

RE 23193

Edition: 2020-07

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rexroth
A Bosch Company

Directional spool valves, direct-operated, with solenoid actuation

Type Z4WE



H8168

- ▶ Size 6
- ▶ Component series 3X
- ▶ Maximum operating pressure 315 bar
- ▶ Maximum flow 50 l/min

Features

- ▶ 4/2 and 4/3 directional shut-off valve
- ▶ Sandwich plate valve
- ▶ As straight-through valve or short-circuit valve
- ▶ Porting pattern according to ISO 4401-03-02-0-05 (with or without locating hole)
- ▶ Wet-pin DC or AC solenoids
- ▶ Cartridge optionally equipped with PWM connector (fast switching amplifier, energy reduction)
- ▶ Manual override, optional
- ▶ Spool position monitoring, optional
- ▶ CE conformity according to the Low-Voltage Directive 2014/35/EU for electrical voltages > 50 VAC or > 75 VDC

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|------------------------------------|-----------|
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RE 23193, edition: 2020-07, **Bosch Rexroth AG**

Knowledge is POWER – Motion Force Control is our Business

HYQUIP Limited New Brunswick Street Horwich Bolton Lancashire BL6 7JB UK

2/26 **Z4WE** | Directional spool valve

Ordering code

| | | | | | | | | | | | | | |
|-------------|----------|----|----------|-----------|----------|----------|----|-----------|----|----|----|----|----------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 |
| Z4WE | 6 | | - | 3X | / | E | | K4 | | | | | * |

| | | |
|----|---|-------------|
| 01 | Shut-off valve, sandwich plate design | Z4WE |
| 02 | Size 6 | 6 |
| 03 | Symbols; possible version see page 6 ... 9 | |
| 04 | Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimension) | 3X |
| 05 | High-power wet-pin solenoid with detachable coil | E |

Electrical voltages

| | | |
|----|------------------------------------|-----------------|
| 06 | For ordering code see page 4 ... 5 | e.g. G24 |
|----|------------------------------------|-----------------|

Manual override ¹⁾

| | | |
|----|--|-------------------------|
| 07 | Without manual override | no code |
| | With lockable manual override "mushroom button" (small) | N4 ²⁾ |
| | With lockable manual override "mushroom button" (large) | N5 ²⁾ |
| | With concealed manual override (standard) | N9 ²⁾ |

Electrical connection

| | | |
|----|--|------------------------------|
| 08 | Without mating connector; connector DIN EN 175301-803 | K4 ³⁾ |
| | Without mating connector; connector according to DIN EN 175301-803 (coil with potted-in connector base and sealing element to valve housing (IP67)) | K4K ^{3); 4)} |

Spool position monitoring

| | | |
|----|---|----------------|
| 09 | Without position switch | no code |
| | Monitored spool position "a" | QMAG24 |
| | Monitored spool position "b" | QMBG24 |
| | Monitored rest position | QM0G24 |
| | For further details, see data sheet 24830 | |

Seal material (observe compatibility of seals with hydraulic fluid used, see page 14)

| | | |
|----|---|----------------|
| 10 | NBR seals | no code |
| | FKM seals | V |
| | Recommended for operation with HFC hydraulic fluids | MH |
| 11 | Without locating hole | no code |
| | With locating hole and locking pin ISO 8752-3x8-St | /62 |
| 12 | Standard | no code |
| | Approval according to CSA C22.2 No. 139-1982 | = CSA |

¹⁾ The manual override cannot be allocated a safety function. It may only be used up to a tank pressure of 50 bar.

²⁾ DC voltage only

³⁾ Mating connectors, separate order, see page 24 and data sheet 08006.

⁴⁾ With additional sealing between solenoid coil and housing.

Ordering code

| | | | | | | | | | | | | | |
|-------------|----------|----|----------|-----------|----------|----------|----|-----------|----|----|----|----|----------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 |
| Z4WE | 6 | | - | 3X | / | E | | K4 | | | | | * |

| | | |
|----|---|--------------|
| 13 | Standard | no code |
| | DC or AC voltage (symbols "E...") ⁵⁾ | |
| | Special housing with connection A①-B① (in housing and control spool); symbol "E147" only | SO10 |
| | Orifice function Ø0.6 mm | SO742 |
| | Orifice function Ø0.8 mm | SO744 |
| | Orifice function Ø0.9 mm | SO749 |
| | Orifice function Ø1.2 mm | SO746 |
| | Orifice function Ø1.3 mm | SO747 |
| | Orifice function Ø1.45 mm | SO65 |
| | Orifice function Ø1.5 mm | SO748 |
| | Control spool with integrated orifice Ø1.2 mm. Coil rotated by 180°. The electrical connection of the coil points in direction T. | SO765 |
| | DC voltage (symbols "X...") ⁵⁾ | |
| | Special housing with orifice Ø2.0 mm between P and working port as well as Ø2.0 mm between working port and T. The electrical connection of the coil points in direction T. | SO60 |
| | Special housing with orifice Ø0.8 mm between P and working port as well as Ø0.8 mm between working port and T. The electrical connection of the coil points in direction T. | SO61 |
| | Special housing with orifice Ø1.3 mm between P and working port as well as Ø2.0 mm between working port and T. The electrical connection of the coil points in direction T. | SO64 |
| | Control spool with integrated orifice Ø0.6 mm between A① and B① as well as orifice Ø1.3 mm between A② and B②; symbol "X258" only | SO63 |
| 14 | Further details in the plain text | * |

⁵⁾Symbols see page 6 ... 11.

4/26 **Z4WE** | Directional spool valve

Ordering code: DC voltage – individual connection

Electrical connections and available voltages

(Special voltages available upon request)

| Connector | | Ordering code | Electrical voltages | | | | | | | | | Protection class according to DIN EN 60529 ¹⁾ | Protection class according to VDE 0580 |
|---|---|---------------|---------------------|------|------|------|------|-------|-------|-------|-------|--|--|
| | | | 12 V | 24 V | 26 V | 48 V | 96 V | 110 V | 125 V | 205 V | 220 V | | |
| | | | Ordering code | | | | | | | | | | |
| | | G12 | G24 | G26 | G48 | G96 | G110 | G125 | G205 | G220 | | | |
| Connector 3-pole (2 + PE) according to DIN EN 175301-803 | ► Standard | K4 | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | IP65 | I ²⁾ |
| | ► With potted-in plug base and sealing element | K4K | ✓ | ✓ | ✓ | – | – | – | – | – | – | IP65 | I ²⁾ |
| Maximum admissible overvoltages according to DIN EN 60664-1:2008-01 (VDE 0110-1) (overvoltage category II): | | | | | | | | | | | | | |
| Nominal voltage U_{Nom} | | in V | 12 | 24 | 26 | 48 | 96 | 110 | 125 | 205 | 220 | | |
| Rated current I_{Nom} | | in A | 2.5 | 1.25 | 1.17 | 0.66 | 0.33 | 0.25 | 0.17 | 0.16 | 0.14 | | |
| Maximum admissible switch-off overvoltage according to VDE 0580 | | in V | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | | |
| Recommended interference protection circuit with 2 x mains voltage | | in V | 24 | 48 | 52 | 96 | 192 | 220 | 250 | 410 | 440 | | |

- ¹⁾ Only with correctly mounted valve with a mating connector suitable for the protection class.
- ²⁾ Protection class I with properly connected protective grounding conductor (PE) and valve mounting surface connected to the protective grounding conductor system.
- ³⁾ With protection class III, a protective extra-low voltage with isolation transformer (PELV, SELV) is to be provided.

Notice:

Solenoid valves induce voltage peaks during switch-off. In order to prevent electro-magnetic interference at the system and damage to the valve control, an interference protection circuit has to be provided on the system side. Alternatively, you can also select a connector with integrated interference protection circuit.

Ordering code: Alternating voltage – individual connection

Electrical connections and available voltages

(Special voltages available upon request)

| Connector | Ordering code | Electrical voltages | | | | | | | | | | Protection class according to DIN EN 60529 ¹⁾ | Protection class according to VDE 0580 |
|--|---------------|---------------------|----------------|----------------|----------------|-------------|-------------|-------------|-------------|----------------|----------------|--|--|
| | | 100 V 50/60 Hz | 100 V 50/60 Hz | 110 V 50/60 Hz | 110 V 50/60 Hz | 120 V 60 Hz | 120 V 60 Hz | 200 V 50 Hz | 200 V 50 Hz | 230 V 50/60 Hz | 230 V 50/60 Hz | | |
| | | G96 | W100 | G96 | W110 | G110 | W110 | G180 | W200 | G205 | W230 | | |
| Connector, 3-pole (2 + PE) according to DIN EN 175301-803 | ► Standard | K4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | IP65 | I ²⁾ |
| Rectifier required (see page 24) | | ✓ | – | ✓ | – | ✓ | – | ✓ | – | ✓ | – | | |
| Maximum admissible overvoltages according to DIN EN 60664-1:2008-01 (VDE 0110-1) (overvoltage category II): | | | | | | | | | | | | | |
| Nominal voltage U_{Nom} | in V | 100 | 100 | 110 | 110 | 120 | 120 | 200 | 200 | 230 | 230 | | |
| Rated current I_{Nom} | in A | 0.31 | 0.56 | 0.34 | 0.52 | – | – | 0.18 | 0.29 | 0.16 | 0.23 | | |
| ► 50 Hz | in A | 0.31 | 0.44 | 0.34 | 0.39 | 0.30 | 0.45 | – | – | 0.16 | 0.17 | | |
| Lower rated current I_1 | ► 50 Hz | in A | – | 0.65 | – | 0.6 | – | – | – | 0.33 | – | 0.27 | |
| ► 60 Hz | in A | – | 0.51 | – | 0.45 | – | 0.52 | – | – | – | 0.2 | | |
| Upper rated current I_2 | ► 50 Hz | in A | – | 0.9 | – | 0.9 | – | – | – | 0.6 | – | 0.36 | |
| ► 60 Hz | in A | – | 0.9 | – | 0.6 | – | 0.9 | – | – | – | 0.36 | | |
| Maximum admissible switch-off overvoltage according to VDE 0580 | in V | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | | |
| Recommended interference protection circuit with 2 x mains voltage | in V | 200 | 200 | 220 | 220 | 240 | 240 | 400 | 400 | 460 | 460 | | |

- ¹⁾ Only with correctly mounted valve with a mating connector suitable for the protection class.
- ²⁾ Protection class I with properly connected protective grounding conductor (PE) and valve mounting surface connected to the protective grounding conductor system.

Notices:

- Solenoid valves induce voltage peaks during switch-off. In order to prevent electro-magnetic interference at the system and damage to the valve control, an interference protection circuit has to be provided on the system side. Alternatively, you can also select a connector with integrated interference protection circuit.
- Dependent on the rated current I_{Nom} , circuit breakers according to tripping characteristic "K" are to be provided. Within a time interval of 0.6s, the tripping current must be 8 to 10 times the nominal power supply. The required non-tripping current of the fuse must not fall below the "lower rated current" value I_1 (see table above). The maximum tripping current must not exceed the "upper rated current" value I_2 (see table above). The temperature dependence of the tripping behavior of the circuit breakers has to be observed according to the manufacturer's specifications.

6/26 Z4WE | Directional spool valve

Symbols: DC or AC voltage (① = component side, ② = plate side)

| | Symbol | Interim positions | Notices |
|-----|--------|-------------------|---------|
| D24 | | | - |
| D27 | | | - |
| E51 | | | - |
| E53 | | | - |
| E56 | | | - |
| E62 | | | - |
| E63 | | | - |

Notice:
Representation dimensions according to ISO 1219-1.
Hydraulic interim positions are shown by dashes.

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Symbols: DC or AC voltage (① = component side, ② = plate side)

| | Symbol | Interim positions | Notices |
|------|--------|-------------------|--|
| E68 | | | - |
| E127 | | | - |
| E130 | | | - |
| E131 | | | - |
| E132 | | | - |
| E135 | | | Only possible with SO number, see "Ordering code" on page 3. |
| E136 | | | Function with orifice Ø1.3 mm |

Notice:
Representation dimensions according to ISO 1219-1.
Hydraulic interim positions are shown by dashes.

Symbols: DC or AC voltage (① = component side, ② = plate side)

| | Symbol | Interim positions | Notices |
|------|--------|-------------------|---|
| E137 | | | Function with orifice Ø1.7 mm |
| E138 | | | Only possible with SO number, see "Ordering code" on page 3. |
| E140 | | | Only possible with SO number, see "Ordering code" on page 3. |
| E144 | | | - |
| E145 | | | - |
| E146 | | | - |
| E147 | | | Only possible with version "SO10", see "Ordering code" on page 3. |

Notice:
Representation dimensions according to ISO 1219-1.
Hydraulic interim positions are shown by dashes.

Symbols: DC or AC voltage (① = component side, ② = plate side)

| | Symbol | Interim positions | Notices |
|------|--------|-------------------|---------|
| E166 | | | - |

Symbols: DC voltage (① = component side, ② = plate side)

| | Symbol | Interim positions | Notices |
|------|--------|-------------------|--|
| X161 | | | Only possible with SO number, see "Ordering code" on page 3. |
| X163 | | | Only possible with SO number, see "Ordering code" on page 3. |
| X181 | | | Only possible with SO number, see "Ordering code" on page 3. |
| X183 | | | Only possible with SO number, see "Ordering code" on page 3. |
| X250 | | | - |

Notice:
Representation dimensions according to ISO 1219-1.
Hydraulic interim positions are shown by dashes.

10/26 **Z4WE** | Directional spool valve

Symbols: DC voltage (① = component side, ② = plate side)

| | Symbol | Interim positions | Notices |
|------|--------|-------------------|-------------------------------|
| X252 | | | - |
| X253 | | | - |
| X254 | | | - |
| X255 | | | - |
| X256 | | | Function with orifice Ø1.4 mm |
| X257 | | | - |

Notice:
Representation dimensions according to ISO 1219-1.
Hydraulic interim positions are shown by dashes.

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Symbols: DC voltage (① = component side, ② = plate side)

| | Symbol | Interim positions | Notices |
|------|--------|-------------------|---|
| X258 | | | Only possible with version "SO63", see "Ordering code" on page 3. |
| X259 | | | - |

Notice:
 Representation dimensions according to ISO 1219-1.
 Hydraulic interim positions are shown by dashes.

12/26 **Z4WE** | Directional spool valve

Function, section

The directional valves type Z4WE are solenoid-actuated directional spool valves. They control start, stop and direction of a flow.

The directional valves basically consist of the housing (1), one or two solenoids (2), the control spool (3), and two return springs (4).

In de-energized condition, the control spool (3) is held in the central position or in the initial position by the return springs (4). The control spool (3) is actuated by wet-pin solenoids (2).

For unobjectionable functioning, the hydraulic system has to be bled properly.

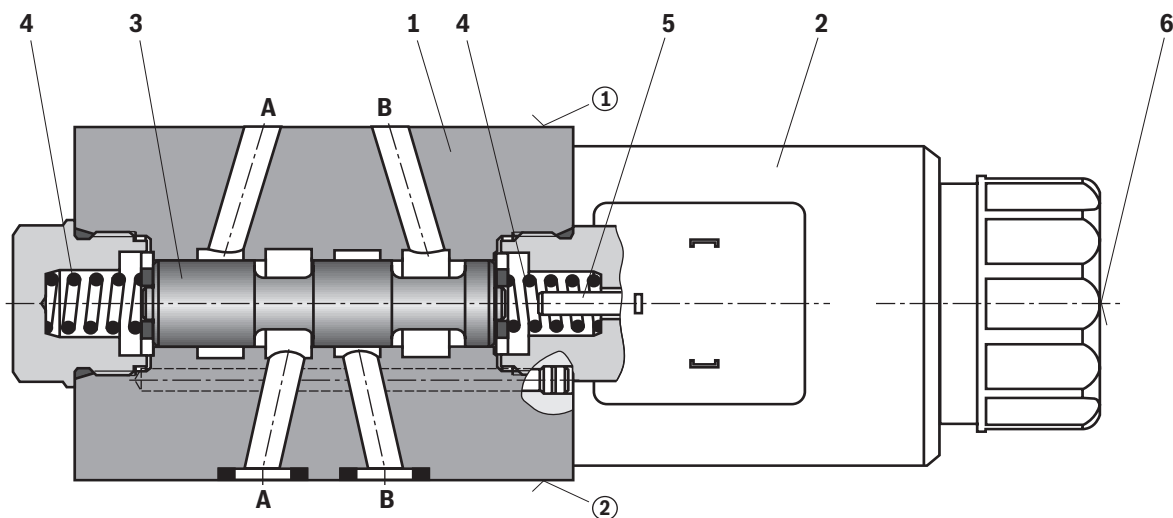
The force of solenoid (2) acts via plunger (5) on control spool (3) and pushes the latter from its rest position to the required end position. In this way, the required direction of flow from A② to A① and from B② to B① is enabled.

After de-excitation of the solenoid (2), the return spring (4) pushes the control spool (3) back to its rest position.

An optional manual override (6) allows the control spool (3) to be moved without solenoid energization.

Notice:

Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle. For admissible shock and vibration loads, see data sheet 08012.



Type Z4WE 6 ...

- ① = component side
- ② = plate side

Technical data

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

| General | | | |
|--|----------------------------|--|---|
| Weight | ▶ Valve with one solenoid | kg | 1.2 |
| | ▶ Valve with two solenoids | kg | 1.6 |
| Installation position | | any (with suspended installation, higher sensitivity to contamination; horizontal installation is recommended) | |
| Ambient temperature range | | °C | -20 ... +50 (NBR seals) -15 ... +50 (FKM seals) |
| Storage temperature range | | °C | +5 ... +40 |
| MTTF _d values according to EN ISO 13849 | | years | 150 (for further details, see data sheet 08012) |
| Admissible shock and vibration loads | | see data sheet 08012 | |
| | | | |
| Hydraulic | | | |
| Maximum operating pressure | ▶ Port P, A, B | bar | 315 |
| | ▶ Port T | bar | 210 with DC voltage 160 with AC voltage |
| Maximum flow | | l/min | 50 |
| Hydraulic fluid | | see table page 14 | |
| Hydraulic fluid temperature range (at the valve working ports) | | °C | -20 ... +80 (NBR seals) -15 ... +80 (FKM seals) -20 ... +50 (HFC hydraulic fluid) |
| Viscosity range | | mm²/s | 2.8 ... 500 |
| Maximum admissible degree of contamination of the hydraulic fluid Cleanliness class according to ISO 4406 (c) | | Class 20/18/15 ¹⁾ | |

¹⁾ 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.

Available filters can be found at www.boschrexroth.com/filter.

14/26 **Z4WE** | Directional spool valve

Technical data

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

| Hydraulic fluid | Classification | Suitable sealing materials | Standards | Data sheet |
|-----------------|----------------------------|--|-----------|------------|
| Mineral oils | HL, HLP, HLPD, HVLP, HVLPD | NBR, FKM | DIN 51524 | 90220 |
| Bio-degradable | ► Insoluble in water | HETG | ISO 15380 | 90221 |
| | | HEES | | |
| | ► Soluble in water | HEPG | ISO 15380 | |
| Flame-resistant | ► Water-free | HFDU (glycol base) | ISO 12922 | 90222 |
| | | HFDU (ester base) | | |
| | | HFDR | | |
| | ► Containing water | HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046) | ISO 12922 | 90223 |



Important information 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.

Technical data

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

| Electric | | | |
|---|-------|---|------------------------------|
| Voltage type | | DC voltage | alternating voltage 50/60 Hz |
| Nominal voltages according to VDE 0580 ²⁾ | | see page 4 | see page 5 |
| Voltage tolerance (nominal voltage) | | % ±10 | |
| Power consumption | | W 30 ³⁾ | – |
| Holding power | | VA – | 50 |
| Switch-on power | | VA – | 220 |
| Duty cycle (ED) | | % 100 (S1 according to VDE 0580) | |
| Switching time according to ISO 6403 ⁴⁾ | ► ON | 20 ... 45 | 10 ... 20 |
| | ► OFF | 10 ... 25 | 15 ... 40 |
| Maximum switching frequency | | 1/h 15000 | 7200 |
| Maximum surface temperature of the coil ⁵⁾ | | °C 120 | |
| Protection class according to DIN EN 60529 | | see page 4 ... 5 | |
| Insulation class according to VDE 0580 | | see page 4 ... 5 | |
| Electrical protection | | Maximum admissible switch-off overvoltage see page 4 ... 5 Every solenoid must be protected individually, using a suitable fuse with tripping characteristics K (inductive loads). | |
| Protective grounding conductor and screening | | The valve must be installed on a surface that is included in the equipotential bonding. Connector pin assignment (CE-compliant installation) see page 24 | |
| Conformity | | CE according to Low-Voltage Directive 2014/35/EU tested according to EN 60204-1:2006-01 and DIN VDE 0580, classified as component | |

²⁾ Special voltages available upon request

³⁾ Reduction of the nominal power by approx. 40% if a 24 V-coil with connector switching amplifier type VT-SSBA1-PWM-1X/V002/5 is used (separate order, material no. **R901290194**, see page 24 and data sheet 30362)

⁴⁾ Measured without flow.

The **switching times** were determined for a hydraulic fluid temperature of 40 °C and a viscosity of 46 cSt. Switching times change dependent on hydraulic fluid temperatures, operating time and application conditions.

⁵⁾ Due to the arising **surface temperatures** of the solenoid coils, the standards ISO 13732-1 and ISO 4413 are to be observed. The specified surface temperature in AC solenoids is valid for fault-free operation. In the error case (e.g. blocking of the control spool), the surface temperature may increase above 180 °C. Thus, the system must be checked for possible dangers considering the ignition temperature of the hydraulic fluid used. As protection, circuit breakers (see table page 4 ... 5) must be used, unless the creation of an ignitable atmosphere can be excluded in a different way. Thus, the surface temperature can – in the error case – be limited to maximally 220 °C. You have to use cables that have been approved of for a working temperature of more than 50 °C (individual connection) and/or 90 °C (central connection).

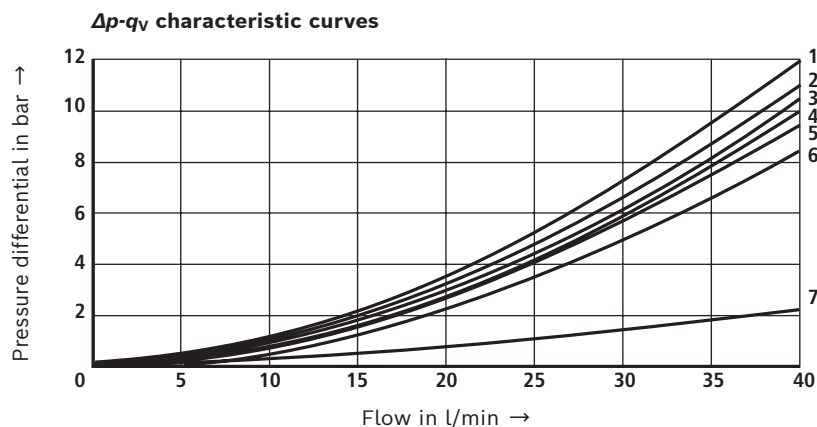
Notices:

- 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.

16/26 **Z4WE** | Directional spool valve

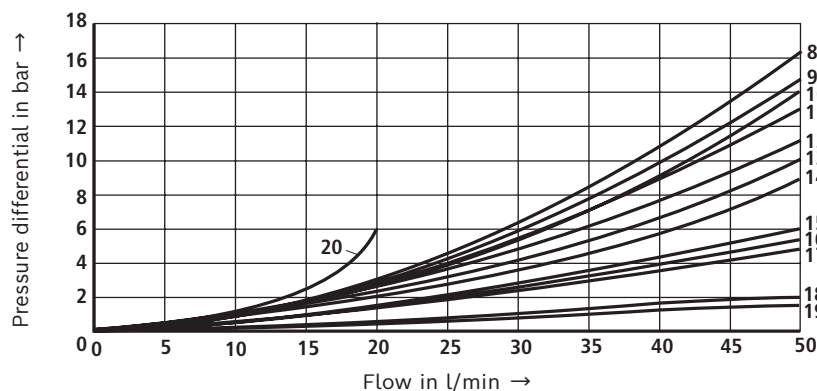
Characteristic curves

(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$)



Further characteristic curves
upon request

| Symbol | A②-A① | A①-A② | B②-B① | B①-B② | A②-B② | B②-A② | T②-T① | P②-P① |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| D24 | 4 | 1 | 2 | 4 | 3 | 2 | 7 | 7 |
| E51 | 3 | 1 | 1 | 3 | – | – | 7 | 7 |
| E53 | 2 | 2 | 2 | 2 | 5 | 2 | 7 | 7 |
| E63 | 2 | 5 | 5 | 3 | – | – | 7 | 7 |
| E68 | 4 | 4 | 6 | 5 | 4 | 5 | 7 | 7 |
| E137 | 1 | 4 | 3 | 2 | 5 | 6 | 7 | 7 |



Further characteristic curves
upon request

| Symbol | Spool position | A①-A② A②-A① | B①-B② | B②-B① | T②-T① | P②-P① | P①-T② | B②-T② | P②-P① | A②-T② | P②-A② B②-T① |
|--------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|----------------|
| X250 | | 16 | 17 | 17 | 18 | 13 | 11 | – | – | – | – |
| X252 | | 16 | 17 | 17 | 18 | 9 | 10 | – | – | – | – |
| X253 | | 13 | 14 | 14 | 19 | 18 | – | – | – | 8 | – |
| X254 | | 16 | 12 | 13 | 18 | 18 | – | 12 | – | – | – |
| X255 | 0 | – | – | – | 15 | – | – | 8 | – | 8 | – |
| | a | 12 | – | – | – | – | – | 13 | – | – | – |
| | b | – | 12 | 12 | – | – | – | – | – | 13 | – |
| X256 | | 12 | 9 | 9 | 18 | – | – | – | 18 | – | 20 |

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Performance limits

(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ and 24 V DC voltage)



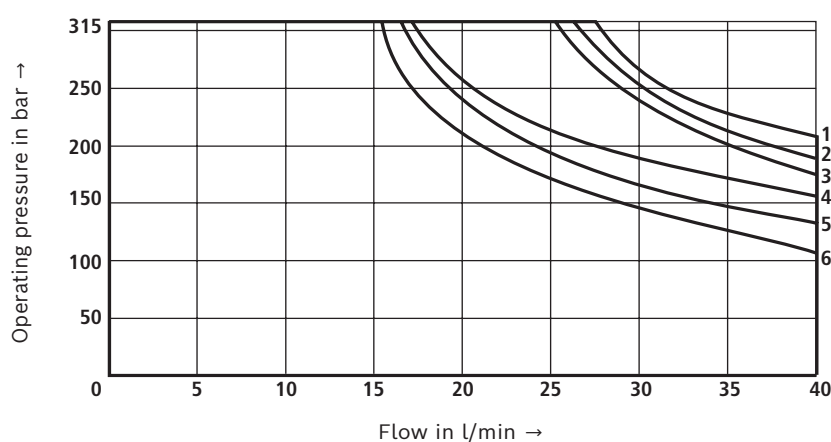
Notice:

The specified performance limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

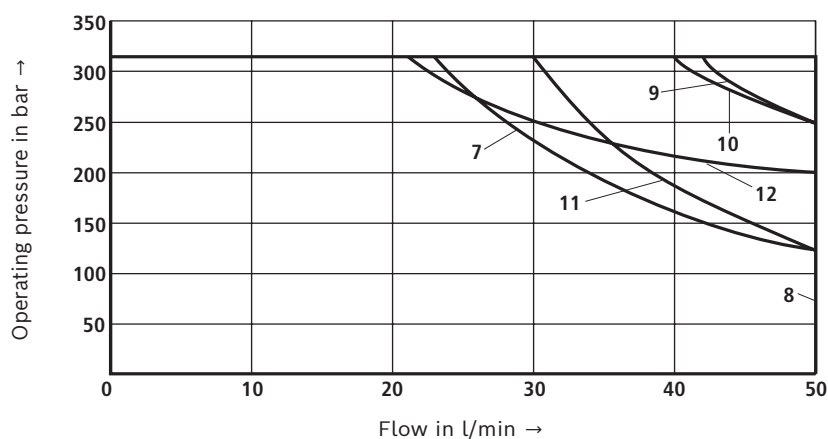
Due to the flow forces acting within the valves, the achievable performance limit may be considerably lower

with only one direction of flow (e.g. from P to A while port B is blocked)!

The performance limits were determined when the solenoids were at operating temperature, at 10% undervoltage and without tank preloading.



- 1 E63
- 2 E68
- 3 E53
- 4 E51
- 5 E137
- 6 D24

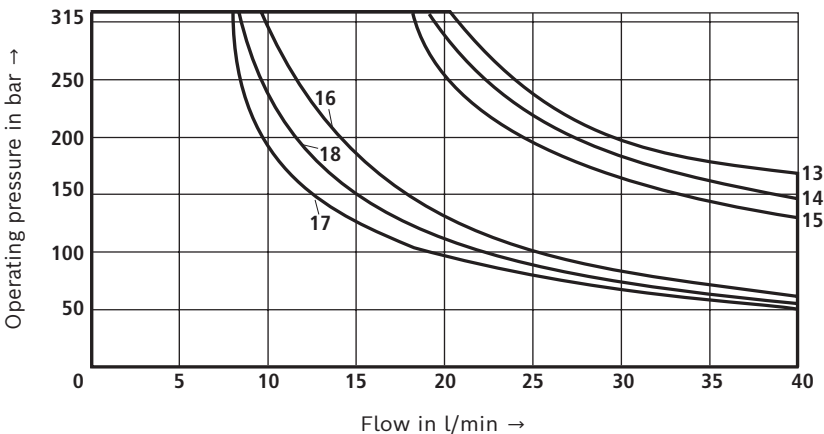


- 7 X250
- 8 X252
- 9 X253
- 10 X254
- 11 X255
- 12 X256

Further characteristic curves upon request

18/26 **Z4WE** | Directional spool valve

Performance limits
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ and 230 V AC voltage)

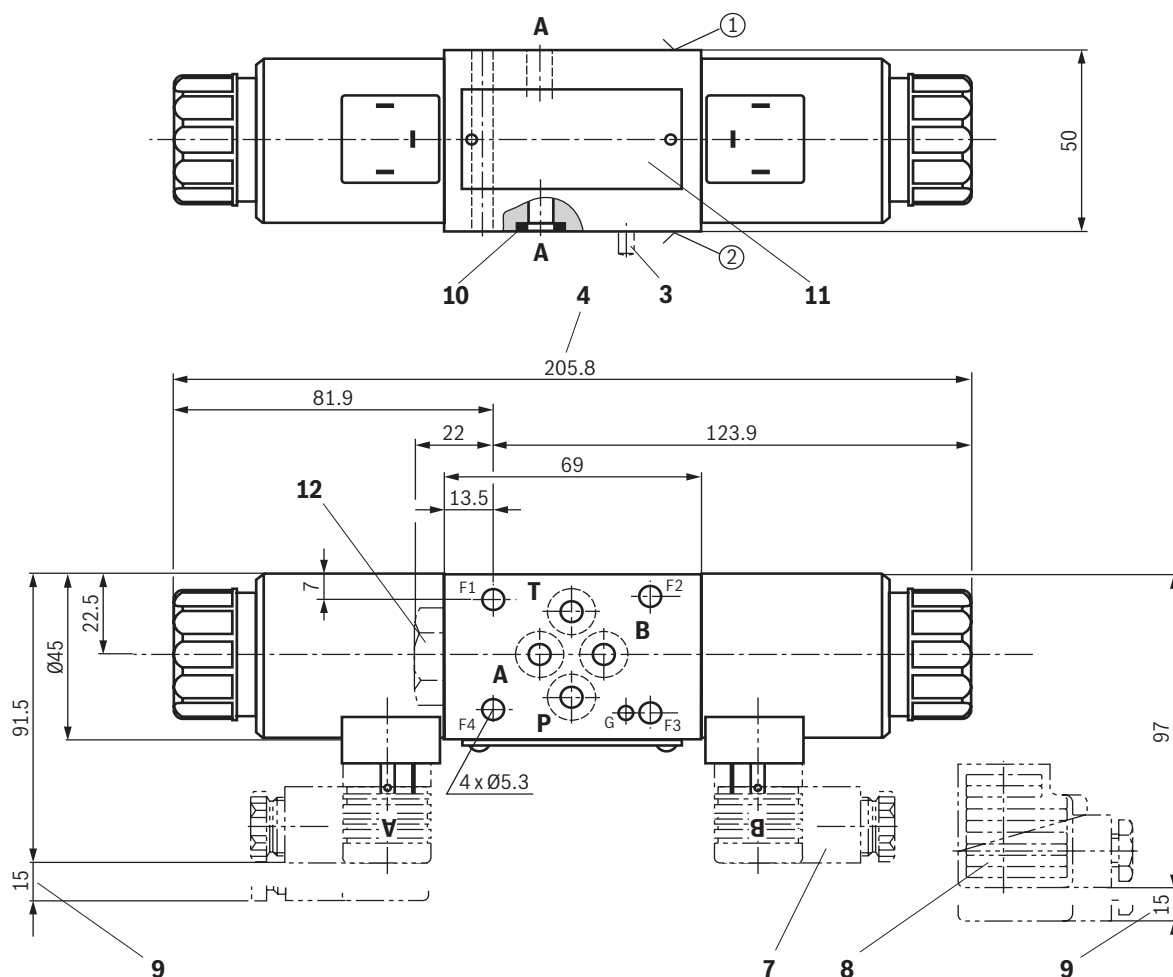


| Symbol | W230-50Hz | W230-60Hz |
|--------|-----------|-----------|
| E63 | 13 | 16 |
| E68 | 14 | 18 |
| E53 | 15 | 18 |
| E137 | 17 | 17 |
| E51 | 17 | 17 |
| D24 | 17 | 17 |

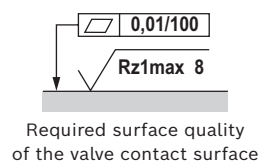
Further characteristic curves upon request

Dimensions: DC voltage
(dimensions in mm)

Symbols D24, E51, E53, E63, E68, E137, ...



Dimensions for manual overrides see page 21.
For item explanations, valve mounting screws and subplates, see page 23.



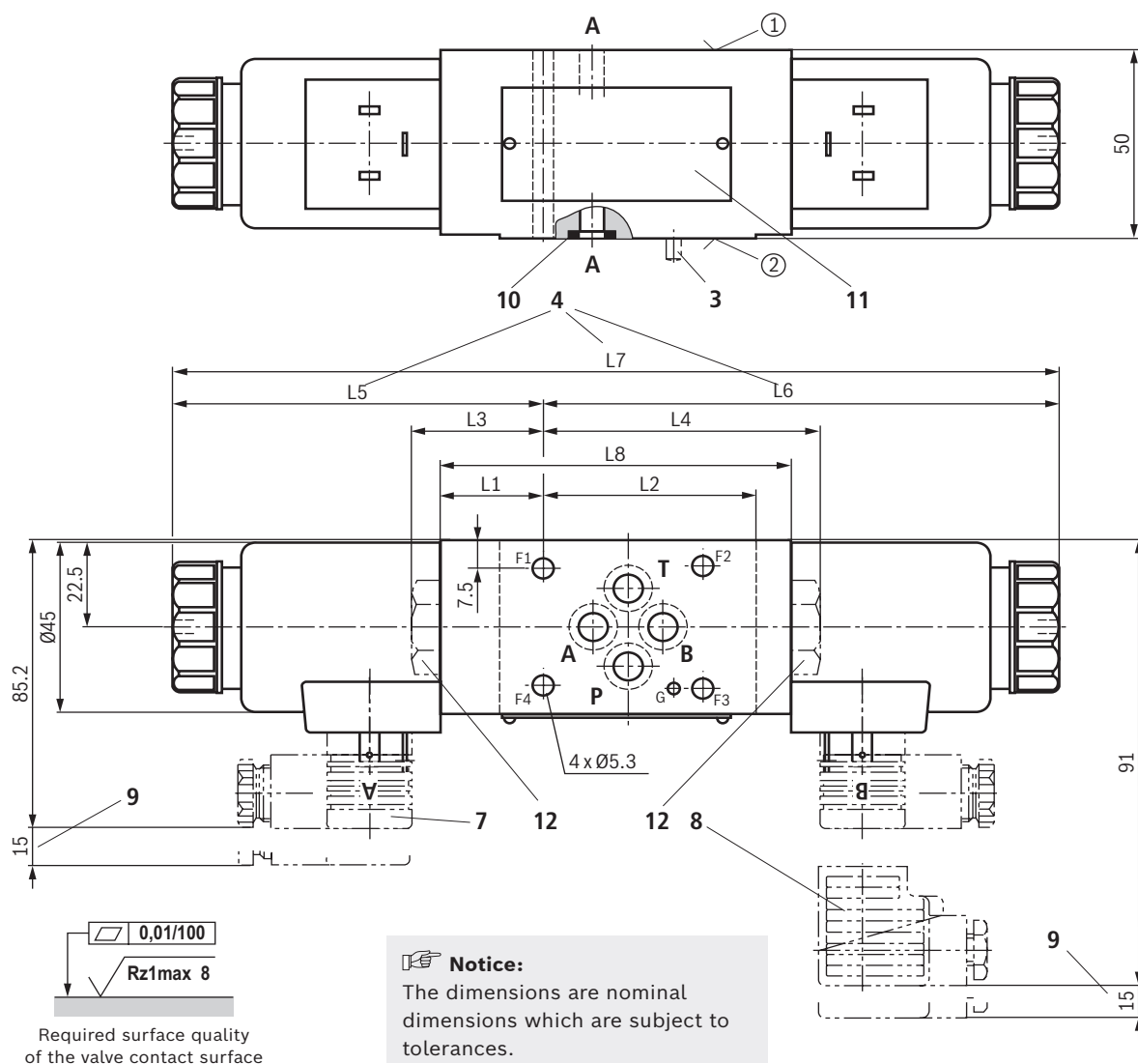
Notice:

The dimensions are nominal dimensions which are subject to tolerances.

20/26 **Z4WE** | Directional spool valve

Dimensions: DC voltage
 (dimensions in mm)

Symbols X250, X252, X253, X254, X255, X256, ...



| Symbol | Solenoid side a | Solenoid side b | L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 |
|--------|-----------------|-----------------|------|------|------|------|------|-------|-------|----|
| X250 | X | | 25.1 | 54.9 | – | 63.3 | 93.4 | – | 215.6 | 80 |
| X252 | | X | 25.1 | 54.9 | 33.5 | – | – | 123.2 | 215.6 | 80 |
| X253 | | X | 18.5 | 54.3 | 26.9 | – | – | 129.8 | 215.6 | 80 |
| X254 | X | | 18.5 | 54.3 | – | 69.9 | 86.8 | – | 215.6 | 80 |
| X255 | X | X | 26.1 | 53.9 | – | – | 94.4 | 131.2 | 225.6 | 90 |
| X256 | | X | 12.2 | 54.8 | 20.6 | – | – | 136.1 | 225.6 | 80 |

Symbols X161, X163, X181, X183, X188 and X157 on request.

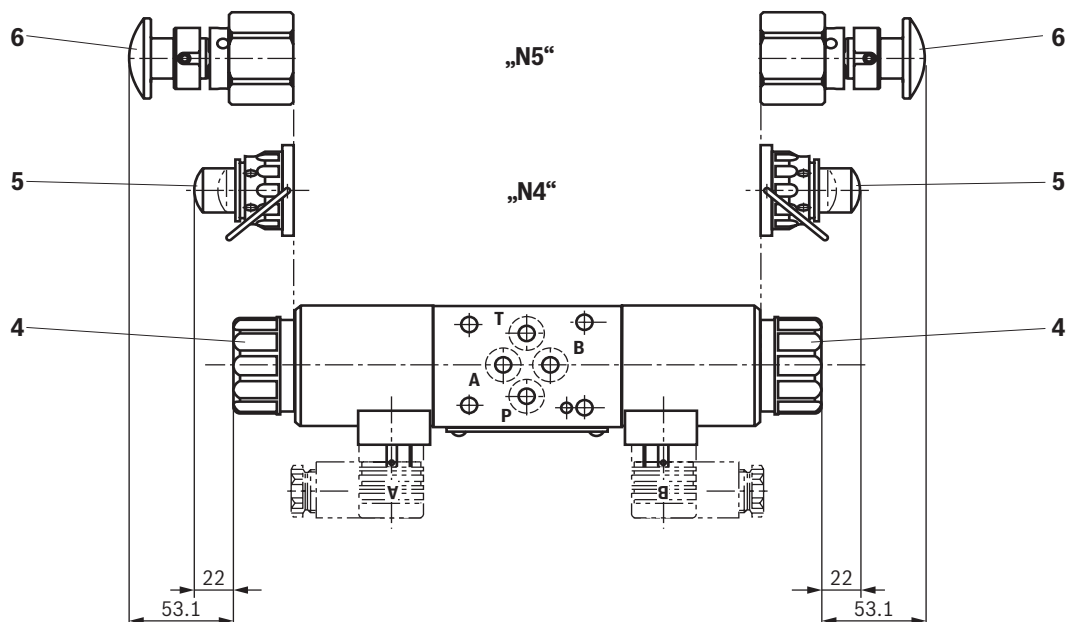
Dimensions for manual overrides see page 21. **For item explanations, valve mounting screws and subplates,** see page 23.

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Dimensions: DC voltage – manual overrides
(dimensions in mm)

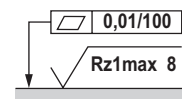


For item explanations, valve mounting screws and subplates, see page 23.



Notice:

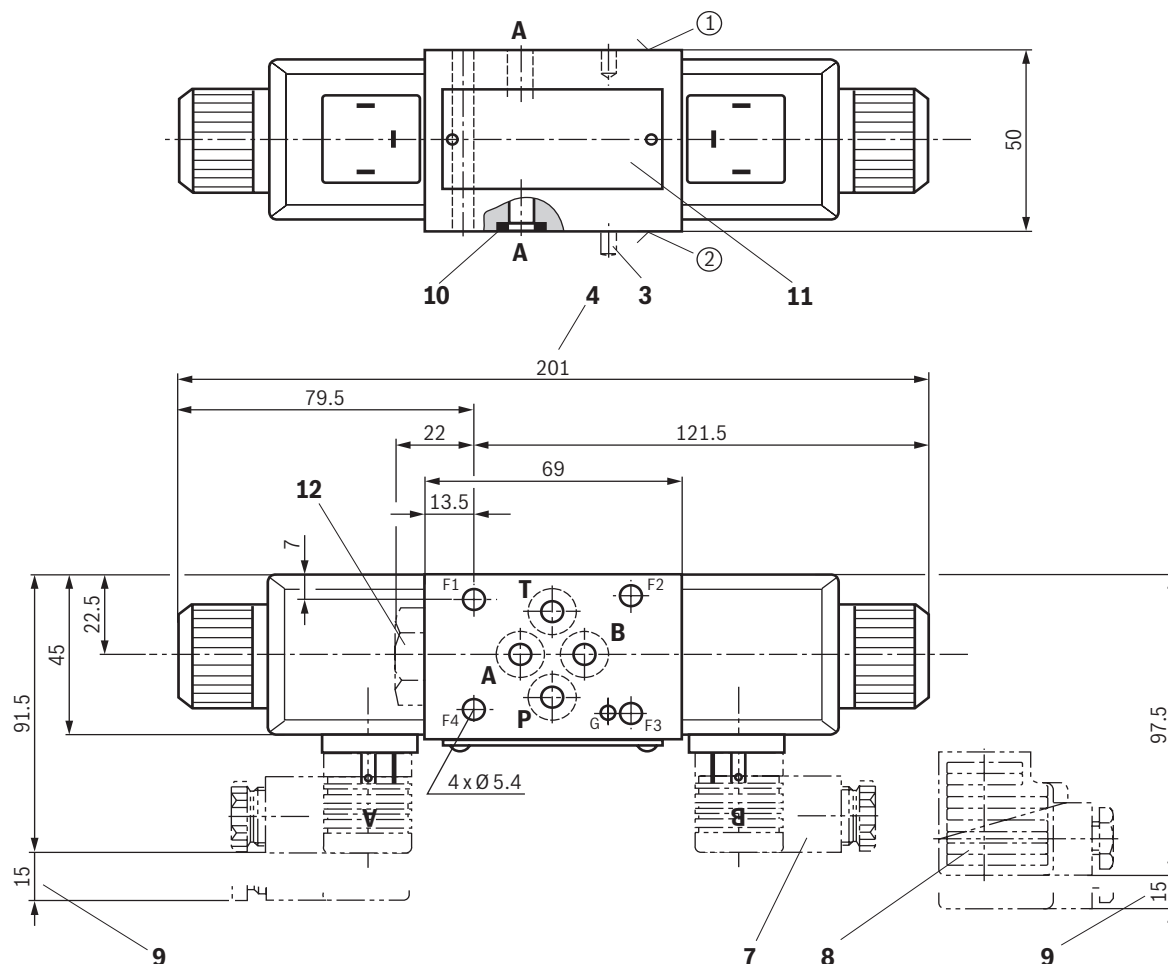
The dimensions are nominal dimensions which are subject to tolerances.



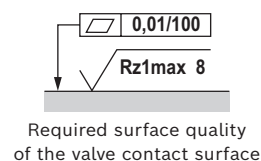
Required surface quality of the valve contact surface

22/26 **Z4WE** | Directional spool valve

Dimensions: AC voltage
(dimensions in mm)



For item explanations, valve mounting screws and subplates, see page 23.



Notice:

The dimensions are nominal dimensions which are subject to tolerances.

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Dimensions

(dimensions in mm)

- | | |
|---|---|
| <ul style="list-style-type: none"> ① Component side – porting pattern according to ISO 4401-03-02-0-05 (with or without locating hole Ø3 x 5 mm deep) ② Plate side – porting pattern according to ISO 4401-03-02-0-05 (with locating hole for locking pin ISO 8752-3x8-St; version "/62") ③ Locking pin ISO 8752-3x8-St; only version "/62" ④ Dimension for solenoid with concealed manual override "N9" (standard) and for valve without manual override ⑤ Lockable manual override "mushroom button" (small) "N4" | <ul style="list-style-type: none"> ⑥ Lockable manual override "mushroom button" (large) "N5" ⑦ Mating connector without circuitry (separate order, see page 24 and data sheet 08006) ⑧ Mating connector with circuitry (separate order, see page 24 and data sheet 08006) ⑨ Space required for removing the mating connector ⑩ Identical seal rings for ports A, B, P, T (plate side) ⑪ Name plate ⑫ Plug screw for valve with one solenoid |
|---|---|

Valve mounting screws (separate order)

| Size | Quantity | Hexagon socket head cap screws |
|------|----------|---|
| 6 | 4 | ISO 4762 - M5 - 10.9 Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 7 \text{ Nm} \pm 10\%$ |
| | or | |
| | 4 | ISO 4762 - M5 - 10.9 Friction coefficient $\mu_{\text{total}} = 0.12 \dots 0.17$; tightening torque $M_A = 8.1 \text{ Nm} \pm 10\%$ |



Notice:

Length and tightening torque of the valve mounting screws must be calculated according to the components mounted under and over the sandwich plate valve.

Subplates (separate order) with porting pattern according to ISO 4401-03-02-0-05 see data sheet 45100.

24/26 Z4WE | Directional spool valve

Electrical connections, assignment

| Ordering code connector | | Top view | Circuit diagram | Pin | Connections, assignment |
|---|-------------------|----------|-----------------|-----|-------------------------------------|
| Connector 3-pole (2 + PE) according to DIN EN 175301-803 | K4 | | | 1 | Solenoid coil, polarity-independent |
| Connector 3-pole (2 + PE) according to DIN EN 175301-803 (with potted-in plug base and sealing element) | K4K ¹⁾ | | | 2 | |
| | | | | ⏏ | Grounding |

- 1) Coil with potted-in connector base and sealing element to valve housing (IP67)
2) Plug-in system suitable for mobile applications

In the electrical connection, the protective grounding conductor (PE ⏏) is to be properly connected.

Notices:

- ▶ Electric lines must be routed in a strain-relieved manner.
- ▶ Cable glands are only suitable for permanently installed cables.
- ▶ Connectors are to be locked during operation. Not intended to be plugged in or disconnected during normal operation under load.
- ▶ Proper connection of the protective grounding conductor at ⏏.
- ▶ Protective grounding conductor cross-section equal to or greater than the line cross-section of the voltage supply.
- ▶ The valve mounting surface must be connected to the protective grounding conductor system.

Accessories (separate order)

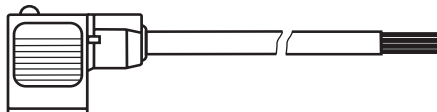
Mating connectors and cable sets

| Item ¹⁾ | Designation | Version | Short designation | Material number | Data sheet |
|--------------------|---|--|-------------------|-----------------|------------|
| 6, 7 | Mating connector; for valves with "K4" connector, 2-pole + PE, design A | Without circuitry, M16 x 1.5, 12 ... 240 V, "a" | Z4 | R901017010 | 08006 |
| | | Without circuitry, M16 x 1.5, 12 ... 240 V, "b" | | R901017011 | |
| | | With indicator light, M16 x 1.5, 12 ... 240 V | Z5L | R901017022 | |
| | | With rectifier, M16 x 1.5, 80 ... 240 V | RZ5 | R901017025 | |
| | | With indicator light and Z-diode-suppressor, M16 x 1.5, 24 V | Z5L1 | R901017026 | |

- 1) See dimensions page 19 ... 22.

Accessories (separate order)

Energy savings and fast switching ¹⁾

| | | | |
|------------------------------|-------|---|--|
| Details see data sheet 30362 | |  | |
| | | Material number | |
| | | Type VT-SSBA1-PWM-1X/V001/5 as fast switching amplifier (switching time reduction by approx. 50%) ²⁾ | Type VT-SSBA1-PWM-1X/V002/5 for energy reduction (energy savings of approx. 40%) ³⁾ |
| a/b | black | R901265633 | R901290194 |

¹⁾ Only with symbols E63, E68, X250 and X252

²⁾ Only for version "G12" and "K4"

³⁾ Only for version "G24" and "K4"

Cartridge with PWM connector according to data sheet 30362:

- Depending on the control spool, increasing the performance limit is possible.
- With version "G24" (energy saving), the coil temperature is reduced by ≥ 30 °C for 100% duty cycle.

Further information

- Subplates
- Inductive position switch and proximity sensors (contactless)
- Hydraulic fluids on mineral oil basis
- Environmentally compatible hydraulic fluids
- Flame-resistant, water-free hydraulic fluids
- Connector switching amplifier type VT-SSBA1
- Reliability characteristics according to EN ISO 13849
- Hydraulic valves for industrial applications
- Selection of the filters
- Information on available spare parts

Data sheet 45100
Data sheet 24830
Data sheet 90220
Data sheet 90221
Data sheet 90222
Data sheet 30362
Data sheet 08012