

Directional spool valves, direct operated,  
with solenoid actuation

Type WE

**RE 23178**

Edition: 2013-06

Replaces: 04.09



H7564

- ▶ Size 6
- ▶ Component series 6X
- ▶ Maximum operating pressure 350 bar [5076 psi]
- ▶ Maximum flow: 80 l/min [21 US gpm] – DC  
60 l/min [15.8 US gpm] – AC

**Features**

- ▶ 4/3, 4/2 or 3/2 directional design
- ▶ High-power solenoid
- ▶ Porting pattern according to DIN 24340 form A
- ▶ Porting pattern according to ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03
- ▶ Wet-pin DC or AC solenoids with detachable coil
- ▶ Solenoid coil can be rotated by 90°
- ▶ The coil can be changed without having to open the pressure-tight chamber
- ▶ Electrical connection as individual or central connection
- ▶ Manual override, optional
- ▶ Spool position monitoring, optional

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## Ordering code

|    |           |          |    |           |          |    |          |    |    |    |          |    |    |    |          |
|----|-----------|----------|----|-----------|----------|----|----------|----|----|----|----------|----|----|----|----------|
| 01 | 02        | 03       | 04 | 05        | 06       | 07 | 08       | 09 | 10 | 11 | 12       | 13 | 14 | 15 | 16       |
|    | <b>WE</b> | <b>6</b> |    | <b>6X</b> | <b>/</b> |    | <b>E</b> |    |    |    | <b>/</b> |    |    |    | <b>*</b> |

|    |   |                                   |
|----|---|-----------------------------------|
| 01 | 3 main ports  | <b>3</b>                          |
|    | 4 main ports  | <b>4</b>                          |
| 02 | Directional valve   | <b>WE</b>                         |
| 03 | Size 6  | <b>6</b>                          |
| 04 | Symbols e.g. C, E, EA, EB, etc; for the possible version, see page 5  |                                   |
| 05 | Component series 60 to 69 (60 to 69: Unchanged installation and connection dimensions)  | <b>6X</b>                         |
| 06 | <b>With</b> spring return   | <b>no code</b>                    |
|    | <b>Without</b> spring return  | <b>O</b>                          |
|    | <b>Without</b> spring return with detent  | <b>OF</b>                         |
| 07 | High-power wet-pin solenoid with detachable coil  | <b>E</b>                          |
| 08 | Direct voltage 24 V   | <b>G24</b>                        |
|    | AC voltage 230 V 50/60 Hz   | <b>W230</b>                       |
|    | AC voltage 120 V or 110 V 50/60 Hz  | <b>W110</b><br><b>W + voltage</b> |
|    | Direct voltage 205 V  | <b>G205</b>                       |
|    | DC solenoid with rectifier for AC voltage<br>(not frequency-related; only available with plug-in connection with cover, see page 17)  | <b>W110R</b>                      |
|    | Connection to AC voltage mains via control with rectifier (see table below and page 4) <sup>1)</sup><br>For further ordering codes for other voltages and frequencies, see page 8 |                                   |
| 09 | <b>Without</b> manual override  | <b>no code</b>                    |
|    | <b>With</b> concealed manual override (standard)  | <b>N9</b> <sup>2)</sup>           |
|    | <b>With</b> manual override   | <b>N</b> <sup>2)</sup>            |
|    | <b>With</b> lockable manual override "mushroom button" (small)  | <b>N4</b> <sup>2)</sup>           |
|    | <b>With</b> lockable manual override "mushroom button" (big)  | <b>N5</b> <sup>2; 3)</sup>        |
|    | <b>With</b> manual override "mushroom button" (big), not lockable   | <b>N6</b> <sup>2)</sup>           |
|    | <b>With</b> lockable manual override "nut"  | <b>N7</b> <sup>2)</sup>           |

## Electrical connection

|    |   |                             |
|----|---|-----------------------------|
| 10 | <b>Individual connection</b>  |                             |
|    | <b>Without</b> mating connector, with connector according to DIN EN 175301-803  | <b>K4</b> <sup>4)</sup>     |
|    | <b>Without</b> mating connector, with connector AMP Junior-Timer  | <b>C4</b> <sup>4)</sup>     |
|    | <b>Without</b> mating connector, with connector DT 04-2PA (Deutsch plug)  | <b>K40</b> <sup>4; 7)</sup> |
|    | <b>Without</b> mating connector, 4-pole with connector M12x1 according to IEC 60947-5-2, integrated interference protection circuit and status LED                                | <b>K72L</b> <sup>5)</sup>   |
|    | <b>Without</b> mating connector, 4-pole with connector M12x1 according to IEC 60947-5-2, integrated interference protection circuit and status LED (no connection pin 1 to pin 2) | <b>K73L</b> <sup>5)</sup>   |
|    | <b>Central connection</b>   |                             |
|    | Cable entry at the cover, with indicator light  | <b>DL</b>                   |
|    | Central plug-in connection at the cover, with indicator light (without mating connector); connector according to DIN EN 175201-804  | <b>DK6L</b> <sup>6)</sup>   |
|    | For further electrical connections, see data sheet 08010  |                             |

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

## Ordering code

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|    | WE | 6  |    | 6X | /  |    | E  |    |    |    | /  |    |    |    | *  |

### Spool position monitoring

|    |   |                |
|----|---|----------------|
| 11 | <b>Without</b> position switch              | <b>no code</b> |
|    | <b>- Inductive position switch type QM</b>  |                |
|    | Monitored spool position "a"                | QMAG24         |
|    | Monitored spool position "b"                | QMBG24         |
|    | Monitored rest position                     | QM0G24         |
|    | <b>- Inductive position switch type QR</b>  |                |
|    | Monitored rest position                     | QR0G24S        |
|    | Monitored spool position "a" and "b"        | QRABG24E       |
|    | <b>- Inductive position switch type QL</b>  |                |
|    | Monitored spool position "a"                | QLAG24         |
|    | Monitored spool position "b"                | QLBG24         |
|    | <b>- Inductive proximity sensor type QS</b> |                |
|    | Monitored spool position "a"                | QSAG24W        |
|    | Monitored spool position "b"                | QSBG24W        |
|    | Monitored spool position "0"                | QS0G24W        |
|    | Monitored spool position "0" and "a"        | QS0AG24W       |
|    | Monitored spool position "0" and "b"        | QS0BG24W       |
|    | Monitored spool position "a" and "b"        | QSABG24W       |
|    | For more information, see data sheet 24830  |                |

|    |  |   |
|----|--|---|
| 12 | <b>Without</b> throttle insert   | <b>no code</b>                                |
|    | <b>With</b> throttle insert see table:                                       |   |
|    | 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  | = X08      = X10      = X12                   |
|    | Use with flows which exceed the performance limit of the valve (see page 6). |   |

### Clamping length

|    |                              |                |
|----|------------------------------|----------------|
| 13 | 42 mm [1.65 inch] (standard) | <b>no code</b> |
|    | 22 mm [0.87 inch]            | <b>Z</b>       |

### Seal material

|    |   |                |
|----|---|----------------|
| 14 | NBR seals   | <b>no code</b> |
|    | FKM seals   | <b>V</b>       |
|    | Attention: Observe compatibility of seals with hydraulic fluid used! (Other seals upon request) |                |

|    |   |                   |
|----|---|-------------------|
| 15 | <b>Without</b> locating hole                              | <b>no code</b>    |
|    | <b>With</b> locating hole                                 | /60 <sup>B)</sup> |
|    | <b>With</b> locating hole and locking pin ISO 8752-3x8-St | /62               |

|    |                                   |  |
|----|-----------------------------------|--|
| 16 | Further details in the plain text |  |
|----|-----------------------------------|--|

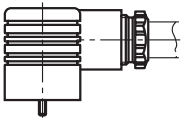
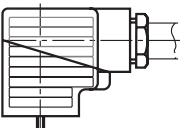
Explanation of the footnotes see page 4.

Preferred types and standard units are contained in the EPS (standard price list).

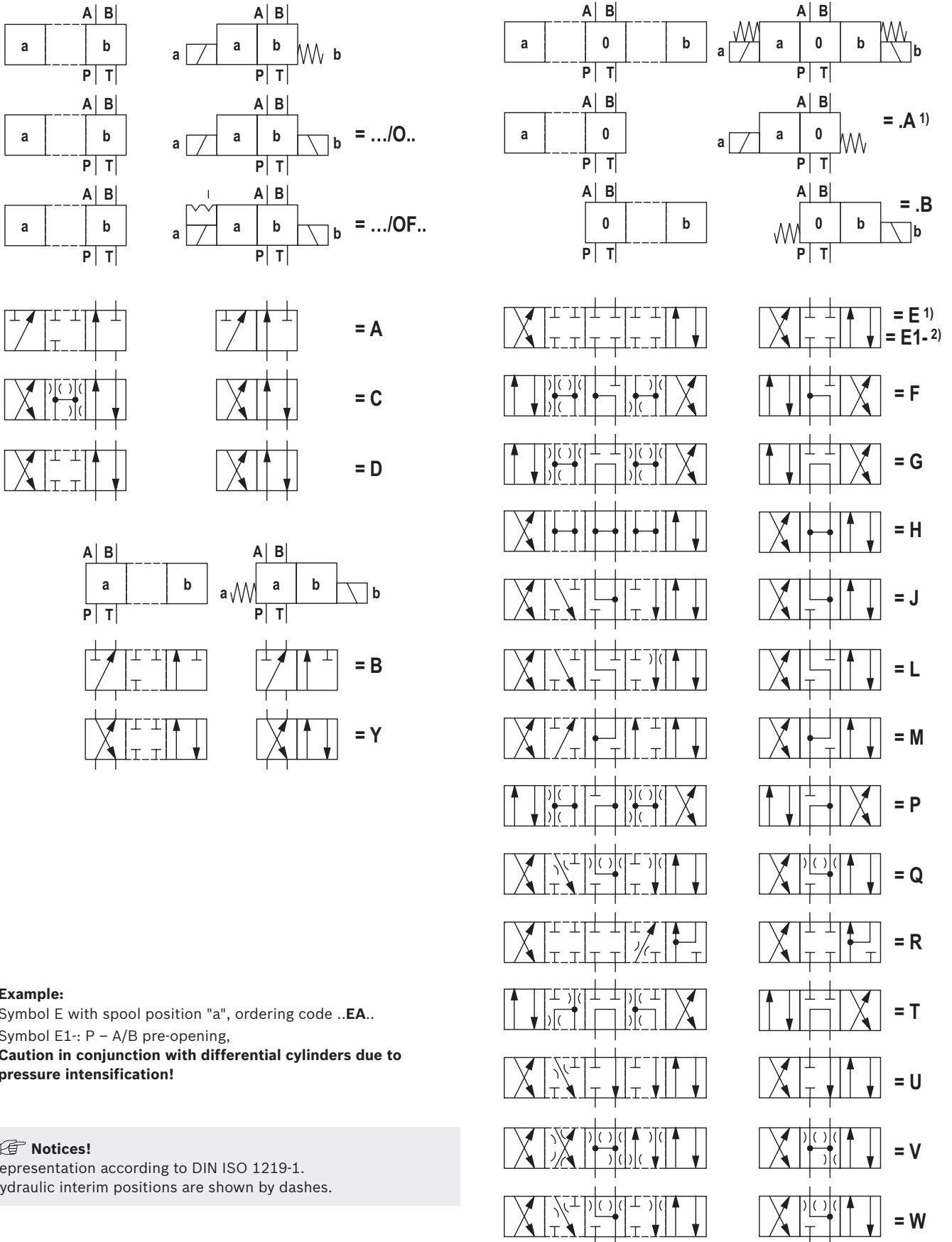
## Ordering code

- 1) Only for version "individual connection"
- 2) 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.
- 3) With tank pressures above 50 bar, it cannot be guaranteed that the valve remains in the position switched by the manual override "N5".
- 4) Mating connectors, separate order, see below and data sheet 08006
- 5) Only version "G24", see data sheet 08010
- 6) Mating connector, separate order, material no. **R900005538**
- 7) Only possible in connection with the symbols G, J, D and E as well a reduced performance limit.
- 8) Locking pin ISO 8752-3x8-St, material no. **R900005694** (separate order)

## Mating connectors according to DIN EN 175301-803

| For details and more mating connectors, see data sheet 08006 |            |               |  |  |   |                             |   |
|--|------------|---------------|--|---|---|-----------------------------|---|
| Port   | Valve side | Color         | Material number  |   |   |                             |   |
|  |            |               | Without circuitry  | With indicator light 12 ... 240 V   | With indicator light and rectifier 12 ... 240 V | With rectifier 12 ... 240 V | With indicator light and Zener diode suppression circuit 24 V |
| M16 x 1.5  | a          | Gray          | <b>R901017010</b>  | -   | -   | -                           | -   |
|  | b          | Black         | <b>R901017011</b>  | -   | -   | -                           | -   |
|  | a/b        | Black         | -  | <b>R901017022</b>   | <b>R901017029</b>                               | <b>R901017025</b>           | <b>R901017026</b>   |
| 1/2" NPT<br>(Pg 16)  | a          | Red/<br>brown | <b>R900004823</b>  | -   | -   | -                           | -   |
|  | b          | Black         | <b>R900011039</b>  | -   | -   | -                           | -   |
|  | a/b        | Black         | -  | <b>R900057453</b>   | <b>R900057455</b>                               | <b>R900842566</b>           | -   |

Symbols



- 1) **Example:**  
Symbol E with spool position "a", ordering code ..EA..
- 2) Symbol E1-: P – A/B pre-opening,  
**Caution in conjunction with differential cylinders due to pressure intensification!**

**Notices!**  
Representation according to DIN ISO 1219-1.  
Hydraulic interim positions are shown by dashes.

## Function, section

Directional valves of type WE are solenoid operated directional spool valves. They control the start, stop and direction of a flow.

The directional valves basically consist of the housing (1), one or two electronic solenoids (2), the control spool (3), and one or two 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 impulse spools). The control spool (3) is actuated by wet-pin electronic solenoids (2).

**To ensure proper functioning, care must be taken that the pressure chamber of the electronic solenoid is filled with oil.**

The force of the electronic solenoid (2) acts via the plunger (5) on the control spool (3) and pushes the latter from its rest position to the required end position. This enables the necessary direction of flow from P to A and B to T or P to B and A to T.

When the electronic solenoid (2) is de-energized, 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.

**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.

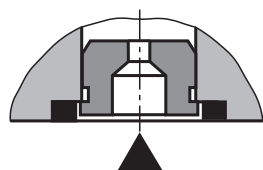
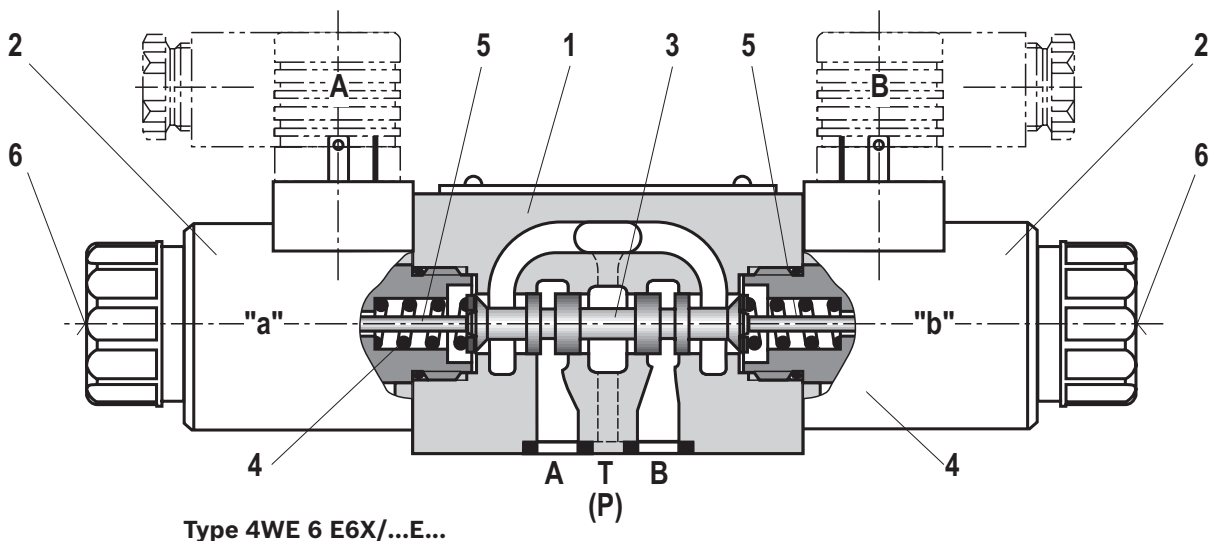
**Without spring return with "OF" detent** (only possible with symbols A, C and D)

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.

### Notices!

Pressure peaks in the tank line to two or several valves can result in unintended control spool movements 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.

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



### Throttle insert

The use of the throttle insert is required when, due to prevailing operating conditions, flows occur during the switching processes which exceed the performance limit of the valve.

## Technical data

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

| general  |                            |          |   |
|--|----------------------------|----------|---|
| Weight   | - Valve with one solenoid  | kg [lbs] | 1.45 [3.2]  |
|  | - Valve with two solenoids | kg [lbs] | 1.95 [4.3]  |
| Installation position                              |                            |          | Any   |
| Ambient temperature range                          |                            | °C [°F]  | -30 ... +50 [-22 ... +122] (NBR seals)<br>-20 ... +50 [-4 ... +122] (FKM seals) |
| MTTF <sub>d</sub> values according to EN ISO 13849 |                            | Years    | 150 (for further details see data sheet 08012)                                  |

| hydraulic   |                 |                          |  |
|---|-----------------|--------------------------|--|
| Maximum operating pressure  | - Ports A, B, P | bar [psi]                | 350 [5076]   |
|   | - Port T        | bar [psi]                | 210 [3050] (DC); 160 [2320] (AC)<br>With symbols A and B, port T must be used as leakage oil connection. |
| Maximum flow  |                 | l/min [USgpm]            | 80 [21] (DC); 60 [15.8] (AC)   |
| Flow cross-section<br>(spool position 0)  | - Symbol Q      | mm <sup>2</sup>          | Approx. 6% of nominal cross-section  |
|   | - Symbol W      | mm <sup>2</sup>          | Approx. 3% of nominal cross-section  |
| Hydraulic fluid   |                 |                          | See table below  |
| Hydraulic fluid temperature range   |                 | °C [°F]                  | -30 ... +80 [-22 ... +176] (NBR seals)<br>-15 ... +80 [-4 ... +176] (FKM seals)                          |
| Viscosity range   |                 | mm <sup>2</sup> /s [cSt] | 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 <sup>1)</sup>   |

| Hydraulic fluid | Classification             | Suitable sealing materials                          | Standards        |
|-----------------|----------------------------|---|------------------|
| Mineral oils    | HL, HLP, HLPD, HVLP, HVLPD | NBR, FKM  | DIN 51524        |
| Bio-degradable  | - insoluble in water       | HETG  | VDMA 24568       |
|                 |                            | HEES  |                  |
|                 | - soluble in water         | HEPG  | VDMA 24568       |
| Flame-resistant | - water-free               | HFDU, HFDR  | ISO 12922        |
|                 | - containing water         | HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620) | NBR<br>ISO 12922 |



### Important information on hydraulic fluids!

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

### ▶ Flame-resistant – containing water:

- Maximum pressure difference 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:** When using bio-degradable hydraulic fluids that are simultaneously zinc-soluble, zinc may accumulate in the fluid (per pole tube 700 mg zinc).

<sup>1)</sup> The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components. For maintenance requirements of the hydraulic fluid and contamination limit values, see data sheet 07300. For the selection of the filters, see [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter).

**Technical data**

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

| <b>electric</b>  |                                       |   |                              |
|--|---------------------------------------|---|------------------------------|
| Voltage type   |                                       | Direct voltage                                    | Alternating voltage 50/60 Hz |
| Available voltages <sup>2)</sup><br>(For ordering codes for AC voltage solenoids, see below) | V                                     | 12, 24, 96, 205                                   | 110, 230                     |
| Voltage tolerance (nominal voltage)  | %                                     | ±10   |                              |
| Power consumption  | W                                     | 30  | –                            |
| Holding power  | VA                                    | –   | 50                           |
| Switch-on power  | VA                                    | –   | 220                          |
| Duty cycle   | %                                     | 100   |                              |
| Switching time according to ISO 6403 <sup>3)</sup>   | – ON                                  | ms  | 25 ... 45                    |
|  | – OFF                                 | ms  | 10 ... 25                    |
| Maximum switching frequency  | 1/h                                   | 15000   | 7200                         |
| Maximum surface temperature of the coil <sup>4)</sup>  | °C [°F]                               | 120 [248]   | 180 [356]                    |
| Protection class according to DIN EN 60529   | – With connector "K4", "K72L", "K73L" | IP 65 (with mating connector mounted and locked)  |                              |
|  | – With connector "C4"                 | IP 66A (with mating connector mounted and locked) |                              |
|  | – With connector "K40"                | IP 69K (with mating connector mounted and locked) |                              |

2) Special voltages available upon request

3) The switching times were determined at a hydraulic fluid temperature of 40 °C [104 °F] and a viscosity of 46 cSt. Deviating hydraulic fluid temperatures can result in different switching times! Switching times change depending on operating time and application conditions.

4) Due to the temperatures occurring at the surfaces of the solenoid coils, the standards ISO13732-1 and ISO 4413 need to be adhered to!

The specified surface temperature in AC solenoids is valid for the faultless operation. In case of error (e.g. blocking of the control spool), the surface temperature may rise to above 180 °C [356 °F]. Thus, the system must be checked for possible dangers considering the flash point (see page 7).

As fuse protection, circuit breakers (see table on page 19) must be used, unless the creation of an ignitable atmosphere can be excluded in a different way. Thus, the surface temperature can – in case of error – be limited to maximally 220 °C [428 °F].

The tripping current must lie within a time interval of 0.6 s with 8 to 10 times the nominal power supply. (tripping characteristics "K").

The necessary non-tripping current of the fuse must not fall below the value  $I_1$  (see table on page 19). The maximum tripping current of the fuse must not exceed the value  $I_2$  (see table on page 19).

The temperature dependence of the tripping behavior of the circuit breakers has to be considered according to the manufacturer's specifications.

**Notices!**

- ▶ The 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!

**Notice!**

**AC solenoids** can be used for 2 or 3 mains; e.g. solenoid type **W110** for:  
110 V, 50 Hz; 110 V, 60 Hz; 120 V, 60 Hz

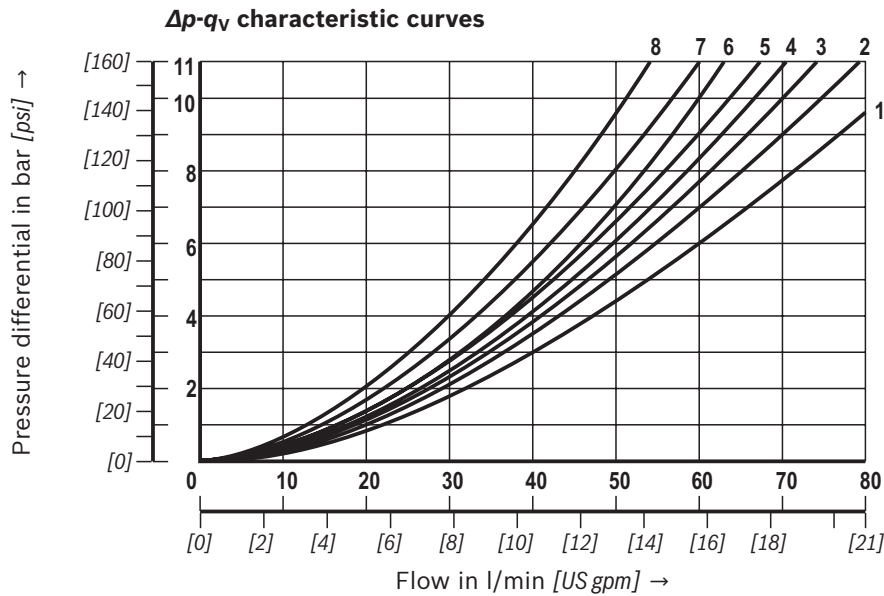
| Ordering code | Mains        |
|---------------|--------------|
| <b>W110</b>   | 110 V, 50 Hz |
|               | 110 V, 60 Hz |
|               | 120 V, 60 Hz |
| <b>W230</b>   | 230 V, 50 Hz |
|               | 230 V, 60 Hz |

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



### Characteristic curves

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



- 7 Symbol "R" in spool position B - A
- 8 Symbol "G" and "T" in central position P - T
- 9 Symbol "H" in central position P - T

| Symbol | Direction of flow |       |       |       |
|--------|-------------------|-------|-------|-------|
|        | P - A             | P - B | A - T | B - T |
| A; B   | 5                 | 5     | -     | -     |
| C      | 3                 | 3     | 5     | 3     |
| D; Y   | 6                 | 6     | 5     | 5     |
| E      | 5                 | 5     | 3     | 3     |
| F      | 3                 | 5     | 3     | 3     |
| T      | 8                 | 8     | 4     | 4     |
| H      | 2                 | 1     | 2     | 2     |
| J; Q   | 3                 | 3     | 2     | 3     |
| L      | 5                 | 5     | 1     | 4     |
| M      | 2                 | 1     | 5     | 5     |
| P      | 5                 | 3     | 3     | 3     |
| R      | 6                 | 6     | 1     | -     |
| V      | 3                 | 2     | 3     | 3     |
| W      | 3                 | 3     | 2     | 2     |
| U      | 5                 | 5     | 4     | 1     |
| G      | 7                 | 7     | 4     | 4     |

**Performance limits**

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

**Notice!**

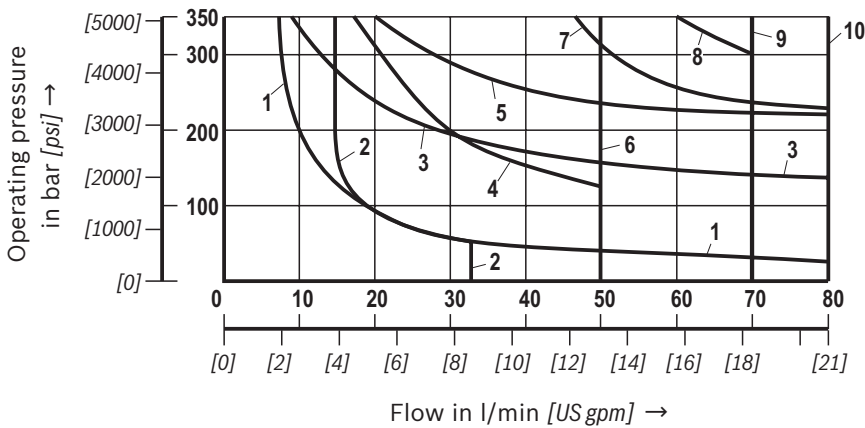
The specified performance limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

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 limit was determined when the solenoids were at operating temperature, at 10% under-voltage and without tank preloading.**



| DC solenoid          |   |
|----------------------|---|
| Characteristic curve | Symbol  |
| 1                    | A; B <sup>1)</sup>  |
| 2                    | V   |
| 3                    | A; B  |
| 4                    | F; P  |
| 5                    | J   |
| 6                    | G; H; T   |
| 7                    | A/O; A/OF; L; U   |
| 8                    | C; D; Y   |
| 9                    | M   |
| 10                   | E; E1- <sup>2)</sup> ; R <sup>3)</sup> ; C/O; C/OF; D/O; D/OF; Q; W |

- 1) With manual override
- 2) P – A/B pre-opening
- 3) Return flow from actuator to tank

**Solenoid voltage (DC solenoid)**

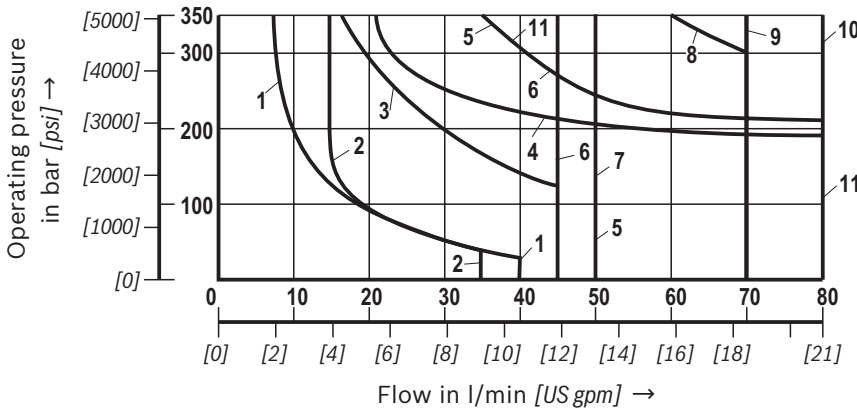
12; 24; 48; 96; 125; 205 V

(other voltages, see page 11)

**Performance limits**

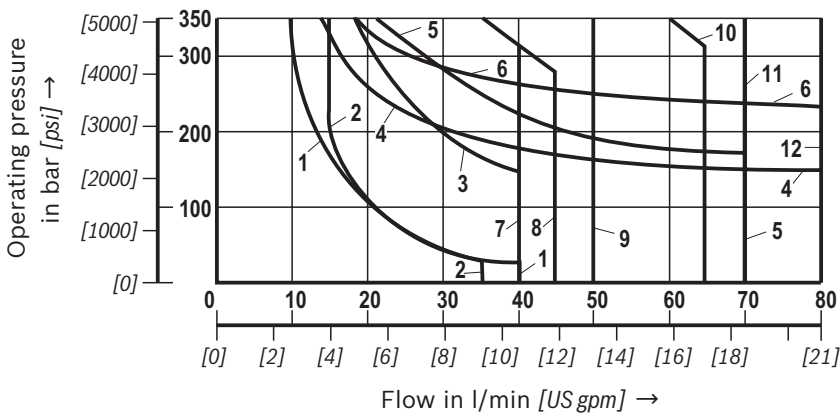
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$  [104 ± 9 °F])

See notice on page 10.



| Solenoid voltage (DC solenoid) |
|--------------------------------|
| 110; 180 V                     |

| DC solenoid          |                                       |
|----------------------|---------------------------------------|
| Characteristic curve | Symbol                                |
| 1                    | A; B                                  |
| 2                    | V                                     |
| 3                    | F; P                                  |
| 4                    | J; L; U                               |
| 5                    | G                                     |
| 6                    | T                                     |
| 7                    | H                                     |
| 8                    | D; C                                  |
| 9                    | M                                     |
| 10                   | C/O; C/OF; D/O; D/OF; E; E1-; R, Q; W |
| 11                   | A/O; A/OF                             |



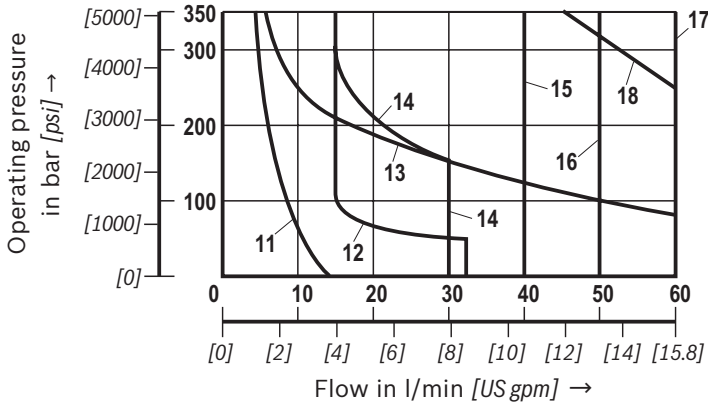
| Solenoid voltage (DC solenoid) |
|--------------------------------|
| 42; 80; 220 V                  |

| DC solenoid          |                                    |
|----------------------|------------------------------------|
| Characteristic curve | Symbol                             |
| 1                    | A; B                               |
| 2                    | V                                  |
| 3                    | F; P                               |
| 4                    | J; L; U                            |
| 5                    | A/O; A/OF                          |
| 6                    | E                                  |
| 7                    | T                                  |
| 8                    | G                                  |
| 9                    | H                                  |
| 10                   | D; C                               |
| 11                   | M                                  |
| 12                   | C/O; C/OF; D/O; D/OF; E1-; R, Q; W |

**Performance limits**

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

See notice on page 10.

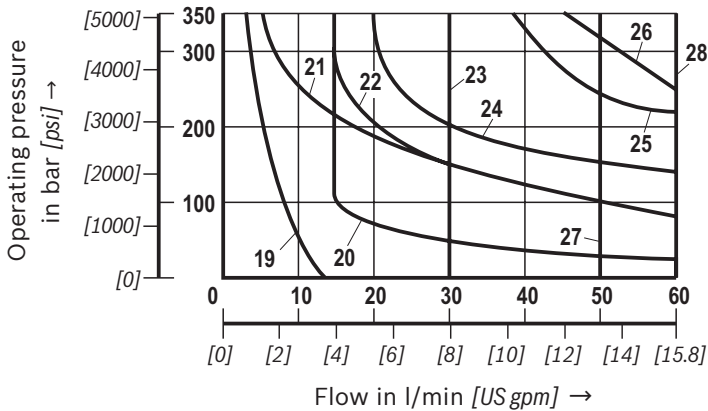


| AC solenoid – 50 Hz  |  |
|----------------------|--|
| Characteristic curve | Symbol   |
| 11                   | A; B <sup>1)</sup>   |
| 12                   | V  |
| 13                   | A; B   |
| 14                   | F; P   |
| 15                   | G; T   |
| 16                   | H  |
| 17                   | A/O; A/OF; C/O; C/OF; D/O; D/OF; E; E1 <sup>-2)</sup> ; J; L; M; Q; R <sup>3)</sup> ; U; W |
| 18                   | C; D; Y  |

| Solenoid voltage (AC solenoid) |                              |
|--------------------------------|------------------------------|
| W110                           | 110 V; 50 Hz<br>120 V; 60 Hz |
| W230                           | 230 V; 50 Hz                 |

- 1) With manual override
- 2) P – A/B pre-opening
- 3) Return flow from actuator to tank

(other voltages upon request)



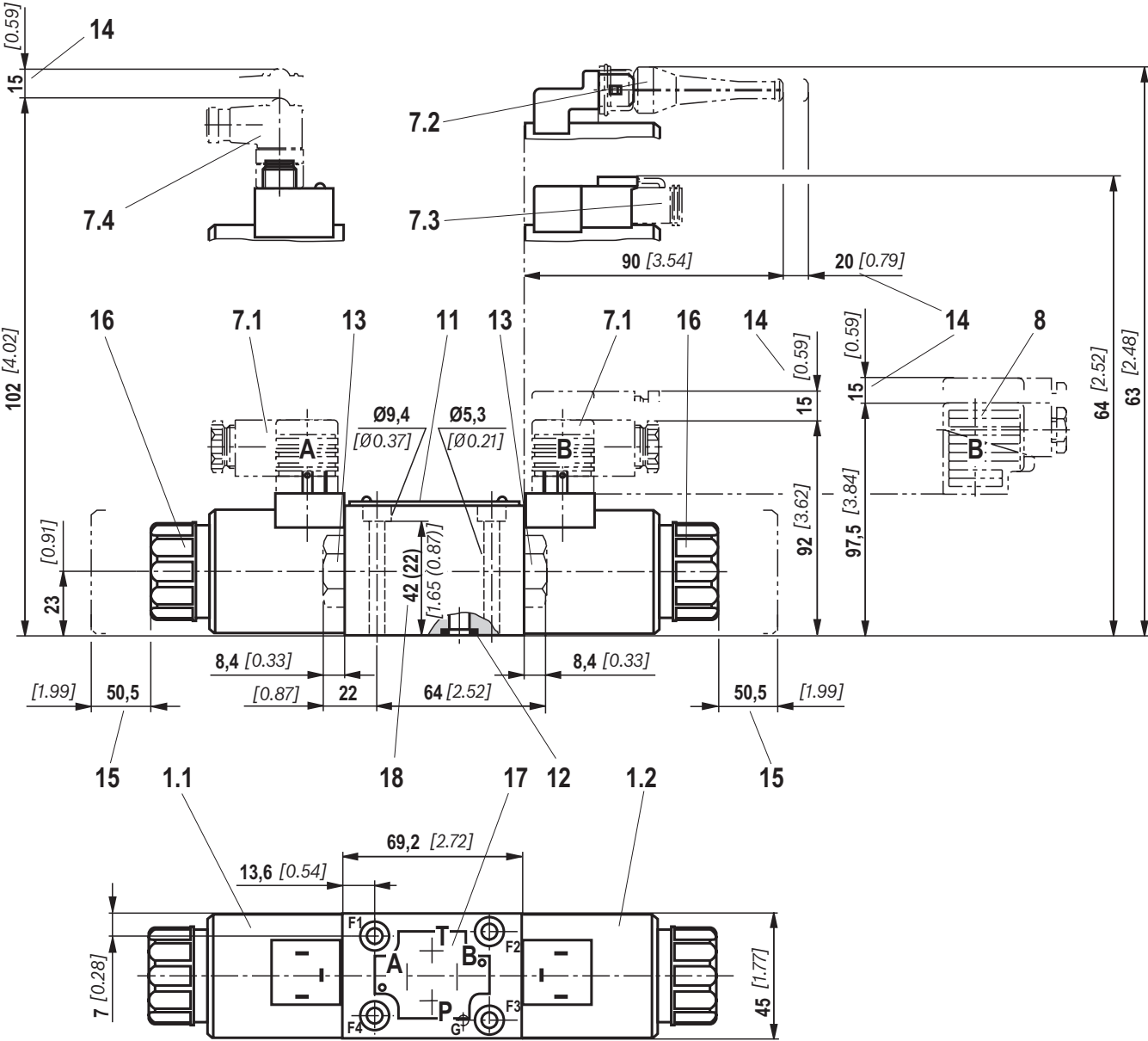
| AC solenoid – 60 Hz  |   |
|----------------------|---|
| Characteristic curve | Symbol  |
| 19                   | A; B <sup>1)</sup>  |
| 20                   | V   |
| 21                   | A; B  |
| 22                   | F; P  |
| 23                   | G; T  |
| 24                   | J; L; U   |
| 25                   | A/O; A/OF; Q; W   |
| 26                   | C; D; Y   |
| 27                   | H   |
| 28                   | C/O; C/OF; D/O; D/OF; E; E1 <sup>-2)</sup> ; M; R <sup>3)</sup> |

| Solenoid voltage (AC solenoid) |              |
|--------------------------------|--------------|
| W110                           | 110 V; 60 Hz |
| W230                           | 230 V; 60 Hz |

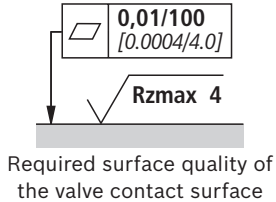
- 1) With manual override
- 2) P – A/B pre-opening
- 3) Return flow from actuator to tank

(other voltages upon request)

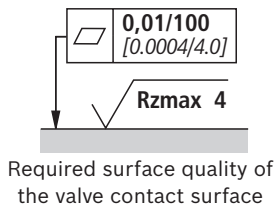
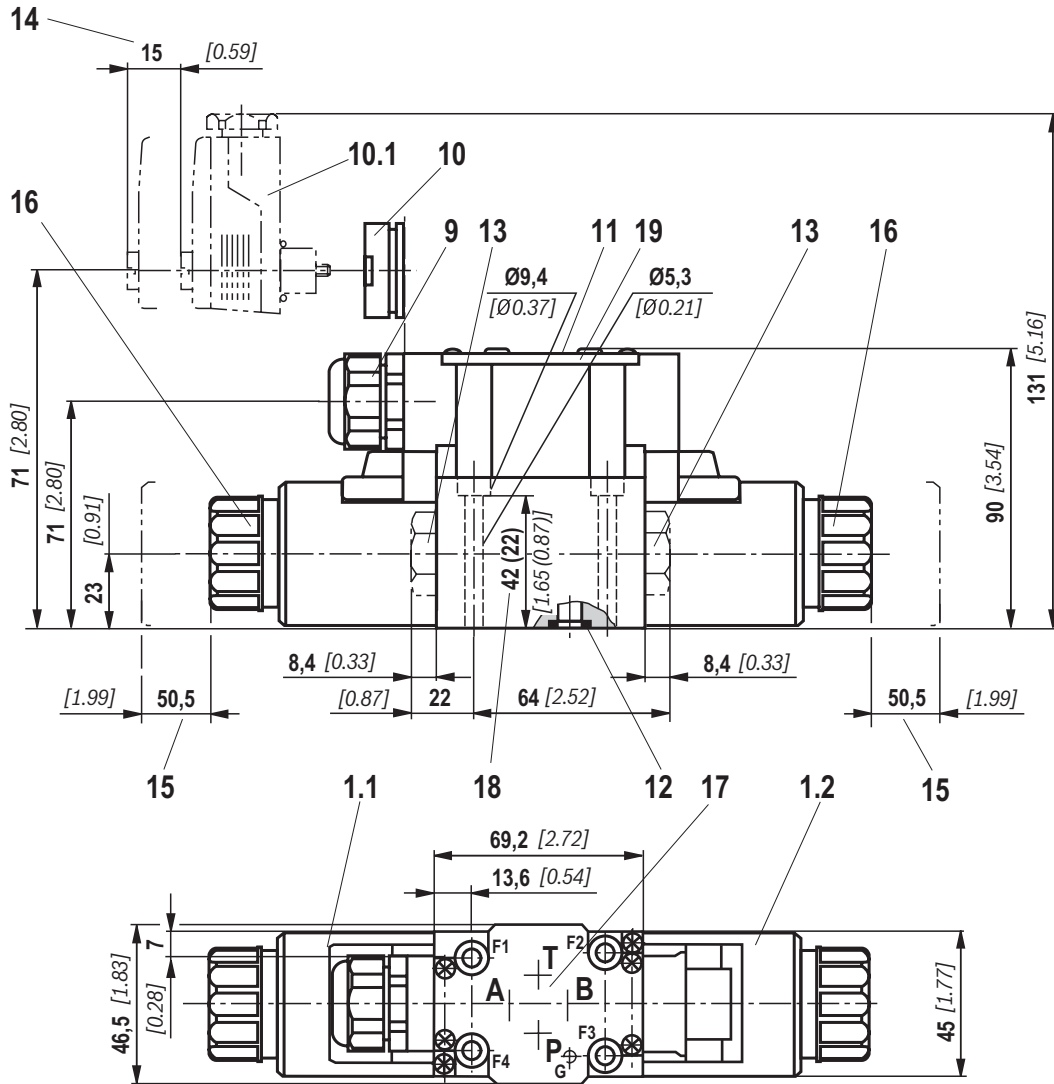
**Dimensions:** Valve with DC solenoid – **Individual connection**  
(dimensions in mm [inch])



**Dimensions for manual overrides** see page 15.  
**Item explanations, valve mounting screws and subplates**  
see page 18.



**Dimensions:** Valve with DC solenoid – **Central connection**  
(dimensions in mm [inch])



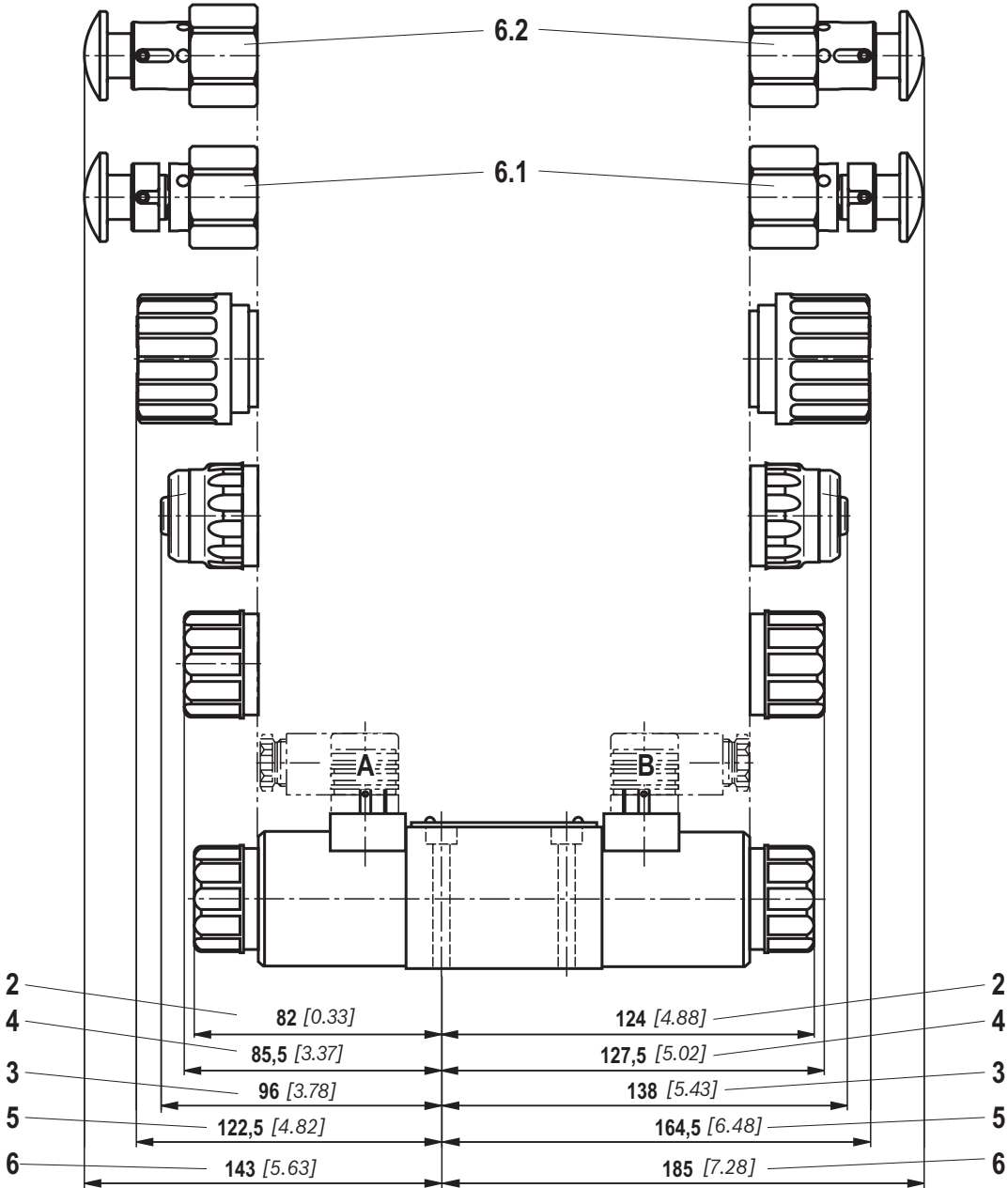
**Terminal assignment with central connection:**

- ▶ **1 solenoid:**  
Always connect the solenoid to terminals 1 and 2, the protective earthing connector to terminal  $\oplus$  PE
- ▶ **2 solenoids:**  
Always connect solenoid "a" to terminals 1 and 2, solenoid "b" to terminals 3 and 4, the protective earthing conductor to terminal  $\oplus$  PE

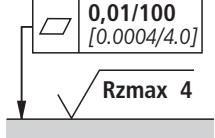
**Dimensions for manual overrides** see page 15.

**Item explanations, valve mounting screws and subplates** see page 18.

**Dimensions:** Valve with DC solenoid – Manual overrides  
(dimensions in mm [inch])

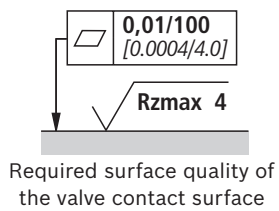
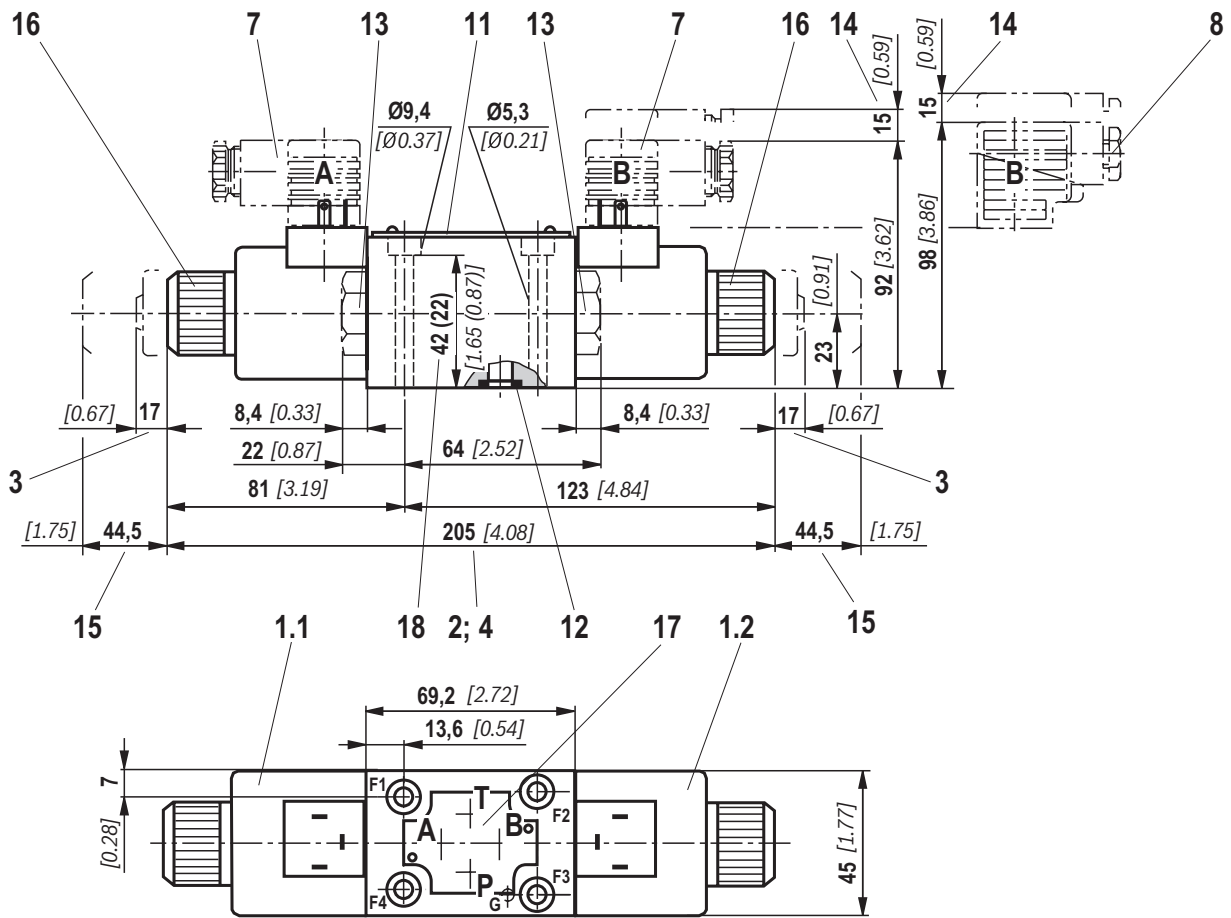


**Item explanations, valve mounting screws and subplates**  
see page 18.



Required surface quality of the valve contact surface

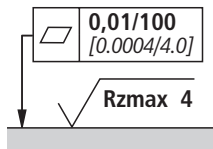
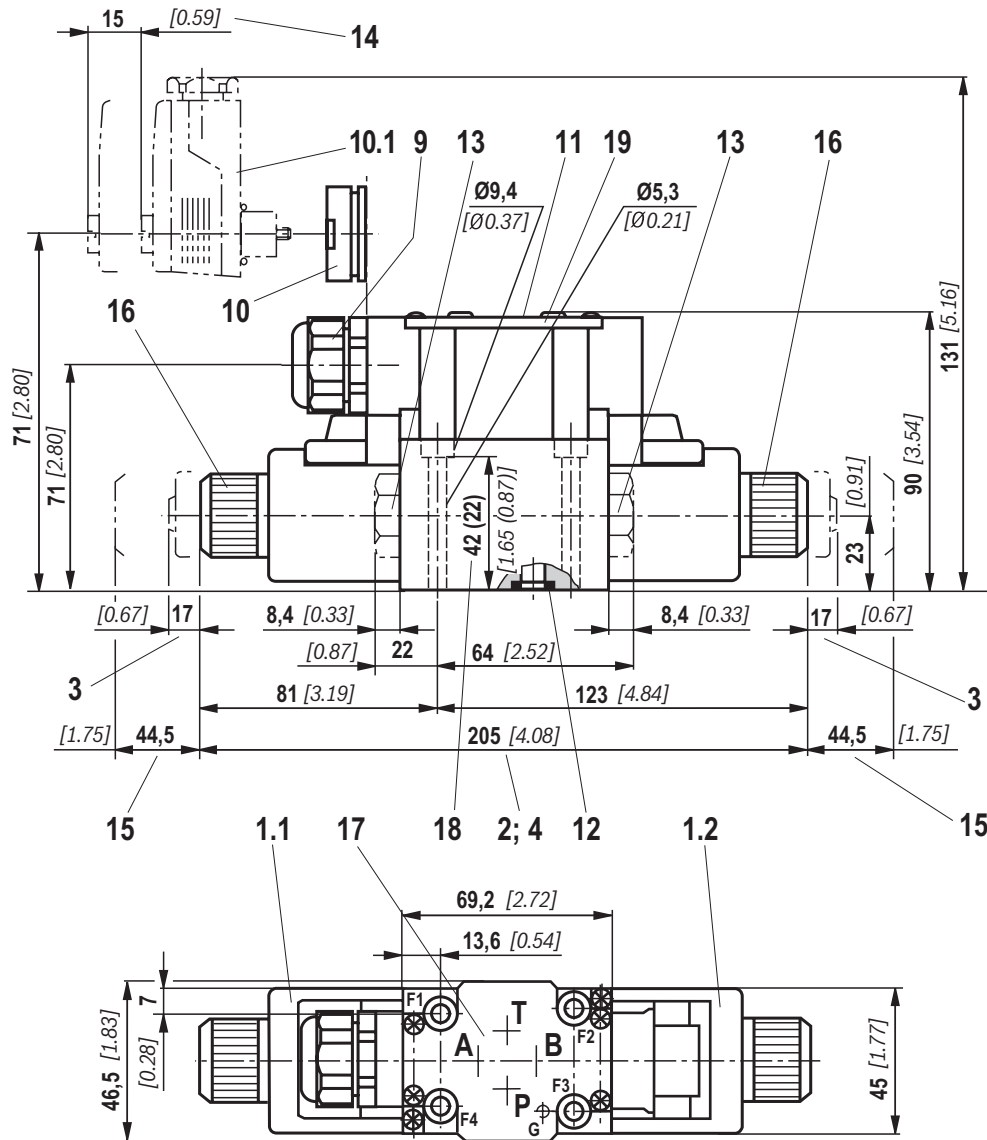
**Dimensions:** Valve with AC solenoid – **Individual connection**  
(dimensions in mm [inch])



**Item explanations, valve mounting screws and subplates**  
see page 18.



**Dimensions:** Valve with AC solenoid – **Central connection**  
(dimensions in mm [inch])




Required surface quality of the valve contact surface

**Terminal assignment with central connection:**

- ▶ **1 solenoid:**  
Always connect the solenoid to terminals 1 and 2, the protective earthing connector to terminal  $\oplus$  PE
- ▶ **2 solenoids:**  
Always connect solenoid "a" to terminals 1 and 2, solenoid "b" to terminals 3 and 4, the protective earthing to terminal  $\oplus$  PE

**Item explanations, valve mounting screws and subplates**  
see page 18.

## Dimensions

- 1.1 Solenoid "a"
- 1.2 Solenoid "b"
  - 2 Dimension for solenoid **with concealed** manual override "N9" (standard)
  - 3 Dimension for solenoid **with** manual override "N"
  - 4 Dimension for solenoid **without** manual override
  - 5 Dimension for solenoid **with** manual override "N7"
  - 6 Dimension for solenoid **with** manual override "N5" and "N6"
- 6.1 Manual override "N5"
- 6.2 Manual override "N6"
- 7.1 Mating connector **without** circuitry for connector "K4" (separate order, see page 4 and data sheet 08006)
- 7.2 Mating connector (AMP Junior Timer) with connector "C4" (separate order, see data sheet 08006)
- 7.3 Mating connector DT 04-2PA (Deutsch plug) with connector "K40" (separate order, see data sheet 08006)
- 7.4 Mating connector angled with M12x1 plug-in connection with status LED "K72L" (separate order, see data sheet 08006)
  - 8 Mating connector **with** circuitry for connector "K4" (separate order, see page 4 and data sheet 08006)
- 9 Cable gland Pg 16 [1/2" NPT] "DL"
- 10 Central plug-in connection "DKL"
- 10.1 Angled socket (red, separate order)  
Material no. **R900005538**
- 11 Name plate
- 12 Identical seal rings for ports A, B, P, T
  -  **Notice!** The ports are clearly determined according to their tasks and must not be arbitrarily interchanged or closed.
- 13 Plug screw for valves with one solenoid
- 14 Space required to remove the mating connector/angled socket
- 15 Space required to remove the coil
- 16 Mounting nut, tightening torque  $M_A = 4^{+1} \text{ Nm } [2.95^{+0.74} \text{ ft-lbs}]$
- 17 Porting pattern according to DIN 24340 form A (**without** locating hole), or ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03 (**with** locating hole for locking pin ISO 8752-3x8-St, material no. **R900005694**, separate order)
- 18 Alternative clamping length ('): 22 mm [0.87 inch]
- 19 Cover
  - Attention!**  
The valve may only be operated with properly mounted cover.

**Subplates** according to data sheet 45052

|                                 |  |
|---------------------------------|--|
| (separate order)                |  |
| ( <b>without</b> locating hole) | G 341/01 (G1/4)<br>G 342/01 (G3/8)<br>G 502/01 (G1/2)  |
| ( <b>with</b> locating hole)    | G 341/60 (G1/4)<br>G 342/60 (G3/8)<br>G 502/60 (G1/2)<br>G 341/12 (SAE-6) <sup>1)</sup><br>G 342/12 (SAE-8) <sup>1)</sup><br>G 502/12 (SAE-10) <sup>1)</sup> |

<sup>1)</sup> Upon request

**Valve mounting screws** (separate order)

- ▶ Clamping length 42 mm:  
**4 metric hexagon socket head cap screws ISO 4762 - M5 x 50 - 10.9-fIZn-240h-L**  
(friction coefficient  $\mu_{\text{total}} = 0.09$  to 0.14);  
tightening torque  $M_A = 7 \text{ Nm } [5.2 \text{ ft-lbs}] \pm 10\%$ ,  
material no. **R913000064**  
or  
**4 hexagon socket head cap screws ISO 4762 - M5 x 50 - 10.9<sup>2)</sup>**  
(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);  
tightening torque  $M_A = 8.1 \text{ Nm } [6 \text{ ft-lbs}] \pm 10\%$

- 4 hexagon socket head cap screws UNC 10-24 UNC x 2" ASTM-A574**  
(friction coefficient  $\mu_{\text{total}} = 0.19$  bis 0.24);  
tightening torque  $M_A = 11 \text{ Nm } [8.2 \text{ ft-lbs}] \pm 15\%$ ,  
(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);  
tightening torque  $M_A = 8 \text{ Nm } [5.9 \text{ ft-lbs}] \pm 10\%$ ,  
material no. **R978800693**

- ▶ Clamping length 22 mm:  
**4 metric hexagon socket head cap screws ISO 4762 - M5 x 30 - 10.9-fIZn-240h-L**  
(friction coefficient  $\mu_{\text{total}} = 0.09$  to 0.14);  
tightening torque  $M_A = 7 \text{ Nm } [5.2 \text{ ft-lbs}] \pm 10\%$ ,  
material no. **R913000316**  
or  
**4 hexagon socket head cap screws ISO 4762 - M5 x 30 - 10.9<sup>2)</sup>**  
(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);  
tightening torque  $M_A = 8.1 \text{ Nm } [6 \text{ ft-lbs}] \pm 10\%$

- 4 hexagon socket head cap screws UNC 10-24 UNC x 1 1/4"**  
(friction coefficient  $\mu_{\text{total}} = 0.19$  to 0.24);  
tightening torque  $M_A = 11 \text{ Nm } [8.2 \text{ ft-lbs}] \pm 15\%$ ,  
(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);  
tightening torque  $M_A = 8 \text{ Nm } [5.9 \text{ ft-lbs}] \pm 10\%$ ,  
material no. **R978802879**

<sup>2)</sup> Not included in the Rexroth delivery range

**Circuit breakers with tripping characteristic "K"**

according to EN 60898-1 (VDE 0641-11), EN 60947-2 (VDE 0660-101), IEC 60898 and IEC 60947-2

| <b>AC solenoid</b> | <b>Lower rated current</b><br><i>I</i> <sub>1</sub> in A | <b>Upper rated current</b><br><i>I</i> <sub>2</sub> in A |
|--------------------|--|--|
| <b>50 Hz</b>       |  |  |
| W24                | 2.30   | 3.60   |
| W42                | 1.45   | 1.92   |
| W48                | 1.15   | 1.92   |
| W100               | 0.64   | 0.90   |
| W110               | 0.60   | 0.90   |
| W115               | 0.52   | 0.90   |
| W127               | 0.48   | 0.60   |
| W200               | 0.33   | 0.60   |
| W220               | 0.31   | 0.60   |
| W230               | 0.26   | 0.36   |
| W240               | 0.26   | 0.36   |

| <b>AC solenoid</b> | <b>Lower rated current</b><br><i>I</i> <sub>1</sub> in A | <b>Upper rated current</b><br><i>I</i> <sub>2</sub> in A |
|--------------------|--|--|
| <b>50 Hz</b>       |  |  |
| W24                | 1.73   | 2.40   |
| W42                | 1.13   | 1.92   |
| W48                | 1.09   | 1.92   |
| W100               | 0.58   | 0.90   |
| W110               | 0.52   | 0.90   |
| W115               | 0.43   | 0.90   |
| W127               | 0.37   | 0.60   |
| W200               | 0.30   | 0.60   |
| W220               | 0.26   | 0.36   |
| W230               | 0.20   | 0.36   |
| W240               | 0.22   | 0.36   |

**More information**

- ▶ Subplates
- ▶ Inductive position switch and proximity sensors (contactless)
- ▶ Smoothly switching version
- ▶ Mineral oil-based hydraulic fluids
- ▶ Reliability characteristics according to EN ISO 13849
- ▶ General product information on hydraulic products
- ▶ Installation, commissioning and maintenance of industrial valves
- ▶ Hydraulic valves for industrial applications
- ▶ Selection of the filters

Data sheet 45052

Data sheet 24830

Data sheet 23183

Data sheet 90220

Data sheet 08012

Data sheet 07008

Data sheet 07300

Data sheet 07600-B

[www.boschrexroth.com/filter](http://www.boschrexroth.com/filter)

## Notes

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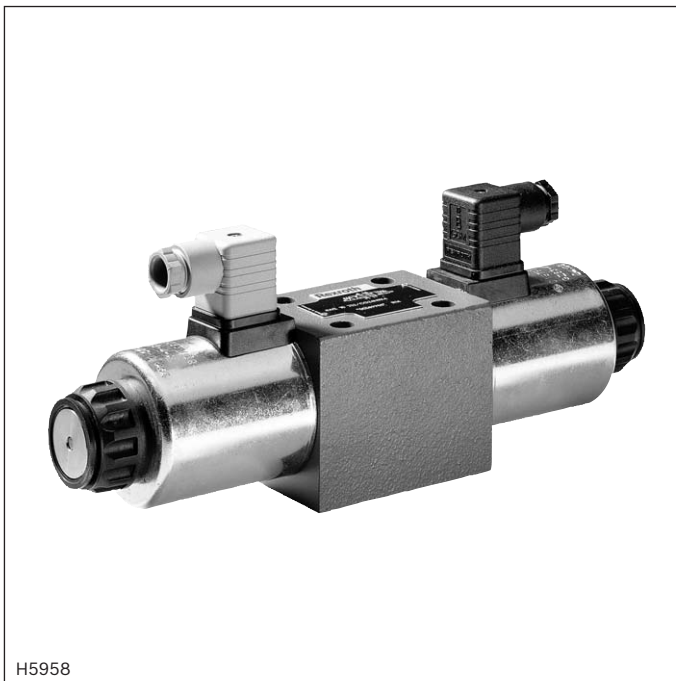
# Directional spool valves, direct operated, with solenoid actuation

## Type WE

**RE 23327**

Edition: 2013-05

Replaces: 08.08



- ▶ Size 10
- ▶ Component series 3X; 4X
- ▶ Maximum operating pressure 315 bar [4569 psi]
- ▶ Maximum flow 120 l/min [31.7 US gpm]

### Features

- ▶ 4/3, 4/2 or 3/2 directional design
- ▶ High-power solenoid
- ▶ Porting pattern according to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- ▶ Wet-pin AC solenoids with detachable coil
- ▶ Solenoid coil can be rotated by 90°
- ▶ The coil can be changed without having to open the pressure-tight chamber
- ▶ Electrical connection as individual or central connection
- ▶ Manual override, optional

### Contents

|                       |           |
|-----------------------|-----------|
| Features              | 1         |
| Contents              | 1         |
| Ordering codes        | 2         |
| Symbols               | 3         |
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| Function, section     | 5         |
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| Performance limits    | 9, 10     |
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| Mating connectors     | 14        |
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## Ordering codes

|    |           |           |    |    |    |          |    |    |    |    |    |    |    |    |    |
|----|-----------|-----------|----|----|----|----------|----|----|----|----|----|----|----|----|----|
| 01 | 02        | 03        | 04 | 05 | 06 | 07       | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|    | <b>WE</b> | <b>10</b> |    | /  |    | <b>C</b> |    |    |    | /  |    |    |    |    | *  |

|    |  |                |
|----|--|----------------|
| 01 | 3 main ports   | <b>3</b>       |
|    | 4 main ports   | <b>4</b>       |
| 02 | Directional valve  | <b>WE</b>      |
| 03 | Size 10  | <b>10</b>      |
| 04 | Symbols e.g. C, E, EA, EB, etc; for the possible version, see page 3   |                |
| 05 | Component series 30 ... 39 (30 ... 39: Unchanged installation and mounting dimensions)                                 | <b>3X</b>      |
|    | Component series 40 ... 49 (40 ... 49: Unchanged installation and mounting dimensions)                                 | <b>4X</b>      |
| 06 | <b>With</b> spring return  | <b>no code</b> |
|    | <b>Without</b> spring return   | <b>O</b>       |
|    | <b>Without</b> spring return with detent   | <b>OF</b>      |
| 07 | High performance wet-pin solenoid with detachable coil   | <b>C</b>       |
| 08 | AC voltage 230 V 50/60 Hz  | <b>W230</b>    |
|    | For further ordering codes for other voltages and frequencies, see page 7;<br>for direct voltage, see data sheet 23340 |                |
| 09 | <b>With</b> concealed manual override (standard)   | <b>N9</b>      |
|    | <b>With</b> manual override  | <b>N</b>       |
|    | <b>Without</b> manual override   | <b>no code</b> |

### Electrical connection

|    |  |                         |
|----|--|-------------------------|
| 10 | <b>Individual connection</b>   |                         |
|    | <b>Without</b> mating connector; connector DIN EN 175301-803                             | <b>K4</b> <sup>1)</sup> |
|    | <b>Central connection</b>  |                         |
|    | Cable entry at the cover, with indicator light   | <b>DL</b>               |
|    | Central plug-in connection at the cover, with indicator light (without mating connector) | <b>DK6L</b>             |
|    | For further electrical connections, see data sheet 08010                                 |                         |


### Spool position monitoring

|    |  |                |
|----|--|----------------|
| 11 | <b>Without</b> position switch   | <b>no code</b> |
|    | <b>- Inductive position switch type QM</b>                                   |                |
|    | Monitored spool position "a"   | <b>QMAG24</b>  |
|    | Monitored spool position "b"   | <b>QMBG24</b>  |
|    | Monitored rest position  | <b>QM0G24</b>  |
|    | For further information, see data sheet 24830                                |                |
| 12 | <b>Without</b> throttle insert   | <b>no code</b> |
|    | Throttle Ø 0.8 mm [0.031 inch]   | <b>B08</b>     |
|    | Throttle Ø 1.0 mm [0.039 inch]   | <b>B10</b>     |
|    | Throttle Ø 1.2 mm [0.047 inch]   | <b>B12</b>     |
|    | Use with flows which exceed the performance limit of the valve (see page 4). |                |

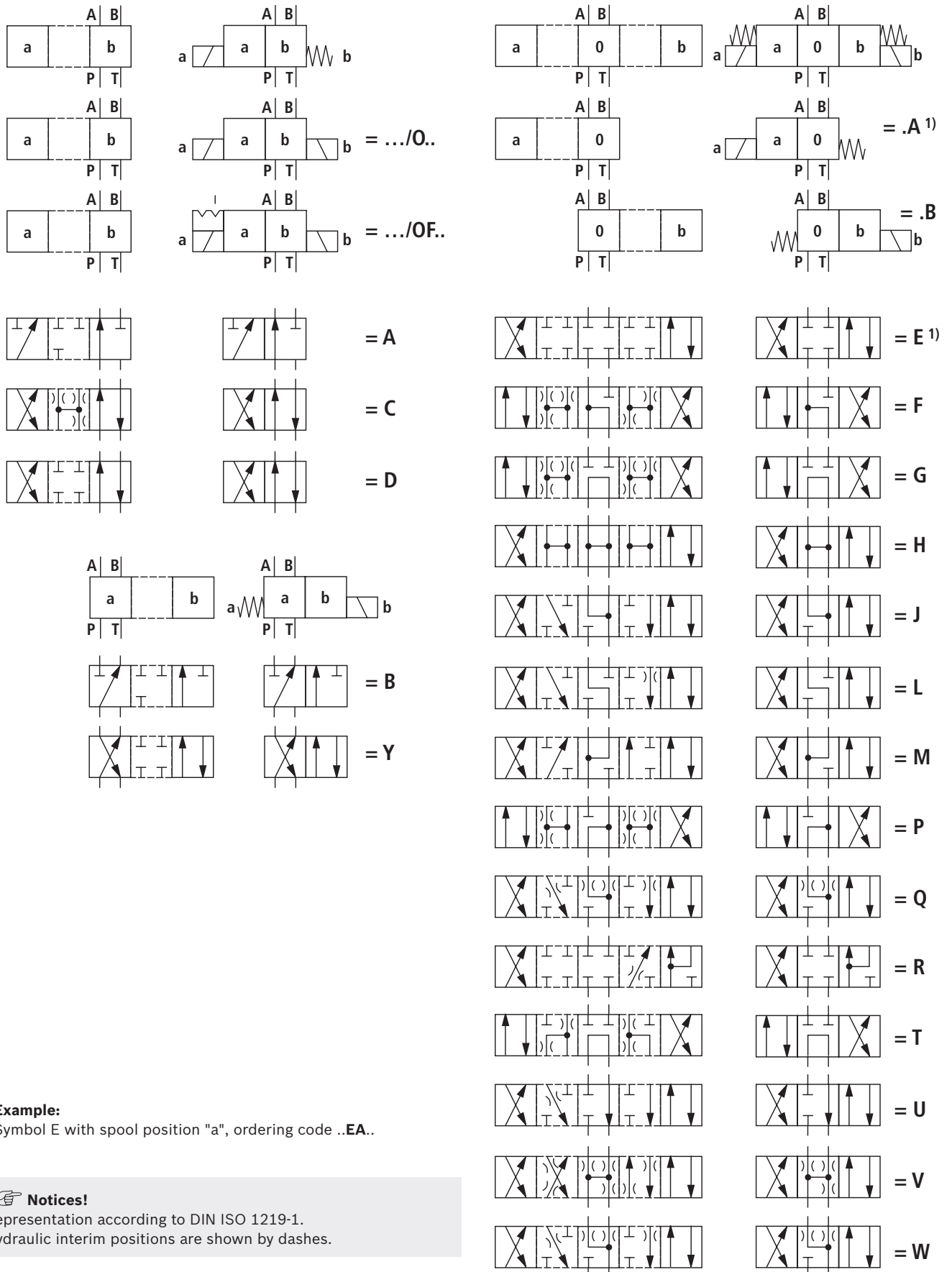
### Seal material

|    |   |                |
|----|---|----------------|
| 13 | NBR seals   | <b>no code</b> |
|    | FKM seals   | <b>V</b>       |
|    | Attention: Observe compatibility of seals with hydraulic fluid used! (Other seals upon request) |                |
| 14 | Further details in the plain text   |                |

<sup>1)</sup> Mating connectors, separate order, see page 14 and data sheet 08006.

 **Notice!** Preferred types and standard units are contained in the EPS (standard price list).

## Symbols



<sup>1)</sup> **Example:**  
Symbol E with spool position "a", ordering code ..EA..

### Notices!

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

## Function, section

The directional valve type WE is a solenoid actuated directional spool valve. It controls the start, stop and direction of a flow.

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

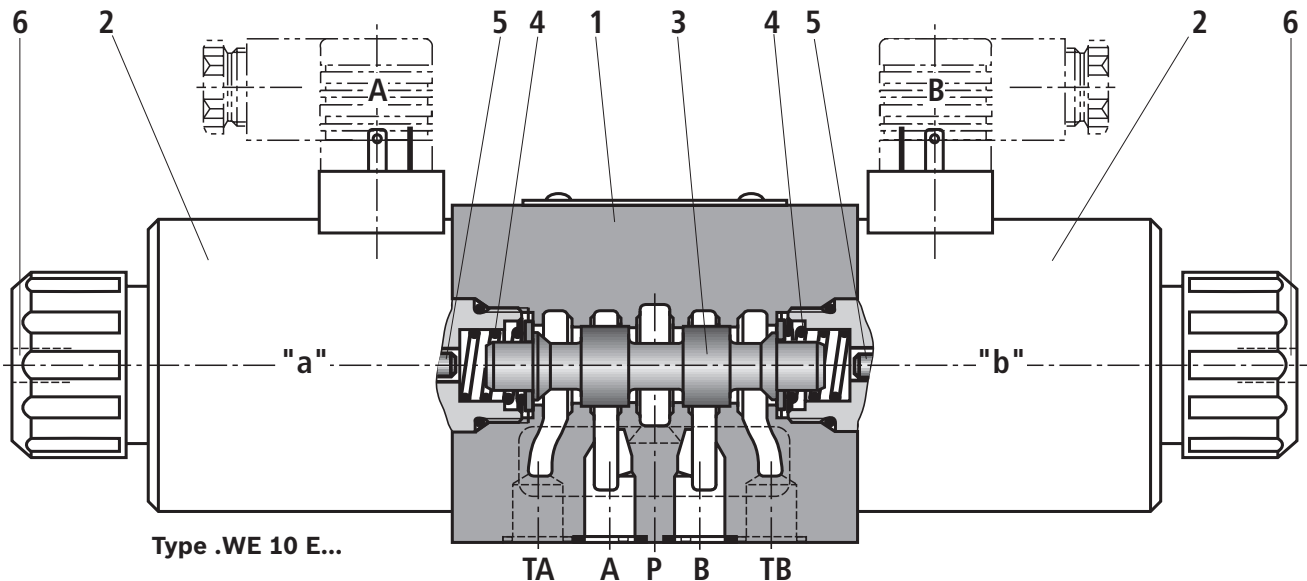
In the de-energized condition, the control spool (3) is held in the central position or in the initial position by the return springs (4) (except for version "O"). The control spool (3) is actuated by wet-pin electronic solenoids (2). The force of electronic solenoid (2) acts via the plunger (5) on the control spool (3) and pushes the latter from its rest position to the required end position. This enables the necessary direction of flow from P to A and B to T or P to B and A to T.

When the electronic solenoid (2) is de-energized, the return spring (4) pushes the control spool (3) back to its rest position.

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

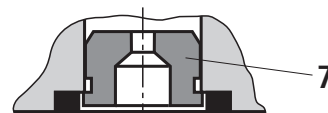
**To ensure proper functioning, make sure that the pressure chamber of the solenoid is filled with oil.**

For additional functions, see page 5.



### Throttle insert "B.."

Using a throttle insert (7) in channels P, A, B or T increases the flow resistance at the valve. 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)

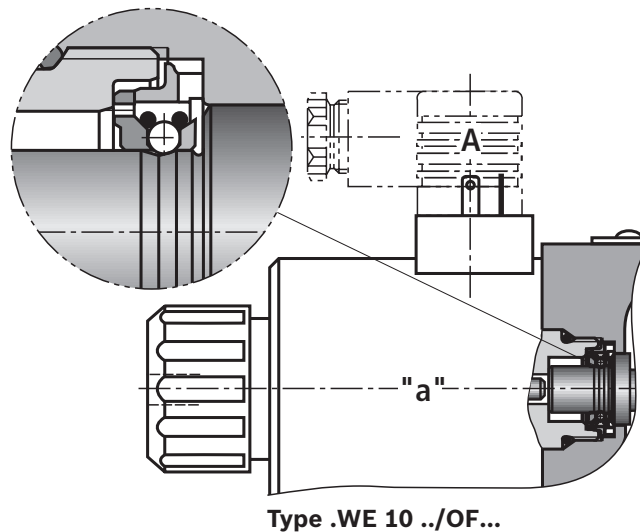
This version is a directional valve with 2 spool positions and 2 electronic solenoids **without** detent. The valve without spring return at the control spool (3) has no defined basic position in the de-energized condition.

**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 therefore be omitted which contributes to energy-efficient operation.

### Notice!

Pressure peaks in the tank line to two or several valves can result in unwanted control spool movements 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 applications outside these parameters, please consult us!)

| <b>general</b>                                     |                            |          |   |                    |
|--|----------------------------|----------|---|--------------------|
| Weight   |                            |          | Individual connection   | Central connection |
|  | - Valve with one solenoid  | kg [lbs] | 3.6 [7.9]   | 3.5 [7.7]          |
|  | - Valve with two solenoids | kg [lbs] | 4.4 [9.7]   | 4.3 [9.5]          |
| Installation position                              |                            | Any      |   |                    |
| Ambient temperature range                          |                            | °C [°F]  | -30 ... +50 [-22... +122] (NBR seals)<br>-20 ... +50 [-4... +122] (FKM seals) |                    |
| MTTF <sub>d</sub> values according to EN ISO 13849 |                            | Years    | 150 (for further details see data sheet 08012)                                |                    |

| <b>hydraulic</b>  |                |                                      |  |  |
|---|----------------|--------------------------------------|--|--|
| Maximum operating pressure  | - Port A, B, P | bar [psi]                            | 315 [4569]   |  |
|   | - Port T       | bar [psi]                            | 160 [2320]<br>With symbols A and B, port T has to be used as leakage oil connection if the operating pressure exceeds the tank pressure. |  |
| Maximum flow  |                | l/min [US gpm]                       | 120 [31.7]   |  |
| Flow cross-section<br>(spool position 0)  | - Symbol V     | mm <sup>2</sup> [inch <sup>2</sup> ] | 11 [0.017] (A/B to T); 10.3 [0.016] (P to A/B)   |  |
|   | - Symbol W     | mm <sup>2</sup> [inch <sup>2</sup> ] | 2.5 [0.004] (A/B to T)   |  |
|   | - Symbol Q     | mm <sup>2</sup> [inch <sup>2</sup> ] | 5.5 [0.009] (A/B to T)   |  |
| Hydraulic fluid   |                |                                      | See table below  |  |
| Hydraulic fluid temperature range<br>(at the valve operating ports)   |                | °C [°F]                              | -30 ... +80 [-22... +176] (NBR seals)<br>-20 ... +80 [-4... +176] (FKM seals)  |  |
|   |                |                                      | 2.8 ... 500 [35 ... 2320]  |  |
| Viscosity range   |                | mm <sup>2</sup> /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 <sup>1)</sup>   |  |

| Hydraulic fluid | Classification             | Suitable sealing materials                          | Standards       |            |
|-----------------|----------------------------|---|-----------------|------------|
| Mineral oils    | HL, HLP, HLPD, HVLP, HVLPD | NBR, FKM  | DIN 51524       |            |
| Bio-degradable  | - insoluble in water       | HETG<br>HEES  | NBR, FKM<br>FKM | VDMA 24568 |
|                 | - soluble in water         | HEPG  | FKM             |            |
| Flame-resistant | - water-free               | HFDU, HFDR  | FKM             | ISO 12922  |
|                 | - containing water         | HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620) | NBR             | ISO 12922  |

**Important information on hydraulic fluids!**

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

**▶ Flame-resistant – containing water:**

- Maximum pressure difference 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:** When using bio-degradable hydraulic fluids that are simultaneously zinc-soluble, zinc may accumulate in the fluid (per pole tube 700 mg zinc).

<sup>1)</sup> The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components. For the selection of the filters, see [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter).

## Technical data

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

| electric  |  |
|---|--|
| Voltage type  | Alternating voltage 50/60 Hz   |
| Available voltages <sup>2)</sup> (For ordering codes for AC voltage solenoids, see below) | V 42, 110, 230   |
| Voltage tolerance (nominal voltage)   | % ±10  |
| Power consumption   | W –  |
| Holding power   | VA 90  |
| Switch-on power   | VA 550   |
| Duty cycle (ED)   | % 100  |
| Switching time according to ISO 6403  | – ON ms 15 ... 25<br>– OFF ms 20 ... 30  |
| Maximum switching frequency   | 1/h 7200   |
| Maximum surface temperatures of the coil <sup>3)</sup>                                    | °C [°F] 180 [356]  |
| Protection class according to DIN EN 60529  | IP 65 with mating connector mounted and locked   |
| Insulation class VDE 0580   | H  |
| Electrical protection   | Every solenoid must be protected individually, using a suitable fuse with tripping characteristic K (inductive loads). |
| Behavior in case of an error (solenoid does not switch though)                            | The solenoid surface temperature may be exceeded.  |

<sup>2)</sup> Special voltages on request

<sup>3)</sup> Possible surface temperature > 50 °C, provide contact protection!

### Notice!

- ▶ 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 an operation temperature above 105 °C [221 °F].
- ▶ When solenoid coils are switched off, voltage peaks result which may cause failures or damage in the connected control electronics. The user has to provide for a suitable circuit for limiting the voltage peaks. It must be noted that a diode switched in an anti-parallel form extends the switching off time.
- ▶ Valves with individual connection and supply voltage 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 5 1/s.
- ▶ Due to possible overloads of the printed-circuit board, valves with central connection must not be operated with twice the voltage.

### Notice!

**AC solenoids** can be used for 2 or 3 mains; e.g. solenoid type **W110** for: 110 V, 50 Hz; 110 V, 60 Hz; 120 V, 60 Hz

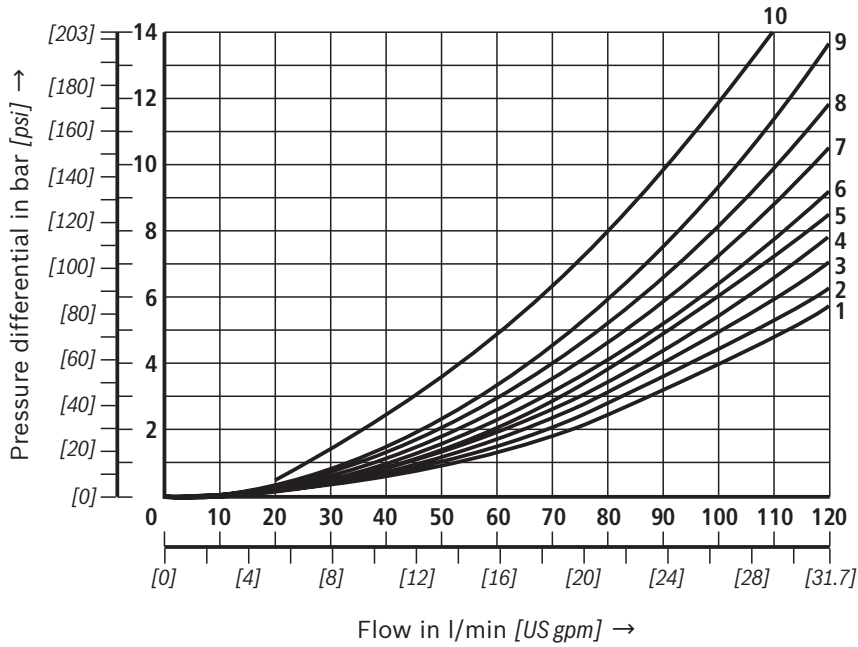
| Ordering code | Mains        |
|---------------|--------------|
| <b>W42</b>    | 42 V, 50 Hz  |
|               | 42 V, 60 Hz  |
| <b>W110</b>   | 110 V, 50 Hz |
|               | 110 V, 60 Hz |
|               | 120 V, 60 Hz |
| <b>W230</b>   | 230 V, 50 Hz |
|               | 230 V, 60 Hz |

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

### Characteristic curves

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

$\Delta p$ - $q_v$  characteristic curves



| Symbol | Direction of flow |       |       |       |
|--------|-------------------|-------|-------|-------|
|        | P - A             | P - B | A - T | B - T |
| A; B   | 3                 | 3     | -     | -     |
| C      | 3                 | 3     | 4     | 5     |
| D; Y   | 5                 | 5     | 6     | 6     |
| E      | 1                 | 1     | 4     | 4     |
| F      | 2                 | 3     | 7     | 4     |
| G      | 3                 | 3     | 6     | 7     |
| H      | 1                 | 1     | 6     | 7     |
| J      | 1                 | 1     | 3     | 3     |
| L      | 2                 | 2     | 3     | 5     |
| M      | 1                 | 1     | 4     | 5     |
| P      | 4                 | 2     | 5     | 7     |
| Q      | 1                 | 2     | 1     | 3     |
| R      | 3                 | 6     | 4     | -     |
| T      | 3                 | 3     | 6     | 7     |
| U; V   | 2                 | 2     | 3     | 3     |
| W      | 2                 | 2     | 4     | 5     |

**Central position:**

| Symbol | Direction of flow |       |       |       |       |
|--------|-------------------|-------|-------|-------|-------|
|        | P - A             | P - B | B - T | A - T | P - T |
| F      | 4                 | -     | -     | 9     | 9     |
| P      | -                 | 5     | 8     | -     | 10    |
| G, T   | -                 | -     | -     | -     | 9     |
| H      | -                 | -     | -     | -     | 3     |

**Spool position:**

| Symbol | Direction of flow |       |       |       |
|--------|-------------------|-------|-------|-------|
|        | P - A             | B - A | A - T | P - T |
| R      | -                 | 9     | -     | -     |

### Performance limits

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

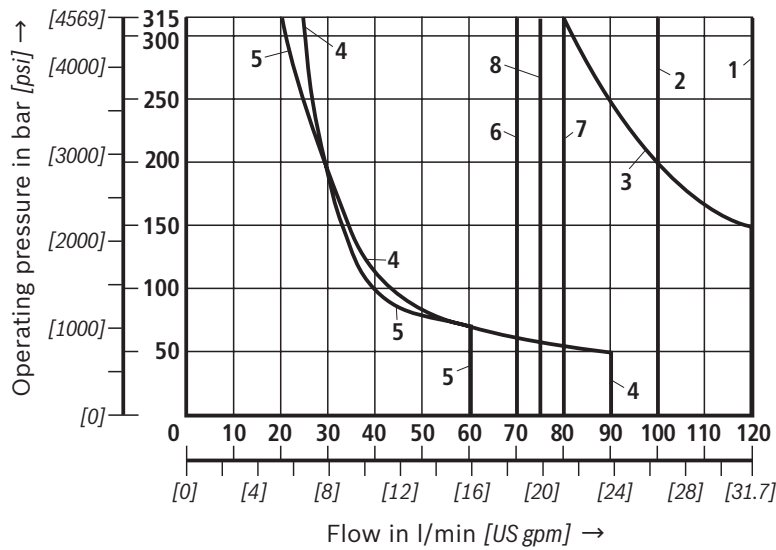
**Notice!**

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 permissible 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, please consult us.

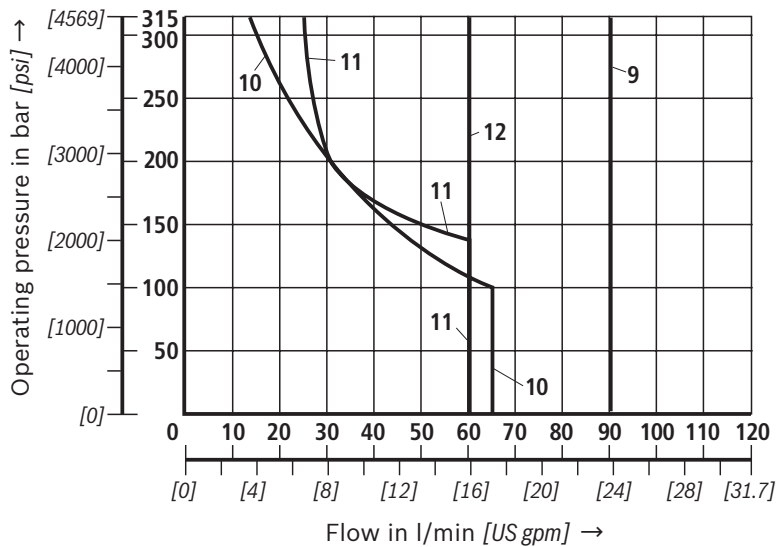
**The performance limits were determined when the solenoids were at operating temperature, at 10% undervoltage and without tank pre-loading.**



| Characteristic curve | Symbol                        |
|----------------------|-------------------------------|
| 1                    | C; C/O; C/OF; D; D/O; D/OF; Y |
| 2                    | E; L; U; Q; W                 |
| 3                    | A/O; A/OF; J                  |
| 4                    | F; P                          |
| 5                    | T                             |
| 6                    | H                             |
| 7                    | R                             |
| 8 <sup>2)</sup>      | L; U                          |

<sup>2)</sup> Central position only

42 V, 50 Hz; 110 V, 50 Hz; 120 V, 60 Hz;  
127 V, 50 Hz; 220 V, 50 Hz; 240 V, 60 Hz



| Characteristic curve | Symbol |
|----------------------|--------|
| 9                    | M      |
| 10                   | A, B   |
| 11                   | G      |
| 12                   | V      |

42 V, 50 Hz; 110 V, 50 Hz; 120 V, 60 Hz;  
127 V, 50 Hz; 220 V, 50 Hz; 240 V, 60 Hz

## Performance limits

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

### Notice!

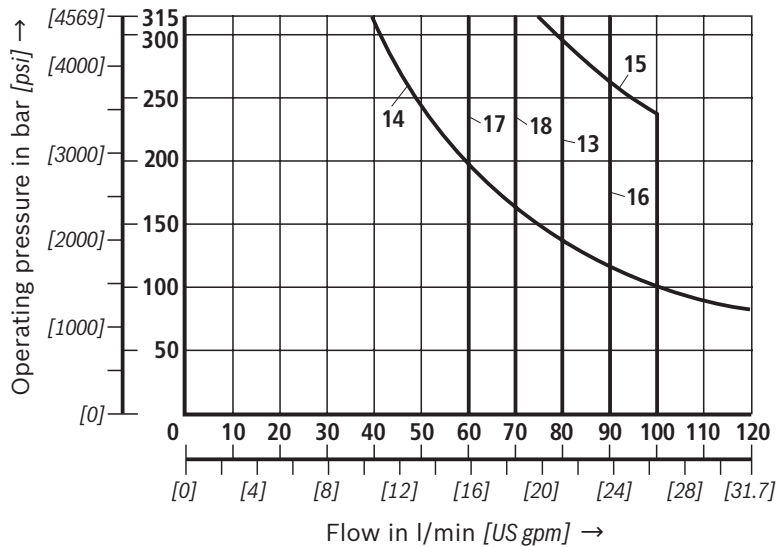
The specified performance limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

Due to the flow forces acting within the valves, the permissible 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, please consult us.

**The performance limits were determined when the solenoids were at operating temperature, at 10% undervoltage and without tank pre-loading.**



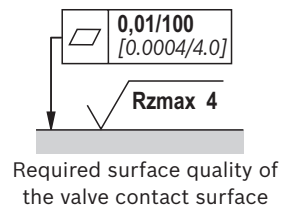
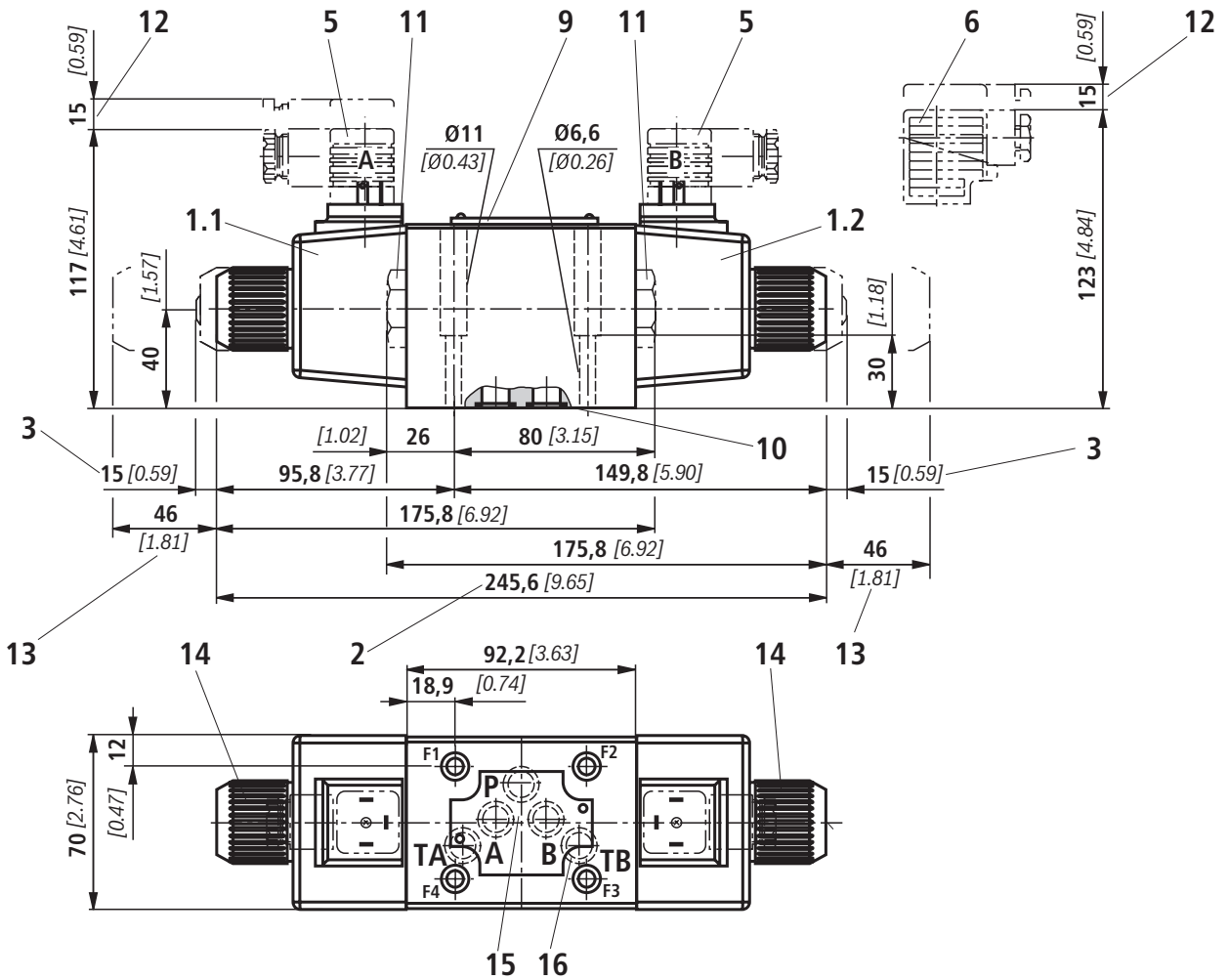
| Characteristic curve | Symbol                        |
|----------------------|-------------------------------|
| 13                   | C; C/O; C/OF; D; D/O; D/OF; Y |
| 14                   | A/O; A/OF                     |
| 15                   | E                             |
| 16                   | M                             |
| 17                   | V                             |
| 18                   | H                             |

42 V, 60 Hz; 110 V, 60 Hz;

127 V, 60 Hz; 220 V, 60 Hz

Please consult us regarding the performance limits for other symbols.

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

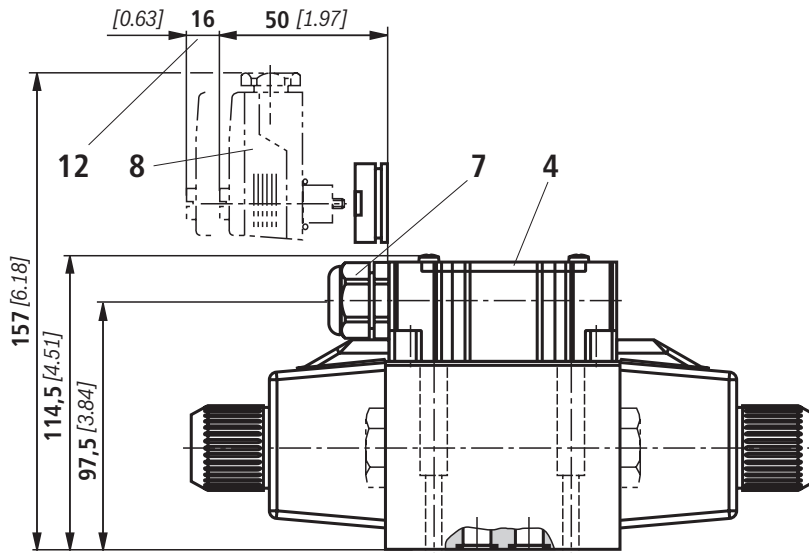


**Notice!**

- ▶ Deviating from ISO 4401, in this data sheet port T is called TA, port T1 is called TB.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

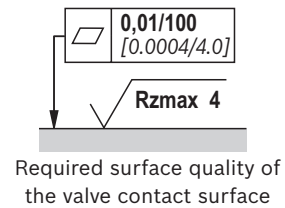
**For item explanations, valve mounting screws and sub-plates, see page 13.**

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



**Terminal assignment with central connection:**

- ▶ **1 solenoid:**  
Always connect the solenoid to terminals 1 and 2,  
the protective grounding conductor to terminal  $\oplus$  PE
- ▶ **2 solenoids:**  
Always connect solenoid "a" to terminals 1 and 2,  
solenoid "b" to terminals 3 and 4,  
the protective grounding conductor to terminal  $\oplus$  PE



**Notice!**

- ▶ Deviating from ISO 4401, in this data sheet port T is called TA, port T1 is called TB.
- ▶ The dimensions are nominal dimensions which are subject to tolerances.

**For item explanations, valve mounting screws and sub-plates, see page 13.**



## Dimensions

- 1.1 Solenoid "a"
- 1.2 Solenoid "b"
- 2 Dimension for solenoid **without** and **with concealed** manual override "N9" (standard)
- 3 Dimension for solenoid **with** manual override "N"
- 4 Cover
  - Attention!**
  - The valve may only be operated with properly mounted cover.
- 5 Mating connector **without** circuitry (separate order, see page 14 and data sheet 08006)
- 6 Mating connector **with** circuitry (separate order, see page 14 and data sheet 08006)
- 7 Cable gland Pg 16 [1/2" NPT] "DL"
- 8 Angled socket (red, separate order) (material no. **R900005538**)
- 9 Name plate
- 10 Identical seal rings for ports A, B, P, TA, TB (for valves with throttle insert: O ring in channel P)
- 11 Plug screw for valves with one solenoid
- 12 Space required to remove the mating connector/ angled socket
- 13 Space required to remove the coil
- 14 Mounting nut, tightening torque  $M_A = 6^{+2} \text{ Nm}$  [4.43<sup>+1.48</sup> 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.

**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) <sup>1)</sup>
  - G 67/12 (SAE-8; 3/4-16) <sup>1)</sup>
  - G 534/12 (SAE-12; 1-1/16-12) <sup>1)</sup>
- <sup>1)</sup> On request

**Valve mounting screws** (separate order)

**4 metric hexagon socket head cap screws**  
**ISO 4762 - M6 x 40 - 10.9-flZn-240h-L**  
 (friction coefficient  $\mu_{\text{total}} = 0.09 \dots 0.14$ );  
 tightening torque  $M_A = 12.5 \text{ Nm}$  [9.2 ft-lbs]  $\pm 10\%$ ,  
 material no. **R913000058**

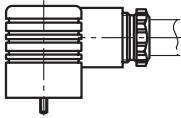
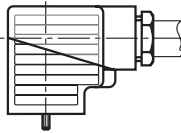
or

**4 hexagon socket head cap screws**  
**ISO 4762 - M6 x 40 - 10.9** (self procurement)  
 (friction coefficient  $\mu_{\text{total}} = 0.12 \dots 0.17$ );  
 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  $\mu_{\text{total}} = 0.19 \dots 0.24$ );  
 tightening torque  $M_A = 20 \text{ Nm}$  [14.7 ft-lbs]  $\pm 15\%$ ,  
 (friction coefficient  $\mu_{\text{total}} = 0.12 \dots 0.17$ );  
 tightening torque  $M_A = 14 \text{ Nm}$  [10.3 ft-lbs]  $\pm 10\%$ ,  
 material no. **R978800710**

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

## Mating connectors according to DIN EN 175301-803

| For details and more mating connectors see data sheet 08006 |            |           |  |  |  |
|---|------------|-----------|---|---|--|
| Port  | Valve side | Color     | Material number   |   |  |
|   |            |           | Without circuitry   | With indicator light<br>12 ... 240 V  | With indicator light and Zener diodes-protection circuit<br>24 V |
| M16 x 1.5   | a          | Gray      | <b>R901017010</b>   | -   | -  |
|   | b          | Black     | <b>R901017011</b>   | -   | -  |
|   | a/b        | Black     | -   | <b>R901017022</b>   | <b>R901017026</b>  |
| 1/2" NPT<br>(Pg 16)   | a          | Red/brown | <b>R900004823</b>   | -   | -  |
|   | b          | Black     | <b>R900011039</b>   | -   | -  |
|   | a/b        | Black     | -   | <b>R900057453</b>   | -  |

## Further information

- ▶ Subplates
- ▶ Inductive position switches and proximity sensors (contactless)
- ▶ Version with DC solenoids
- ▶ Hydraulic fluids on mineral oil basis
- ▶ Reliability characteristics according to EN ISO 13849
- ▶ General product information on hydraulic products
- ▶ Installation, commissioning and maintenance of industrial valves
- ▶ Selection of the filters

Data sheet 45054

Data sheet 24830

Data sheet 23340

Data sheet 90220

Data sheet 08012

Data sheet 07008

Data sheet 07300

[www.boschrexroth.com/filter](http://www.boschrexroth.com/filter)

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## Notes

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## Notes