Directional spool valves, direct operated, with solenoid actuation

Type WE

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

Contents

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

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
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<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>WE</td>
<td>10</td>
<td>5X</td>
<td>/</td>
<td>E</td>
<td>/</td>
<td>/</td>
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<td></td>
</tr>
</tbody>
</table>

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 3) 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

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

Bosch Rexroth AG, RE 23340, edition: 2015-07
Directional spool valve

Ordering codes

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
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<td>WE</td>
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<td>/</td>
<td>E</td>
<td>/</td>
<td>/</td>
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<td></td>
</tr>
</tbody>
</table>

11 Individual connection

Without mating connector; connector according to DIN EN 175301-803

Without mating connector; connector according to DIN EN 175301-803 (coil with potted-in connector base and sealing element to valve housing (IP67))

Without mating connector, 4-pole with connector M12x1 according to IEC 60947-5-2, integrated interference protection circuit and status LED

Without mating connector; connector AMP Junior-Timer

Central connection

Cable entry at the cover, with indicator light

Central plug-in connection at the cover, with indicator light (without mating connector); connector according to DIN EN 175201-804

Without mating connector; threaded connection 1/2"-14 NPT

Cable gland at the cover, with indicator light and cable bridge at the ground connection

Mini-change connector, 5-pole

Additional electrical connections and available voltages see page 10

Switching time increase

12 Without switching time increase

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

With throttle insert (6, 9):

Port | Throttle Ø in mm [inch]
-----|-------------------------
| 0.8 [0.031] | 1.0 [0.039] | 1.2 [0.047] |
| 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

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

FKM seals

Seals for HFC hydraulic fluids

Low-temperature version

M

V

MH

MT

Observe compatibility of seals with hydraulic fluid used!

16 Approval according to CSA C22.2 No. 139-10

Porting pattern according to ANSI B93.9 (if solenoid "a" is energized, channel P is connected to A)

CSA

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.
Ordering codes

1) Only for version "Central connection"
2) Only for version "Individual connection"
3) The manual override cannot be allocated a safety function. The manual override units may only be used up to a tank pressure of 50 bar.
4) With tank pressures above 50 bar, it cannot be guaranteed that the valve remains in the position switched by the "N5" manual override.
5) Protective cap must be removed prior to actuation.
6) Mating connectors, separate order, see page 20 and data sheet 08006.

7) Recommended for mobile applications; with additional sealing between solenoid coil and pole tube.
8) When the admissible valve performance limits are exceeded, throttle inserts are to be installed (for performance limits, see page 12 and 13).
9) Not with low-temperature version "MT".
10) If throttle inserts are used in channel T, the pressure in the working ports and for connection to the tank chambers must not exceed 210 bar.

Symbols

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

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.

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**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.
### Technical data
(For application outside these parameters, please consult us!)

<table>
<thead>
<tr>
<th>general</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>– Valve with one solenoid kg [lbs]</td>
</tr>
<tr>
<td>– Valve with two solenoids kg [lbs]</td>
</tr>
<tr>
<td>Installation position</td>
</tr>
<tr>
<td>– Standard version °C [°F]</td>
</tr>
<tr>
<td>– Version for HFC hydraulic fluid °C [°F]</td>
</tr>
<tr>
<td>– Low-temperature version °C [°F]</td>
</tr>
<tr>
<td>Ambient temperature range</td>
</tr>
<tr>
<td>Storage temperature range °C [°F]</td>
</tr>
<tr>
<td>MTTF(df) values according to EN ISO 13849 Years</td>
</tr>
</tbody>
</table>

| hydraulic |
| maximum operating pressure 2) – Ports A, B, P bar [psi] | 350 [5076] |
| – Port T bar [psi] | 210 [3050] |
| tank pressure (standard) |
| Hydraulic fluid temperature range °C [°F] | –20 ... +80 [–4 ... +176] (NBR seals) |
| – Low-temperature version °C [°F] | –20 ... +50 [–4 ... +122] (HFC hydraulic fluid) |
| – 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 % |
| Viscosity range mm²/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 | NBR, FKM | ISO 15380 | 90221 |
|  | soluble in water | HEES | FKM | ISO 15380 | 90221 |
| Flame-resistant | water-free | HEPG | FKM | ISO 12922 | 90222 |
|  | containing water | HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620) | NBR | 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-solving, 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!)

<table>
<thead>
<tr>
<th>electric</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage type</strong></td>
<td><strong>Direct voltage</strong></td>
<td><strong>Alternating voltage</strong></td>
</tr>
<tr>
<td>Nominal voltage according to VDE 0580 (ordering code see page 2 and 10)</td>
<td>V 12, 24, 26, 48, 96, 110, 125, 180, 205, 220</td>
<td>Possible with central connection via rectifier 4)</td>
</tr>
<tr>
<td>Voltage tolerance (nominal voltage)</td>
<td>% ±10</td>
<td></td>
</tr>
<tr>
<td>Nominal power according to VDE 0580</td>
<td>W 40 5)</td>
<td></td>
</tr>
<tr>
<td>Duty cycle (ED)</td>
<td>% 100 (S1 according to VDE 0580)</td>
<td></td>
</tr>
<tr>
<td>Switching time 6)</td>
<td>– ON Pressure change 5 % ms 60 ... 104 7; 8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure change 95 % ms 90 ... 165 7; 8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– OFF Pressure change 5 % ms 12 ... 50</td>
<td>230 ... 330</td>
</tr>
<tr>
<td></td>
<td>Pressure change 95 % ms 48 ... 104</td>
<td>250 ... 360</td>
</tr>
<tr>
<td>Switching time according to ISO 6403 9)</td>
<td>– ON ms 45 ... 60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– OFF ms 20 ... 30</td>
<td>250 ... 360</td>
</tr>
<tr>
<td>Maximum switching frequency</td>
<td>1/h 15000</td>
<td>7200</td>
</tr>
<tr>
<td>Protection class according to DIN EN 60529</td>
<td>See page 10</td>
<td></td>
</tr>
<tr>
<td>Protection class according to VDE 0580</td>
<td>See page 10</td>
<td></td>
</tr>
<tr>
<td>Maximum surface temperature of the coil 10)</td>
<td>°C [°F] 140 [284]</td>
<td></td>
</tr>
<tr>
<td>Insulation class VDE 0580</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Electrical protection</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Protective earthing conductor and screening</td>
<td>See connector pin assignment (CE-compliant installation) page 18 and 19</td>
<td></td>
</tr>
<tr>
<td>Conformity</td>
<td>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</td>
<td></td>
</tr>
</tbody>
</table>

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!
**Technical data**

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

## Electrical connections and available voltages

<table>
<thead>
<tr>
<th>Connector ordering codes</th>
<th>Ordering codes</th>
<th>Direct voltage</th>
<th>Alternating voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>G12</td>
<td>G24</td>
</tr>
<tr>
<td>Individual connection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without mating connector, individual connection; connector according to DIN EN 175301-803</td>
<td>K4</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Without mating connector, 4-pole with connector M12x1 according to IEC 60947-5-2, integrated interference protection circuit and status LED</td>
<td>K4K 12)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Without mating connector; connector according to VDE 0580</td>
<td>K72L</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Without mating connector; connector AMP Junior-Timer</td>
<td>C4Z</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Central connection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without mating connector; threaded connection 1/2”-14 NPT</td>
<td>DAL</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Central plug-in connection at the cover, with indicator light (without mating connector) with connector according to DIN EN 175201-804</td>
<td>DK6L 17)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cable gland at the cover, with indicator light (terminal area 6 ... 12 mm [0.23 ... 0.47 inch])</td>
<td>DL 14)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cable gland at the cover, with indicator light and cable bridge at the ground connection</td>
<td>DJL 14)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Mini-change connector, 5-pole according to ANSI/B93.55M-1981</td>
<td>DK25L 17)</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

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 ½) has to be connected correctly.

---

**Notes:**
- 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.
Directional spool valve

Characteristic curves (measured with HLP46, $\theta_{\text{Oil}} = 40 \pm 5 \, ^\circ\text{C} [104 \pm 9 \, ^\circ\text{F}]$)

### $\Delta p - q_v$ characteristic curves

**Pressure differential in bar [psi] $\rightarrow$ Flow in l/min [US gpm] $\rightarrow$**

#### Symbol | Direction of flow
--- | ---
A; B | P – A 6 6 – –
A73, B73 | P – B 23 23 – –
C | A – T 2 2 5 7
D | B – T 2 2 5 7
D73 | 17 16 19 21
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 | 14 14 6 8
L73 | 17 17 18 20
M | 16 17 4 8
P | 18 21 18 24
Q | 24 24 23 24
R | 18 4 10 24
R73 | 3 3 6 11
S | 22 10 11 24
T | 18 18 24 24
U | 22 22 23 24
V | 17 17 18 20
W | 17 17 18 21
X | 3 2 4 9
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
--- | ---
H | P – A 12 12 13 13 15

---

RE 23340, edition: 2015-07, Bosch Rexroth AG
Performance limits
(measured with HLP46, $T_{\text{oil}} = 40 \pm 5 \, ^\circ\text{C} \left[104 \pm 9 \, ^\circ\text{F}\right]$)

**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.

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**Spring side**

![Spring side graph]

**Solenoid side**

![Solenoid side graph]

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<table>
<thead>
<tr>
<th>Characteristic curve</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>E73, Q</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
</tr>
<tr>
<td>7</td>
<td>G73</td>
</tr>
<tr>
<td>8</td>
<td>M; V</td>
</tr>
<tr>
<td>9</td>
<td>P</td>
</tr>
<tr>
<td>10</td>
<td>A73</td>
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<td>H73</td>
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<tr>
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<td>H</td>
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<tr>
<td>15</td>
<td>D73</td>
</tr>
<tr>
<td>16</td>
<td>B73</td>
</tr>
<tr>
<td>17</td>
<td>Y11</td>
</tr>
<tr>
<td>18</td>
<td>C; D; E73</td>
</tr>
<tr>
<td>19</td>
<td>E67</td>
</tr>
<tr>
<td>20</td>
<td>G</td>
</tr>
</tbody>
</table>
**Performance limits**
(measured with HLP46, \(\theta_{\text{oil}} = 40 \pm 5 \, ^\circ\text{C} \left[104 \pm 9 \, ^\circ\text{F}\right]\))

---

**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: Individual connection**
(dimensions in mm [inch])

**Notices:**
- Deviating from ISO 4401, port T is called TA and port T1 is called TB in this data sheet.
- 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.
**Dimensions: Central connection**
(dimensions in mm [inch])

- Required surface quality of the valve contact surface

- **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 \( M_A = 1.75 \text{ Nm [1.29 ft-lbs]} \pm 10\% \)

- **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])

--

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

---

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"

---

**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 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 data sheet 08006)

7.1 Cable gland Pg 16 "DL" (terminal area 6 ... 12 mm [0.24 ... 0.47 inch]); lock nut, tightening torque $M_a = 3.3$ Nm [2.43 ft-lbs] ±10 %
7.2 Central connection box "DAL" 1/2" NPT, tightening torque $M_a = 5$ Nm [3.69 ft-lbs] ±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 $M_a = 14.5\pm1.5$ 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 $M_a = 1.0$ Nm [0.74 ft-lbs] ±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)  
G 67/12 (SAE-8; 3/4-16)  
G 534/12 (SAE-12; 1-1/16-12)

1) Upon request

Valve mounting screws (separate order)
4 metric hexagon socket head cap screws
ISO 4762 - M6 x 40 - 10.9-flZn-240h-L
(friccion coefficient $\mu_{total} = 0.09$ to 0.14);
tightening torque $M_a = 12.5$ Nm [9.2 ft-lbs] ±10 %, material no. R913000058
or
4 hexagon socket head cap screws
ISO 4762 - M6 x 40 - 10.9 (self procurement)
(friccion coefficient $\mu_{total} = 0.12$ to 0.17);
tightening torque $M_a = 15.5$ Nm [11.4 ft-lbs] ±10 %

4 UNC hexagon socket head cap screws
1/4-20 UNC x 1-1/2" ASTM-A574
(friccion coefficient $\mu_{total} = 0.19$ to 0.24);
tightening torque $M_a = 25$ Nm [18.4 ft-lbs] ±15 %,
(friccion coefficient $\mu_{total} = 0.12$ to 0.17);
tightening torque $M_a = 19$ Nm [14.0 ft-lbs] ±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):

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

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

<table>
<thead>
<tr>
<th>Connector ordering codes</th>
<th>Top view</th>
<th>Circuit diagram</th>
<th>Pin</th>
<th>Connections, assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector, 3-pole (2+PE) according to DIN EN 175301-803 (IP65)</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
<td>1</td>
<td>Solenoid coil, polarity-independent</td>
</tr>
<tr>
<td>2</td>
<td>Earthing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K4, K4K 3)</td>
<td>3) Coil with potted-in connector base and sealing element to valve housing (IP67)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Connector according to IEC 60947-5-2, M12x1 with suppressor diode, only 24 V DC, integrated interference protection circuit and status LED | [Diagram] | [Diagram] | 1 | Internal bridge |
| K72L | 2 | Solenoid coil GND |
| 3 | Solenoid coil 24 V DC supply voltage |
| 4 | without function |
| 5 | without function |

| Connector, 2-pole connector, type AMP Junior-Timer, rotated by 90° relative to valve axis | [Diagram] | [Diagram] | 1 | Solenoid coil, polarity-independent |
| C4Z | 2 |

3) M3, tightening torque maximum $M_{f, \text{max}} = 0.5 \text{ Nm} \left(0.37 \text{ ft-lbs}\right)$
## Electrical connections, assignment – central connection

### Electrical connections and coil connection combinations

<table>
<thead>
<tr>
<th>Connector ordering codes</th>
<th>Top view</th>
<th>Circuit diagram</th>
<th>Pin</th>
<th>Connections, assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable gland at the cover, with indicator light (terminal area 6 ... 12 mm [0.23 ... 0.47 inch])</td>
<td>DL</td>
<td><img src="image1.png" alt="Diagram" /></td>
<td>1+ 3+</td>
<td>Valve solenoid &quot;a&quot; 1)</td>
</tr>
<tr>
<td>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])</td>
<td>DJL</td>
<td><img src="image2.png" alt="Diagram" /></td>
<td>3+</td>
<td>Valve solenoid &quot;b&quot; 1)</td>
</tr>
<tr>
<td>Without mating connector; threaded connection 1/2&quot;-14 NPT (terminal area 6 ... 12 mm [0.23 ... 0.47 inch])</td>
<td>DAL 3)</td>
<td><img src="image3.png" alt="Diagram" /></td>
<td>4–</td>
<td>Earthing</td>
</tr>
<tr>
<td>Central plug-in connection at the cover, with indicator light (without mating connector) with connector according to DIN EN 175201-804</td>
<td>DK6L</td>
<td><img src="image4.png" alt="Diagram" /></td>
<td>1</td>
<td>Valve solenoid &quot;a&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Valve solenoid &quot;b&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>Not used</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>Not used</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>Earthing</td>
</tr>
<tr>
<td>Mini-change connector, 5-pole according to ANSI/B93.55M-1981</td>
<td>DK25L</td>
<td><img src="image5.png" alt="Diagram" /></td>
<td>1</td>
<td>Valve solenoid &quot;a&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Valve solenoid &quot;b&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>Earthing</td>
</tr>
</tbody>
</table>

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

---

![NPT thread](image6.png)
### Mating connectors according to DIN EN 175301-803

For details and more mating connectors, see data sheet 08006

<table>
<thead>
<tr>
<th>Port</th>
<th>Valve side</th>
<th>Color</th>
<th>Material no.</th>
<th>Material no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M16 x 1.5</td>
<td>a</td>
<td>Gray</td>
<td>R901017010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a/b</td>
<td>Black</td>
<td>R901017011</td>
<td>R901017022</td>
</tr>
<tr>
<td>1/2” NPT</td>
<td>a</td>
<td>Red/brown</td>
<td>R900004823</td>
<td>R900057453</td>
</tr>
<tr>
<td></td>
<td>a/b</td>
<td>Black</td>
<td>R900011039</td>
<td>R900842566</td>
</tr>
</tbody>
</table>

### Energy savings and fast switching

Details see data sheet 30362

<table>
<thead>
<tr>
<th>Port</th>
<th>Material no.</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>a/b</td>
<td>R901265633</td>
<td>Cartridge with PWM connector according to data sheet 30362:</td>
</tr>
<tr>
<td></td>
<td>Type VT-SSBA1-PWM-1X/V001/5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(switching time reduction by approx. 50 %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R901290194</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type VT-SSBA1-PWM-1X/V002/5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(energy savings of approx. 40 %)</td>
<td></td>
</tr>
</tbody>
</table>

### Project planning information

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

<table>
<thead>
<tr>
<th>Port</th>
<th>Pressure</th>
<th>Temperature range in °C / °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>– P, A, B, T</td>
<td>Static 100 bar [1450 psi]</td>
<td>–40 ... –35 [-40 ... -31]</td>
</tr>
<tr>
<td>– P, A, B</td>
<td>Dynamic from 100 bar [1450 psi] to 350 bar [5076 psi] in linear form as a function of the temperature</td>
<td>–35 ... –30 [-31 ... -22]</td>
</tr>
<tr>
<td>– T</td>
<td>Dynamic from 100 bar [1450 psi] to 210 bar [3050 psi] in linear form as a function of the temperature</td>
<td>–35 ... –30 [-31 ... -22]</td>
</tr>
<tr>
<td>– P, A, B, T</td>
<td>Maximum operating pressure</td>
<td>–30 ... +50 [-22 ... 122]</td>
</tr>
</tbody>
</table>
Additional information

- Subplates
- Hydraulic fluids on mineral oil basis
- Environmentally compatible hydraulic fluids
- Flame-resistant, water-free hydraulic fluids
- Connector switching amplifier type VT-SSBA1
- Directional spool and seat valves with electrical actuation and M12x1 plug-in connection
- Reliability characteristics according to EN ISO 13849
- Hydraulic valves for industrial applications
- CE declaration of conformity according to Low-voltage Directive 2006/95/EC
- Selection of filters
- Information on available spare parts

Data sheet 45054
Data sheet 90220
Data sheet 90221
Data sheet 90222
Data sheet 30362
Data sheet 08010
Data sheet 08012
Data sheet 07600-B
Upon request
www.boschrexroth.com/filter
www.boschrexroth.com/spc
Notes
Notes
Notes