4/2, 4/3, and 5/2, 5/3 proportional directional valve, pilot operated, without electrical position feedback without/with integrated electronics (OBE)

Type .WRZ... .WRZE... and .WRH...

Sizes 10 to 52
Component series 7X
Maximum operating pressure 350 bar
Maximum flow 2800 l/min

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<th>Page</th>
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<td>27</td>
</tr>
</tbody>
</table>

Features

- Pilot operated, 2-stage proportional directional valve with integrated electronics (OBE) with type 4WRZE
- Control of flow direction and size
- Operation by means of proportional solenoids with central thread and detachable coil
- For subplate mounting:
  - Porting pattern according to ISO 4401
- Manual override, optional
- Spring-centered control spool
- Control electronics
  - Type .WRZE...
    - Integrated electronics (OBE) with voltage or current input (A1 and/or F1)
  - Type .WRZ...
    - Digital or analog amplifier in Euro-card format
    - Analog amplifier in modular design

Information on available spare parts:
www.boschrexroth.com/spc
**Ordering codes** (types 4WRZ and 4WRH; sizes 10 to 32 subplate mounting; size 52 flange connection)

<table>
<thead>
<tr>
<th>4WR_</th>
<th>-7X</th>
</tr>
</thead>
</table>

Hydraulic actuation = H  
Electro-hydraulic actuation = Z

**Type WRZ:**

For external electronics = no code  
With integrated electronics = E

<table>
<thead>
<tr>
<th>Size</th>
<th>= Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>52</td>
<td>52</td>
</tr>
</tbody>
</table>

For **control spool symbols**, see page 3

**Rated flow** in l/min at valve pressure differential $\Delta p = 10$ bar

<table>
<thead>
<tr>
<th>Size</th>
<th>Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>25 l/min</td>
</tr>
<tr>
<td>16</td>
<td>100 l/min</td>
</tr>
<tr>
<td>25</td>
<td>220 l/min</td>
</tr>
<tr>
<td>32</td>
<td>360 l/min</td>
</tr>
<tr>
<td>52</td>
<td>1000 l/min</td>
</tr>
</tbody>
</table>

Component series 70 to 79 = 7X  
(70 to 79: Unchanged installation and connection dimensions)

For subplate mounting = no code  
For flange connection (size 52 only) = F

**Pilot control valve size 6**

Proportional solenoid with detachable coil = 6E

**Supply voltage**

Direct voltage 24 V = G24

Without manual override = no code  
With concealed manual override = N9

Without special type of protection = no code  
Seawater-resistant = J

**Pilot oil supply and return**

External pilot oil supply, external pilot oil return = no code  
Internal pilot oil supply, external pilot oil return = E  
Internal pilot oil supply, internal pilot oil return = ET  
External pilot oil supply, internal pilot oil return = T

(only possible without code for size 52 and type 4WRH)
**Control spool symbols**

<table>
<thead>
<tr>
<th>Control Spool Symbols</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Symbol 1" /></td>
<td>E1-</td>
</tr>
<tr>
<td><img src="image2" alt="Symbol 2" /></td>
<td>E3-</td>
</tr>
<tr>
<td><img src="image3" alt="Symbol 3" /></td>
<td>W6-</td>
</tr>
<tr>
<td><img src="image4" alt="Symbol 4" /></td>
<td>W8-</td>
</tr>
<tr>
<td><img src="image5" alt="Symbol 5" /></td>
<td>W9-</td>
</tr>
</tbody>
</table>

1) Not for type 4WRH

With symbols E1- and W8-:

- P → A: \( q_v \)
- B → T: \( q_v / 2 \)

With symbols E3- and W9-:

- P → A: \( q_v \)
- B → T: Blocked

(differential circuit, piston top at port A)

**Notice:** With symbols W6-, W8-, W9-, W6A, there is a connection from A → T and B → T with less than 2% of the respective nominal cross-section in switching position "0".

**Electronics interface**

- Command value ±10 V
- Command value 4 to 20 mA
- For types WRZ and WRH

**Electrical connection type WRZ:**

- Without mating connector, with connector according to DIN EN 175301-803
- Mating connector, separate order, see page 27

**Type WRZE:**

- Without mating connector, with connector according to DIN EN 175201-804
- Mating connector, separate order, see page 27

1) Not applicable with types 4WRH

2) For version "J" → "N" instead of "N9"

3) For information on the seawater-resistant version, see data sheet 29115-M

4) For version "J" = seawater-resistant only "K31"

**Electric special types of protection available on request.**

- Electric special types of protection available on request.

For further details, see the plain text.

- NBR seals
- FKM seals
- Without pressure reducing valve
- With pressure reducing valve ZDR 6 DP0-4X/40YM-W80 (not adjustable)
### Ordering codes (types 4WRZ 52 and 4WRH 52; subplate mounting)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5WR_</td>
<td>52</td>
</tr>
</tbody>
</table>

**Hydraulic actuation**
- Electro-hydraulic = Z
- For external electronics = no code
- With integrated electronics = E
- Size 52 = 52

**Rated flow** in l/min at valve pressure differential $\Delta p = 10$ bar
- 1000 l/min = 1000

**Component series** 70 to 79
- 70 to 79: Unchanged installation and connection dimensions

**Pilot control valve size 6**
- Proportional solenoid with detachable coil = 6E ¹)

**Supply voltage**
- Direct voltage 24 V = G24 ¹)
- Without manual override = no code
- With concealed manual override = N9 ¹, ²)

**Electrical connection type WRZ:**
- Without mating connector, with connector according to DIN EN 175301-803 = K4 ¹, 4)
- Mating connector, separate order, see page 27

**Type WRZE:**
- Without mating connector, with connector according to DIN EN 175201-804 = K31 ¹, 4)
- Mating connector, separate order, see page 27

**Electronics interface**
- Command value $\pm 10$ V = A1
- Command value 4 to 20 mA = F1
- For types WRZ and WRH = no code

**Without pressure reducing valve** = no code
- With pressure reducing valve ZDR 6 DP0-4X/40YM-W80 (not adjustable) = D3 ¹)

**Seawater-resistant** = J ³)

**NBR seals** = M
**FKM seals** = V

For further details, see the plain text

¹) Not applicable with types 4WRH

²) For version "J"→"N" instead of "N9"

³) For information on the seawater-resistant version, see data sheet 29115-M

⁴) For version "J" = seawater-resistant only "K31"

Electric special types of protection available on request.
Control spool symbols

With symbols E1- and W8-:
- \( P \rightarrow A: q_v \)
- \( B \rightarrow T: q_v/2 \)
- \( P \rightarrow B: q_v/2 \)
- \( A \rightarrow R: q_v \)

With symbols E3- and W9-:
- \( P \rightarrow A: q_v \)
- \( B \rightarrow T: \text{Blocked} \)
- \( P \rightarrow B: q_v/2 \)
- \( A \rightarrow R: q_v \)

(differential circuit, piston top at port A)

Notice:
- Only external pilot oil supply and return possible
- With control spool W6, W8, W9, W6A, there is a connection from \( A \rightarrow R \) and \( B \rightarrow T \) with less than 2% of the respective nominal cross-section in switching position "0".

1) Not for type 4WRH
### Symbols (simplified)

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>4WRZE…7X./… and type 4WRZ 52…7XF/…</td>
<td>With electro-hydraulic actuation and for external electronics</td>
<td>X = external</td>
<td>Y = external</td>
</tr>
<tr>
<td>Type 5WRZ 52-7X./…</td>
<td></td>
<td>X = external</td>
<td>Y = external</td>
</tr>
<tr>
<td>Type 4WRZ…7X./…ET…</td>
<td></td>
<td>X = internal</td>
<td>Y = internal</td>
</tr>
<tr>
<td>Type 4WRZ…A-7X./… and type 4WRZ 52 A…-7XF/…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 5WRZ 52 A-7X./…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 4WRZ…-7X./…ET…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 4WRH…-7X./…</td>
<td>With electro-hydraulic actuation and for integrated electronics</td>
<td>X = external</td>
<td>Y = external</td>
</tr>
<tr>
<td>Type 5WRH 52-7X./…</td>
<td></td>
<td>X = external</td>
<td>Y = external</td>
</tr>
<tr>
<td>Type 4WRH…A…-7X./…</td>
<td></td>
<td>X = internal</td>
<td>Y = internal</td>
</tr>
<tr>
<td>With hydraulic actuation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 4WRH…-7X./… and type 4WRH 52…-7XF/…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 5WRH 52…-7X.</td>
<td></td>
<td>X = external</td>
<td>Y = external</td>
</tr>
<tr>
<td>Type 4WRH…A…-7X./…</td>
<td></td>
<td>X = external</td>
<td>Y = external</td>
</tr>
</tbody>
</table>

X = external
Y = internal
Function, section

**Pilot control valve type 3DREP 6...**

The pilot control valve is a 3-way pressure reducing valve that is actuated by a proportional solenoid. It converts an electrical input signal into a proportional pressure output signal and is used for all valves of the type 4WRZ... and 5WRZ...

The proportional solenoids are controllable, wet-pin DC solenoids with a central thread and a detachable coil. The solenoids are controlled by external electronics (type .WRZ...).

**Set-up:**
The valve basically consists of:
- Housing (1)
- Control spool (2) with pressure measuring spool (3 and 4)
- Solenoids (5 and 6) with central threads

**Function:**
The pressure in A or B is set by means of the proportional solenoids. The amount of the pressure depends on the current. With de-energized solenoids (5, 6), the control spool (2) is held in the central position by means of the pressure springs (8). Ports A and B are connected with T so that the hydraulic fluid can flow to the tank without obstructions.

By energizing a proportional solenoid, e.g. solenoid "a" (5), the pressure measuring spool (3) and with it the control spool (2) are moved to the right. This opens the connection from P to B and A to T via orifice-type cross-sections with progressive flow characteristic. With the surface of the pressure measuring spool (4) the pressure that builds up in channel B acts on the control spool and against the solenoid force. The pressure measuring spool (4) is supported by solenoid "b". If the pressure exceeds the value set at solenoid "a", the control spool (2) is pushed back against the solenoid force and connects B with T until the set pressure is reached again. The pressure is proportional to the solenoid current.

When the solenoid is switched off, the control spool (2) is returned into the central position by the compression springs (8).

---

**Pilot control valve with two switching positions**

(type 3DREP 6...B...)

The operation of this valve version basically corresponds to the valve with 3 switching positions. However, this 2 spool position valve is only equipped with solenoid "a" (5). In the place of the second proportional solenoid there is a plug screw (9).

**Information on type 3DREP 6:**
Prevent the tank line from draining. If this is possible due to installation conditions, install a preload valve (with a preload pressure of approx. 2 bar).
Pilot control valve type 3DREPE 6…

The pilot control valve is a 3-way pressure reducing valve that is actuated by a proportional solenoid. It converts an electrical input signal into a proportional pressure output signal and is used for all valves of the type 4WRZE... and 5WRZE...

The proportional solenoids are controllable, wet-pin DC solenoids with a central thread and a detachable coil. The solenoids are controlled by the integrated electronics (type .WRZE...).

Set-up:
The valve basically consists of:
- Housing (1)
- Control spool (2) with pressure measuring spool (3 and 4)
- Solenoids (5 and 6) with central threads
- Integrated electronics (7)

Function:
The pressure in A or B is set by means of the proportional solenoids. The amount of the pressure depends on the current. With de-energized solenoids (5, 6), the control spool (2) is held in the central position by means of the pressure springs (8). Ports A and B are connected with T so that the hydraulic fluid can flow to the tank without obstructions.

By energizing a proportional solenoid, e.g. solenoid “a” (5), the pressure measuring spool (3) and with it the control spool (2) are moved to the right. This opens the connection from P to B and A to T via orifice-type cross-sections with progressive flow characteristic. With the surface of the pressure measuring spool (4) the pressure that builds up in channel B acts on the control spool and against the solenoid force. The pressure measuring spool (4) is supported by solenoid “b”. If the pressure exceeds the value set at solenoid “a”, the control spool (2) is pushed back against the solenoid force and connects B with T until the set pressure is reached again. The pressure is proportional to the solenoid current.

When the solenoid is switched off, the control spool (2) is returned into the central position by the compression springs (8).
Function, section

Pilot operated proportional directional valves
Types 4WRZ... and 5WRZ.52...

Valves of type 4WRZ... are pilot operated 4-way directional valves that are actuated by proportional solenoids. They control the flow direction and size.
Valves of type 5WRZ... are equipped with an additional port "R" (only size 52).

Set-up:
The valve basically consists of:
- Pilot control valve (9) with proportional solenoids (5 and 6)
- Main valve (10) with main control spool (11) and centering spring (12)

Notice!
Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.

Function:
- With de-energized solenoids (5, 6), the main control spool (11) is held in the central position by means of the centering spring (12).
- The main control spool (11) is controlled by the pilot control valve (9); the main control spool is proportionally moved, e.g. by actuating solenoid "b" (6).
  → The control spool (2) is moved to the right, pilot oil enters the pressure chamber (13) via the pilot control valve (9) and deflects the main control spool (11) according to the electric input signal.
  → This opens the connection from P to B and A to T via orifice-type cross-sections with progressive flow characteristic.
- Pilot oil is internally supplied to the pilot control valve via port P or externally via port X.
- Switching the solenoid off (6)
  → The control spool (2) and main control spool (11) are moved back into the central position.
- Depending on the switching position, flow occurs from P to A and B to T or P to B and A to T (R).
An optional manual override (14 and 15) can be used to move the control spool (2) without solenoid energization.

Notice:
Inadvertent activation of the manual override may result in uncontrollable machine movements.

![Diagram of the valve system]
Function, section

Externally pilot operated proportional directional valves
Types 4WRH... and 5WRH.52...

Valves of the type WRH... are pilot operated proportional directional valves for external actuation via pressure control valves.

Set-up:
The valve basically consists of:
– Main valve (10) with main control spool (11) and centering spring (12)
– Diversion plate (16)

Notice!
Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.

Function:
– The diversion plate (16) connects control port A that leads to the pressure chamber (13) with port Y and control port B with port X.
– If port X is pressurized, the main control spool (11) is moved to the right (P to B and A to T). If port Y is pressurized, the main control spool is moved to the left (P to A and B to T).

The pilot pressure at the main valve must not exceed 25 bar (16 bar with size 52!)

Technical data (for applications outside these parameters, please consult us!)

<table>
<thead>
<tr>
<th>general</th>
<th>.WRZ</th>
<th>.WRZE</th>
<th>.WRH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation position</td>
<td>Any, preferably horizontal (for commissioning information, see data sheet 07800)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>°C</td>
<td>-20 to +80</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>°C</td>
<td>-20 to +70</td>
<td>-20 to +50</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subplate mounting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size 10</td>
<td>7.8</td>
<td>8.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Size 16</td>
<td>11.9</td>
<td>12.1</td>
<td>9.7</td>
</tr>
<tr>
<td>Size 25</td>
<td>18.2</td>
<td>18.4</td>
<td>18.0</td>
</tr>
<tr>
<td>Size 32</td>
<td>42.2</td>
<td>42.2</td>
<td>41.5</td>
</tr>
<tr>
<td>Size 52</td>
<td>79.5</td>
<td>79.7</td>
<td></td>
</tr>
<tr>
<td>Flange connection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size 52</td>
<td>77.5</td>
<td>77.7</td>
<td></td>
</tr>
<tr>
<td>With &quot;D3&quot;</td>
<td>kg</td>
<td>+0.5 in addition</td>
<td></td>
</tr>
<tr>
<td>Sine test according to DIN EN 60068-2-6:2008</td>
<td></td>
<td>10 cycles, 10...2000...10 Hz with logarithmic frequency changing speed of 1 oct./min., 5 to 57 Hz, amplitude 1.5 mm (p-p), 57 to 2000 Hz, amplitude 10 g, 3 axes</td>
<td></td>
</tr>
<tr>
<td>Random test according to DIN EN 60068-2-64:2009</td>
<td></td>
<td>20...2000 Hz, amplitude 0.05 g²/Hz (10 gRMS) 3 axes, 30 min testing time per axis</td>
<td></td>
</tr>
<tr>
<td>Shock test according to DIN EN 60068-2-27:2010</td>
<td></td>
<td>Half sine 15 g/11 ms, 3 times in positive/3 times in negative direction per axis, 3 axes</td>
<td></td>
</tr>
<tr>
<td>Humid heat, cyclic according to DIN EN 60068-2-30:2006</td>
<td></td>
<td>Variant 2 +25 °C to +55 °C, 90% to 97% relative humidity, 2 cycles at 24 hours each</td>
<td></td>
</tr>
</tbody>
</table>
Technical data (for applications outside these parameters, please consult us!)

**hydraulic** (measured with HLP46, $\theta_{oil} = 40 \, ^\circ C \pm 5 \, ^\circ C$ and $p = 100$ bar)

<table>
<thead>
<tr>
<th>Size</th>
<th>Operating pressure</th>
<th>Return flow pressure</th>
<th>Flow of the main valve</th>
<th>Pilot flow at ports X and Y</th>
<th>Pilot volume for switching process 0 → 100%</th>
<th>Hydraulic fluid temperature range</th>
<th>Viscosity range</th>
<th>Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)</th>
<th>Hysteresis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External pilot oil supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pilot control valve</td>
<td>Main valve</td>
</tr>
<tr>
<td></td>
<td>Internal pilot oil supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 18/16/13 1)</td>
<td>Class 20/18/15 1)</td>
</tr>
</tbody>
</table>

1) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

For the selection of the filters, see [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter)

### Hydraulic fluid

<table>
<thead>
<tr>
<th>Classification</th>
<th>Suitable sealing materials</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils and related hydrocarbons</td>
<td>HL, HLP</td>
<td>NBR, FKM</td>
</tr>
<tr>
<td>Flame-resistant – containing water</td>
<td>HFC (Fuchs HYDROTHERM 46M, Petrofer Ultra Safe 620)</td>
<td>NBR</td>
</tr>
</tbody>
</table>

---

### Important information on hydraulic fluids!

- For more information and data on the use of other hydraulic fluids refer to data sheet 90220 or contact us!
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.)!
- The flash point of the process and operating medium used must be 40 K greater than the maximum solenoid surface temperature.

- **Flame-resistant – containing water**: The maximum pressure differential per control edge is 175 bar. Pressure pre-loading at the tank port > 20% of the pressure differential; otherwise, increased cavitation.
- Life cycle as compared to operation with mineral oil HL, HLP 50% to 100%
Technical data (for applications outside these parameters, please consult us!)

**electric**

<table>
<thead>
<tr>
<th></th>
<th>.WRZ ¹)</th>
<th>.WRZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage type</td>
<td>Direct voltage</td>
<td></td>
</tr>
<tr>
<td>Command value overlap</td>
<td>% 15</td>
<td></td>
</tr>
<tr>
<td>Maximum current</td>
<td>A 1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Solenoid coil resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Cold value at 20 °C</td>
<td>Ω 4.8</td>
<td>2</td>
</tr>
<tr>
<td>– Maximum hot value</td>
<td>Ω 7.2</td>
<td>3</td>
</tr>
<tr>
<td>Duty cycle</td>
<td>% 100</td>
<td></td>
</tr>
<tr>
<td>Maximum coil temperature</td>
<td>°C 150</td>
<td></td>
</tr>
<tr>
<td>Protection class of the valve</td>
<td>IP65 with mating connectors mounted and locked</td>
<td></td>
</tr>
</tbody>
</table>

**Control electronics**

**Type 4WRZ**

- Digital amplifier in Euro-card format ²) VT-VSPD-1-2X/... according to data sheet 30523
- Analog amplifier in Euro-card format ²) with 1 ramp time VT-VSPA2-1-2X/V0/T1, according to data sheet 30110
- Analog amplifier in Euro-card format ²) with 5 ramp times VT-VSPA2-1-2X/V0/T5, according to data sheet 30110
- Analog module amplifier ²) VT-11118-1X/... according to data sheet 30218

**Type 4WRZE**

- Analog command value module ²) VT-SWMA-1-1X/... according to data sheet 29902
- Analog command value module ²) VT-SWMAK-1-1X/... according to data sheet 29903
- Digital command value card ²) VT-HACD-1-1X/... according to data sheet 30143
- Analog command value card ²) VT-SWKA-1-1X/... according to data sheet 30255

**Current consumption**

<table>
<thead>
<tr>
<th>I_max</th>
<th>A 1.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Impulse current</td>
<td>A 3</td>
</tr>
</tbody>
</table>

**Command value signal**

- Voltage input "A1" | V ±10 |
- Current input "F1" | mA 4 to 20 |

¹) With Bosch Rexroth AG control electronics
²) Separate order
³) Due to the temperatures occurring at the surfaces of the solenoid coils, the European standards ISO 13732-1 and EN 982 need to be adhered to.
Electrical connection

For type .WRZ... (for external electronics – not with version "J" = seawater-resistant)
For mating connectors, see page 27

For type .WRZE... (for external electronics – with version "J" = seawater-resistant)
For mating connectors, see page 27

<table>
<thead>
<tr>
<th>Connector pin assignment</th>
<th>Contact</th>
<th>Signal with A1</th>
<th>Signal at F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>A</td>
<td>24 VDC (ur(t) = 19.4 to 35 V); ( I_{\text{max}} = 2 \text{ A} )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>0 V</td>
<td></td>
</tr>
<tr>
<td>Reference (actual value)</td>
<td>C</td>
<td>Cannot be used (^1)</td>
<td></td>
</tr>
<tr>
<td>Differential amplifier input</td>
<td>D</td>
<td>±10 V; ( R_e &gt; 50 \text{ k}\Omega ); ( 4 \text{ to } 20 \text{ mA}; ( R_e &gt; 100 \text{ \Omega} )</td>
<td></td>
</tr>
<tr>
<td>(Command value)</td>
<td>E</td>
<td>Command value reference potential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>Cannot be used (^1)</td>
<td></td>
</tr>
<tr>
<td>Protective grounding conductor</td>
<td>PE</td>
<td>Connected to cooling element and valve housing</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Contacts C and F must not be connected!

Command value: A positive command value (0 to 10 V or 12 to 20 mA) at D and a reference potential at E result in a flow from P to A and B to T.
A negative command value (0 to –10 V or 12 to 4 mA) at D and a reference potential at E result in a flow from P to B and A to T.
If the valve and the solenoid are on side "a" (control spool variants EA and W6A), a positive command value at D and a reference potential at E result in flow from P to B and A to T.

Connection cable: Recommendation: – Up to 25 m cable length, type LiYCY 5 x 0.75 mm\(^2\)
– Up to 50 m 25 m cable length, type LiYCY 5 x 1.0 mm\(^2\)
External diameter 6.5 to 11 mm
Only install the shield on the supply side on the protective grounding conductor.
Block diagram of the integrated electronics (OBE) for type WRZE

<table>
<thead>
<tr>
<th>Interface</th>
<th>Integrated electronics (OBE)</th>
<th>Valve</th>
</tr>
</thead>
</table>

Supply voltage: 24 V
GND
Protective grounding conductor 1), 2)

Command value
Reference potential

Differential amplifier
Ramp generator 3)
Summing device
Step function generator
Locking
Output stage 4)
Output stage 5)

Power supply unit

1) Port PE is connected to the cooling element and the valve housing
2) The protective grounding conductor is screwed to the valve housing and cover
3) Ramp can be set from 0 to 2.5 s from the outside, identical for $T_{up}$ and $T_{down}$
4) The output stages are current-controlled

---

---
**Characteristic curves size 10** (control spool "E, W6-, EA, W6A" as well as HLP46, $\theta_{\text{oil}} = 40 ^\circ \text{C} \pm 5 ^\circ \text{C}$ and $p = 100$ bar)

25 l/min rated flow at 10 bar valve pressure differential

<table>
<thead>
<tr>
<th>Stroke in %</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow in l/min</td>
<td>0</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\Delta p$</th>
<th>10 bar, constant</th>
<th>20 bar, constant</th>
<th>30 bar, constant</th>
<th>50 bar, constant</th>
<th>100 bar, constant</th>
</tr>
</thead>
</table>

50 l/min rated flow at 10 bar valve pressure differential

<table>
<thead>
<tr>
<th>Stroke in %</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow in l/min</td>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td>125</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\Delta p$</th>
<th>10 bar, constant</th>
<th>20 bar, constant</th>
<th>30 bar, constant</th>
<th>50 bar, constant</th>
<th>100 bar, constant</th>
</tr>
</thead>
</table>

85 l/min rated flow at 10 bar valve pressure differential

<table>
<thead>
<tr>
<th>Stroke in %</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow in l/min</td>
<td>0</td>
<td>30</td>
<td>60</td>
<td>90</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\Delta p$</th>
<th>10 bar, constant</th>
<th>20 bar, constant</th>
<th>30 bar, constant</th>
<th>50 bar, constant</th>
<th>100 bar, constant</th>
</tr>
</thead>
</table>

$\Delta p$ = valve pressure differential according to DIN 24311 (inlet pressure $p_P$ minus load pressure $p_L$ minus return flow pressure $p_T$)

Transition functions with stepped, electric input signals, measured at $p_{\text{st}} = 50$ bar

**Type 4WRZ...**

<table>
<thead>
<tr>
<th>Signal change in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke in %</td>
</tr>
<tr>
<td>Time in ms</td>
</tr>
</tbody>
</table>

**Type 4WRZE...**

<table>
<thead>
<tr>
<th>Signal change in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke in %</td>
</tr>
<tr>
<td>Time in ms</td>
</tr>
</tbody>
</table>
Characteristic curves size 16 (control spool "E, W6-, EA, W6A" as well as HLP46, $\theta_{oil} = 40 ^\circ C \pm 5 ^\circ C$ and $p = 100$ bar)

100 l/min rated flow at 10 bar valve pressure differential

$\Delta p = 10$ bar, constant
1. $\Delta p = 20$ bar, constant
2. $\Delta p = 30$ bar, constant
3. $\Delta p = 50$ bar, constant
4. $\Delta p = 100$ bar, constant

125 l/min rated flow at 10 bar valve pressure differential

$\Delta p = 10$ bar, constant
1. $\Delta p = 20$ bar, constant
2. $\Delta p = 30$ bar, constant
3. $\Delta p = 50$ bar, constant
4. $\Delta p = 100$ bar, constant

150 l/min rated flow at 10 bar valve pressure differential

$\Delta p = 10$ bar, constant
1. $\Delta p = 20$ bar, constant
2. $\Delta p = 30$ bar, constant
3. $\Delta p = 50$ bar, constant
4. $\Delta p = 100$ bar, constant

180 l/min rated flow at 10 bar valve pressure differential

$\Delta p = 10$ bar, constant
1. $\Delta p = 20$ bar, constant
2. $\Delta p = 30$ bar, constant
3. $\Delta p = 50$ bar, constant
4. $\Delta p = 100$ bar, constant

$\Delta p =$ valve pressure differential according to DIN 24311 (inlet pressure $p_\text{i}$ minus load pressure $p_\text{l}$ minus return flow pressure $p_\text{r}$)
Characteristic curves size 16 (control spool "E, W6-, EA, W6A" as well as HLP46, \(\vartheta_{\text{oil}} = 40 \, ^\circ\text{C} \pm 5 \, ^\circ\text{C}\) and \(p = 100 \, \text{bar}\))

Transition functions with stepped, electric input signals, measured at \(p_{\text{st}} = 50 \, \text{bar}\)

**Type 4WRZ...**

![Graph showing transition functions for Type 4WRZ](image)

**Type 4WRZE...**

![Graph showing transition functions for Type 4WRZE](image)
Characteristic curves size 25 (control spool "E, W6-, EA, W6A" as well as HLP46, $\theta_{oil} = 40 \, ^\circ C \pm 5 \, ^\circ C$ and $p = 100 \, \text{bar}$)

220 l/min rated flow at 10 bar valve pressure differential

325 l/min rated flow at 10 bar valve pressure differential

$\Delta p =$ valve pressure differential according to DIN 24311 (inlet pressure $p_P$ minus load pressure $p_L$ minus return flow pressure $p_T$)

Transition functions with stepped, electric input signals, measured at $p_{sr} = 50 \, \text{bar}$

Type 4WRZ...

Type 4WRZE...
Characteristic curves size 32 (control spool “E, W6-, EA, W6A” as well as HLP46, $\theta_{oil} = 40 \, ^\circ C \pm 5 \, ^\circ C$ and $p = 100 \, \text{bar}$)

360 l/min rated flow at 10 bar valve pressure differential

520 l/min rated flow at 10 bar valve pressure differential

$\Delta p$ = valve pressure differential according to DIN 24311 (inlet pressure $p_P$ minus load pressure $p_L$ minus return flow pressure $p_T$)

Transition functions with stepped, electric input signals, measured at $p_{St} = 50 \, \text{bar}$

Type 4WRZ...

Type 4WRZE...
Characteristic curves size 52 (control spool "E, W6-, EA, W6A" as well as HLP46, \( \theta_{\text{oil}} = 40\, ^\circ\text{C} \pm 5\, ^\circ\text{C} \) and \( p = 100\, \text{bar} \))

1000 l/min rated flow at 10 bar valve pressure differential

\[ \Delta p = \text{valve pressure differential according to DIN 24311 (inlet pressure } p_P \text{ minus load pressure } p_L \text{ minus return flow pressure } p_T) \]

Transition functions with stepped, electric input signals, measured at \( p_{\text{es}} = 50\, \text{bar} \)

**Type .WRZ...**

<table>
<thead>
<tr>
<th>Signal change in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
</tr>
<tr>
<td>75</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time in ms →</th>
<th>Stroke in % →</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>200</td>
<td>25</td>
</tr>
<tr>
<td>600</td>
<td>75</td>
</tr>
<tr>
<td>1000</td>
<td>100</td>
</tr>
</tbody>
</table>

**Type .WRZE...**

<table>
<thead>
<tr>
<th>Signal change in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
</tr>
<tr>
<td>75</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time in ms →</th>
<th>Stroke in % →</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>200</td>
<td>25</td>
</tr>
<tr>
<td>600</td>
<td>75</td>
</tr>
<tr>
<td>1000</td>
<td>100</td>
</tr>
</tbody>
</table>

1. \( \Delta p = 10\, \text{bar}, \text{constant} \)
2. \( \Delta p = 20\, \text{bar}, \text{constant} \)
3. \( \Delta p = 30\, \text{bar}, \text{constant} \)
4. \( \Delta p = 50\, \text{bar}, \text{constant} \)
5. \( \Delta p = 100\, \text{bar}, \text{constant} \)
**Dimensions:** Size 10 (dimensions in mm)

1. **Main valve**
2. **Pilot control valve**
3. **Dimension for version “4WRZ...” (not seawater-resistant)**
4. **Dimension for version “4WRZE...”**
5. **Proportional solenoid “a”**
6. **Proportional solenoid “b”**
7. **Mating connector “A”, separate order, see page 27**
8. **Mating connector “B”, separate order, see page 27**
9. **Mating connector, separate order, see page 27**
10. **Concealed manual override “N9”**
11. **Plug screw for valves with one solenoid**
12. **Name plate for pilot control valve**
13. **Name plate for main valve**
14. **Integrated electronics (OBE)**
15. **Pressure reducing valve “D3”**
16. **Identical seal rings for ports A, B, P, T, and T1**
17. **Identical seal rings for ports X and Y**
18. **Space required to remove the mating connector**
19. **Diversion plate (type 4WRH...)**
20. **Machined installation surface, porting pattern according to ISO 4401-05-05-0-05, ports X and Y as required**

For subplates and valve mounting screws, see page 27.
Dimensions: Size 16 (dimensions in mm)

1 Main valve
2 Pilot control valve
3 Dimension for version "4WRZ..." (not seawater-resistant)
4 Dimension for version "4WRZE..."
5 Proportional solenoid "a"
6 Proportional solenoid "b"
7 Mating connector "A", separate order, see page 27
8 Mating connector "B", separate order, see page 27
9 Mating connector, separate order, see page 27
10 Concealed manual override "N9"
11 Plug screw for valves with one solenoid
12 Name plate for pilot control valve
13 Name plate for main valve
14 Integrated electronics (OBE)
15 Pressure reducing valve "D3"
16 Identical seal rings for ports A, B, P, and T
17 Identical seal rings for ports X and Y
18 Space required to remove the mating connector
19 Diversion plate (type 4WRH...)
20 Machined installation surface, porting pattern according to ISO 4401-07-0-0-05, ports X and Y as required deviating from the standard: Ports A, B, P, T Ø20 mm.
21 Locking pin

For subplates and valve mounting screws, see page 27
**Dimensions:** Size 25 (dimensions in mm)

1. Main valve
2. Pilot control valve
3. Dimension for version "4WRZ..." (not seawater-resistant)
4. Dimension for version "4WRZE..."
5. Proportional solenoid "a"
6. Proportional solenoid "b"
7. Mating connector "A", separate order, see page 27
8. Mating connector "B", separate order, see page 27
9. Mating connector, separate order, see page 27
10. Concealed manual override "N9"
11. Plug screw for valves with one solenoid
12. Name plate for pilot control valve
13. Name plate for main valve
14. Integrated electronics (OBE)
15. Pressure reducing valve "D3"
16. Identical seal rings for ports A, B, P, and T
17. Identical seal rings for ports X and Y
18. Space required for removing the mating connector
19. Diversion plate (type 4WRH...)
20. Machined installation surface, porting pattern according to ISO 4401-08-08-0-05, ports X and Y as required
21. Locking pin

For subplates and valve mounting screws, see page 27
**Dimensions:** Size 32 (dimensions in mm)

1. Main valve
2. Pilot control valve
3. Dimension for version "4WRZ..." (not seawater-resistant)
4. Dimension for version "4WRZE..."
5. Proportional solenoid "a"
6. Proportional solenoid "b"
7. Mating connector "A", separate order, see page 27
8. Mating connector "B", separate order, see page 27
9. Mating connector, separate order, see page 27
10. Concealed manual override "N9"
11. Plug screw for valves with one solenoid
12. Name plate for pilot control valve
13. Name plate for main valve
14. Integrated electronics (OBE)
15. Pressure reducing valve "D3"
16. Identical seal rings for ports A, B, P, and T
17. Identical seal rings for ports X and Y
18. Space required for removing the mating connector
19. Diversion plate (type 4WRH...)
20. Machined installation surface, porting pattern according to ISO 4401-10-09-0-05, ports X and Y as required deviating from the standard:
   - Ports A, B, T and P Ø38 mm.
21. Locking pin

For subplates and valve mounting screws, see page 27
**Dimensions:** Subplate mounting size 52 (dimensions in mm)

1. Main valve
2. Pilot control valve
3. Dimension for version “4WRZ...”
   (not seawater-resistant)
4. Dimension for version “4WRZE...”
5. Proportional solenoid “a”
6. Proportional solenoid “b”
7. Mating connector “A”
8. Mating connector “B”
9. Mating connector, separate order, see page 27
10. Concealed manual override “N9”
11. Plug screw for valves with one solenoid
12. Name plate for pilot control valve
13. Name plate for main valve
14. Integrated electronics (OBE)
15. Identical seal rings for ports A, B, P, T, and R
16. Identical seal rings for ports X, Y, and L
17. Space required to remove the mating connector
18. Adapter plate
19. Pressure reducing valve “D3”
20. Diversion plate (type 4WRH...)
21. Machined installation surface, porting pattern, ports X and Y as required
22. Transport aid

For subplates and valve mounting screws, see page 27

---

For subplates and valve mounting screws, see page 27
Dimensions: Flange connection size 52 (dimensions in mm)

1 Main valve
2 Pilot control valve
3 Dimension for version "4WRZ..." (not seawater-resistant)
4 Dimension for version "4WRZE..."
5 Proportional solenoid "a"
6 Proportional solenoid "b"
7 Mating connector "A", separate order, see page 27
8 Mating connector "B", separate order, see page 27
9 Mating connector, separate order, see page 27
10 Concealed manual override "N9"
11 Plug screw for valves with one solenoid
12 Name plate for pilot control valve
13 Name plate for main valve
14 Integrated electronics (OBE)
15 Space required to remove the mating connector
16 Adapter plate
17 Pressure reducing valve "D3"
18 Diversion plate (type 4WRH...)
19 Transport aid

For subplates and valve mounting screws, see page 27
## Accessories (not included in the scope of delivery)

### Mating connectors

<table>
<thead>
<tr>
<th>Mating connector for 4WRZ</th>
<th>DIN EN 175301-803</th>
<th>Solenoid &quot;a&quot;, grey</th>
<th>Solenoid &quot;b&quot;, black</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>R901017010</td>
<td>R901017011</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mating connector for 4WRZE and 4WRZE...J...</th>
<th>DIN EN 175201-804</th>
<th>e.g. R900021267 (plastic)</th>
<th>e.g. R900223890 (metal)</th>
<th></th>
</tr>
</thead>
</table>

### Hexagon socket head cap screws

<table>
<thead>
<tr>
<th>Size 10</th>
<th>4x ISO 4762 - M6 x 45 - 10.9-flZn-240h-L Tightening torque $M_A = 13.5$ Nm ±10% or 4x ISO 4762 - M6 x 45 - 10.9 Tightening torque $M_A = 15.5$ Nm ±10%</th>
<th>R913000258</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 16</td>
<td>2x ISO 4762 - M6 x 60 - 10.9-flZn-240h-L Tightening torque $M_A = 12.2$ Nm ±10% or 4x ISO 4762 - M10 x 60 - 10.9-flZn-240h-L Tightening torque $M_A = 58$ Nm ±20% or 2x ISO 4762 - M6 x 60 - 10.9 Tightening torque $M_A = 15.5$ Nm ±10% or 4x ISO 4762 - M10 x 60 - 10.9 Tightening torque $M_A = 75$ Nm ±20%</td>
<td>R913000115</td>
</tr>
<tr>
<td>Size 25</td>
<td>6x ISO 4762 - M12 x 60 - 10.9-flZn-240h-L Tightening torque $M_A = 100$ Nm ±20% or 6x ISO 4762 - M12 x 60 - 10.9 Tightening torque $M_A = 130$ Nm ±20%</td>
<td>R913000121</td>
</tr>
<tr>
<td>Size 32</td>
<td>6x ISO 4762 - M20 x 60 - 10.9-flZn-240h-L Tightening torque $M_A = 340$ Nm ±20% or 6x ISO 4762 - M20 x 60 - 10.9 Tightening torque $M_A = 430$ Nm ±20%</td>
<td>R901035246</td>
</tr>
</tbody>
</table>

**Size 52**

With a steel installation surface:

7x ISO 4762 - M20 x 90 - 10.9-flZn-240h-L
Tightening torque $M_A = 465$ Nm ±20% or 4x ISO 4762 - M12 x 70 - 10.9 Tightening torque $M_A = 100$ Nm ±20% or 4x ISO 4762 - M12 x 70 - 10.9 Tightening torque $M_A = 130$ Nm ±20%

**Size 52**

(4WRZ52)

When using type 4WRZ..., use the following throttle inserts in channel A and B of the pilot control valve:

<table>
<thead>
<tr>
<th>Subplates/connection flanges</th>
<th>Data sheet</th>
<th>Throttle insert</th>
<th>$\phi$ in mm</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 10</td>
<td>45054</td>
<td>Size 10</td>
<td>1.8</td>
<td>R900158510</td>
</tr>
<tr>
<td>Size 16</td>
<td>45056</td>
<td>Size 16</td>
<td>2.0</td>
<td>R900158547</td>
</tr>
<tr>
<td>Size 25</td>
<td>45058</td>
<td>Size 25</td>
<td>2.8</td>
<td>R900157948</td>
</tr>
<tr>
<td>Size 32</td>
<td>45060</td>
<td>Size 32</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Size 52</td>
<td>45501</td>
<td>Size 52</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>