

Directional spool valves, direct operated,
with solenoid actuation

Type WE

RE 23340

Edition: 2015-07

Replaces: 2013-06



- ▶ Size 10
- ▶ Component series 5X
- ▶ Maximum operating pressure 350 bar [5076 psi]
- ▶ Maximum flow 160 l/min [42.3 US gpm]

**Features**

- ▶ 4/3-, 4/2- or 3/2-way version
- ▶ Porting pattern according to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- ▶ High-power solenoid, optionally rotatable by 90°
- ▶ Electrical connection as individual or central connection
- ▶ Cartridge optionally equipped with PWM connector (fast switching amplifier, energy reduction)
- ▶ Manual override, optional
- ▶ CE conformity according to the Low Voltage Directive 2006/95/EC for electrical voltages >50 VAC or > 75 VDC
- ▶ Solenoid coil with UR approval UL 429
- ▶ Approval according to CSA C22.2 No. 139-10, optional

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Ordering codes

| | | | | | | | | | | | | | | | | |
|----|-----------|-----------|----|-----------|----|----|----------|----|----|----|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | WE | 10 | | 5X | / | | E | | | | / | | | | | * |

| | | |
|---|--|----------------------------|
| 01 | 3 main ports | 3 |
| | 4 main ports | 4 |
| 02 | Directional valve | WE |
| 03 | Size 10 | 10 |
| 04 | Symbols e. g. C, E, EA, EB, etc; possible version see page 4 and 5 | e. g. C |
| 05 | Component series 50 to 59 (50 to 59: Unchanged installation and connection dimensions) | 5X |
| 06 | With spring return | no code |
| | With reinforced compression spring (for quick switching off) | D |
| | Without spring return | O |
| | Without spring return with detent | OF |
| 07 | High-power wet-pin solenoid with detachable coil | E |
| 08 | Direct voltage 12 V | G12 |
| | Direct voltage 24 V | G24 |
| | Direct voltage 26 V | G26 |
| | Direct voltage 48 V | G48 |
| | Direct voltage 96 V | G96 |
| | Direct voltage 110 V | G110 ¹⁾ |
| | Direct voltage 125 V | G125 |
| | Direct voltage 180 V | G180 |
| | Direct voltage 205 V | G205 |
| | Direct voltage 220 V | G220 |
| | Alternating voltage 100 V | W100R ¹⁾ |
| | Alternating voltage 110 V | W110R ¹⁾ |
| | Alternating voltage 120 V | W120R ¹⁾ |
| | Alternating voltage 200 V | W200R ¹⁾ |
| | Alternating voltage 230 V | W230R ¹⁾ |
| | Connection to AC voltage mains via control with rectifier (see table below and page 20). ²⁾ | |
| Electrical connections and available voltages see page 10 | | |
| 09 | Without manual override | no code |
| | With concealed manual override (standard) | N9 ³⁾ |
| | With concealed manual override and protective cap ⁵⁾ | N8 ³⁾ |
| | With lockable manual override "mushroom button" (large) | N5 ^{3; 4)} |
| | With manual override "mushroom button" (large), not lockable | N6 ³⁾ |

Corrosion resistance (outside)

| | | |
|----|---|----------------|
| 10 | None (valve housing primed) | no code |
| | Improved corrosion protection (240 h salt spray test according to EN ISO 9227) (see also page 10) | J3 |

Electrical connection

| AC voltage mains (admissible voltage tolerance ±10 %) | Nominal voltage of the DC solenoid in case of operation with alternating voltage | Ordering code |
|--|---|---------------|
| 100 V - 50/60 Hz | 96 V | G96 |
| 110 V - 50/60 Hz | 96 V | G96 |
| 200 V - 50/60 Hz | 180 V | G180 |
| 230 V - 50/60 Hz | 205 V | G205 |

Ordering codes

| | | | | | | | | | | | | | | | | |
|----|-----------|-----------|----|-----------|----|----|----------|----|----|----|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | WE | 10 | | 5X | / | | E | | | / | | | | | | * |

| | | |
|--|--|-----------------------------|
| 11 | Individual connection | |
| | Without mating connector; connector according to DIN EN 175301-803 | K4 ⁶⁾ |
| | Without mating connector; connector according to DIN EN 175301-803 (coil with potted-in connector base and sealing element to valve housing (IP67)) | K4K ^{6; 7)} |
| | Without mating connector, 4-pole with connector M12x1 according to IEC 60947-5-2, integrated interference protection circuit and status LED | K72L ⁶⁾ |
| | Without mating connector; connector AMP Junior-Timer | C4Z ⁶⁾ |
| | Central connection | |
| | Cable entry at the cover, with indicator light | DL |
| | Central plug-in connection at the cover, with indicator light (without mating connector); connector according to DIN EN 175201-804 | DK6L |
| | Without mating connector; threaded connection 1/2"-14 NPT | DAL |
| | Cable gland at the cover, with indicator light and cable bridge at the ground connection | DJL |
| | Mini-change connector, 5-pole | DK25L |
| Additional electrical connections and available voltages see page 10 | | |

Switching time increase

| | | |
|----|---|----------------|
| 12 | Without switching time increase | no code |
| | With switching time increase (only with symbol ".73"; not for version "D" with reinforced compression spring; more information upon request) | A12 |

| | | | | |
|---|--|----------------------------------|----------------------|----------------------|
| 13 | Without throttle insert | | no code | |
| | With throttle insert ^{8; 9)} : | | | |
| | Port | Throttle Ø in mm [<i>inch</i>] | | |
| | | 0.8 [<i>0.031</i>] | 1.0 [<i>0.039</i>] | 1.2 [<i>0.047</i>] |
| | P | = B08 | = B10 | = B12 |
| | A | = H08 | = H10 | = H12 |
| | B | = R08 | = R10 | = R12 |
| | A and B | = N08 | = N10 | = N12 |
| T ¹⁰⁾ | = X08 | = X10 | = X12 | |
| Further throttle insert diameters upon request. | | | | |

Control spool play

| | | |
|----|---|----------------|
| 14 | Standard | no code |
| | Minimum (to be selected in case of reduced leakage → higher level of oil cleanliness recommended) | T06 |
| | Increased (to be selected in case of a hydraulic fluid/environment temperature difference >25 K → increased internal leakage) | T12 |

Seal material

| | | |
|----|---|------------|
| 15 | NBR seals | M |
| | FKM seals | V |
| | Seals for HFC hydraulic fluids | MH |
| | Low-temperature version | MT |
| | Observe compatibility of seals with hydraulic fluid used! | |
| 16 | Approval according to CSA C22.2 No. 139-10 | CSA |
| | Porting pattern according to ANSI B93.9 (if solenoid "a" is energized, channel P is connected to A) | AN |
| 17 | Further details in the plain text | * |

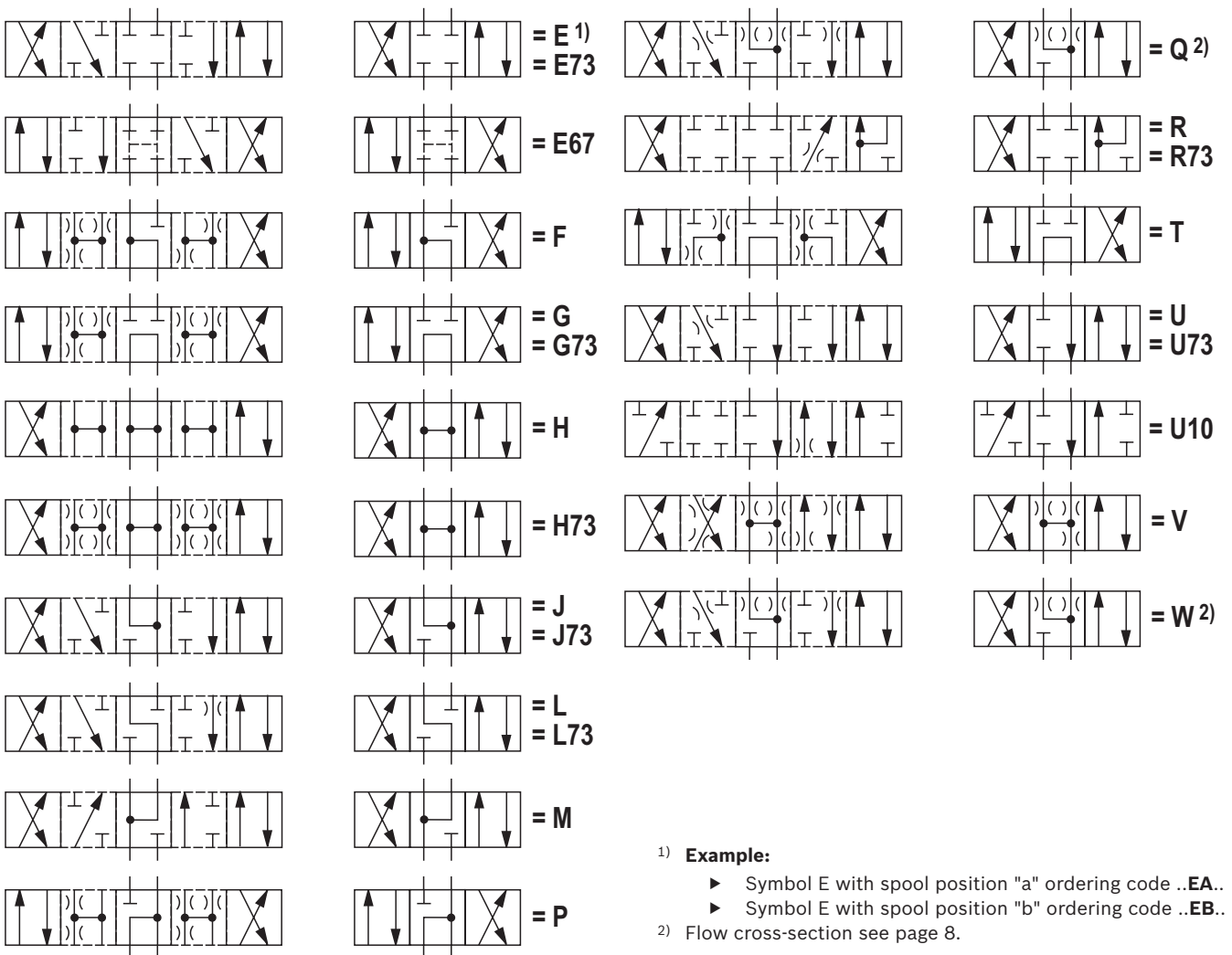
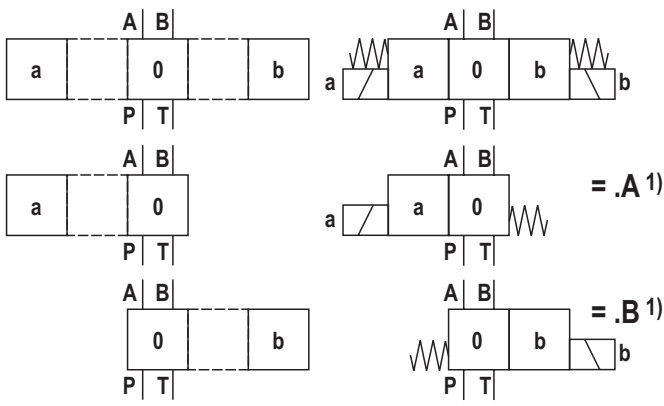
Explanation of the footnotes see page 4.



Notice:

For directional spool valves size 10 with spool position monitoring, see data sheet 23352.

Symbols



- 1) **Example:**
- ▶ Symbol E with spool position "a" ordering code **..EA..**
 - ▶ Symbol E with spool position "b" ordering code **..EB..**
- 2) Flow cross-section see page 8.

Notices!

- ▶ Representation according to DIN ISO 1219-1.
- Hydraulic interim positions are shown by dashes.
- ▶ Other symbols upon request.

Function, section

The directional valve type WE is a solenoid-actuated directional spool valve that can be used as electro-magnetic component. It controls the start, stop and direction of a flow.

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

In the de-energized condition, the control spool (3) is held in the central position or in the initial position by the return springs (4) (except for version "O").

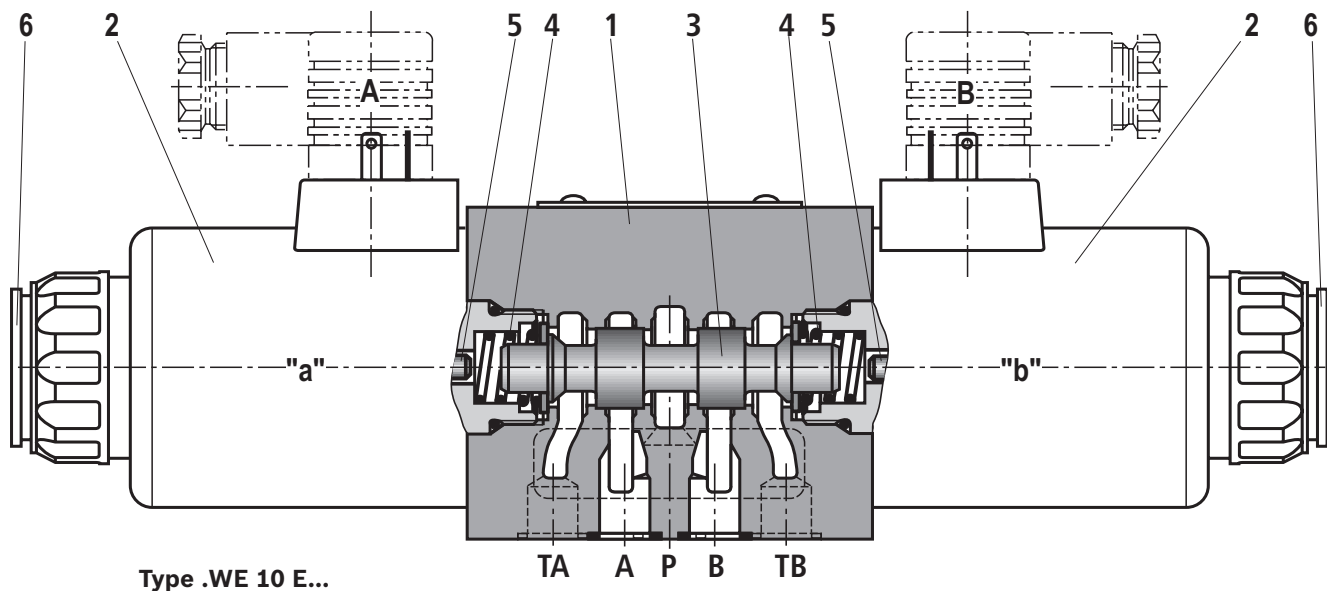
If the wet-pin electronic solenoid (2) is energized, the control spool (3) moves out of its rest position into the required end position. In this way, the required direction of flow according to the selected symbol is released.

After the electronic solenoid (2) has been switched off, the control spool (3) is pushed back into its central position or into its initial position (except for valves with "OF" detent and valves without type "O" spring).

A manual override (6) allows for the manual switching of the valve without solenoid energization.

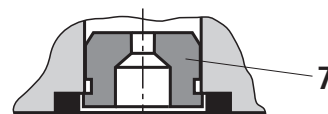
To ensure proper functioning, make sure that the pressure chamber of the solenoid is filled with oil.

More functions see page 7.



Throttle insert "B.."

Using a throttle insert (7) in channels P, A, B or T, the flow resistance at the valve can be increased. Its use is required when, due to prevailing operating conditions, flows occur during the switching processes, which exceed the performance limit of the valve.



Function, section

Without spring return "O" (only possible with symbols A, C and D)

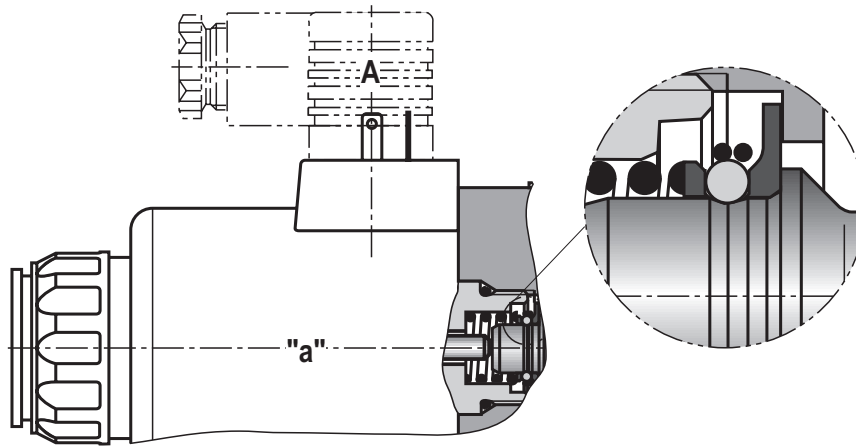
This version is a directional valve with 2 spool positions and 2 electronic solenoids **without** detent. The valve without spring return at the control spool (3) has no defined basic position in the de-energized condition.

Without spring return with "OF" detent (only possible with symbols A, C and D)

This version is a directional valve with 2 spool positions and 2 electronic solenoids **with** detent. The detents are used to fix the control spool (3) in the relevant spool position. During operation, continuous application of current to the electronic solenoid can thus be omitted which contributes to energy-efficient operation.

Notice:

Pressure peaks in the tank line to two or several valves can result in unintended movement of the control spool in the case of valves with detent! We therefore recommend that separate return lines be provided or a check valve installed in the tank line.



Type .WE 10 ../OF...

Technical data

(For application outside these parameters, please consult us!)

| general | | | | |
|--|---|----------|--|--------------------|
| Weight | | | Individual connection | Central connection |
| | – Valve with one solenoid | kg [lbs] | 3.9 [8.6] | 4.0 [8.8] |
| | – Valve with two solenoids | kg [lbs] | 5.5 [12.1] | 5.6 [12.3] |
| Installation position | | | Any ¹⁾ | |
| Ambient temperature range | – Standard version | °C [°F] | –20 ... +70 [–4 ... +158] (NBR seals) –15 ... +70 [+5 ... +158] (FKM seals) | |
| | – Version for HFC hydraulic fluid | °C [°F] | –20 ... +50 [–4 ... +122] | |
| | – Low-temperature version ²⁾ | °C [°F] | –40 ... +50 [–40 ... +122] | |
| Storage temperature range | | °C [°F] | –20 ... +50 [–4 ... +122] | |
| MTTF _d values according to EN ISO 13849 | | Years | 300 (for further details see data sheet 08012) | |

| hydraulic | | | | |
|---|-----------------|--------------------------|--|--|
| Maximum operating pressure ²⁾ | – Ports A, B, P | bar [psi] | 350 [5076] | |
| | – Port T | bar [psi] | 210 [3050] Tank pressure (standard) With symbols A and B, port T must be used as leakage oil connection if the operating pressure exceeds the maximum admissible tank pressure. | |
| Maximum flow | | l/min [US gpm] | 160 [42.3] | |
| Flow cross-section (spool position 0) | – Symbol Q | mm ² | Approx. 6 % of nominal cross-section | |
| | – Symbol W | mm ² | Approx. 3 % of nominal cross-section | |
| Hydraulic fluid | | | See table below | |
| Hydraulic fluid temperature range (at the valve working ports) | | °C [°F] | –20 ... +80 [–4 ... +176] (NBR seals) | |
| | | | –15 ... +80 [+5 ... +176] (FKM seals) | |
| | | | –20 ... +50 [–4 ... +122] (HFC hydraulic fluid) | |
| | | | –40 ... +50 [–40 ... +122] (low-temperature version) | |
| Viscosity range | | mm ² /s [SUS] | 2.8 ... 500 [35 ... 2320] | |
| Maximum admissible degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c) | | | Class 20/18/15 ³⁾ | |

| 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, HFDR | ISO 12922 | 90222 |
| | ▶ containing water | HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620) | ISO 12922 | 90223 |

Important information on hydraulic fluids:

- ▶ For more 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 flash point of the hydraulic fluid used must be 40 K higher than the maximum solenoid surface temperature.

▶ Flame-resistant – containing water:

- Maximum pressure differential per control edge 50 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 %

- ▶ **Bio-degradable and flame-resistant:** When using hydraulic fluids that are simultaneously zinc-solvent, zinc may accumulate (700 mg zinc per pole tube).

¹⁾ With suspended installation, higher sensitivity to contamination. Horizontal installation is recommended.

²⁾ In case of use at low temperatures, see project planning information on page 20.

³⁾ 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.

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

Technical data

(For application outside these parameters, please consult us!)

| electric | | | | | |
|---|---|---|---|-----------------------------|-------------|
| Voltage type | | Direct voltage | Alternating voltage | | |
| Nominal voltage according to VDE 0580 (ordering code see page 2 and 10) | V | 12, 24, 26, 48, 96, 110, 125, 180, 205, 220 | Possible with central connection or via rectifier ⁴⁾ | | |
| Voltage tolerance (nominal voltage) | % | ±10 | | | |
| Nominal power according to VDE 0580 | W | 40 ⁵⁾ | | | |
| Duty cycle (ED) | % | 100 (S1 according to VDE 0580) | | | |
| Switching time ⁶⁾ | – ON | Pressure change 5 % | ms | 60 ... 104 ^{7; 8)} | |
| | | Pressure change 95 % | ms | 90 ... 165 ^{7; 8)} | |
| | – OFF | Pressure change 5 % | ms | 12 ... 50 | 230 ... 330 |
| | | Pressure change 95 % | ms | 48 ... 104 | 250 ... 360 |
| Switching time according to ISO 6403 ⁹⁾ | – ON | 45 ... 60 | | | |
| | – OFF | 20 ... 30 | | 250 ... 360 | |
| Maximum switching frequency | 1/h | 15000 | 7200 | | |
| Protection class according to DIN EN 60529 | See page 10 | | | | |
| Protection class according to VDE 0580 | See page 10 | | | | |
| Maximum surface temperature of the coil ¹⁰⁾ | °C [°F] | 140 [284] | | | |
| Insulation class VDE 0580 | F | | | | |
| Electrical protection | Every solenoid must be protected individually, using a suitable fuse with tripping characteristics K (inductive loads). The valve must be installed on a surface that is included in the equipotential bonding. | | | | |
| Protective earthing conductor and screening | See connector pin assignment (CE-compliant installation) page 18 and 19 | | | | |
| Conformity | CE according to Low-Voltage Directive 2006/95/EC tested according to DIN EN 60204-1 (VDE0113-1): 2010-05 and DIN VDE 0580: 2000-07 | | | | |

- 4) ▶ Mating connectors with rectifier see page 20
▶ Possible voltages see page 2
▶ Rectifiers must comply with the relevant standards as well as the coil performance data!
▶ With a central connection, the rectifier is on the board
- 5) 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 20 and data sheet 30362)
- 6) Measured with flow, 80 % performance limit and horizontal installation position.
- 7) Not with symbols A, B and .73.
- 8) Reduction of the switching time by approx. 50 % if a 12 V-coil with connector switching amplifier type VT-SSBA1-PWM-1X/V001/5 is used (separate order, material no. **R901265633**, see page 20 and data sheet 30362)
- 9) Measured without flow
- 10) Possible surface temperature > 50 °C, provide contact protection!

Notices:

- ▶ The solenoid coils must not be painted.
- ▶ Actuation of the manual override is only possible up to a tank pressure of approx. 50 bar [725 psi]. 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, actuation of the opposite solenoid must be ruled out!
- ▶ The simultaneous actuation of 2 solenoids of one valve must be ruled out!
- ▶ Use cables that are approved for a working temperature above 105 °C [221 °F].
- ▶ Valves with individual connection and a supply voltage of 12 V or 24 V can be operated with twice the voltage for reducing the switching time. For this purpose, the voltage has to be reduced to the nominal valve voltage after 100 ms by means of pulse width modulation. The maximum admissible switching frequency is 3 1/s.
- ▶ Due to possible overload of the board, valves with central connection must not be operated with twice the voltage.
- ▶ If the standard environmental conditions according to VDE 0580 cannot be provided, the valve must be especially protected!

 **Electrical connections** see page 10.

Technical data


(For application outside these parameters, please consult us!)

Electrical connections and available voltages

| Connector ordering codes | | Ordering codes | | | | | | | | | | | | | Protection class according to DIN EN 60529 ¹¹⁾ | Protection class according to VDE 0580 | | | | | |
|--|---|-----------------------------|------------------|------------------|------------------|-----|------|------|------|------|------|---------------------|-------|-------|---|--|-------|-------|------|---------------------|--------------------|
| | | Direct voltage | | | | | | | | | | Alternating voltage | | | | | | | | | |
| | | G12 | G24 | G26 | G48 | G96 | G110 | G125 | G180 | G205 | G220 | W100R | W110R | W120R | | | W200R | W230R | | | |
| Individual connection | Without mating connector, individual connection; connector according to DIN EN 175301-803 | K4 | ✓ | ✓ | - | ✓ | ✓ | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | - | - | - | IP65 | I |
| | | K4K ¹²⁾ | ✓ ₁₃₎ | ✓ ₁₃₎ | ✓ ₁₃₎ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | IP65, IP67 | I |
| | Without mating connector, 4-pole with connector M12x1 according to IEC 60947-5-2, integrated interference protection circuit and status LED | K72L | - | ✓ ₁₃₎ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | IP65 | III ¹⁵⁾ |
| Without mating connector; connector AMP Junior-Timer | C4Z | - | - | ✓ ₁₃₎ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | IP66 | III ¹⁵⁾ | |
| Central connection | Without mating connector; threaded connection 1/2"-14 NPT | DAL | ✓ | ✓ | - | - | ✓ | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | IP65 ¹⁶⁾ | I |
| | Central plug-in connection at the cover, with indicator light (without mating connector) with connector according to DIN EN 175201-804 | DK6L ¹⁷⁾ | ✓ | ✓ | - | - | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | IP65 | I |
| | Cable gland at the cover, with indicator light (terminal area 6 ... 12 mm [0.23... 0.47 inch]) | DL ¹⁴⁾ | ✓ | ✓ | - | - | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | IP65 | I |
| | Cable gland at the cover, with indicator light and cable bridge at the ground connection | DJL ¹⁴⁾ | - | ✓ | - | - | - | ✓ | - | - | - | - | ✓ | ✓ | - | ✓ | ✓ | ✓ | ✓ | IP65 | I |
| | Mini-change connector, 5-pole according to ANSI/B93.55M-1981 | DK25L ¹⁷⁾ | - | ✓ | - | - | ✓ | - | - | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | IP65 | I |

- ¹¹⁾ Only with correctly mounted valve with a mating connector suitable for the protection class.
- ¹²⁾ Recommended for mobile applications; with additional sealing between solenoid coil and pole tube.
- ¹³⁾ Solenoid coils without "Recognized component" according to UL 429
- ¹⁴⁾ Possible with version "J3".
- ¹⁵⁾ With protection class III, a protective extra-low voltage with isolation transformer (PELV, SELV) is to be provided.
- ¹⁶⁾ Only with professionally designed connection with appropriate sealing to the central connection.
- ¹⁷⁾ Connector pin assignment see page 19

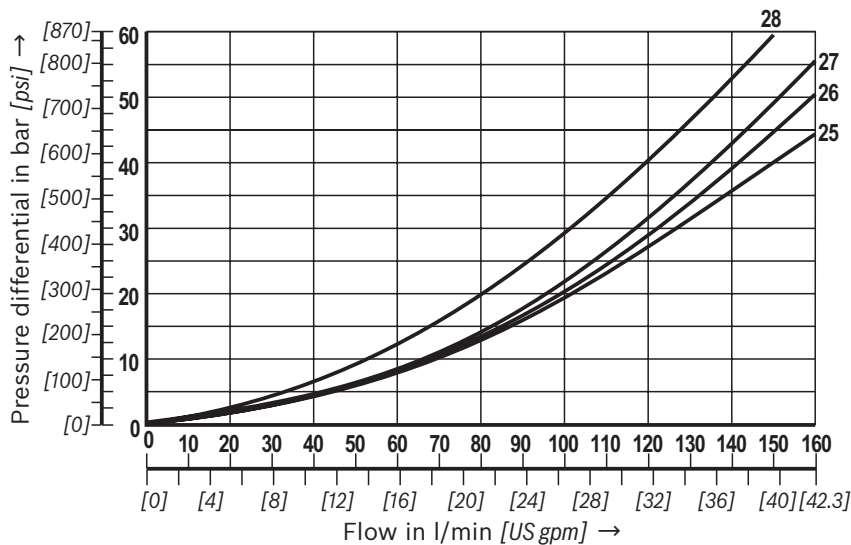
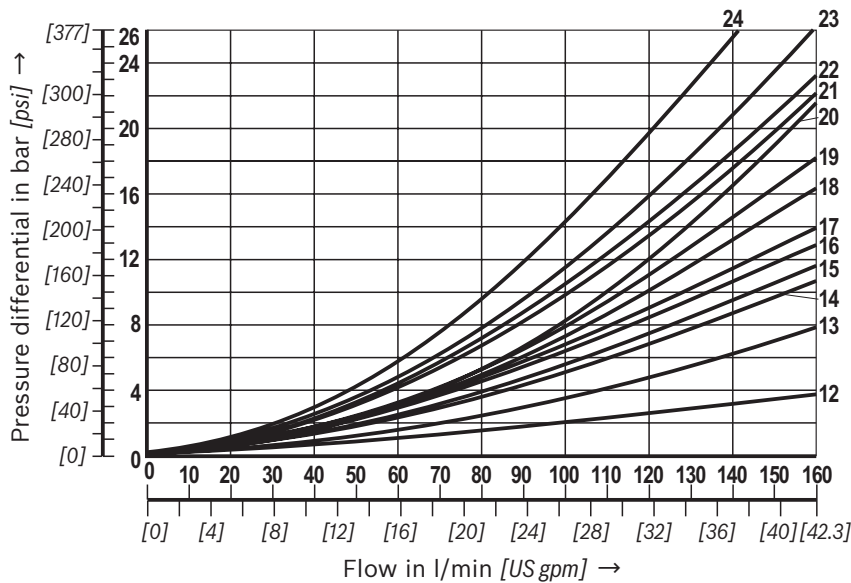
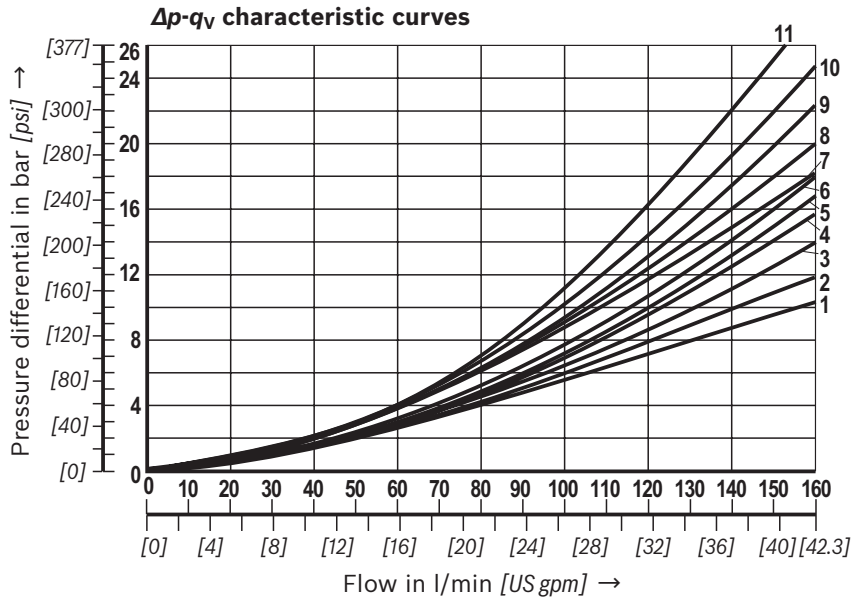
When establishing the electrical connection, the protective earthing conductor (PE \perp) has to be connected correctly.

 **Notices:**

- ▶ The plug-in connectors used are not intended to be plugged in or disconnected during normal operation under load.
- ▶ Operation of the valves only admissible with appropriate and locked mating connector.

Characteristic curves

(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$ [$104 \pm 9 \text{ }^\circ\text{F}$])



| Symbol | Direction of flow | | | |
|----------|-------------------|-------|-------|-------|
| | P - A | P - B | A - T | B - T |
| A; B | 6 | 6 | - | - |
| A73, B73 | 23 | 23 | - | - |
| C | 1 | 2 | 5 | 7 |
| D | 2 | 2 | 5 | 7 |
| D73 | 25 | 26 | 26 | 27 |
| E | 17 | 16 | 19 | 21 |
| E67 | 4 | 4 | 11 | 24 |
| E73 | 17 | 18 | 21 | 21 |
| F | 2 | 3 | 22 | 23 |
| G | 4 | 4 | 24 | 24 |
| G73 | 18 | 18 | 24 | 24 |
| H | 14 | 14 | 20 | 21 |
| H73 | 14 | 14 | 6 | 9 |
| J | 3 | 3 | 9 | 11 |
| J73 | 22 | 21 | 23 | 24 |
| L | 3 | 3 | 9 | 9 |
| L73 | 22 | 10 | 11 | 24 |
| M | 14 | 14 | 6 | 8 |
| P | 17 | 14 | 20 | 23 |
| Q | 16 | 17 | 4 | 8 |
| R | 18 | 21 | 18 | 24 |
| R73 | 24 | 24 | 23 | 24 |
| T | 18 | 4 | 10 | 24 |
| U | 3 | 3 | 6 | 11 |
| U10 | Upon request | | | |
| U73 | 22 | 22 | 23 | 24 |
| V | 17 | 17 | 18 | 20 |
| W | Upon request | | | |
| X7 | Upon request | | | |
| X34 | Upon request | | | |
| Y | 17 | 16 | 18 | 21 |
| Y11 | 3 | 2 | 4 | 9 |
| Y73 | 26 | 26 | 26 | 28 |

Central position:

| Symbol | Direction of flow | | | | |
|--------|-------------------|-------|-------|-------|-------|
| | P - A | P - B | B - T | A - T | P - T |
| H | 12 | 12 | 13 | 13 | 15 |

Performance limits

(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$ [104 ± 9 °F])

Notice:

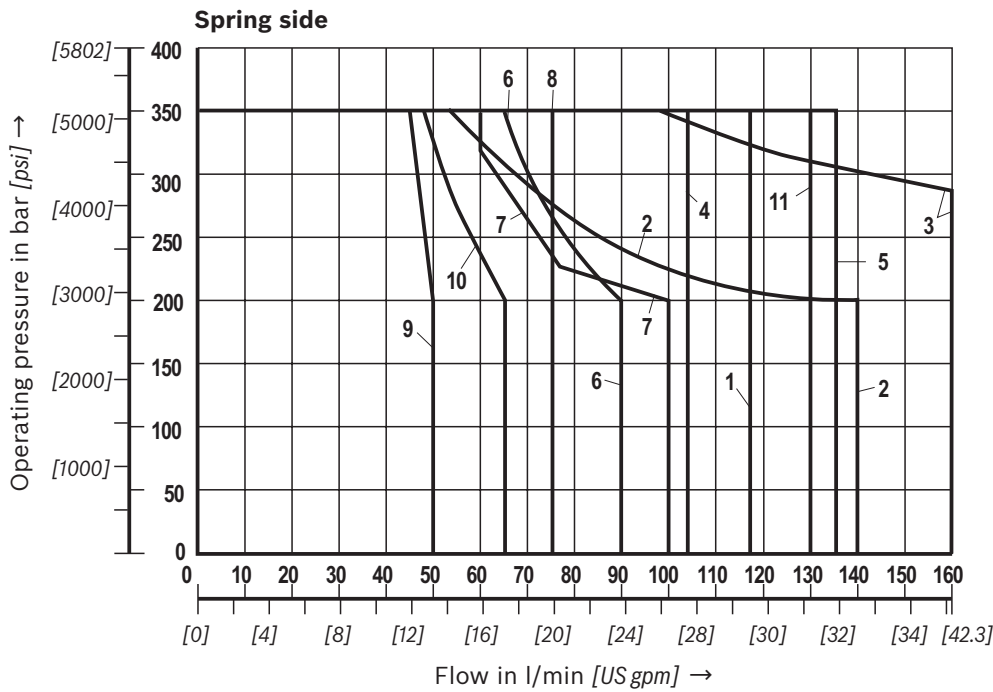
The specified performance limits are valid for operation with two directions of flow (e. g. from P to A and simultaneous return flow from B to T).

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

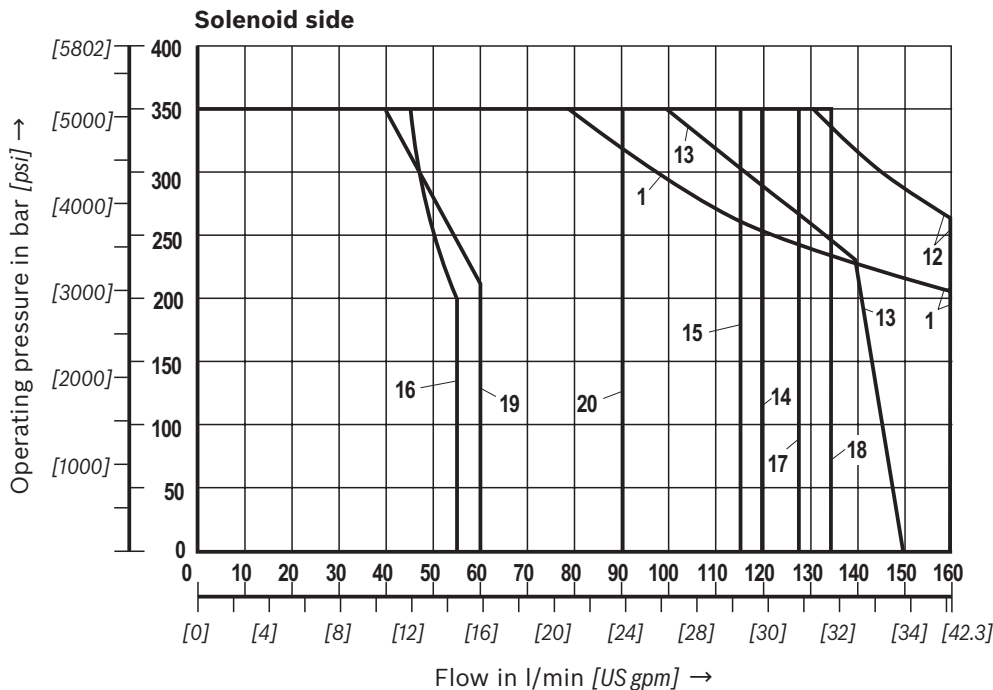
with only one direction of flow (e. g. from P to A while port B is blocked)!

In such cases of application, please consult us!

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



| Characteristic curve | Symbol |
|----------------------|--------|
| 1 | L |
| 2 | A |
| 3 | B |
| 4 | Y |
| 5 | E73, Q |
| 6 | F |
| 7 | G73 |
| 8 | M; V |
| 9 | P |
| 10 | A73 |
| 11 | H73 |



| Characteristic curve | Symbol |
|----------------------|-----------|
| 1 | L |
| 12 | A/O |
| 13 | J |
| 14 | H |
| 15 | D73 |
| 16 | B73 |
| 17 | Y11 |
| 18 | C; D; E73 |
| 19 | E67 |
| 20 | G |

Performance limits

(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$ [$104 \pm 9 \text{ }^\circ\text{F}$])

Notice:

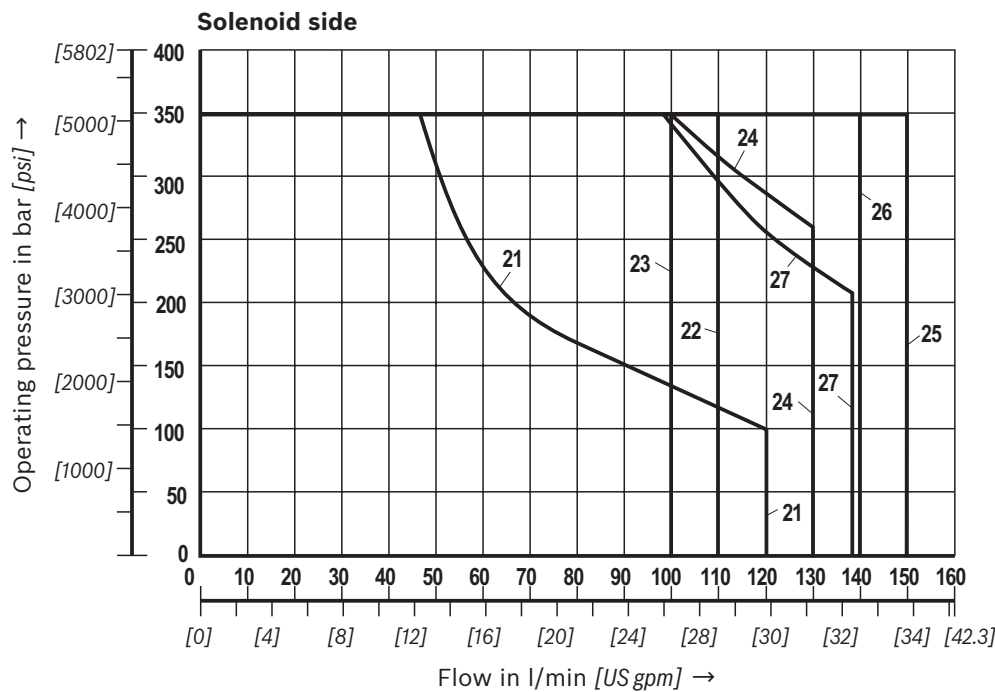
The specified performance limits are valid for operation with two directions of flow (e. g. from P to A and simultaneous return flow from B to T).

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

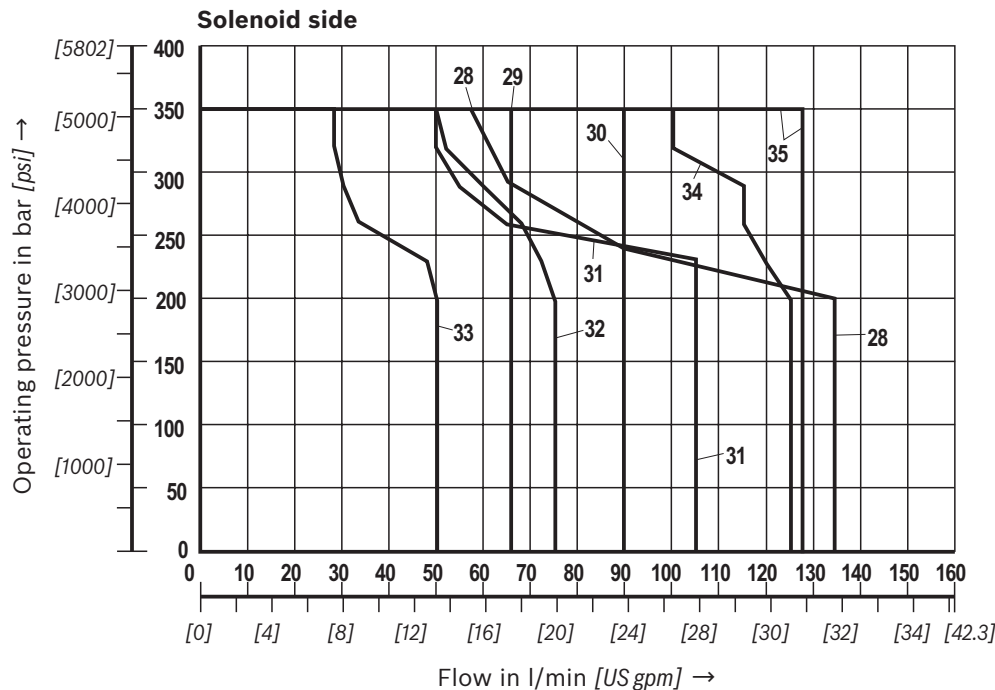
with only one direction of flow (e. g. from P to A while port B is blocked)!

In such cases of application, please consult us!

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

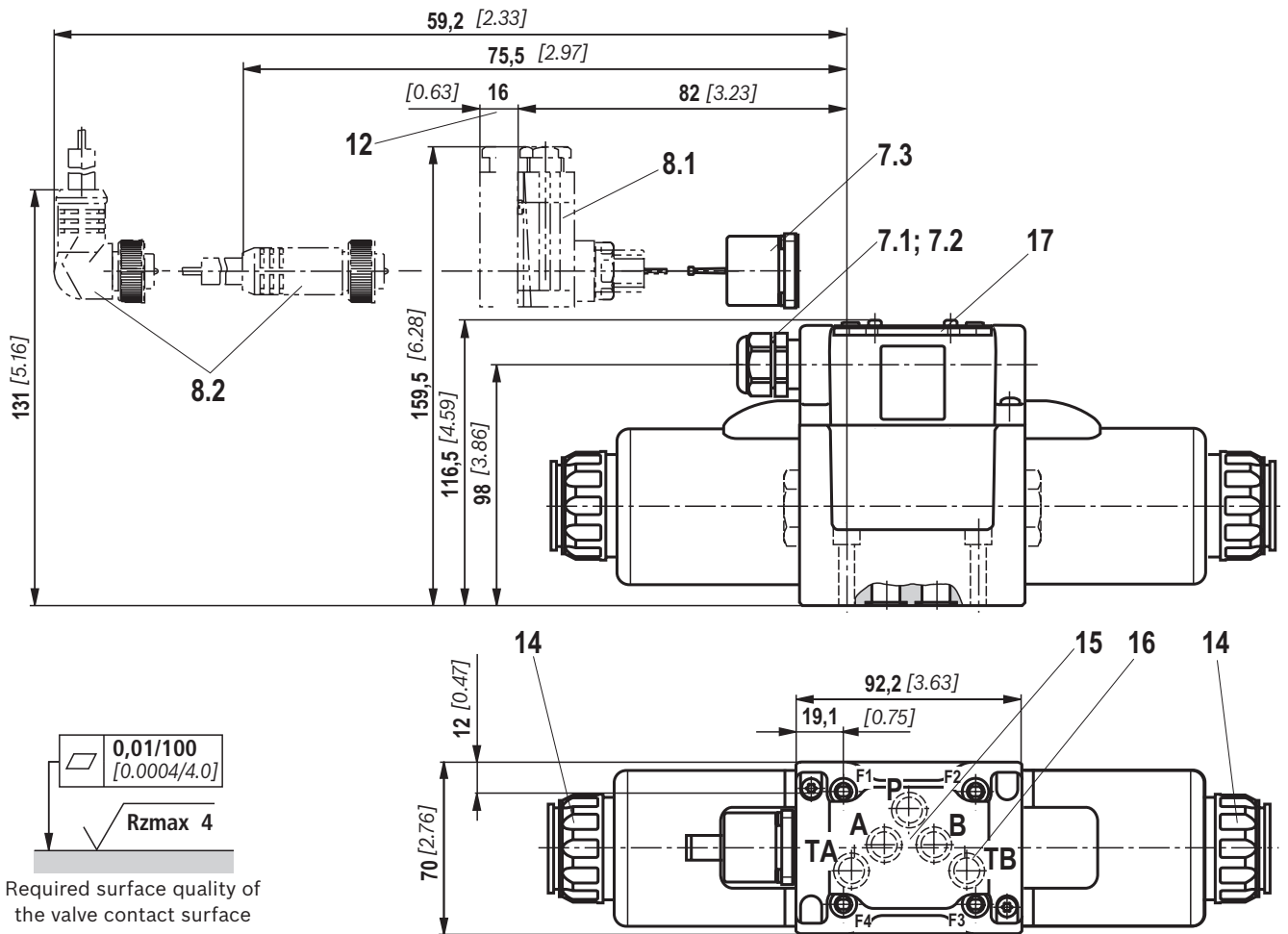


| Characteristic curve | Symbol |
|----------------------|----------|
| 21 | A; B |
| 22 | G73 |
| 23 | F; L73 |
| 24 | E |
| 25 | C/O; D/O |
| 26 | J73 |
| 27 | U |



| Characteristic curve | Symbol |
|----------------------|--------|
| 28 | Q |
| 29 | V |
| 30 | P |
| 31 | R |
| 32 | R73 |
| 33 | T |
| 34 | U73 |
| 35 | Y73 |

Dimensions: Central connection (dimensions in mm [inch])



Special points with version "DAL" and "DL"

- ▶ Version "DL" is only suitable for permanently installed cables. Lines must be routed in a pull-relieved manner.
- ▶ Minimum line cross-section 0.75 mm² (AWG 18)
- ▶ With a maximum line cross-section of 1.50 mm² (AWG 16) and if wire end ferrules are used, wire end ferrules without flange must be crimped to a maximum cross-section of 1.5 mm x 2 mm (trapezoidal crimp) using an appropriate tool (e. g. "PZ 6/5", co. Weidmüller) to ensure that they fit into the printed circuit board terminals.
- ▶ Before crimping, the wires have to be stripped to 9-1 mm [$0.35-0.039$ inch].
- ▶ For the corresponding line cross-section ¹⁾, wire end ferrules without flange (according to DIN 46228-1) with a length of 8 mm [0.31 inch] are to be used.
- ▶ For the earthing connection, ring cable lugs according to DIN 46234-4-1 are to be used, tightening torque $M_A = 1.75$ Nm [1.29 ft-lbs] ± 10 %

Notice:

The dimensions are nominal dimensions which are subject to tolerances.

Dimensions for manual overrides see page 16.

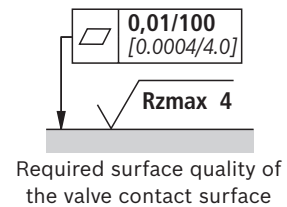
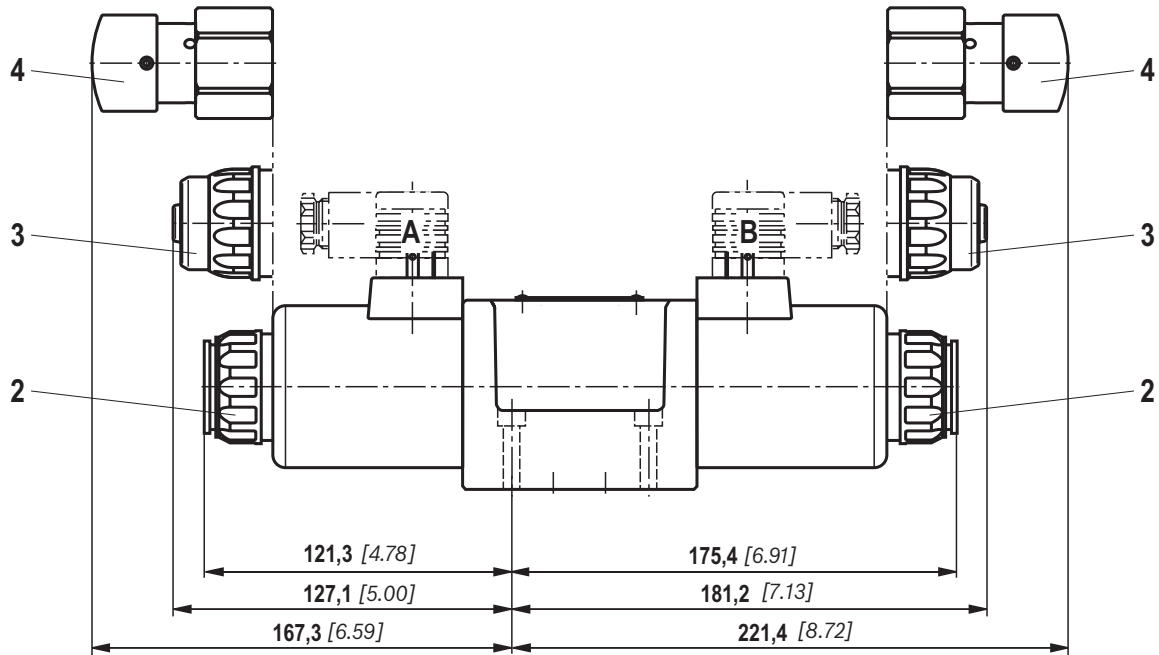
Item explanations, valve mounting screws and subplates see page 17.

- ¹⁾ 0.75 mm² (AWG 20)
1.00 mm² (AWG 18)
1.50 mm² (AWG 16)

Notice:

The lines must be finely stranded.

Dimensions: Manual overrides
(dimensions in mm [inch])



- 2 Version **without** and **with concealed** manual override "**N9**" (standard)
- 3 Version **with** concealed manual override and protective cap "**N8**". (The protective cap must be removed prior to actuation.)
- 4 Version **with** manual override "**N5**" and "**N6**"

Item explanations, valve mounting screws and subplates see page 17.

Notice:

The dimensions are nominal dimensions which are subject to tolerances.

Dimensions

- 1.1 Solenoid "a"
- 1.2 Solenoid "b"
- 2 Version **without** and **with concealed** manual override "**N9**" (standard)
- 3 Version **with** concealed manual override and protective cap "**N8**". (The protective cap must be removed prior to actuation.)
- 4 Version **with** manual override "**N5**" and "**N6**"
- 5.1 Mating connector **without** circuitry for connector "K4" (separate order, see page 20 and data sheet 08006)
- 5.2 Mating connector **without** circuitry for connector "K4K" (separate order, see data sheet 08006)
- 5.3 Mating connector angled with M12x1 plug-in connection and status LED for connector "K72L" (separate order, see data sheet 08006)
- 5.4 Double mating connector **without/with** circuitry for connector "K4" (separate order, see data sheet 08006)
- 5.5 Mating connector (AMP Junior Timer) for connector "C4Z" (separate order, see data sheet 08006)
- 6 Mating connector **with** circuitry for connector "K4" (separate order, see page 20 and data sheet 08006)
- 7.1 Cable gland Pg 16 "DL" (terminal area 6 ... 12 mm [0.24 ... 0.47 inch]); lock nut, tightening torque $M_A = 3.3 \text{ Nm}$ [2.43 ft-lbs] $\pm 10 \%$
- 7.2 Central connection box "DAL" 1/2" NPT, tightening torque $M_A = 5 \text{ Nm}$ [3.69 ft-lbs] $\pm 10 \%$; sealing by sealant
- 7.3 Connector "DK6L" and "DK25L"
- 8.1 Mating connector for connector "DK6L" (separate order, material no. **R900002803**, see data sheet 08006)
- 8.2 Mini-change connector, 5-pole for connector "DK25L" (separate order, material no. **R900057631**)
- 9 Name plate
- 10 Identical seal rings for ports A, B, P, TA, TB
- 11.1 Plug screw for valves with one solenoid on B side
- 11.2 Plug screw for valves with one solenoid on A side
- 12 Space required to remove the mating connector/angled socket
- 13 Space required to remove the coil
- 14 Mounting nut, tightening torque $M_A = 14.5 \pm 1.5 \text{ Nm}$ [10.69 ± 1.1 ft-lbs]
- 15 Porting pattern according to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- 16 Connection TB can only be used in connection with separately produced bore.
- 17 Cover

Notice: The valve may only be operated with properly mounted cover! Tightening torque of the cover screws $M_A = 1.0 \text{ Nm}$ [0.74 ft-lbs] $\pm 10 \%$.
Prior to opening the frame, it must be ensured that the valve has no voltage!

Subplates according to data sheet 45054 (separate order)

G 66/01 (G3/8)
 G 67/01 (G1/2)
 G 534/01 (G3/4)
 G 66/12 (SAE-6; 9/16-18)¹⁾
 G 67/12 (SAE-8; 3/4-16)¹⁾
 G 534/12 (SAE-12; 1-1/16-12)¹⁾

¹⁾ Upon request

Valve mounting screws (separate order)

4 metric hexagon socket head cap screws

ISO 4762 - M6 x 40 - 10.9-fIZn-240h-L

(friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);
 tightening torque $M_A = 12.5 \text{ Nm}$ [9.2 ft-lbs] $\pm 10 \%$,
 material no. **R913000058**

or

4 hexagon socket head cap screws

ISO 4762 - M6 x 40 - 10.9 (self procurement)

(friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17);
 tightening torque $M_A = 15.5 \text{ Nm}$ [11.4 ft-lbs] $\pm 10 \%$

4 UNC hexagon socket head cap screws

1/4-20 UNC x 1-1/2" ASTM-A574

(friction coefficient) $\mu_{\text{total}} = 0.19$ to 0.24);
 tightening torque $M_A = 25 \text{ Nm}$ [18.4 ft-lbs] $\pm 15 \%$,
 (friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17);
 tightening torque $M_A = 19 \text{ Nm}$ [14.0 ft-lbs] $\pm 10 \%$,
 material no. **R978800710**

With different friction coefficients, the tightening torques are to be adjusted accordingly!

Over-current fuse and switch-off voltage peaks

Maximum admissible overvoltages according to DIN EN 60664-1:2008-01 (VDE 0110-1) (overvoltage category II):

| Electrical connection ¹⁾ | Nominal voltage in V | Rated current in A | Maximum admissible switch-off overvoltage in V ²⁾ |
|--|-------------------------|-----------------------|---|
| K4, K4K, DAL, D6KL, DL | 12 | 3.72 | 500 |
| K4, K4K, K72L, DAL, D6KL, DL, DJL, DK25L | 24 | 1.74 | 500 |
| K4, C4Z | 26 | 1.70 | 500 |
| K4 | 48 | 0.57 | 500 |
| K4, DAL, D6KL, DL, DK25L | 96 | 0.47 | 500 |
| D6KL, DL, DJL | 110 | 0.41 | 500 |
| K4 | 125 | 0.22 | 500 |
| K4, C4Z | 180 | 0.28 | 500 |
| K4, DAL, D6KL, DL | 205 | 0.22 | 500 |
| K4, DAL, D6KL, DL | 220 | 0.21 | 500 |

1) Interference protection circuit integrated

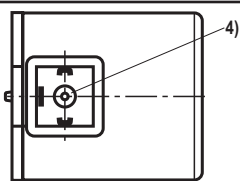
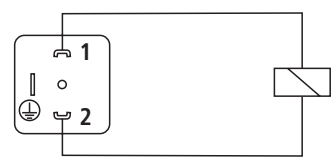

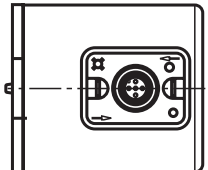
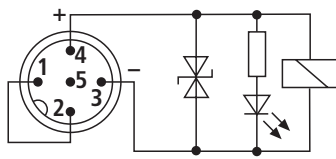
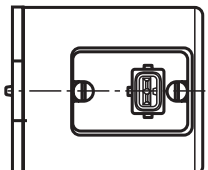
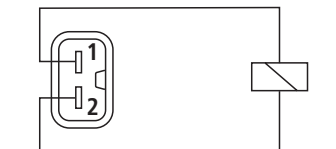
2) To be ensured by user circuitry

Notice:

When solenoid coils are switched off, voltage peaks result which may cause faults or damage in the connected control electronics. We therefore recommend limiting them to 2 x nominal voltage by means of an interference protection circuit. It must be noted that a diode switched in an antiparallel form extends the switching off time.

Electrical connections, assignment – individual connection

Electrical connections and coil connection combinations

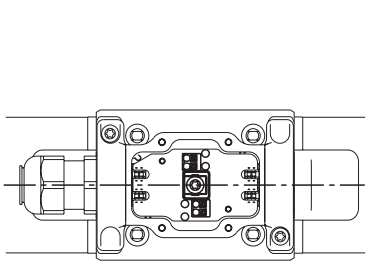
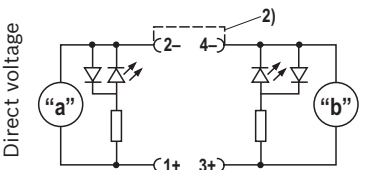
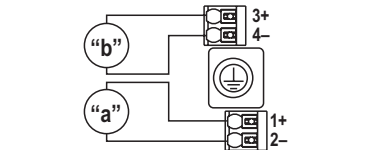
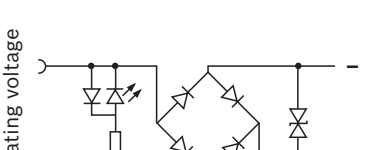
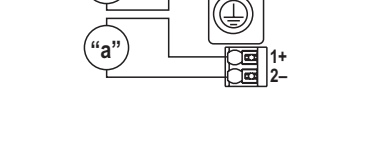
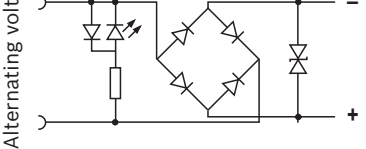
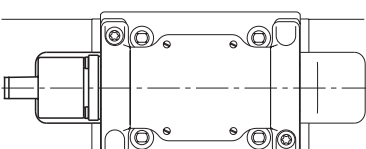
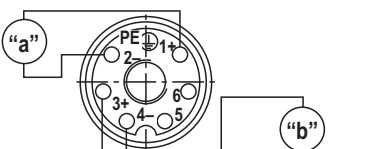
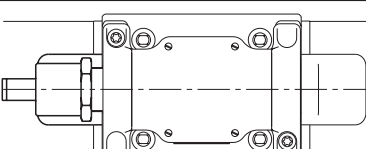
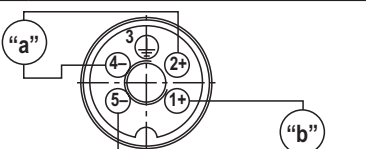
| Connector ordering codes | Top view | Circuit diagram | Pin | Connections, assignment |
|---|---|--|---|--------------------------------------|
| Connector, 3-pole (2+PE) according to DIN EN 175301-803 (IP65) |  |  | 1 | Solenoid coil, polarity-independent |
| | | | 2 | |
| | | |  | Earthing |
| Connector 4-pole according to IEC 60947-5-2, M12x1 with suppressor diode, only 24 V DC, integrated interference protection circuit and status LED |  |  | 1 | Internal bridge |
| | | | 2 | |
| | | | 3 | Solenoid coil GND |
| | | | 4 | Solenoid coil 24 V DC supply voltage |
| | | | 5 | without function |
| 2-pole connector, type AMP Junior-Timer, rotated by 90° relative to valve axis |  |  | 1 | Solenoid coil, polarity-independent |
| | | | 2 | |

3) Coil with potted-in connector base and sealing element to valve housing (IP67)

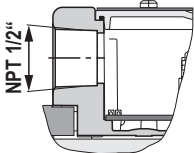
4) M3, tightening torque maximum $M_{A \max} = 0.5 \text{ Nm}$ [0.37 ft-lbs]

Electrical connections, assignment – central connection

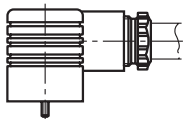
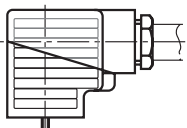
Electrical connections and coil connection combinations

| Connector ordering codes | Top view | Circuit diagram | Pin | Connections, assignment |
|---|---|---|---------------------------------|--|
| Cable gland at the cover, with indicator light (terminal area 6 ... 12 mm [0.23 ... 0.47 inch]) | DL  | Direct voltage  | 1+ 2- 3+ 4- | Valve solenoid "a" 1) Valve solenoid "b" 1) |
| Cable gland at the cover, with indicator light and cable bridge at the ground connection (terminal area 6 ... 12 mm [0.23 ... 0.47 inch]) | DJL  | Direct voltage  | 1+ 2- 3+ 4- | Valve solenoid "a" 1) Valve solenoid "b" 1) |
| Without mating connector; threaded connection 1/2"-14 NPT (terminal area 6 ... 12 mm [0.23 ... 0.47 inch]) | DAL ³⁾  | Alternating voltage  | 1+ 2- 3+ 4- ⊕ | Valve solenoid "a" 1) Valve solenoid "b" 1) Earthing |
| Central plug-in connection at the cover, with indicator light (without mating connector) with connector according to DIN EN 175201-804 | DK6L  |  | 1 2 3 4 5 6 ⊕ | Valve solenoid "a" Valve solenoid "b" Not used Earthing |
| Mini-change connector, 5-pole according to ANSI/B93.55M-1981 | DK25L  |  | 1 2 3 4 5 | Valve solenoid "a" Valve solenoid "b" Earthing |

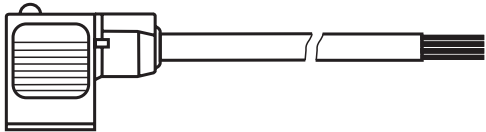
- 1) Core marking:
+ → red
- → blue
- 2) Bridge only for version "DJL"
- 3) Cable gland with NPT thread



Mating connectors according to DIN EN 175301-803

| For details and more mating connectors, see data sheet 08006 | | |  |  | | |
|--|------------|-----------|---|--|--------------------------------|---|
| Port | Valve side | Color | Material no. | | | |
| | | | Without circuitry | With indicator light 12 ... 240 V | With rectifier 12 ... 240 V | With indicator light and Zener diode suppression circuit 24 V |
| M16 x 1.5 | a | Gray | R901017010 | - | - | - |
| | a/b | Black | R901017011 | R901017022 | R901017025 | R901017026 |
| 1/2" NPT (Pg16) | a | Red/brown | R900004823 | - | - | - |
| | a/b | Black | R900011039 | R900057453 | R900842566 | - |

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 C, D, E, E67, J, J2, Y and Y11; not for version "D" with reinforced compression spring

²⁾ Only available for "G12" and "K4/K4K" version

³⁾ Only available for "G24" and "K4/K4K" version

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.

Project planning information

Temperature range and maximum operating pressure in case of use at low temperatures

| Port | Pressure | Temperature range in °C [°F] |
|--------------|---|------------------------------|
| - P, A, B, T | Static 100 bar [1450 psi] | -40 ... -35 [-40... -31] |
| - P, A, B | Dynamic from 100 bar [1450 psi] to 350 bar [5076 psi] in linear form as a function of the temperature | -35 ... -30 [-31... -22] |
| - T | Dynamic from 100 bar [1450 psi] to 210 bar [3050 psi] in linear form as a function of the temperature | -35 ... -30 [-31... -22] |
| - P, A, B, T | Maximum operating pressure | -30 ... +50 [-22... 122] |

Additional information

| | |
|--|--|
| ▶ Subplates | Data sheet 45054 |
| ▶ Hydraulic fluids on mineral oil basis | Data sheet 90220 |
| ▶ Environmentally compatible hydraulic fluids | Data sheet 90221 |
| ▶ Flame-resistant, water-free hydraulic fluids | Data sheet 90222 |
| ▶ Connector switching amplifier type VT-SSBA1 | Data sheet 30362 |
| ▶ Directional spool and seat valves with electrical actuation and M12x1 plug-in connection | Data sheet 08010 |
| ▶ Reliability characteristics according to EN ISO 13849 | Data sheet 08012 |
| ▶ Hydraulic valves for industrial applications | Data sheet 07600-B |
| ▶ CE declaration of conformity according to Low-voltage Directive 2006/95/EC | Upon request |
| ▶ Selection of filters | www.boschrexroth.com/filter |
| ▶ Information on available spare parts | www.boschrexroth.com/spc |

Notes

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Notes

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Notes