**Features:**

- Pilot operated 2-stage proportional directional valve for the control of direction and flow rate
- Proportional solenoid operation, with central thread and removable coil
- For sub-plate mounting:
  - Porting pattern to DIN 24 340 part 2 form A
  - ISO 4401 and CETOP-RP121H
  - NFPA T3.5.1M R1 and ANSI B93.7 D 05, D 07, D 08, D 10 (4WRZ…, sizes 10 to 32)
  - Porting pattern to DIN 24 340 part 2 form B (5WRZ…, size 52)

Subplates to data sheet RA 45 054 to RA 45 060 (separate order), see pages 17 to 20

- Manual override, optional
- Spring centered control spool
- Models WRZE and WRZEB with integrated control electronics
- External control electronics for model WRZ:
  - electrical amplifier model VT-VSPA2-50-1X/… in the Eurocard format (subject to separate order), see pages 8 and 24

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**Symbols**

Example: 4WRZE(B)…
1 Pilot valve with integrated control electronics (comprehensive)
2 Pressure reducing valve D3 (optional)
3 Main valve

Example: 4WRH… (comprehensive)

Example: 4WRZE(B)… (simplified)
Pilot valve model 3DREP 6...

The pilot valve is a proportional solenoid operated 3-way pressure reducing valve. It is used to convert an electrical input signal into a proportional pressure output signal and is used on all 4WRZ... and 5WRZ... valves.

The proportional solenoids are controllable DC wet pin solenoids with central thread and removable coil. The solenoid is optionally controlled by external control electronics (model .WRZ) or via the integrated control electronics (model .WRZE or .WRZEB).

Functional description:
- With the solenoids (5 and 6) in the de-energized condition the control spool (2) is held in the center position by springs
- Direct actuation of the control spool (2) by energizing one of the proportional solenoids, e.g. solenoid “a” energized (5)
  → movement of the pressure measuring spool (3) and control spool (2) to the left in proportion to the electrical input signal
  → the connection from P to B and A to T is via orifice model cross-sections with progressive flow characteristic
- De-energization of the solenoids (5)
  → the control spool (2) is returned to the center position via the springs

In the center position ports A and B are open to T, therefore, the pressure fluid can flow unhindered to the reservoir.

Design:
The valve basically is comprised of:
- housing (1) with connection interface
- control spool (2) with pressure measuring spools (3 and 4)
- solenoids (5 and 6) with central thread
- optionally with integrated electronics (7)

Model 3DREP 6...

Model 3DREPE 6...

Valve with 2 spool position
(Modes 3DREP...A... or 3DREP...B...)

The function of this version of the valve is basically the same as that of the valve with 3 spool positions. The 2 spool position valves are however only fitted with solenoid “a” (5) or solenoid “b” (6). A plug (8) is fitted in place of the 2nd proportional solenoid.

Note:
Draining of the tank line should be prevented. A suitable check valve can be fitted in the tank line [approx. 30 PSI (2 bar)].
Proportional valves with external pilot operation models 4WRH... and 5WRH...
The model .WRH... valves are pilot operated proportional directional valves for external operation via pressure control valves.

Design:
The valve basically comprises of:
- Main valve (10) with main spool (11) and centering spring (12)
- Inter-connection plate (16)

Functional description:
- The inter-connection plate (16) connects the pilot connection A with connection T(Y) and pilot connection B with P(X)
- The pilot pressure at the main valve must not exceed 360 PSI (25 bar) for sizes 10–32 and 230 PSI (16 bar) for size 52!

→ for movement of the main spool (2) to the right, pilot oil flows via the pilot valve (9) into the pressure chamber (13) and moves the main spool (11) in proportion to the electrical input signal
→ the connection from P to A and from B to T is via orifice cross-sections with progressive flow characteristics
- The pilot oil supply to the pilot valve is internal via port P or external via port X
- De-energization of the solenoids (6)
→ the control spool (2) and pilot spool (11) are moved back into their center positions
- Flow which is dependent of the switched position is either from P to A and B to T or P to B and A to R.

An optional manual override (14 and 15), makes it possible to move the pilot spool (2) without energizing the solenoids

⚠️ Attention!
Unintended use of the manual override can lead to uncontrolled machine movements!
Hydraulic operation = H
Electro-hydraulic operation = Z

**Only for WRZ:**
- without integrated control electronics = No code
- with integrated control electronics (standard electronics) = E
- with integrated control electronics (simple electronics) = EB

| Nominal size 10 | 10 |
| Nominal size 16 | 16 |
| Nominal size 25 | 25 |
| Nominal size 32 | 32 |
| Nominal size 52 | 52 |

**Symbols**

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>T</td>
<td>P</td>
<td>T</td>
</tr>
</tbody>
</table>

With symbols E1- and W6-:
- P to A: \( q_{\text{max}} \)
- B to T: \( q_{\text{V}}/2 \)

With symbols E3- and W9-:
- P to A: \( q_{\text{max}} \)
- B to T: closed
- P to B: \( q_{\text{V}}/2 \)
- A to T: \( q_{\text{V}}_{\text{max}} \)

Note: With spools W6-, W8-, W9-, W6A, W6B in their neutral position "0", there is a connection from A to T and B to T with an opening of less than 2% of the relevant cross-section.

**Electrical connection**

- only for WRZ:
  - K4 = 1, 3) with component plug to DIN 43 650-AM2
  - without plug-in connector
  - plug-in connectors – separate order
    - side a (Z4) RR00 074 683
    - side b (Z4) RR00 074 684
    - side a (Z4) RR00 004 823
    - side b (Z4) RR00 011 039

For WRZE and WRZEB:
- K31 = 1, 3) with component plug to E DIN 43 563-AM6-3
- without plug-in connector
- plug-in connectors – separate order
  - no. RR00 021 267

**Pilot oil feed and drain**

- without special protection
- seawater resistant
- without hand override
- with concealed hand override

**Electronic control supply voltage**

- G24 = 1) 24V DC (standard version)
- 6E = 1) proportional solenoid with removable coil

**Nominal flow in GPM (L/min) with a 145 PSI (10 bar) valve pressure drop**

| 25 | 50 | 85 |
| 100 | 150 |
| 220 | 325 |
| 360 | 520 |
| 1000 | 1600 |

1) Omitted for 4WRH and 4WRZ without pilot valve
2) With version "J"→"N" instead of "N9"
3) With version "J" = seawater resistant only "K31"
### Ordering details for 5WRZ 52 and 5WRH 52; sub-plate mounting

| 5WR_ | 52 | -7X/ | | | V |
|------|----|------|---|---|

**Hydraulic operation**
- \( = H \)

**Electro-hydraulic operation**
- \( = Z \)

**Only for WRZ:**
- **without** integrated control electronics = **no code**
- **with** integrated control electronics (standard electronics) = **E**
- **with** integrated control electronics (simple electronics) = **EB**

**Nominal size 52**
- = **52**

#### Symbols

<table>
<thead>
<tr>
<th>a</th>
<th>0</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>P</td>
<td>T</td>
</tr>
</tbody>
</table>

- = **E**
- = **E1-**
- = **E3-**
- = **W6-**
- = **W8-**
- = **W9-**
- = **W6A**
- = **EB**
- = **W6B**

With symbols **E1-** and **W8-**:
- P to A: \( q_v = 264 \text{ GPM (1000 L/min)} \)
- B to T: \( q_v = 132 \text{ GPM (500 L/min)} \)
- P to B: \( q_v = 132 \text{ GPM (500 L/min)} \)
- A to R: \( q_v = 264 \text{ GPM (1000 L/min)} \)

With symbols **E3-** and **W9-**:
- P to A: \( q_v = 264 \text{ GPM (1000 L/min)} \)
- B to T: \( q_v = 132 \text{ GPM (500 L/min)} \)
- P to B: \( q_v = 264 \text{ GPM (1000 L/min)} \)
- A to R: \( q_v = 264 \text{ GPM (1000 L/min)} \)

(Regeneratrive circuit, base of spool at port A)

**Note:**
- Pilot oil feed and discharge only possible externally
- With spools W6-, W8-, W9-, W6A, W6B in their neutral position "0", there is a connection from A to T and B to T with an opening of less than 2% of the relevant cross-section.

---

**Further details in clear text**

- \( V = \) FPM seals, suitable for mineral oil (HL, HLP) to DIN 51 52 52

- **No code** = **without** pressure reducing valve
- \( D3 = \) **with** pressure reducing valve, model ZDR 6 DP0-4X/40YM-W80 (fixed setting)

**For 4WRZE and WRZEB:**
- **A1** = command value input ± 10 V
- **Only for 4WRZE:**
- **F1** = command value input 4 to 20 mA

**Electrical connection only for WRZ:**
- **K4** = with component plug to DIN 43 650-AM2
- **without** plug-in connector

- **plug-in connectors – separate order**
  - side a (Z4) RR00 074 683
  - side b (Z4) RR00 004 823
  - side a (Z45) RR00 011 039
  - side b (Z45) RR00 021 267

**For WRZE and WRZEB:**
- **K31** = with component plug to E DIN 43 563-AM6-3
- **without** plug-in connector

- **plug-in connector – separate order** RR00 021 267

**Electronic control supply voltage**

- **G24** = 24V DC
- **6E** = **proportional solenoid with removable coil**

**Nominal flow in 145 PSI (10 bar) valve pressure drop**

- **1000 =**

- 264 GPM (1000 L/min)

---

1) Omitted for 5WRH and 5WRZ without pilot valve
2) With version "J" instead of "N9"
3) With version "J" = seawater resistant only "K31"
<table>
<thead>
<tr>
<th>Model 4WRZ...</th>
<th>Model 4WRZ(B)...</th>
<th>Model 4WRZ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B</td>
<td>A B</td>
<td>A B</td>
</tr>
<tr>
<td>X = external</td>
<td>X = external</td>
<td>X = external</td>
</tr>
<tr>
<td>Y = external</td>
<td>Y = external</td>
<td>Y = external</td>
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</table>

<table>
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<th>Model 5WRZ(B)...</th>
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</thead>
<tbody>
<tr>
<td>A B</td>
<td>A B</td>
<td>A B</td>
</tr>
<tr>
<td>X = external</td>
<td>X = external</td>
<td>X = external</td>
</tr>
<tr>
<td>Y = external</td>
<td>Y = external</td>
<td>Y = external</td>
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</table>

<table>
<thead>
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<th>Model 4WRZE(B)...</th>
<th>Model 4WRZE...</th>
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</thead>
<tbody>
<tr>
<td>A B</td>
<td>A B</td>
<td>A B</td>
</tr>
<tr>
<td>X = external</td>
<td>X = external</td>
<td>X = external</td>
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<tr>
<td>Y = external</td>
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<th>Model 5WRZE(B)...</th>
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<tbody>
<tr>
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<td>A B</td>
<td>A B</td>
</tr>
<tr>
<td>X = external</td>
<td>X = external</td>
<td>X = external</td>
</tr>
<tr>
<td>Y = external</td>
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<th>Model 4WRH...</th>
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<td>A B</td>
<td>A B</td>
</tr>
<tr>
<td>X = external</td>
<td>X = external</td>
<td>X = external</td>
</tr>
<tr>
<td>Y = external</td>
<td>Y = external</td>
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</table>
## General

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<th>WRZ</th>
<th>WRZE</th>
<th>WRZEB</th>
</tr>
</thead>
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<tr>
<td>Installation position</td>
<td>optional, preferably horizontal (for commissioning guidelines see RA 07 800)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>°F (°C)</td>
<td>–4 to +176 (–20 to +80)</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>°F (°C)</td>
<td>–4 to +158 (–20 to +70)</td>
<td>–4 to +122 (–20 to +50)</td>
</tr>
<tr>
<td>Spool symbol</td>
<td>E, E1-, E3-, W6-, W8-, W9-</td>
<td>EA, W6A, EB, W6B</td>
<td></td>
</tr>
</tbody>
</table>

### Hydraulic (measured at $v = 190$ SUS ($41$ mm²/s) and $t = 122$ °F ($50$ °C))

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>Size</th>
<th>10</th>
<th>16</th>
<th>25</th>
<th>32</th>
<th>52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Pilot valve, Pilot oil feed external</td>
<td>PSI (bar)</td>
<td>435 to 1450 (30 to 100)</td>
<td>290 to 1450 (20 to 100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Main valve Pilot oil feed internal</td>
<td>PSI (bar)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return line pressure</td>
<td>Port T (port R) (pilot oil drain external)</td>
<td>PSI (bar)</td>
<td>4600 (315)</td>
<td>5100 (350)</td>
<td>5100 (350)</td>
<td>5100 (350)</td>
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<tr>
<td></td>
<td>Port T (pilot oil drain internal)</td>
<td>PSI (bar)</td>
<td>435 (30)</td>
<td>435 (30)</td>
<td>435 (30)</td>
<td>435 (30)</td>
</tr>
<tr>
<td></td>
<td>Port Y</td>
<td>PSI (bar)</td>
<td>435 (30)</td>
<td>435 (30)</td>
<td>435 (30)</td>
<td>435 (30)</td>
</tr>
<tr>
<td>Pilot oil volume for spool movement 0 → 100 %</td>
<td>in³</td>
<td>0.104</td>
<td>0.281</td>
<td>0.61</td>
<td>1.617</td>
<td>3.313</td>
</tr>
<tr>
<td></td>
<td>cm³</td>
<td>(1.7)</td>
<td>(4.6)</td>
<td>(10)</td>
<td>(26.5)</td>
<td>(54.3)</td>
</tr>
<tr>
<td>Pilot oil flow at ports X and Y for stepped form input signals 0 → 100 %</td>
<td>GPM (L/min)</td>
<td>0.214 (3.5)</td>
<td>0.336 (5.5)</td>
<td>0.427 (7)</td>
<td>0.97 (15.9)</td>
<td>0.427 (7)</td>
</tr>
<tr>
<td>Flow through main valve</td>
<td>GPM (L/min)</td>
<td>44.9 (170)</td>
<td>121.5 (460)</td>
<td>230 (870)</td>
<td>423 (1600)</td>
<td>740 (2800)</td>
</tr>
</tbody>
</table>

### Degree of fluid contamination

- Maximum permissible degree of contamination of the fluid is to NAS 1638. Therefore, we recommend a filter with a minimum retention rate of $\beta_5 \geq 75$

| Pilot valve | class 7 | $x = 5$ |
| Main valve | class 9 | $x = 15$ |

### Pressure fluid

- Mineral oil (HL, HLP) to DIN 51 524

### Pressure fluid temperature range

- °F (°C) –4 to +176 (–20 to +80) (preferably +104 to +122 (+40 to +50))

### Viscosity range

- SUS (mm²/s) 97 to 1760 (20 to 380) (preferably 141 to 215 (30 bis 46))

### Hysteresis

- % ≤ 6

### Repeatability

- % ≤ 3
## Technical data (for applications outside these parameters, please consult us!)

### Electrical

<table>
<thead>
<tr>
<th></th>
<th>WRZ</th>
<th>WRZE</th>
<th>WRZEB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exceeds NEMA Class B (IP65)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>analog</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command value signal</td>
<td>V</td>
<td>±10</td>
<td>±10</td>
</tr>
<tr>
<td>Voltage “A1”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current “F1”</td>
<td>mA</td>
<td>4 to 20</td>
<td></td>
</tr>
<tr>
<td>Input impedance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage “A1”</td>
<td>Ω</td>
<td>30K higher</td>
<td>12K higher</td>
</tr>
<tr>
<td>Current “F1”</td>
<td>Ω</td>
<td>100</td>
<td>—</td>
</tr>
<tr>
<td>Command value overlap</td>
<td>%</td>
<td>15</td>
<td>—1</td>
</tr>
<tr>
<td>Max. current</td>
<td>A</td>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Solenoid coil</td>
<td>Cold value at 68 °F (20 °C)</td>
<td>Ω</td>
<td>4.8</td>
</tr>
<tr>
<td>resistance</td>
<td></td>
<td></td>
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<tr>
<td>Max. warm value</td>
<td>Ω</td>
<td>7.2</td>
<td>3</td>
</tr>
<tr>
<td>Duty</td>
<td>%</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Coil temperature</td>
<td>°F (°C)</td>
<td>up to 302 (150)</td>
<td></td>
</tr>
<tr>
<td>Electrical connections</td>
<td></td>
<td>WRZ with component plug to DIN 43 650-AM2 plug-in connector to DIN 43 650-AF2/Pg11 1)</td>
<td>WRZE with component plug to E DIN 43 563-AM6-3 plug-in connector E DIN 43 563-BF6-3/Pg11 1)</td>
</tr>
<tr>
<td>Current requirement</td>
<td>Imax A</td>
<td>—</td>
<td>1.8</td>
</tr>
<tr>
<td>Impulse current</td>
<td>A</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>Control electronics</td>
<td></td>
<td>For WRZ (separate order) Amplifier in Euro-card format – with 1 ramp time VT: VSPA2-50-1X/T1, see page 24 or RA 30 113 – with 5 ramp time VT: VSPA2-50-1X/T5, see page 24 or RA 30 113 Modular design amplifier VT 11 011-1X/..., see page 25 or RA 29 737 For WRZE, WRZEB integrated into the valve, see pages 10 to 11</td>
<td></td>
</tr>
</tbody>
</table>

1) Separate order, see pages 4, 5 and 9

**Note:** For details concerning environmental simulation testing for they are of EMV (electro-magnetic compatibility), climate and mechanical loading see RA 29 115-U (explanation regarding environmental compatibility).
Electrical connections, plug-in connectors  dimensions in inches (millimeters)

For model .WRZ… (without integrated control electronics)

Connection at the component plug

Connection at the plug-in connector

Plug-in connector to DIN 43 650 -AF2/Pg11
Solenoid a, grey, Pg 11 (Z4)
Part no. RR00 074 683
Solenoid b, black, Pg 11 (Z4)
Part no. RR00 074 684
Solenoid a, red-brown, 1/2" NPT (Z45)
Part no. RR00 004 823
Solenoid b, black, 1/2" NPT (Z45)
Part no. RR00 011 039
Refer to RA 08 006 for standard cable assemblies without circuitry.

For model 4WRZE…, 4WRZEB… (with integrated electronics and for version "J" = seawater resistant)

Plug-in connector to E DIN 43 563-BF6-3/Pg11
Subject to separate order under Material no. RR00 021 267
For pin allocation see block circuit diagrams on pages 6 and 7.
Integrated control electronics for model WRZE

Component plug pin allocation

<table>
<thead>
<tr>
<th></th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>24 VDC (19 to 35 VDC)</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>GND (0 V)</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>do not connect (0 V)</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
<td>command value (±10 V / 4 to 20 mA)</td>
</tr>
<tr>
<td>E</td>
<td>E</td>
<td>Reference potential</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>do not connect</td>
</tr>
<tr>
<td>PE</td>
<td></td>
<td>protective ground</td>
</tr>
</tbody>
</table>

Command value: A positive command value (0 to +10 V or 12 to 20 mA) at D and reference potential at E results 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 reference potential at E results in a flow from P to B and A to T.
For valves with 1 solenoid on side A (spool variant EA and W6A) with the reference potential at E and a positive command value at D (4 to 20 mA) results in a flow from P to B and A to T.

Connection cable: Recommended: – up to 80 ft (25 m) cable length stranded 18 AWG (LiYCY 5 x 0.75 mm²)
– up to 160 ft (50 m) cable length stranded 16 AWG (LiYCY 5 x 1.0 mm²)
Outside diameter 0.26 to 0.44 in (6.5 to 11.2 mm)
Only attach shield to earth ground PE on the supply side.

Block circuit diagram/connection allocation for the integrated electronics

1) Output stage current regulated

Protective ground connected to valve housing and cover
Ramp 0 to 5 s can be externally adjusted ($T_{up}$ $T_{down}$)
Clockwise increases ramp time
Integrated control electronics for model WRZEB

**Component plug pin allocation**

**Connection model K31**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Power supply 24 V DC (19 to 35 VDC)</td>
</tr>
<tr>
<td>B</td>
<td>GND (0 V)</td>
</tr>
<tr>
<td>C</td>
<td>do not connect (0 V)</td>
</tr>
<tr>
<td>D</td>
<td>Differential input command value (± 10 V / 4 to 20 mA)</td>
</tr>
<tr>
<td>E</td>
<td>Reference potential</td>
</tr>
<tr>
<td>F</td>
<td>do not connect</td>
</tr>
<tr>
<td>PE</td>
<td>protective ground</td>
</tr>
</tbody>
</table>

**Command value:** A positive command value at D and reference potential at E results in a flow from P to A and B to T. A negative command value at D and reference potential at E results in a flow from P to B and A to T. For valves with 1 solenoid on side A (spool variant EA and W6A) with the reference potential at E and a positive command value at D results in a flow from P to B and A to T.

**Connection cable:** Recommended: – up to 80 ft (25 m) cable length stranded 18 AWG (LiYCY 6 x 0.75 mm²) – up to 160 ft (50 m) cable length stranded 16 AWG (LiYCY 6 x 1.0 mm²)

Outside diameter 0.26 to 0.44 in (6.5 to 11.2 mm)

Only attach shield to earth ground PE on the supply side.

**Block circuit diagram/connection allocation for the integrated electronics**

---

1) Protective ground connected to valve housing and cover
2) There is no ramp with EB electronics

1) Output stage current regulated
Transient function with a step form electrical input signal

Models 4WRZ... and 4WRZEB

Technical data: measured with spools “E, W6-, EA, W6A, EB, W6B” at \( \nu = 215 \text{ SUS (46 mm}^2/\text{s}) \) and \( t = 104 \text{ °F (40 °C)} \)

\[ \Delta p = \text{valve pressure differential to DIN 24 311 (input pressure minus load pressure and return line pressure)} \]
**Technical data:** measured with spools “E, W6-, EA, W6A, EB, W6B” at \( v = 215 \text{ SUS} \) (46 mm\(^2\)/s) and \( t = 104 \text{ °F} \) (40 °C)

\[ \Delta p = \text{Valve pressure differential to DIN 24 311 (input pressure minus load pressure and return line pressure)} \]
Transverse function with a step form electrical input signal

Models 4WRZ... and 4WRZEB

Model 4WRZE...

Technical data: measured with spools "E, W6-, EA, W6A, EB, W6B" at \( \nu = 215 \text{ SUS} \) (46 \text{ mm}^2/\text{s}) and \( t = 104 \, ^\circ\text{F} \) (40 \text{ °C})

Technical data: measured with spools "E, W6-, EA, W6A, EB, W6B" at \( \nu = 215 \text{ SUS} \) (46 \text{ mm}^2/\text{s}) and \( t = 104 \, ^\circ\text{F} \) (40 \text{ °C})

58.1 GPM (220 L/min) nominal flow with a 145 PSI (10 bar) valve pressure differential
1 \( \Delta p = 145 \text{ PSI} \) (10 bar) constant
2 \( \Delta p = 290 \text{ PSI} \) (20 bar) constant
3 \( \Delta p = 435 \text{ PSI} \) (30 bar) constant
4 \( \Delta p = 725 \text{ PSI} \) (50 bar) constant
5 \( \Delta p = 1450 \text{ PSI} \) (100 bar) constant

85.9 GPM (325 L/min) nominal flow with a 145 PSI (10 bar) valve pressure differential
1 \( \Delta p = 145 \text{ PSI} \) (10 bar) constant
2 \( \Delta p = 290 \text{ PSI} \) (20 bar) constant
3 \( \Delta p = 435 \text{ PSI} \) (30 bar) constant
4 \( \Delta p = 725 \text{ PSI} \) (50 bar) constant
5 \( \Delta p = 1450 \text{ PSI} \) (100 bar) constant

\( \Delta p = \) Valve pressure differential to DIN 24 311 (input pressure minus load pressure and return line pressure)
### Technical data

**Transmitting function with a step form electrical input signal**

#### Size 32

Models 4WRZ... and 4WRZEB

![Graphs showing flow vs. time for models 4WRZ... and 4WRZEB](image)

- **Stroke in %**
- **Time in ms**
- **Signal change in %**

#### Model 4WRZE...

![Graphs showing flow vs. time for model 4WRZE...](image)

- **Stroke in %**
- **Time in ms**
- **Signal change in %**

**Measured at:**

- \( \Delta p = 145 \text{ PSI (10 bar)} \) constant
- \( \Delta p = 290 \text{ PSI (20 bar)} \) constant
- \( \Delta p = 435 \text{ PSI (30 bar)} \) constant
- \( \Delta p = 725 \text{ PSI (50 bar)} \) constant
- \( \Delta p = 1450 \text{ PSI (100 bar)} \) constant

**Technical data:** measured with spools “E, W6-, EA, W6A, EB, W6B” at \( \nu = 215 \text{ SUS (46 mm}^2/\text{s)} \) and \( t = 104 \text{ °F (40 °C)} \)

- **Flow in GPM (L/min):**
  - 95.1 GPM (360 L/min) nominal flow with a 145 PSI (10 bar) valve pressure differential
  1. \( \Delta p = 145 \text{ PSI (10 bar)} \) constant
  2. \( \Delta p = 290 \text{ PSI (20 bar)} \) constant
  3. \( \Delta p = 435 \text{ PSI (30 bar)} \) constant
  4. \( \Delta p = 725 \text{ PSI (50 bar)} \) constant
  5. \( \Delta p = 1450 \text{ PSI (100 bar)} \) constant

- **Flow in GPM (L/min):**
  - 137.4 GPM (520 L/min) nominal flow with a 145 PSI (10 bar) valve pressure differential
  1. \( \Delta p = 145 \text{ PSI (10 bar)} \) constant
  2. \( \Delta p = 290 \text{ PSI (20 bar)} \) constant
  3. \( \Delta p = 435 \text{ PSI (30 bar)} \) constant
  4. \( \Delta p = 725 \text{ PSI (50 bar)} \) constant
  5. \( \Delta p = 1450 \text{ PSI (100 bar)} \) constant

\( \Delta p = \) Valve pressure differential to DIN 24 311 (input pressure minus load pressure and return line pressure)
Technical data: measured with spools “E, W6-, EA, W6A, EB, W6B” at \( v = 215 \text{ SUS} \) (46 \( \text{mm}^2/\text{s} \)) and \( t = 104 \ ^\circ \text{F} \) (40 \( ^\circ \text{C} \)).

264.2 GPM (1000 L/min) nominal flow with a 145 PSI (10 bar) valve pressure differential

1 \( \Delta p = 145 \text{ PSI} \) (10 bar) constant
2 \( \Delta p = 290 \text{ PSI} \) (20 bar) constant
3 \( \Delta p = 435 \text{ PSI} \) (30 bar) constant
4 \( \Delta p = 725 \text{ PSI} \) (50 bar) constant
5 \( \Delta p = 1450 \text{ PSI} \) (100 bar) constant

\( \Delta p = \) Valve pressure differential to DIN 24 311 (input pressure minus load pressure and return line pressure)
Subplates and valve mounting bolts must be ordered separately, see data sheet RA 45 054.

Subplates:
- G 534/05 (3/4” NPT)
- G 535/05 (3/4” NPT)
- G 536/05 (1” NPT)
- G 534/12 (SAE-12; 1-1/16-12) without X and Y
- G 535/12 (SAE-12; 1-1/16-12)
- G 536/12 (SAE-16; 1-5/16-12)

Valve mounting bolts:
- 4) 1/4-20 UNC x 1-3/4” (M6 x 45)
- DIN 912-10.9, Grade 8 or better
- Torque $M_A = 11.4$ lb-ft (15.5 Nm)

1. Main valve
2. Pilot valve
3. Dimension for version “4WRZ...” (not seawater resistant)
4. Dimension for version “4WRZEB...”
5. Dimension for versions “4WRZEB” and “4WRZ...J” (seawater resistant)
6. Proportional solenoid “a”
7. Proportional solenoid “b”
8. Plug-in connector “A,” subject to separate order, see pages 4 and 9
9. Plug-in connector “B,” subject to separate order, see pages 4 and 9
10. Plug-in connector to E-DIN 43 563, subject to separate order, see pages 4 and 9
11.1 Concealed hand override “N9”
11.2 Hand override “N” for seawater resistant version “J”
12. Cover for valve with one solenoid (versions “A” or “B”)
13. Name plate for pilot valve
14. Name plate for main valve
15. Integrated control electronics
16. Pressure reducing valve
17. R-ring (13 x 1.6 x 2 mm); Ports A, B, P, T
18. R-ring (11.18 x 1.6 x 1.78 mm); Ports X, Y
19. Space required to remove plug-in connector
20. Interconnecting plate (model 4WRH...)
21. Machined valve mounting face, connection location to DIN 24 340 form A, ISO 4401, CETOP-RP121H (X, Y as required), NFPA T3.5.1M R1, and ANSI B93.7 D05

Section details see page 23.
Unit dimensions, size 16: dimensions in inches (millimeters)

Section details see page 19.

Subplates and valve mounting bolts must be ordered separately, see data sheet RA 45 056.

Subplates:
- G 172/05 (3/4” NPT)
- G 172/12 (SAE-12; 1-1/16-12)
- G 174/05 (1” NPT)
- G 174/12 (SAE-16; 1-5/16-12)
- G 174/08 (3/4” ISO flanged ports)

Valve mounting bolts:
- 2) 1/4-20 UNC x 2-1/4” (M6 x 60 mm) (UNC bolt kit #US00 833 395). Socket head cap screws, SAE grade 8 or better. Tightening torque 1/4” 11.5 lb-ft (15.5 Nm) 3/8” 55 lb-ft (75 Nm). Subplate and valve mounting bolts must be ordered separately, see RA 45 056.

1 Main valve
2 Pilot valve
3 Dimension for version “4WRZ…” (not seawater resistant)
4 Dimension for version “4WRZE…”
5 Dimension for versions “4WRZEB” and “4WRZ…J” (seawater resistant)
6 Proportional solenoid “a”
7 Proportional solenoid “b”
8 Plug-in connector “A,” subject to separate order, see pages 4 and 9
9 Plug-in connector “B,” subject to separate order, see pages 4 and 9
10 Plug-in connector to E-DIN 43 563, separate order, see pages 4 and 9
11.1 Concealed hand override “N9”
11.2 Hand override “N” for seawater resistant version “J”
12 Cover for valve with one solenoid (versions “A” or “B”)
13 Name plate for pilot valve
14 Name plate for main valve
15 Integrated control electronics
16 Pressure reducing valve
17 R-ring (22.53 x 2.3 x .62 mm); Ports A, B, P, T
18 R-ring (10 x 2 x 2 mm); Ports X, Y
19 Space required to remove plug-in connector
20 Interconnecting plate (model 4WRH…)
21 Machined valve mounting face, connection location to DIN 24 340 form A, ISO 4401, CETOP-RP121H, NFPA T3.5.1M R1, and ANSI B93.7 D07
22 Locating pin

- 0.0004/4.0 in
- 0.01/100 mm

Required surface finish of mating piece

PMT 115/06.98

MAN RANGE

MANN \ FIFA

Rexroth
Unit dimensions, size 25: dimensions in inches (millimeters)

Subplates and valve mounting bolts must be ordered separately, see data sheet RA 45 058.

Subplates:
G 153/05 (1" NPT)
G 153/12 (SAE-16; 1-5/16-12)
G 154/05 (1-1/4" NPT)
G 154/12 (SAE-20; 1-5/8-20)
G 156/08 (1-1/2" NPT)
G 156/12 (SAE-24; 1-7/8-20)

Valve mounting bolts:
6) 1/2-13 UNC x 2-1/2" (M12 x 60 mm) (UNC bolt kit #UN00 833 397). Socket head cap screws, SAE grade 8 or better. Tightening torque 92 lb-ft (125 Nm).

Subplate and valve mounting bolts must be ordered separately, see RA 45 058.

1 Main valve
2 Pilot valve
3 Dimension for version “4WRZ…” (not seawater resistant)
4 Dimension for version “4WRZE…”
5 Dimension for versions “4WRZEB” and “4WRZ…J” (seawater resistant)
6 Proportional solenoid “a”
7 Proportional solenoid “b”
8 Plug-in connector “A,” subject to separate order, see pages 4 and 9
9 Plug-in connector “B,” subject to separate order, see page 4 and 9
10 Plug-in connector to E-DIN 43 563, separate order, see pages 4 and 9
11.1 Concealed hand override “N9”
11.2 Hand override “N” for seawater resistant version “J”
12 Cover for valve with one solenoid (versions “A” or “B”)
13 Name plate for pilot valve
14 Name plate for main valve
15 Integrated control electronics
16 Pressure reducing valve
17 R-ring (27.8 x 2.6 x 3 mm); Ports A, B, P, T
18 R-ring (19 x 3 x 3 mm); Ports X, Y
19 Space required to remove plug-in connector
20 Interconnecting plate (model 4WRH…)
21 Machined valve mounting face, connection location to DIN 24 340 form A, ISO 4401, CETOP-RP121H, NFPA T3.5.1M R1, and ANSI B93.7 D08
22 Locating pin
Unit dimensions, size 32: dimensions in inches (millimeters)

Subplates:
G 157/05 (1-1/2" NPT)
G 157/12 (SAE-24; 1-7/8-12)
G 158/10 (1-1/2" iso flanged ports)

Valve mounting bolts:
6) 3/4-10 UNC x 3-1/4" (M20 x 80 mm). (UNC bolt kit #UN00 833 394). Socket head cap screws, SAE grade 8 or better. Tightening torque 317 lb-ft (430 Nm). Subplate and valve mounting bolts must be ordered separately, see RA45 060.

Subplates and valve mounting bolts must be ordered separately, see data sheet RA 45 060.

Valve mounting bolts:
6) 3/4-10 UNC x 3-1/4" (M20 x 80 mm). (UNC bolt kit #UN00 833 394). Socket head cap screws, SAE grade 8 or better. Tightening torque 317 lb-ft (430 Nm). Subplate and valve mounting bolts must be ordered separately, see RA45 060.

1. Main valve
2. Pilot valve
3. Dimension for version “4WRZ…” (not seawater resistant)
4. Dimension for version “4WRZE…”
5. Dimension for versions “4WRZEB” and “4WRZ…J” (seawater resistant)
6. Proportional solenoid “a”
7. Proportional solenoid “b”
8. Plug-in connector “A,” subject to separate order, see pages 4 and 9
9. Plug-in connector “B,” subject to separate order, see pages 4 and 9
10. Plug-in connector to E-DIN 43 563, separate order, see page 4 and 9
11.1 Concealed hand override “N9”
11.2 Hand override “N” for seawater resistant version “J”
12. Cover for valve with one solenoid (versions “A” or “B”)
13. Name plate for pilot valve
14. Name plate for main valve
15. Integrated control electronics
16. Pressure reducing valve

Section details see page 23.

17. R-ring (42.5 x 3 x 3 mm); Ports A, B, P, T
18. R-ring (19 x 3 x 3 mm); Ports X, Y
19. Space required to remove plug-in connector
20. Interconnecting plate (model 4WRH…) 
21. Machined valve mounting face, connection location to DIN 24 340 form A, ISO 4401, CETOP-RP121H, NFPA T3.5.1M R1, and ANSI B93.7 D10
22. Locating pin
**Unit dimensions, size 52** (subplate mounting): dimensions in inches (millimeters)

**Valve mounting bolts:**
6) 3/4-10 UNC x 3-1/2" (M20 x 90 mm) – steel
6) 3/4-10 UNC x 3-3/4" (M20 x 100 mm) – cast iron
Socket head cap screws, SAE grade 8 or better. Tightening torque 450 lb-ft (610 Nm). Valve mounting bolts must be ordered separately.

1. Main valve
2. Pilot valve
3. Dimension for version “4WRZ…” (not seawater resistant)
4. Dimension for version “4WRZE…”
5. Dimension for versions “4WRZEB” and “4WRZ…J” (seawater resistant)
6. Proportional solenoid “a”
7. Proportional solenoid “b”
8. Plug-in connector “A,” subject to separate order, see pages 5 and 9
9. Plug-in connector “B,” subject to separate order, see pages 5 and 9
10. Plug-in connector to E DIN 43 563, separate order, see pages 5 and 9

**Concealed hand override “N9”**

**Hand override “N” for seawater resistant version “J”**

12. Cover for valve with one solenoid (versions “A” or “B”)

13. Name plate for pilot valve
14. Name plate for main valve
15. Integrated control electronics
17. R-ring (54.5 x 3.53 x 3.53 mm); Ports A, B, P, T, R
18. R-ring (18.64 x 3.53 x 3.53 mm); Ports X, Y, L
19. Space required to remove plug-in connector
20. Interconnecting plate (model 4WRH…)
21. Machined valve mounting face, connection location to DIN 24 340 form B, ISO 4401 and CETOP RP121H
23. Adaptor plate
24. Transport assistance

**Required surface finish of mating piece**

![Diagram of valve and connections](image-url)
Unit dimensions, size 52 (flange connection): dimensions in inches (millimeters)

Connecting flanges and valve mounting bolts must be ordered separately, see RA 45 501.

Valve mounting bolts:
4) 1/2-13 UNC x 2-3/4" (M12 x 70 mm). Tightening torque 96 lb-ft (130 Nm).

1 Main valve
2 Pilot valve
3 Dimension for version “4WRZ…” (not seawater resistant)
4 Dimension for version “4WRZE…”
5 Dimension for versions “4WRZEB” and “4WRZ…J” (seawater resistant)
6 Proportional solenoid “a”
7 Proportional solenoid “b”
8 Plug-in connector “A,” subject to separate order, see pages 4 and 9
9 Plug-in connector “B,” subject to separate order, see pages 4 and 9
10 Plug-in connector to E DIN 43 563, subject to separate order, see page 4 and 9
11.1 Concealed hand override “N9”
11.2 Hand override “N” for seawater resistant version “J”
12 Cover for valve with one solenoid (versions “A” or “B”)
13 Name plate for pilot valve
14 Name plate for main valve
15 Integrated control electronics
19 Space required to remove plug-in connector
20 Interconnecting plate (model 4WRH…)
23 Adaptor plate
24 Transport assistance
**Pilot oil supply**

**Model 4WRZ…-…/… and**  
**Model 4WRH…-…/…**  
external pilot supply  
external drain  

With this version pilot oil is fed from a separate control circuit (external).  
Pilot oil drain is not via the T line in the main valve, but is routed separately into the tank via port Y (external).

**Model 4WRZ…-…/…E…**  
internal pilot supply  
external drain  

With this version pilot oil is fed from the P line in the main valve (internal).  
Pilot oil drain is not via the T line in the main valve, but is routed separately into the tank via port Y (external).  
Port X has to be plugged on the sub-plate.

**Model 4WRZ…-…/…ET…**  
internal pilot supply  
internal drain  

On this version pilot oil is fed from the P line in the main valve (internal).  
The pilot oil drain is direct into the T line in the main valve (internal).  
Ports X and Y have to be plugged on the sub-plate.

**Model 4WRZ…-…/…T…**  
external pilot supply  
internal drain  

On this version pilot oil is fed from a separate control circuit (external).  
Pilot oil drain directly into the T line in the main valve (internal).

*Items 1 and 2: plug M6 DIN 906-8.8 3 mm hex*

---

**Size 10**  
For section location, see page 17  
![Diagram of Size 10](image)

**Size 16**  
For section location, see page 18  
![Diagram of Size 16](image)

**Size 25**  
For section location, see page 19  
![Diagram of Size 25](image)

**Size 32**  
For section location, see page 20  
![Diagram of Size 32](image)

---

**Plug-in throttle valves**

When using a proportional directional valve model 4WRZ… the following plug-in orifice inserts should be used in lines A and B of the pilot valve:

<table>
<thead>
<tr>
<th>Size</th>
<th>10</th>
<th>16</th>
<th>25</th>
<th>32</th>
<th>52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø in inches</td>
<td>0.071</td>
<td>0.079</td>
<td>0.11</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Ø in (mm)</td>
<td>(1.8)</td>
<td>(2.0)</td>
<td>(2.8)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Material no.</td>
<td>RR00 158 510</td>
<td>RR00 158 547</td>
<td>RR00 157 948</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
Control electronics for model WRZ...: amplifier VT-VSPA2-50

(Separate order)

Technical data

- **Operating voltage**
  - upper limiting value \( V_{DC(t)\text{max}} \): 35 V
  - lower limiting value \( V_{DC(t)\text{min}} \): 22 V

- **Solenoid current** \( I_{\text{max}} \): 1.5 A

- **Clock frequency of the output stages** \( f \): 300 Hz ±10%

- **Card dimensions**: Euro-card 100 x 160 mm
  - DIN 41 494

- **Front plate dimensions**
  - Height: 3 U 5.06 inches (128.4 mm)
  - Width soldering side: 1 HP 0.2 inches (5.08 mm)
  - Width component side: 7 HP

For applications outside these parameters, please consult us!

For further information see: catalogue sheet RA 30 113

Block circuit diagram / connection allocation (version with one ramp time "T1")

Command value 1
Command value 2
Command value 3
Command value 4
Command value 5
Command value 6

Differential input
Ref. potential/GND

"Enable" internal
"Enable" external (+ V\( \text{B} \))

Measuring zero (M0) is raised by 9 V compared to 0 V operating voltage!

Call-up comm. value 1
Call-up comm. value 2
Call-up comm. value 3
Call-up comm. value 4
Call-up "ramp off"
Call-up "switch over to auxiliary voltage"

Relay call-up voltage (+ 24 V)

H1 to H4 = LED displays for command value call-ups
K1 to K6 = call-up relay
R1 to R4 = command values
R7 = bias current solenoid "a"
R8 = bias current solenoid "b"
t = ramp time

F = on front plate

1. Command values
2. Differential input
3, 6. Summation
4. Ramp generator
5. Step function
7. PI current controller
8. Output stage with pulse generator
9. Power supply
10. Monitoring
11. Monitoring cable break (only with 4 to 20 mA)
### Ordering details

<table>
<thead>
<tr>
<th>VT-VSPA2</th>
<th>-50 - 1X</th>
<th>*</th>
</tr>
</thead>
</table>

Amplifier for controlled proportional directional valves, analog, with 2 output stages

Amplifier for proportional directional valves

3DREP 6 (series 2X) and 4WRZ (series 7X) = 50

Series 10 to 19 = 1X

(10 to 19: unchanged technical data and connection allocation)

Further details in clear text

<table>
<thead>
<tr>
<th>T1</th>
<th>1 ramp time</th>
</tr>
</thead>
<tbody>
<tr>
<td>T5</td>
<td>5 ramp times</td>
</tr>
</tbody>
</table>