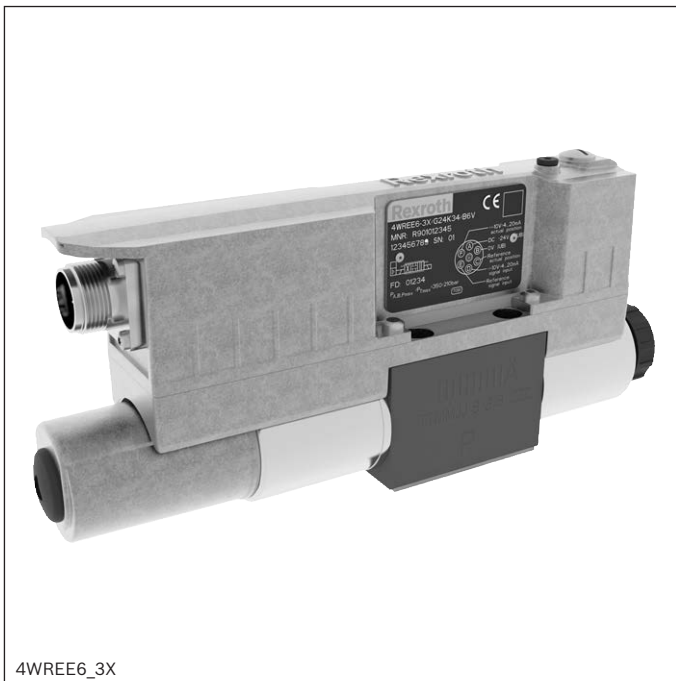


Proportional directional valve, direct operated,
with electrical position feedback and
integrated electronics (OBE)

Type 4WREE

RE 29105
Edition: 2018-12



- ▶ Size 6
- ▶ Component series 3X
- ▶ Maximum operating pressure 350 bar
- ▶ Maximum flow 80 l/min
- ▶ Rated flow 4 ... 32 l/min ($\Delta p = 10$ bar)

Features

- ▶ 4/2 or 4/3-way version
- ▶ For subplate mounting
- ▶ Porting pattern according to ISO 4401-03-02-0-05
- ▶ Control of flow direction and size
- ▶ Operation by means of proportional solenoids with central thread
- ▶ Spring-centered control spool
- ▶ Integrated control electronics (OBE) with voltage or current input ("A1" and/or "F1")

Contents

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Ordering code

| | | | | | | | | | | | | |
|----------|------------|----------|----------|----|----|----|-------------|----------|----------|-----------|----|----------|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 |
| 4 | WRE | E | 6 | | | | - 3X | / | / | 24 | | * |

| | | |
|----|---|------------|
| 01 | 4 main ports | 4 |
| 02 | Proportional directional valve direct operated, with electrical position feedback | WRE |
| 03 | With integrated electronics (OBE) | E |
| 04 | Size 6 | 6 |
| 05 | Symbols; possible version see page 3 | |

Rated flow ($\Delta p = 5$ bar/control edge)

| | | |
|----|--|----------------|
| 06 | 4 l/min | 04 |
| | 8 l/min | 08 |
| | 16 l/min | 16 |
| | 32 l/min | 32 |
| 07 | Without step function | no code |
| | Overlap jump (opening point 5 % command value with symbols E, W and W1-) | J |
| 08 | Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions) | 3X |

Seal material (observe compatibility of seals with hydraulic fluid used, see page 15)

| | | |
|----|-----------|----------|
| 09 | FKM seals | V |
| | NBR seals | M |

Supply voltage

| | | |
|----|---------------------|-----------|
| 10 | Direct voltage 24 V | 24 |
|----|---------------------|-----------|

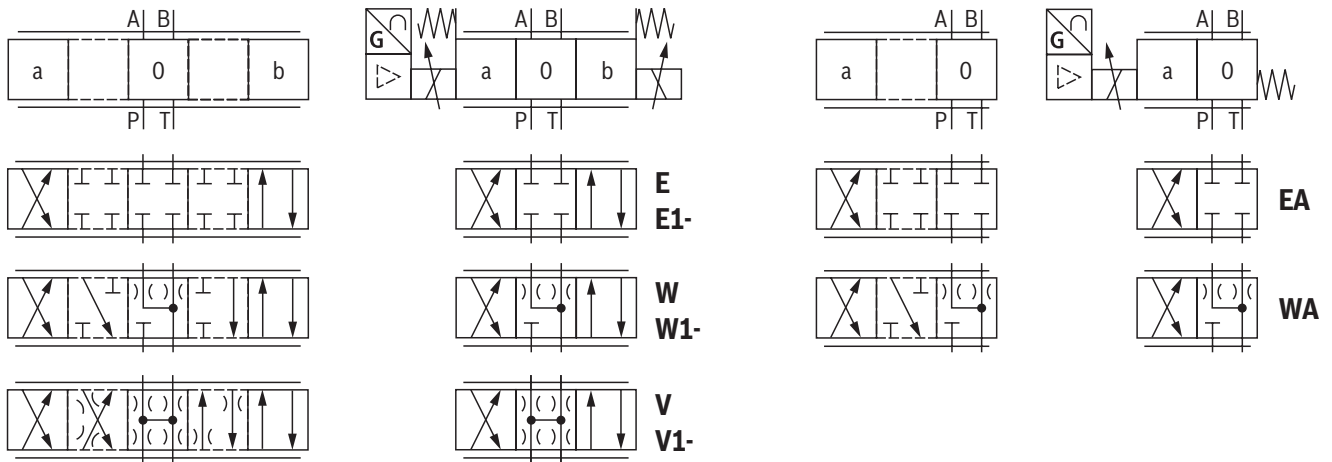
Interfaces of the control electronics

| | | |
|----|---------------------------------|-----------|
| 11 | Command value input ± 10 V | A1 |
| | Command value input 4 ... 20 mA | F1 |

Special versions

| | | |
|----|--|----------------|
| 12 | Without pressure compensation element in the OBE | no code |
| | With pressure compensation element in the OBE | -967 |
| 13 | Further details in the plain text | |

Symbols



Notice:

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

With symbol E1-, V1- and W1-:

$P \rightarrow A: q_{V \max}$ $B \rightarrow T: q_{V/2}$

$P \rightarrow B: q_{V/2}$ $A \rightarrow T: q_{V \max}$

Function, section

The type 4WREE valve is a direct operated proportional directional valve with electrical position feedback and integrated electronics (OBE).

Set-up

The valve basically consists of:

- ▶ Housing (1) with connection surface
- ▶ Control spool (2) with compression springs (3 and 4) and spring plate (5 and 6)
- ▶ Solenoids (7 and 8) with central thread
- ▶ Position transducer (9)
- ▶ Integrated electronics (13)
- ▶ Electric zero point adjustment (12) accessible via the rubber plug

Function:

- ▶ With de-energized solenoids (7 and 8), central position of the control spool (2) by compression springs (3 and 4) between spring plates (5 and 6)
- ▶ Direct operation of the control spool (2) by controlling a proportional solenoid, e.g. solenoid "b" (8)
 - Displacement of the control spool (2) to the left proportional to the electric input signal
 - This opens the connection from P to A and B to T via orifice-type cross-sections with progressive flow characteristic

In the de-energized condition, the control spool (2) is held in a mechanical central position by the return springs of the solenoids. With control spool symbol "V", this position does not correspond to the hydraulic central position! When the electric valve control loop is closed, the control spool is positioned in the hydraulic central position.

Valve with 2 spool positions (version "4WREE...A...")

The function of this valve version basically corresponds to the valve with three spool positions. The 2 spool position valves are, however, only equipped with solenoid "a" (7). Instead of the 2nd proportional solenoid, there is a plug screw (10).

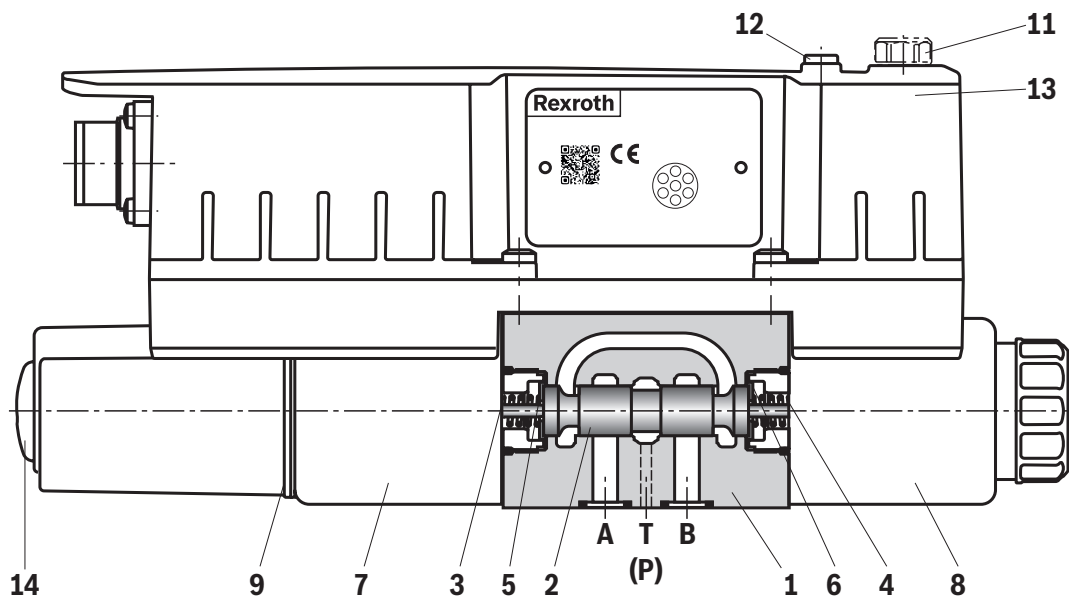
Pressure compensation element in the OBE "-967"

To prevent condensate formation in the housing of the integrated electronics (OBE), an electronics protection membrane (11) can be used.

Recommended for use outside industry-standard conditions with high ambient air humidity and significant cyclic temperature changes (e. g. outdoors).

Notes:

- ▶ Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.
- ▶ The tank line must not be allowed to run empty. With corresponding installation conditions, a preload valve (preload pressure approx. 2 bar) must be installed.
- ▶ The PG fitting (14) must not be opened.



Technical data

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

| general | | | |
|--|----------------------------|--------------------|--|
| Weight | ▶ Valve with two solenoids | kg | 2.6 |
| | ▶ Valve with one solenoid | kg | 2.1 |
| Installation position | | | any, preferably horizontal |
| Ambient temperature range | | °C | -20 ... +60 |
| Storage temperature range with UV protection | | °C | +5 ... +40 |
| Transport temperature | | °C | -30 ... +80 |
| Maximum storage time | Years | | 1 (if the storage conditions are observed; refer to the operating instructions 07600-B) |
| Sine test according to DIN EN 60068-2-6 | | | 10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes |
| Noise test according to DIN EN 60068-2-64 | | | 20 ... 2000 Hz / 10 g _{RMS} / 30 g peak / 30 min. / 3 axes |
| Transport shock according to DIN EN 60068-2-27 | | | 15 g / 11 ms / 3 shocks / 3 axes |
| Shock according to DIN EN 60068-2-27 | | | 15 g / 11 ms / 1000 shocks / 3 axes |
| Maximum relative humidity (no condensation) | | % | 95 |
| Maximum solenoid surface temperature | | °C | 150 (individual operation) |
| MTTF _d value according to EN ISO 13849 | Years | | 150 (for further details see data sheet 08012) |
| Conformity | | | ▶ CE according to EMC directive 2014/30/EU, tested according to EN 61000-6-2 and EN 61000-6-3 ▶ RoHS directive 2015/65/EU ▶ REACH ordinance (EC) no. 1907/2006 |
| Environmental compatibility | ▶ Climate | | Environmental audit according to EN 60068-2 |
| hydraulic | | | |
| Maximum operating pressure | ▶ Port A, B, P | bar | 350 |
| | ▶ Port T | bar | 210 |
| Maximum flow (recommended) | | l/min | 80 |
| Rated flow ($\Delta p = 10$ bar) | | l/min | 4; 8; 16; 32 |
| Hydraulic fluid | | | see table page 15 |
| Hydraulic fluid temperature range | ▶ admissible | °C | -20 ... +70 |
| | ▶ recommended | | -40 ... +50 |
| Viscosity range | ▶ admissible | mm ² /s | 20 ... 380 |
| | ▶ recommended | mm ² /s | 30 ... 46 |
| Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c) | | | class 20/18/15 ¹⁾ |

¹⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.
Available filters can be found at www.boschrexroth.com/filter.

**Notice:**

The specified technical data were measured with HLP46 and $\vartheta_{oil} = 40 \pm 5$ °C.

Technical data

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

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

**Important information on hydraulic fluids:**

- ▶ For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ **Bio-degradable and flame-resistant – containing water:** If this hydraulic fluid is used, small amounts of dissolved zinc may get into the hydraulic system.

▶ Flame-resistant – containing water:

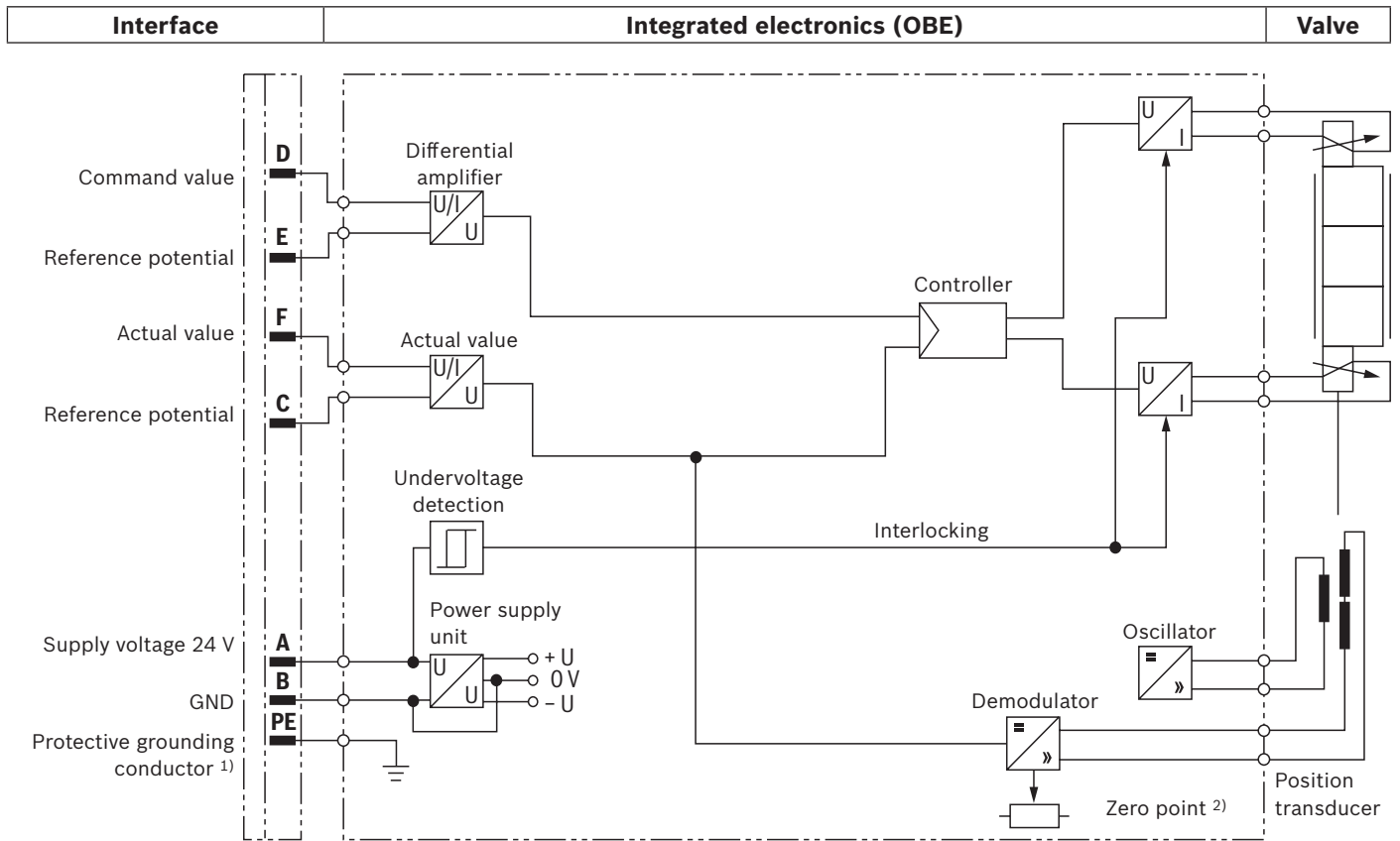
- Due to increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended - if possible specific to the installation - to back up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
- Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, the command value profile is to be adjusted for proportional and high-response valves.

| static /dynamic | | |
|--|-----------|--------|
| Hysteresis | % | < 0.1 |
| Range of inversion | % | < 0.05 |
| Response sensitivity | % | < 0.05 |
| Zero shift upon change of hydraulic fluid temperature and operating pressure | %/10 K | ≤ 0.15 |
| | %/100 bar | ≤ 0.1 |

| electrical, integrated electronics (OBE) | | |
|---|-----------------------|---|
| Voltage type | | Direct voltage |
| Supply voltage | ▶ Nominal voltage | VDC 24 |
| | ▶ Lower limit value | V 19 |
| | ▶ Upper limit value | V 36 |
| Maximum admissible residual ripple | Vpp | 2.5 |
| Current consumption of the amplifier | ▶ I_{max} | A < 2 |
| | ▶ Impulse current | A 3 |
| Solenoid coil resistance | ▶ Cold value at 20 °C | Ω 2.65 |
| | ▶ Maximum hot value | Ω 4.05 |
| Duty cycle | % | 100 |
| Maximum coil temperature ²⁾ | °C | 150 |
| Protection class of the valve according to EN 60529 | | IP65 (with mating connector mounted and locked) |
| Electro-magnetic compatibility (EMC) | | ▶ Interference resistance prEN 50082-2 |
| | | ▶ Interference emission EN 50081-1 |

²⁾ Due to the arising surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 are to be observed.

Block diagram/pin assignment



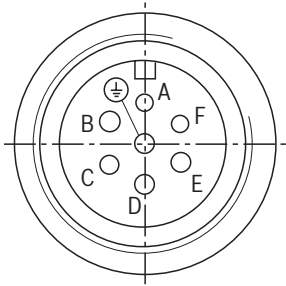
- 1) The protective grounding conductor (PE) is connected to the valve housing.
- 2) Zero point can be set from the outside

Notice: Electrical signals provided via control electronics (e. g. actual value) must not be used to switch off safety-relevant machine functions.

Electrical connections and assignment

Connector pin assignment

| Pin | Signal | Assignment interface A1 | Assignment interface F1 |
|-----|----------------------------------|---|---|
| A | Supply voltage | 24 VDC | |
| B | | 0 V | |
| C | Reference potential actual value | Reference contact F | |
| D | Differential amplifier input | Command value ± 10 V; $R_e > 50$ k Ω | Command value 4 ... 20 mA; $R_e > 100$ Ω |
| E | | Reference potential command value | |
| F | Measuring output (actual value) | Actual value ± 10 V (limit load 5 mA) | Actual value 4 ... 20 mA (load resistance max. 300 Ω) |
| PE | | Functional ground (directly connected to cooling element and valve housing) | |



| | |
|---|---|
| Command value: | ▶ Positive command value (0 ... 10 V or 12 ... 20 mA) at D and reference potential at E cause flow from P → A and B → T. |
| | ▶ Negative command value (0 ... -10 V or 12 ... 4 mA) at D and reference potential at E cause flow from P → B and A → T. |
| | ▶ With valves with solenoid on side a (symbols EA and WA), a positive command value 0 ... +10 V or 4 ... 20 mA at D and reference potential at E result in flow from P → B and A → T. |
| Actual value: | ▶ Actual value (0 ... 10 V or 12 ... 20 mA) at F and reference potential at C cause flow from P → B and A → T. |
| | ▶ With valves with one solenoid, a positive actual value from 0 to +10V or 4 to 20 mA at F and reference potential at C cause flow from P → B and A → T. |
| Connection cable (recommendation): | ▶ Up to 20 m cable length type LiYCY 7 x 0.75 mm ² |
| | ▶ Up to 50 m cable length type LiYCY 7 x 1.0 mm ² |
| | ▶ Apply screening on supply side |

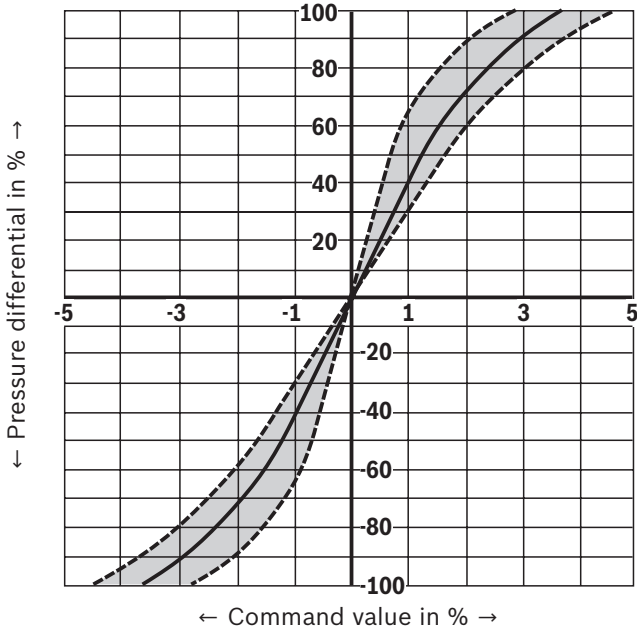
Notice:

Mating connectors, separate order, see page 16 and data sheet 08006.

Characteristic curves

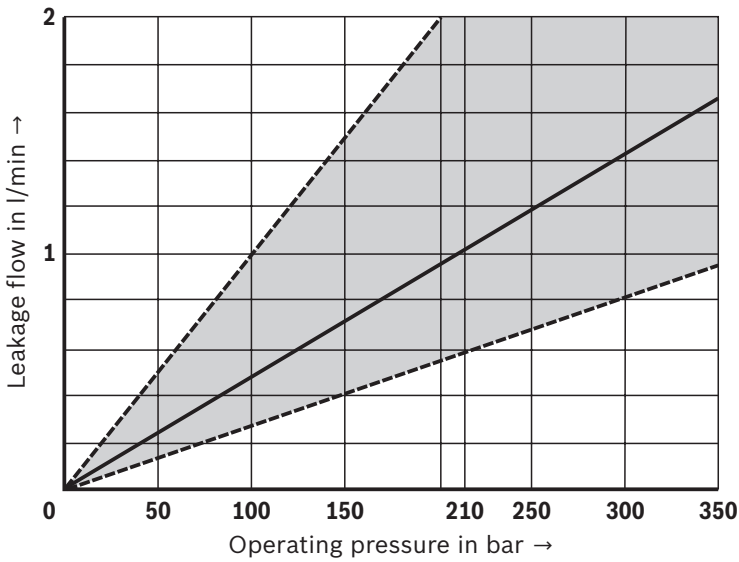
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Pressure/signal characteristic curve (symbol V), $p_s = 100 \text{ bar}$



Leakage flow with central control spool position

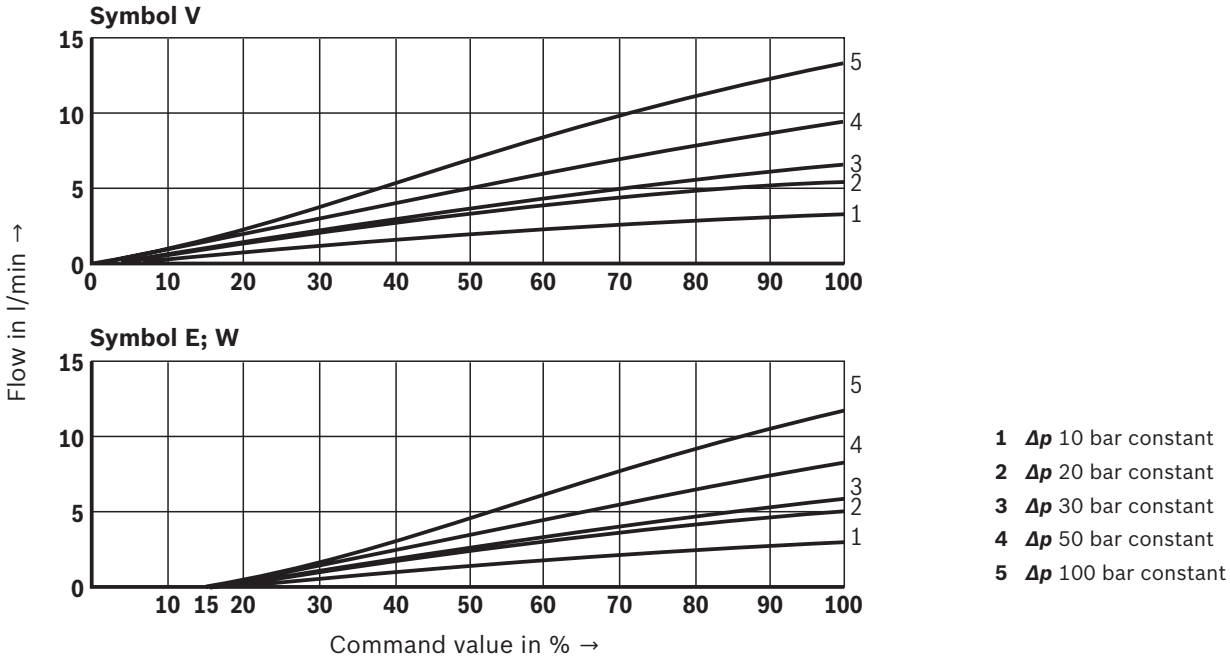
Version "V32"



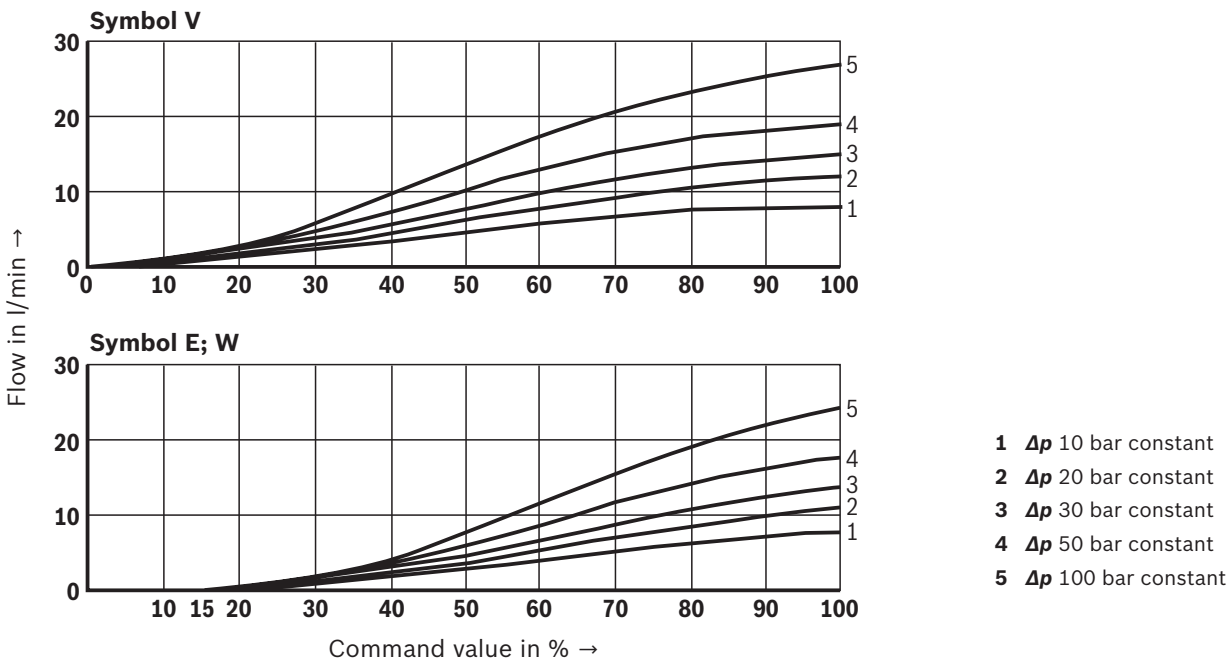
Characteristic curves

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

Rated flow 4 l/min (P → A; B → T or P → B; A → T)



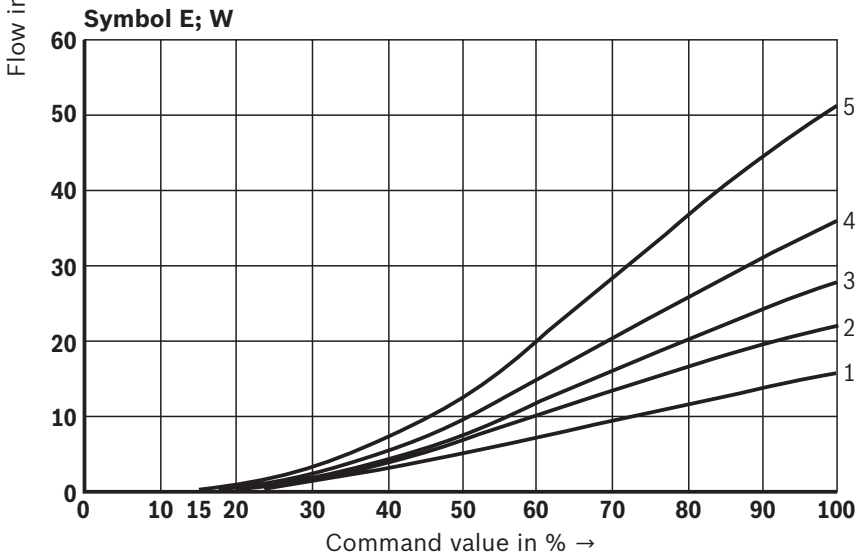
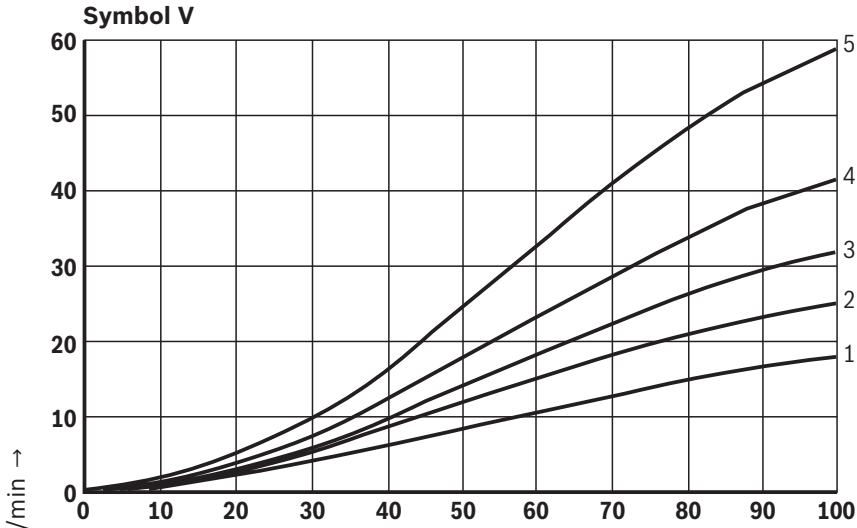
Rated flow 8 l/min (P → A; B → T or P → B; A → T)



Characteristic curves

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

Rated flow 16 l/min (P → A; B → T or P → B; A → T)

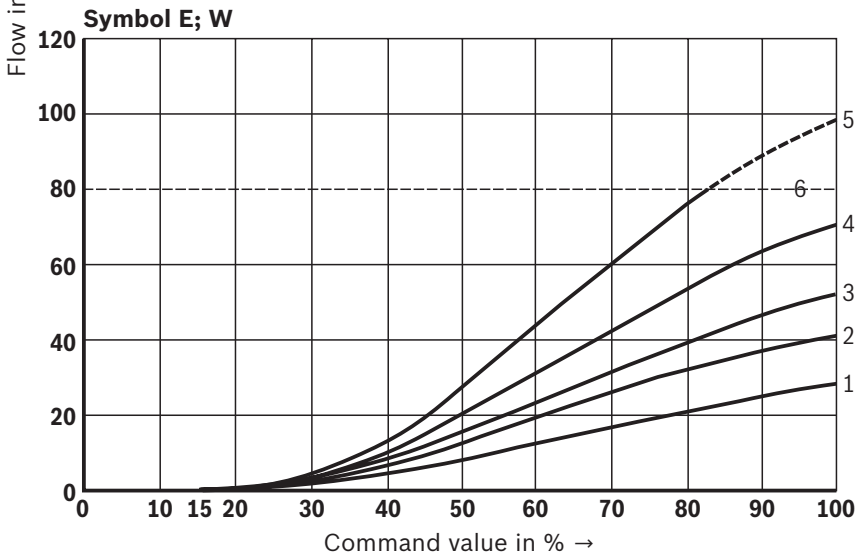
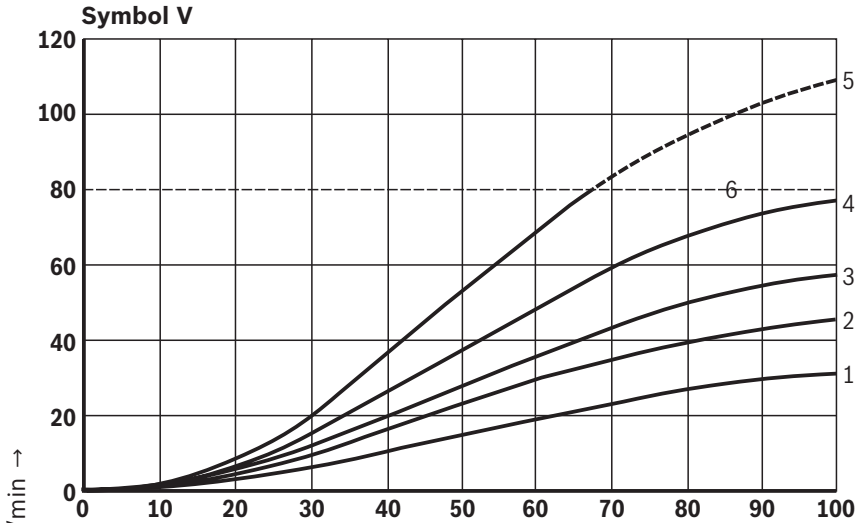


- 1 Δp 10 bar constant
- 2 Δp 20 bar constant
- 3 Δp 30 bar constant
- 4 Δp 50 bar constant
- 5 Δp 100 bar constant

Characteristic curves

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

Rated flow 32 l/min (P → A; B → T or P → B; A → T)



- 1 Δp 10 bar constant
- 2 Δp 20 bar constant
- 3 Δp 30 bar constant
- 4 Δp 50 bar constant
- 5 Δp 100 bar constant
- 6 Maximum flow (recommended)

Notes:

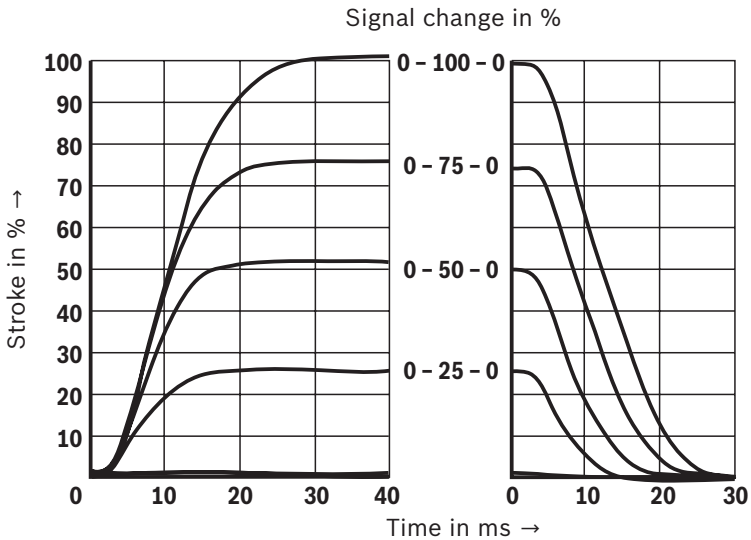
- ▶ Flow values in the maximum command value range (see tolerance field of the flow/signal function)
- ▶ $\Delta p = p_p - p_L - p_T$
 Δp valve pressure differential
 p_p inlet pressure
 p_L load pressure
 p_T return flow pressure

Characteristic curves

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

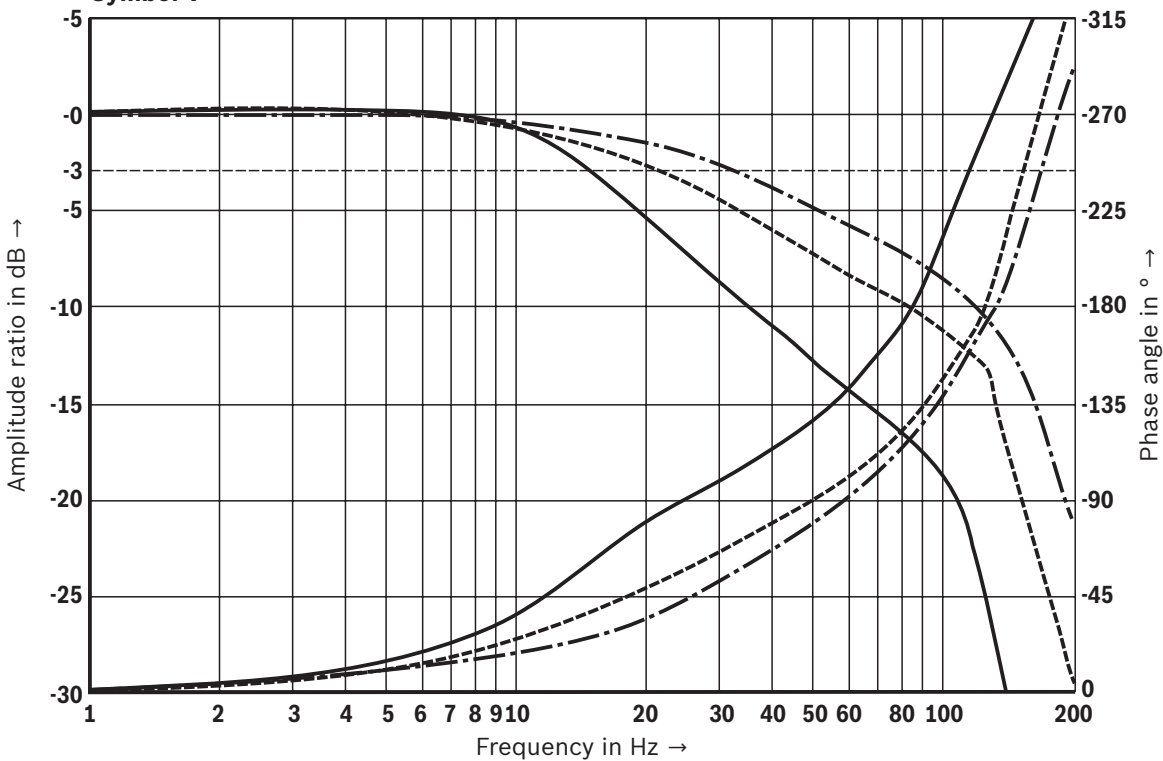
Transition function with stepped electric input signals (4/3 directional design)

Symbol V; E



Frequency response characteristic curves

Symbol V

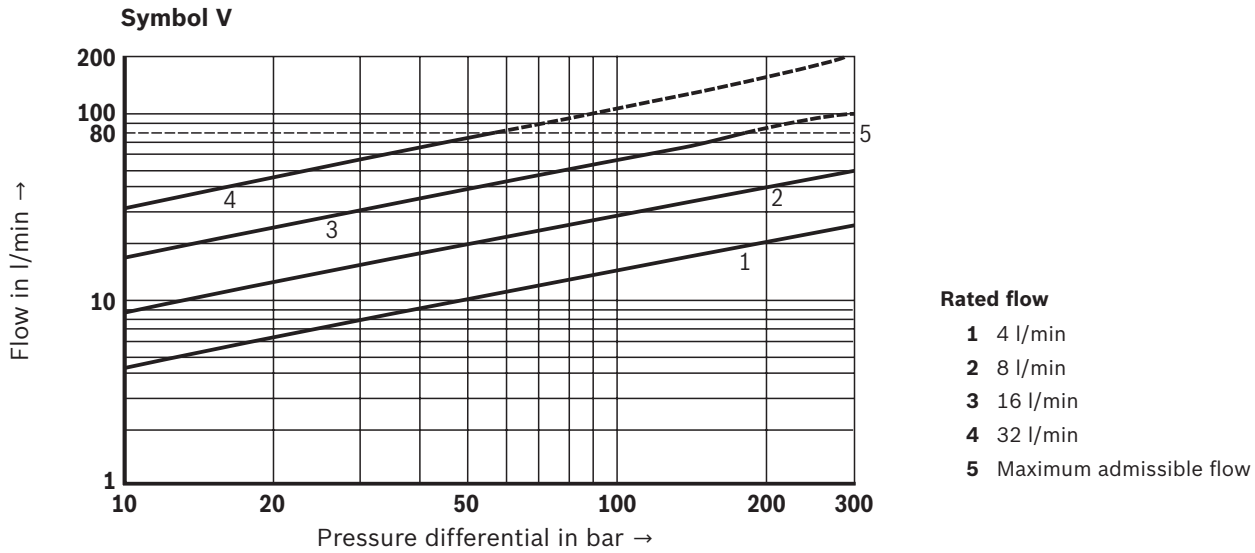


- Signal ±10 %
- ... Signal ±25 %
- Signal ±100%

Characteristic curves

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

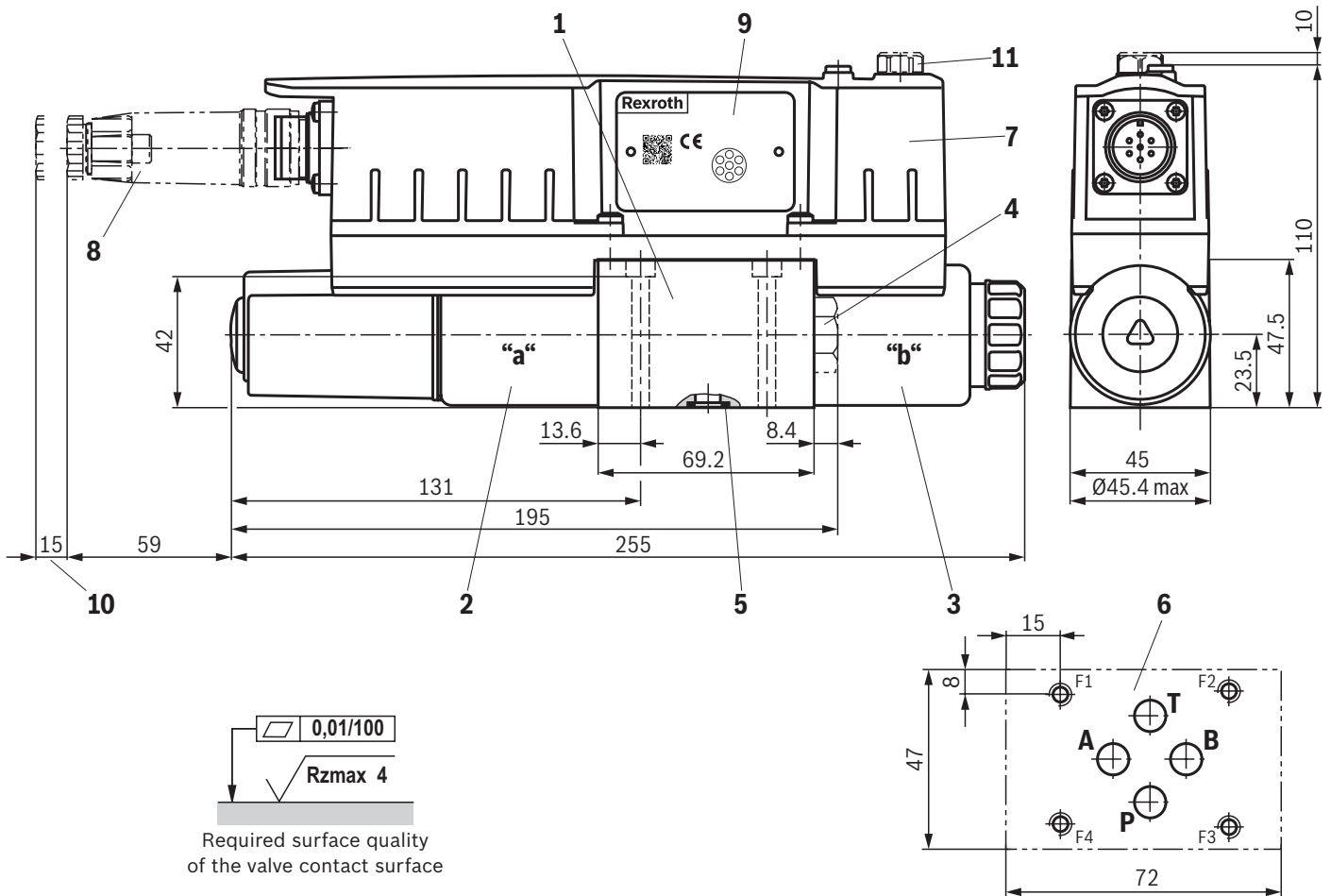
Flow / load function with maximum valve opening (P → A; B → T or P → B; A → T)



Notice:

If the valve is operated outside the specified power limits for more than 10 seconds, the solenoid current is reduced by a ramp in order to avoid overload.

Dimensions (dimensions in mm)



- 1 Valve housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 4 Plug screw for valve with one solenoid (2 spool positions, version "EA" or "WA")
- 5 Identical seal rings for ports A, B, P, and T
- 6 Machined valve contact surface; porting pattern according to ISO 4401-03-02-0-05
Deviating from the standard: Ports P, A, B, T $\varnothing 8$ mm
- 7 Integrated electronics (OBE)
- 8 Mating connector, separate order, see page 16
data sheet 08006
- 9 Name plate
- 10 Space required for removing the mating connector
- 11 Pressure compensation element in the OBE "-967"

Notes:

- ▶ The dimensions are nominal dimensions which are subject to tolerances.
- ▶ Mating connectors, separate order, see page 16 and data sheet 08006.

Notice:

- The dimensions are nominal dimensions which are subject to tolerances.

Valve mounting screws see page 16.

Dimensions

Valve mounting screws (separate order)

| Nominal size | Quantity | Hexagon socket head cap screws | Material number |
|--------------|---|--|--|
| 6 | 4 | ISO 4762 - M5 x 50 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 7 \text{ Nm} \pm 10 \%$ | R913043758 |
| | or | | |
| | 4 | ISO 4762 - M5 x 50 - 10.9 Tightening torque $M_A = 8.9 \text{ Nm} \pm 10 \%$ | Not included in the Rexroth delivery range |
| | or | | |
| 4 | ASME B18.3 - 1/4-20 UNC x 1 3/4" - ASTM-A574 Tightening torque $M_A = 15 \text{ Nm} [11 \text{ ft-lbs}] \pm 10 \%$ | Not included in the Rexroth delivery range | |



Notice:

The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure.

Subplates (separate order) with porting pattern according to ISO 4401-05-04-0-05 see data sheet 45100.

Accessories (separate order)

Valves with integrated electronics

| Mating connectors 6-pole + PE | Design | Material | Material number | Data sheet |
|--|----------|----------|-----------------|------------|
| For the connection of valves with integrated electronics, round connector 6+PE, line cross-section 0.5 ... 1.5 mm ² | straight | Metal | R900223890 | 08006 |
| | straight | Plastic | R900021267 | 08006 |
| | angled | Plastic | R900217845 | – |

| Cable sets 6-pole + PE | Length in m | Material number | Data sheet |
|---|-------------|-----------------|------------|
| For the connection of valves with integrated electronics, round connector 6+PE, straight connector, shielded, potted-in mating connector, line cross-section 0.75 mm ² | 3.0 | R901420483 | 08006 |
| | 5.0 | R901420491 | 08006 |
| | 10.0 | R901420496 | 08006 |
| | 20.0 | R901448068 | – |

Test and service devices

| | Material number | Data sheet |
|---|-----------------|------------|
| Service case with test device for proportional servo valves with integrated electronics (OBE) | R901049737 | 29685 |

Control electronics

| | | Type | Data sheet |
|----------------------|---------|-------------------|------------|
| Command value module | Analog | VT-SWMA-1-1X/... | 29902 |
| | | VT-SWMAK-1-1X/... | 29903 |
| Command value card | Analog | VT-SWKA-1-1X/... | 30255 |
| | Digital | VT-HACD-1-1X/... | 30143 |

Further information

- ▶ Subplates Data sheet 45100
- ▶ Hydraulic fluids on mineral oil basis Data sheet 90220
- ▶ Environmentally compatible hydraulic fluids Data sheet 90221
- ▶ Flame-resistant, water-free hydraulic fluids Data sheet 90222
- ▶ Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC) Data sheet 90223
- ▶ Reliability characteristics according to EN ISO 13849 Data sheet 08012
- ▶ Hexagon socket head cap screw, metric/UNC Data sheet 08936
- ▶ Installation, commissioning and maintenance of servo valves and high-response valves Data sheet 07700
- ▶ Installation, commissioning and maintenance of proportional valves Data sheet 07800
- ▶ Hydraulic valves for industrial applications Data sheet 07600-B
- ▶ Assembly, commissioning and maintenance of hydraulic systems Data sheet 07900
- ▶ Selection of filters www.boschrexroth.com/filter
- ▶ Information on available spare parts www.boschrexroth.com/spc

Notes

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Notes

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

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Notes

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

Evolution Motion Solutions
13835 Senlac Dr, Farmers Branch, TX 75234
800-569-9801
info@evolutionmotion.com
www.evolutionmotion.com

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