered</td>
<td></td>
</tr>
<tr>
<td>E, J, L, M, Q, R, U, W</td>
<td>1100</td>
</tr>
<tr>
<td>G, T, H, F, P</td>
<td>900</td>
</tr>
<tr>
<td>V</td>
<td>1100</td>
</tr>
<tr>
<td>X external – pressure-centered (at minimum pilot pressure 8.5 bar)</td>
<td></td>
</tr>
<tr>
<td>all symbols</td>
<td>1100</td>
</tr>
<tr>
<td>X external – pressure-centered (at minimum pilot pressure 15 bar)</td>
<td></td>
</tr>
<tr>
<td>all symbols</td>
<td>1100</td>
</tr>
</tbody>
</table>

Important notices (applies to all sizes):
The specified performance limits apply to the use with two directions of flow (e.g. from $P$ to $A$ and simultaneous return flow from $B$ to $T$ at a ratio of 1:1).
Due to the flow forces acting within the valves, the admissible switching power limit may be considerably lower with only one direction of flow (e.g. from $P$ to $A$ while port $B$ is blocked, with flow in the same or in different directions).
In such cases of use, please consult us.
The performance limits were determined when the solenoids were at operating temperature, at 10% undervoltage and without tank preloading.
Dimensions: NG10 (dimensions in mm)

Notice: The dimensions are nominal dimensions which are subject to tolerances.

For item explanations and subplates, see page 33.
Valve mounting screws, see page 34.
Dimensions: NG16
(dimensions in mm)

For item explanations and subplates, see page 33.
Valve mounting screws, see page 34.

Notice:
The dimensions are nominal dimensions which are subject to tolerances.

Required surface quality of the valve contact surface

RE 24751, edition: 2020-03, Bosch Rexroth AG
**Dimensions:** NG25 ("W.H 22")
(dimensions in mm)

1) Port L only for valves with pressure-centered zero position

For item explanations and subplates, see page 33.
Valve mounting screws, see page 34.

Notice:
The dimensions are nominal dimensions which are subject to tolerances.

Required surface quality of the valve contact surface
**Dimensions:** NG25 ("W.H 25")
(dimensions in mm)

For item explanations and subplates, see page 33.

Valve mounting screws, see page 34.

Notice:
The dimensions are nominal dimensions which are subject to tolerances.
**Dimensions:** NG32  
(dimensions in mm)

For item explanations and subplates, see page 33.  
Valve mounting screws, see page 34.

**Notice:**  
The dimensions are nominal dimensions which are subject to tolerances.

---

For Bosch Rexroth AG, RE 24751, edition: 2020-03
Dimensions

1 Main valve
2 Pilot control valve type 4WE 6 ... (data sheet 23178):
2.1 ▶ Pilot control valve type 4WE 6 D... (1 solenoid) for main valves with Symbols C, D, K, Z Symbols HC, HD, HK, HZ
▶ Pilot control valve type 4WE 6 JA... (1 solenoid "a") for main valves with symbols EA, FA, etc., Spring return
▶ Pilot control valve type 4WE 6 MA... (1 solenoid "a") for main valves with symbols HEA, HFA, etc., hydraulic control spool return
2.2 ▶ Pilot control valve type 4WE 6 Y... (1 solenoid "a") for main valves with Symbol Y Symbol HY
▶ Pilot control valve type 4WE 6 JB... (1 solenoid "b") for main valves with symbols EB, FB, etc., Spring return
▶ Pilot control valve type 4WE 6 MB... (1 solenoid "b") for main valves with symbols HEB, HFB, etc., hydraulic control spool return
2.3 ▶ Pilot control valve type 4WE 6J... (2 solenoids) for main valves with 3 spool positions, spring-centered
▶ Pilot control valve type 4WE6M... (2 solenoids) for main valves with 3 spool positions, pressure-centered
3.1 Solenoid "a"
3.2 Solenoid "b"
4 Manual override, "N", optional
▶ Actuation of the manual override is only possible up to a tank pressure of approx. 50 bar. Avoid damage to the bore of the manual override. (Special tool for the operation, separate order, material no. R900024943). When the manual override is blocked, the operation of the solenoid must be prevented.
▶ Simultaneous actuation of the solenoids must be prevented.
5 Solenoid without manual override
6 Solenoid with manual override
7 Height of the diversion plate with hydraulic actuation (type WH...)

8 Switching time adjustment (wrench size 6), optional
9 Pressure reducing valve, optional
10.1 Machined valve contact surface; porting pattern according to ISO 4401-05-05-0-05
10.2 Machined valve contact surface; porting pattern according to ISO 4401-07-07-0-05
10.3 Machined valve contact surface; porting pattern according to ISO 4401-08-08-0-05
10.4 Machined valve contact surface; porting pattern according to ISO 4401-10-09-0-05
11 Name plate pilot control valve
12 Name plate complete valve
13 Seal rings
14 Space required for removing the mating connector
15 2-spool position valves with spring end position in the main valve (symbols A, C, D, K, Z)
16 2-spool position valves with spring end position in the main valve (symbols B, Y)
17 3-spool position valves, spring-centered;
  2-spool position valves with hydraulic end position in the main valve
18 3-spool position valves, pressure-centered
19 Locking pin

Subplates (separate order) with porting pattern according to ISO 4401, see data sheet 45100.
Valve mounting screws, see page 34.
## Dimensions

**Valve mounting screws** (separate order)

<table>
<thead>
<tr>
<th>Size</th>
<th>Quantity</th>
<th>Hexagon socket head cap screws</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>4</td>
<td>ISO 4762 - M6 × 45 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B&lt;br&gt;Friction coefficient $\mu_{\text{total}} = 0.09 \ldots 0.14$; tightening torque $M_A = 12.5$ Nm ±10%</td>
<td>R913043777</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or 1/4-20 UNC x 1 3/4” ASTM-A574</td>
<td>Not included in the Rexroth delivery range</td>
</tr>
<tr>
<td>16</td>
<td>4</td>
<td>ISO 4762 - M10 × 60 - 10.9-flZn/nc/480h/C&lt;br&gt;Friction coefficient $\mu_{\text{total}} = 0.09 \ldots 0.14$; tightening torque $M_A = 58$ Nm ±10%</td>
<td>R913014770</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ISO 4762 - M6 × 60 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B&lt;br&gt;Friction coefficient $\mu_{\text{total}} = 0.09 \ldots 0.14$; tightening torque $M_A = 12.5$ Nm ±10%</td>
<td>R913043410</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Hexagon socket head cap screws UNC 3/8-16 UNC x 2 1/4” - ASTM-A574</td>
<td>Not included in the Rexroth delivery range</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Hexagon socket head cap screws UNC 1/4-20 UNC x 2 1/4” - ASTM-A574</td>
<td>Not included in the Rexroth delivery range</td>
</tr>
<tr>
<td>25</td>
<td>6</td>
<td>ISO 4762 - M12 × 60 - 10.9-flZn/nc/480h/C&lt;br&gt;Friction coefficient $\mu_{\text{total}} = 0.09 \ldots 0.14$; Tightening torque $M_A = 100$ Nm ±10%</td>
<td>R913015613</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>UNC 1/2-13 UNC x 2 1/2” ASTM-A574</td>
<td>Not included in the Rexroth delivery range</td>
</tr>
<tr>
<td>32</td>
<td>6</td>
<td>ISO 4762 - M20 × 80 - 10.9-flZn/nc/480h/C&lt;br&gt;Friction coefficient $\mu_{\text{total}} = 0.09 \ldots 0.14$; tightening torque $M_A = 340$ Nm ±10%</td>
<td>R913008472</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>UNC 3/4-10 UNC x 3 1/4” - ASTM-A574</td>
<td>Not included in the Rexroth delivery range</td>
</tr>
</tbody>
</table>
**Stroke setting, mounting options**
(dimensions in mm)

The stroke of the control spool is limited by the stroke setting (1). The control spool stroke is shortened by loosening the lock nut (2) and clockwise rotation of the adjustment spindle (3). The control chamber (4) must be depressurized for this.

<table>
<thead>
<tr>
<th>NG</th>
<th>L4</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>6.5</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>25 (&quot;W.H 22&quot;)</td>
<td>9.5</td>
</tr>
<tr>
<td>25 (&quot;W.H 25&quot;)</td>
<td>12.5</td>
</tr>
<tr>
<td>32</td>
<td>15</td>
</tr>
</tbody>
</table>

More dimensions see below and page 36.

5 Adjustment range
▶ NG10:
  1 rotation = 1 mm adjustment travel
▶ NG16 and 32:
  1 rotation = 1.5 mm adjustment travel

### 3-spool position valve 1)

<table>
<thead>
<tr>
<th>Stroke setting on valve side A and B</th>
<th>spring-centered</th>
<th>pressure-centered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L1</td>
<td>L2</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>25 2)</td>
<td>96</td>
<td>241</td>
</tr>
<tr>
<td>25 3)</td>
<td>123</td>
<td>276</td>
</tr>
<tr>
<td>32</td>
<td>133</td>
<td>344</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stroke setting on valve side A</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>16</td>
<td>100</td>
<td>156</td>
</tr>
<tr>
<td>25 2)</td>
<td>96</td>
<td>193</td>
</tr>
<tr>
<td>25 3)</td>
<td>123</td>
<td>225</td>
</tr>
<tr>
<td>32</td>
<td>133</td>
<td>287</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stroke setting on valve side B</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>56</td>
</tr>
<tr>
<td>25 2)</td>
<td>48</td>
<td>241</td>
</tr>
<tr>
<td>25 3)</td>
<td>72</td>
<td>276</td>
</tr>
<tr>
<td>32</td>
<td>76</td>
<td>344</td>
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</tbody>
</table>

1) With symbol A only version "11", with symbol B only version "12" possible.
### Stroke setting, mounting options
(dimensions in mm)

#### 2-spool position valve

<table>
<thead>
<tr>
<th>Stroke setting on valve side A and B</th>
<th>Spring end position</th>
<th>Hydraulic end position</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
<tr>
<td>10</td>
<td>90</td>
<td>144</td>
</tr>
<tr>
<td>16</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25</td>
<td>96</td>
<td>241</td>
</tr>
<tr>
<td>25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>32</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stroke setting on valve side A</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>11</td>
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<tr>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
<tr>
<td>10</td>
<td>90</td>
<td>106</td>
</tr>
<tr>
<td>16</td>
<td>100</td>
<td>180</td>
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<td>123</td>
<td>253</td>
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<tr>
<td>32</td>
<td>133</td>
<td>316</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Stroke setting on valve side B</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
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<tr>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
<tr>
<td>10</td>
<td>52</td>
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<tr>
<td>25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>32</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

2) Version "W.H 22"
3) Version "W.H 25"

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**Notice:**
The dimensions are nominal dimensions which are subject to tolerances.
Switching time adjustment

The switching time of the main valve (1) is influenced by the use of a twin throttle check valve (2) (type Z2FS 6; data sheet 27506).

Modification of supply (3) to discharge control (4):
Remove the pilot control valve (5) – The plate (6) to accept the seal rings stays in place – Turn the switching time adjustment (2) around its longitudinal axis and put it back, install the pilot control valve (5).

Notice:
The modification may only be performed by authorized specialists or at the factory.

Pressure reducing valve "D3"

The pressure reducing valve (8) has to be used at a pilot pressure above 250 bar (with "WEH 22 ...": 210 bar) and with version "H-". The secondary pressure is kept at a constant level of 45 bar.

Notice:
- If a pressure reducing valve "D3" (8) is used, a "B10" throttle insert has to be installed in channel P of the pilot control valve.
- The modification may only be performed by authorized specialists or at the factory.
Preload valve (not for NG10)

In case of valves with depressurized circulation and internal pilot oil supply, the installation of the preload valve (9) in channel P of the main valve is required in order to build up the minimum pilot pressure.

The pressure differential of the preload valve is to be added to the pressure differential of the main valve (see characteristic curves) to result in one total value. The cracking pressure amounts to approx. 4.5 bar.

**Notice:** For series-production status, see ordering key on the name plate.

<table>
<thead>
<tr>
<th>Size</th>
<th>Item 9.1</th>
<th>Item 9.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>R961009415 (from component series 72)</td>
<td>R961009417 (up to component series 71)</td>
</tr>
<tr>
<td>25 (“W.H 22”)</td>
<td>R961009609</td>
<td>–</td>
</tr>
<tr>
<td>25 (“W.H 25”)</td>
<td>R961009166 (from component series 68)</td>
<td>R961009416 (up to component series 67)</td>
</tr>
<tr>
<td>32</td>
<td>–</td>
<td>R961009610 (up to component series 63)</td>
</tr>
</tbody>
</table>

**∆p–q_V characteristic curve** (measured with HLP46, \(\vartheta_{\text{oil}} = 40^\circ\text{C} \pm 5^\circ\text{C}\))

1. NG16
2. NG25 (“W.H 25”)
3. NG25 (“W.H 22”)
4. NG32
Project planning information

The stipulations of the Machinery Directive 2006/42/EC are to be adhered to.
Please also note data sheet 08012 with information on MTTFD values and shock and vibration loads.

Further information

- Directional spool valve
- Subplates
- Inductive position switch and proximity sensors (contactless)
- Hydraulic fluids on mineral oil basis
- Environmentally compatible hydraulic fluids
- Flame-resistant, water-free hydraulic fluids
- Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)
- Reliability characteristics according to EN ISO 13849
- Hexagon socket head cap screw, metric/UNC
- Hydraulic valves for industrial applications
- General product information on hydraulic products
- Assembly, commissioning and maintenance of industrial valves
- Mating connectors and cable sets for valves and sensors
- Directional spool and seat valves with electrical actuation and M12x1 plug-in connection
- Use of non-electrical hydraulic components in an explosive environment (ATEX)
- Selection of filters
- Information on available spare parts

Data sheet 23178
Data sheet 45100
Data sheet 24830
Data sheet 90220
Data sheet 90221
Data sheet 90222
Data sheet 90223
Data sheet 08012
Data sheet 08936
Operating instructions 07600-B
Data sheet 07008
Data sheet 07300
Data sheet 08006
Data sheet 08010
Data sheet 07011
www.boschrexroth.com/filter
www.boschrexroth.com/spc
Notes