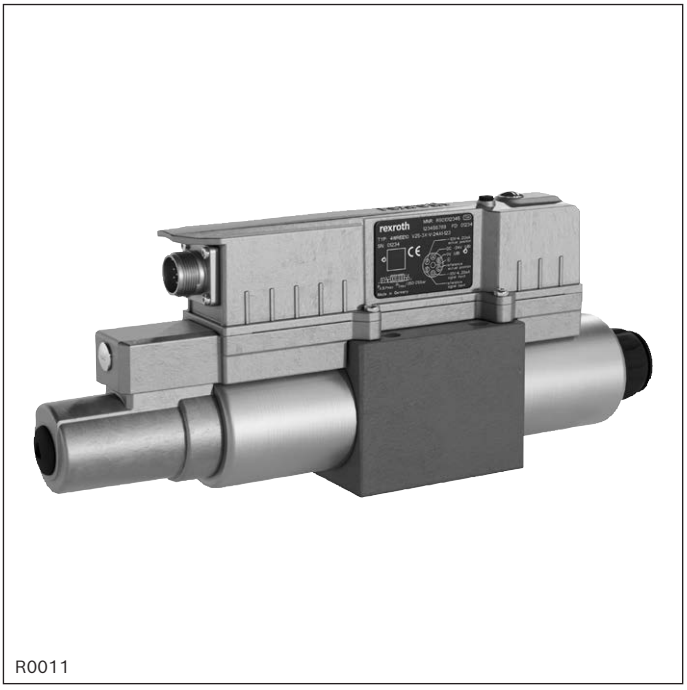
RE 29106
Edition: 2022-11
Replaces: 29061

rexroth
A Bosch Company

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

Type 4WREE



R0011

- Size 10
- Component series 3X
- Maximum operating pressure 350 bar
- Maximum flow 180 l/min
- Rated flow 25 ... 75 l/min (***Δp*** = 10 bar)

Features

- 4/3-way version
- For subplate mounting
- Porting pattern according to ISO 4401-05-04-0-05
- 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", "A7" or "F1", "F7")
- CE conformity according to EMC Directive 2014/30/EU.
- UKCA conformity according to Electromagnetic Compatibility Regulations SI 2016/1091

Contents

Ordering code

01	02	03	04	05	06		07		08	09		10	11		12	13
4	**WRE**	**E**	**10**			**–**	**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 10	**10**
05	Symbols; possible version see page 3	

Rated flow (***Δp*** = 5 bar/control edge)

06	25 l/min	**25**
	50 l/min	**50**
	75 l/min	**75**
07	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

08	FKM seals	**V**
	NBR seals	**M**

Corrosion resistance (outside)

09	None (valve housing with standard painting)	**no code**
	Improved corrosion protection (720 h salt spray test according to EN ISO 9227)	**J5**

Supply voltage

10	Direct voltage 24 V	**24**

Interfaces of the control electronics

11	Command value input ±10 V; actual value output ±10 V	**A1**
	Command value input 4 ... 20 mA; actual value output 4 ... 20 mA	**F1**
	Command value input ±10 V; actual value output 4 ... 20 mA	**A7**
	Command value input 4 ... 20 mA; actual value output ±10 V	**F7**

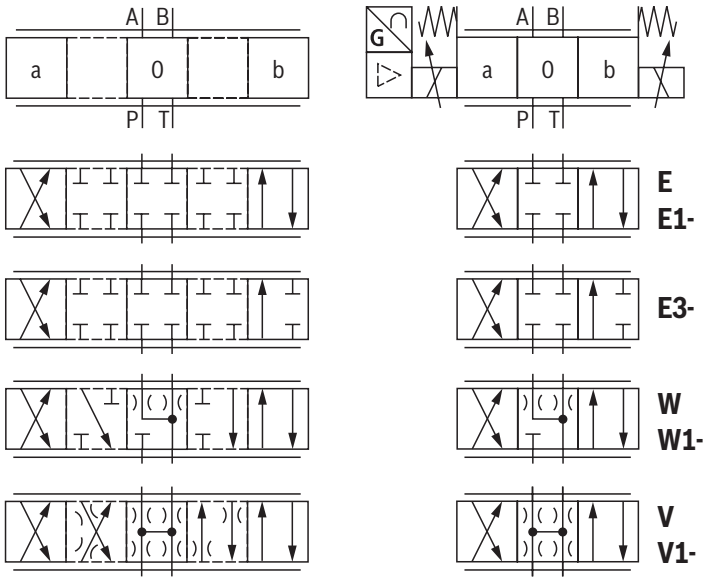
Test certificates

12	None	**no code**
	Functional certificate 3.1 (test according to EN 10204) [1)]	**3**
13	For further information, see the plain text	

[1)] When ordering, the functional certificate material number must be specified in addition to the valve material number:

- Functional certificate 3.1: **R900259791**
- Functional certificate 3.1 with characteristic curve: **R900278467**

Symbols



With symbol E1-, V1- and W1-:

P → A: $q_{V\,max}$ B → T: $q_V/2$

P → B: $q_V/2$ A → T: $q_{V\,max}$

With symbol E3-:

P → A: $q_{V\,max}$

P → B: $q_V/2$ A → T: $q_{V\,max}$

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

Function, section

The type 4WREE valve is a direct operated proportional directional control 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. This position does not correspond to the hydraulic central position for symbol V. When the electric valve control loop is closed, the control spool is positioned in the hydraulic central position.

In case of the following errors, the control solenoids are de-energized by the integrated electronics (OBE):

- Falling below the minimum supply voltage
- Only at interface "F1" and "F7":
  - Falling below the minimum current command value of 1.5 mA (includes cable break of the command value line (current loop))

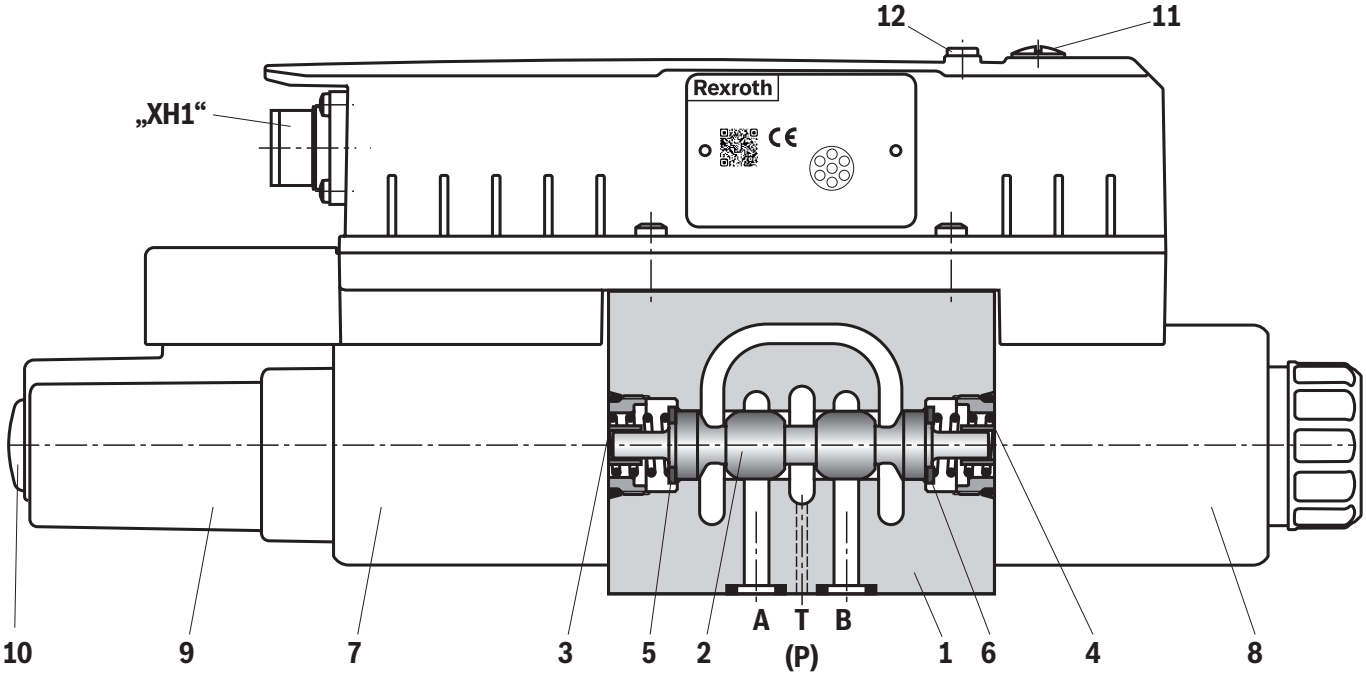
Pressure compensation element

Prevents condensate formation in the housing of the integrated electronics (OBE) for use outside industry-standard conditions with high ambient air humidity and significant cyclic temperature changes (e.g. outdoors).

☞ **Notice:**

- 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 (10, 11) must not be opened.

Control solenoid shut-off



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

General			
Type of connection			Subplate mounting
Porting pattern			ISO 4401-05-04-0-05
Weight		kg	7.3
Installation position			Any, preferably horizontal
Ambient temperature range		°C	–20 ... +60
Storage temperature range (with UV protection)		°C	+5 ... +40
Transport temperature range		°C	–30 ... +80
Maximum storage time		Years	1 (if the storage conditions are observed, refer to the operating instructions 07600-B)
Maximum relative humidity (no condensation)		%	95
Protection class according to EN 60529			IP65 (if suitable and correctly mounted mating connectors are used)
Maximum surface temperature		°C	150 (individual operation)
$MTTF_D$ values according to EN ISO 13849		Years	150 (for further details see data sheet 08012)
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 / 24 h / 3 axes
Transport shock according to DIN EN 60068-2-27			15 g / 11 ms / 3 shocks / 3 axes
Environmental compatibility	▶ Climate		Environmental audit according to EN 60068-2
Conformity	▶ CE according to EMC directive 2014/30/EU, tested according to		EN 61000-6-2 and EN 61000-6-3
	▶ RoHS directive		2011/65/EU [1]

Hydraulic			
Maximum operating pressure	▶ Ports A, B, P	bar	350
	▶ Port T	bar	210
Hydraulic fluid			See table page 6
Hydraulic fluid temperature range		°C	–20 ... +70
Viscosity range		mm^2/s	20 ... 380
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)			Class 20/18/15 [2]
Rated flow (***Δp*** = 10 bar)		l/min	25; 50; 75
Maximum flow (recommended)		l/min	180

[1] The product fulfills the substance requirements of the RoHS directive 2011/65/EU.

[2] 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.

☞ **Notice:**
The specified technical data were measured with HLP46 and ϑ_{oil} = 40 ±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, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	FKM	ISO 15380	90221
		HEES	FKM		
	▶ Soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	FKM	ISO 12922	90222
		HFDU (ester base)	FKM		
		HFDR	FKM		
	▶ Containing water	HFC (Fuchs: Hydrotherm 46M, Fuchs Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	NBR	ISO 12922	90223

☞ **Important information on hydraulic fluids:**
- For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- **Bio-degradable and flame-resistant – containing water:**
  If this hydraulic fluid is used, small amounts of dissolved zinc may get into the hydraulic system.
- **Flame-resistant – containing water:**
  - Due to increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended - if possible specific to the installation - to back up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
  - Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, 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
Temperature drift when changing	▶ Hydraulic fluid temperature	%/10 K	≤0.15
	▶ Operating pressure	%/100 bar	≤0.1

Electrical, integrated electronics (OBE)			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
Current consumption	▶ Maximum	A	<2
	▶ Impulse current	A	3
Solenoid coil resistance	▶ Cold value at 20 °C	Ω	4.55
	▶ Maximum hot value	Ω	6.82
Relative duty cycle time according to VDE 0580			S1 (continuous operation)

Technical data

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

Electrical, integrated electronics (OBE) – Interface "A1"			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
	▶ Fuse protection, external	A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			See pin assignment on page 10 (CE-compliant installation)
Maximum voltage of the differential inputs against 0 V			D → B; E → B (max. 18 V)
Command value (differential amplifier)	▶ Measurement range	V	±10
	▶ Input resistance	kΩ	>100
Actual value (test signal)	▶ Output range	V	±10
	▶ Minimum load impedance	kΩ	>1

Electrical, integrated electronics (OBE) – Interface "F1"			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
	▶ Fuse protection, external	A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			See pin assignment on page 10 (CE-compliant installation)
Maximum voltage of the differential inputs against 0 V			D → B; E → B (max. 18 V)
Command value	▶ Input current range	mA	4 ... 20
	▶ Input resistance	Ω	200
Actual value (test signal)	▶ Output range	mA	4 ... 20
	▶ Maximum load	Ω	500

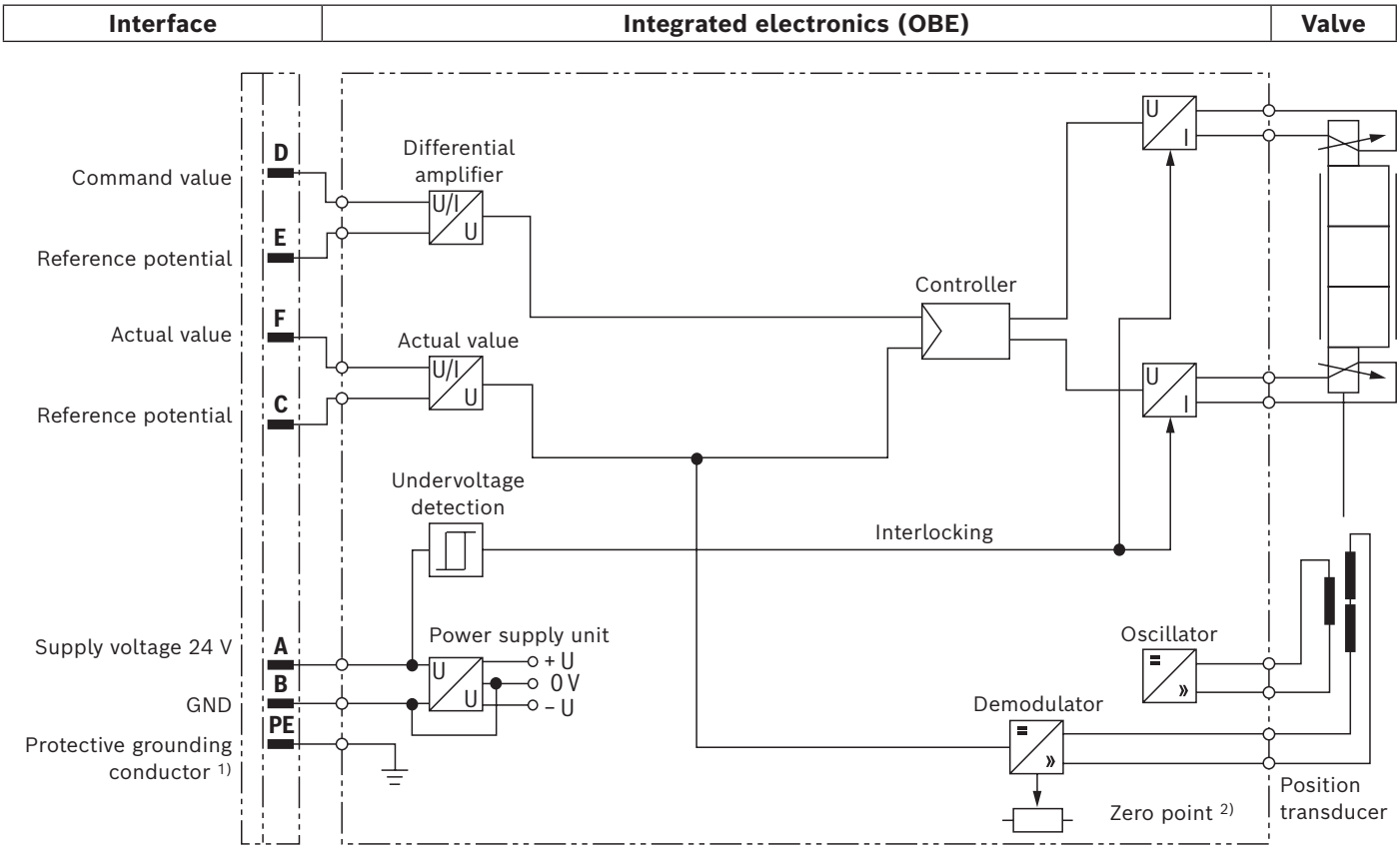
Electrical, integrated electronics (OBE) – Interface "A7"			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
	▶ Fuse protection, external	A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			See pin assignment on page 10 (CE-compliant installation)
Maximum voltage of the differential inputs against 0 V			D → B; E → B (max. 18 V)
Command value (differential amplifier)	▶ Measurement range	V	±10
	▶ Input resistance	kΩ	>100
Actual value (test signal)	▶ Output range	mA	4 ... 20
	▶ Maximum load	Ω	500

Technical data

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

Electrical, integrated electronics (OBE) – Interface "F7"			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
	▶ Fuse protection, external	A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			See pin assignment on page 10 (CE-compliant installation)
Maximum voltage of the differential inputs against 0 V			D → B; E → B (max. 18 V)
Command value	▶ Input current range	mA	4 ... 20
	▶ Input resistance	Ω	200
Actual value (test signal)	▶ Output range	V	±10
	▶ Minimum load impedance	kΩ	>1

Block diagram/pin assignment



1) The protective grounding conductor (PE) is connected to the valve housing.

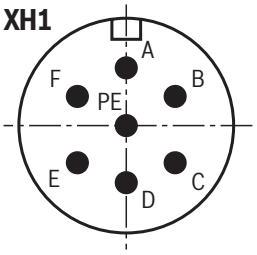
2) Zero point can be set from the outside

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

Contact	Interface assignment			
	"A1" (6 + PE)	**"F1"** (6 + PE)	**"A7"** (6 + PE)	**"F7"** (6 + PE)
A	Supply voltage	Supply voltage	Supply voltage	Supply voltage
B	GND	GND	GND	GND
C	Reference potential actual value	Reference potential actual value	Reference potential actual value	Reference potential actual value
D	Command value	Command value	Command value	Command value
E	Reference potential command value	Reference potential command value	Reference potential command value	Reference potential command value
F	Actual value	Actual value	Actual value	Actual value
FE	Functional ground (directly connected to the valve housing)			

XH1



Command value	▶ Command value 0 ... +10 V or 12 ... 20 mA at D and reference potential at E cause flow from P → A and B → T.
	▶ Command value 0 ... −10 V or 12 ... 4 mA at D and reference potential at E cause 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 result in flow from P → A and B → T.
	▶ Actual value 0 ... 10 V or 12 ... 4 mA at F and reference potential at C cause flow from P → B and A → T.
Connection cable	▶ Up to 20 m cable length type LiYCY 7 x 0.75 mm^2
	▶ Up to 40 m cable length type LiYCY 7 x 1.0 mm^2
	▶ EMC-compliant installation: – Apply screening to both line ends – Use metal mating connector (see page 23) ▶ Alternatively up to 30 m cable length admissible – Apply screening on supply side – Plastic mating connector (see page 23) can be used

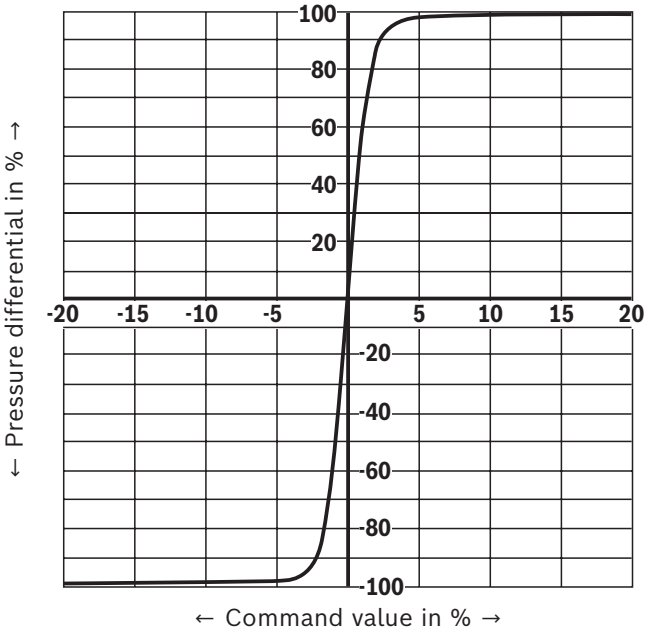
☞ **Notice**:
Mating connectors, separate order, see page 23 and data sheet 08006.

Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

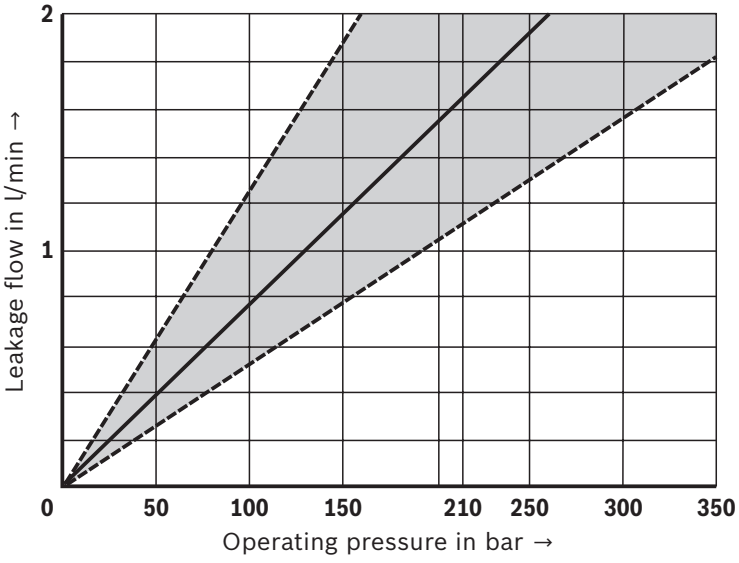
Pressure-signal characteristic curve (p_s = 100 bar)

Symbol V; V1-



Leakage flow with central control spool position

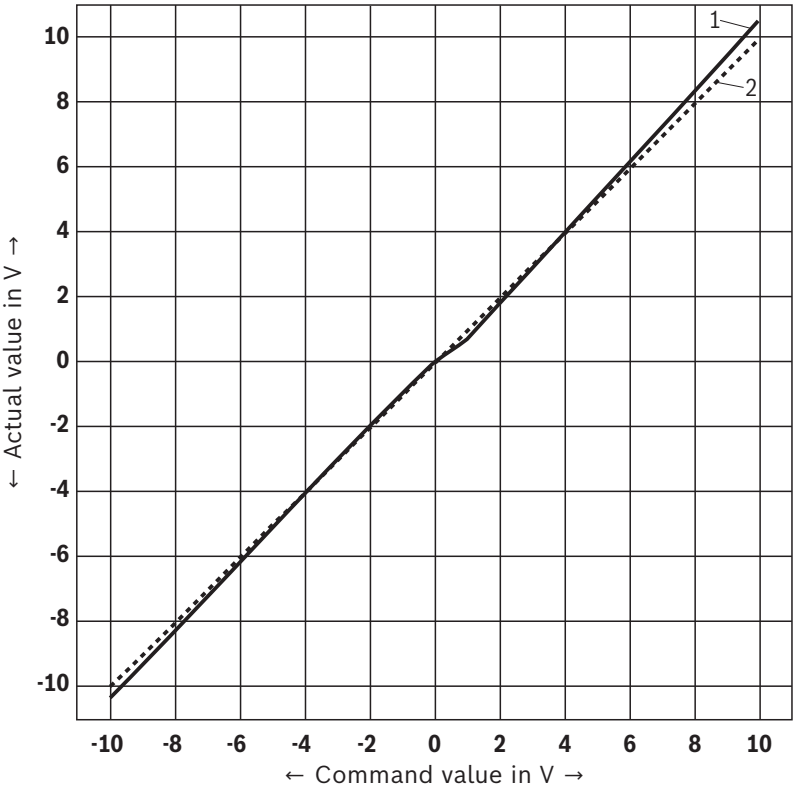
Version "V75"



Characteristic curves
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Command value/actual value deviation

Version "E1-75"



1 Command value and actual value measured
2 Without adjustment

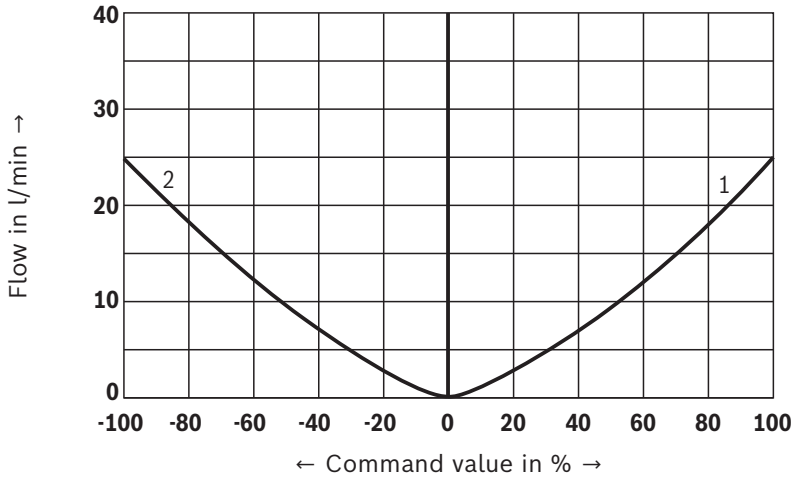
☞ **Notice:**
The command value/actual value is adjusted individually for each valve with version "E1-75". The representation shown here is exemplary and shows typical values.

Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

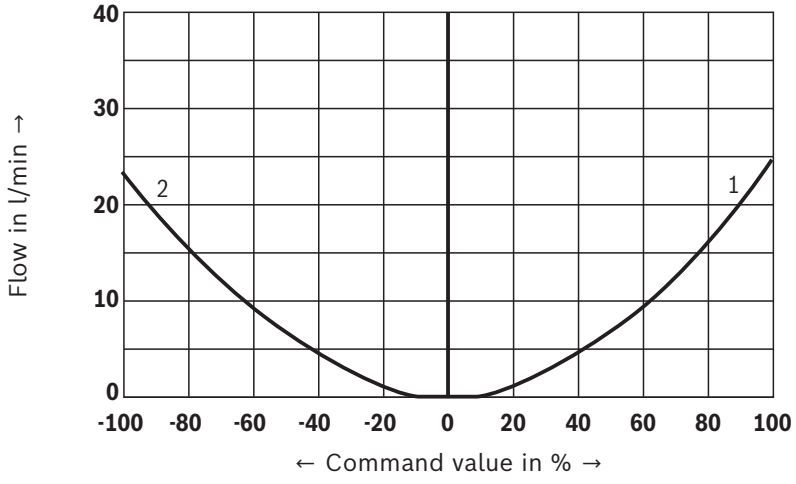
Flow/signal function (rated flow 25 l/min with Δp = 10 bar)

Symbol V



1 P–A; B–T
2 P–B; A–T

Symbol E



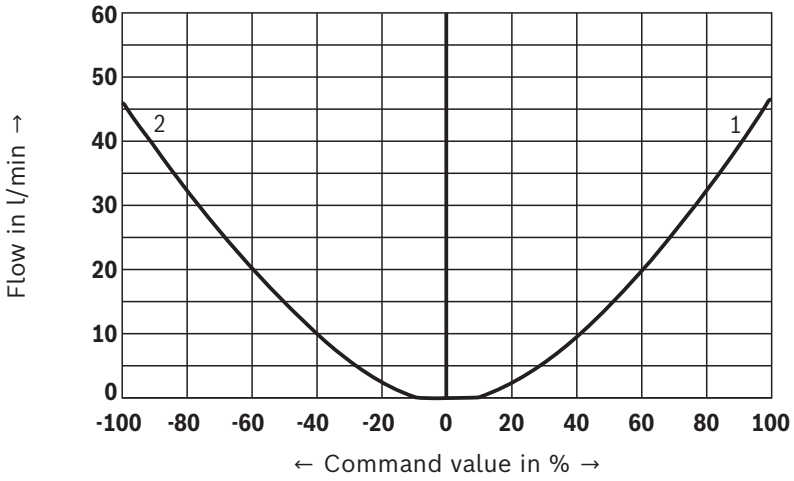
1 P–A; B–T
2 P–B; A–T

Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

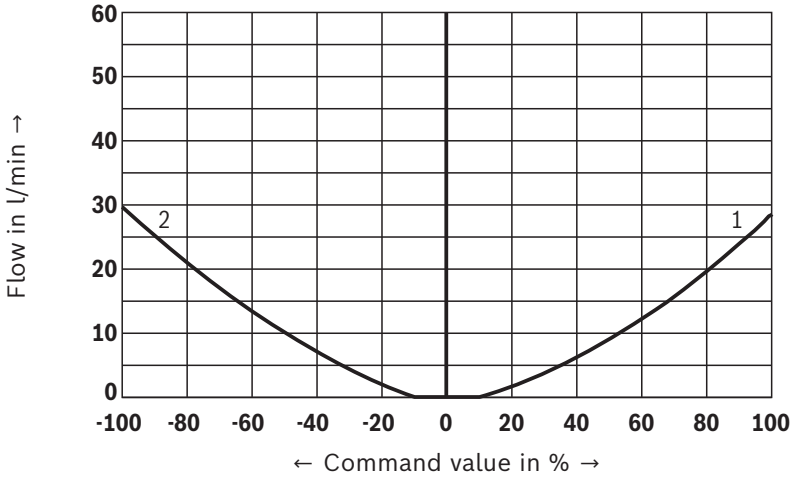
Flow/signal function (rated flow 50 l/min with Δp = 10 bar)

Symbol E



1 P–A; B–T
2 P–B; A–T

Symbol E1-



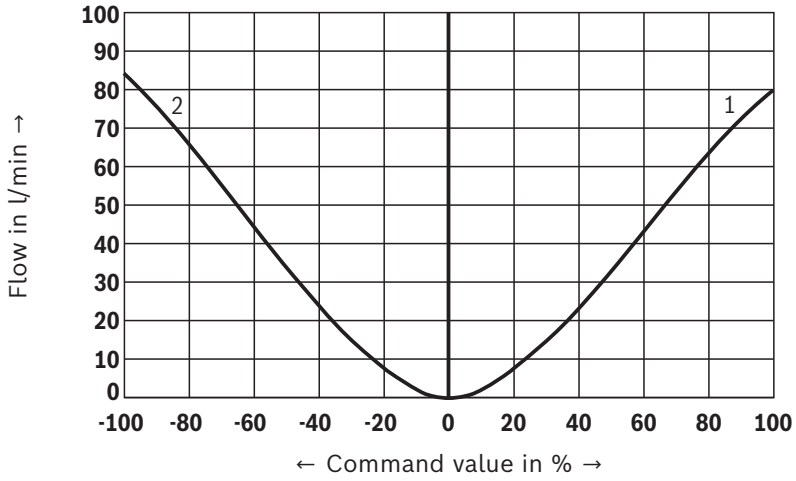
1 P–A; B–T
2 P–B; A–T

Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

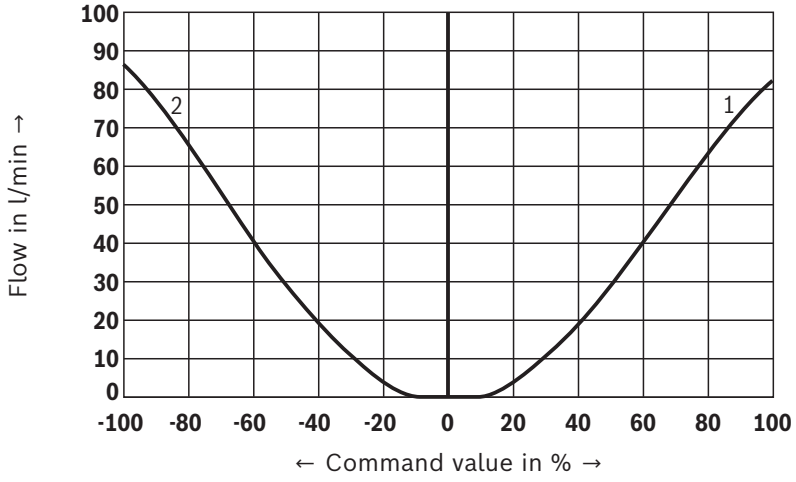
Flow/signal function (rated flow 75 l/min with Δp = 10 bar)

Symbol V



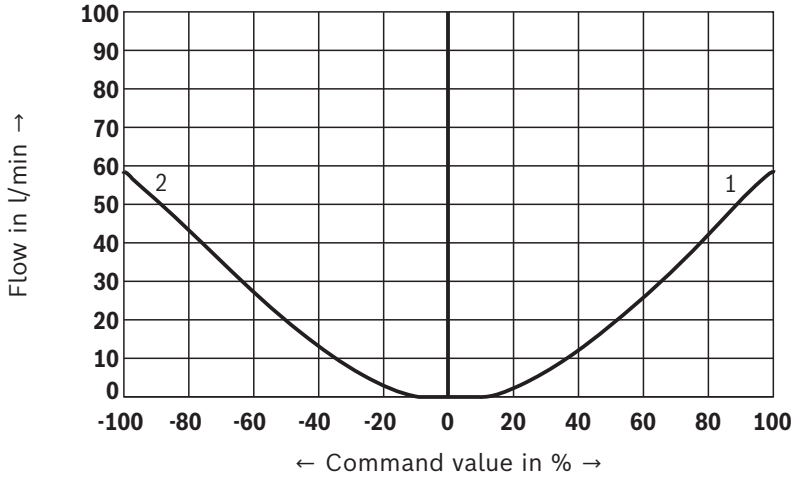
1 P–A; B–T
2 P–B; A–T

Symbol E



1 P–A; B–T
2 P–B; A–T

Symbol E1-



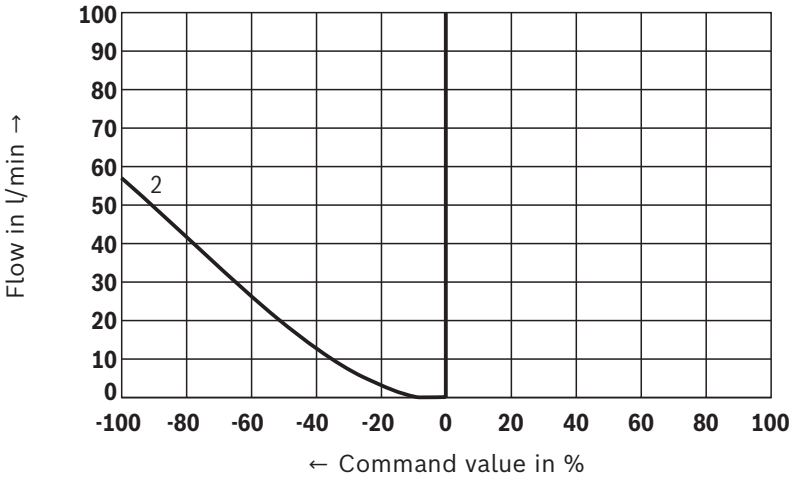
1 P–A; B–T
2 P–B; A–T

Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

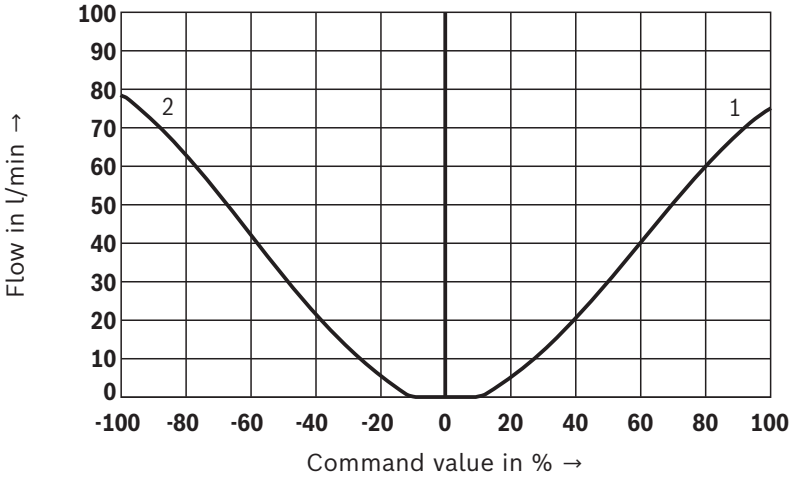
Flow/signal function (rated flow 75 l/min with Δp = 10 bar)

Symbol E3-



2 P–B; A–T

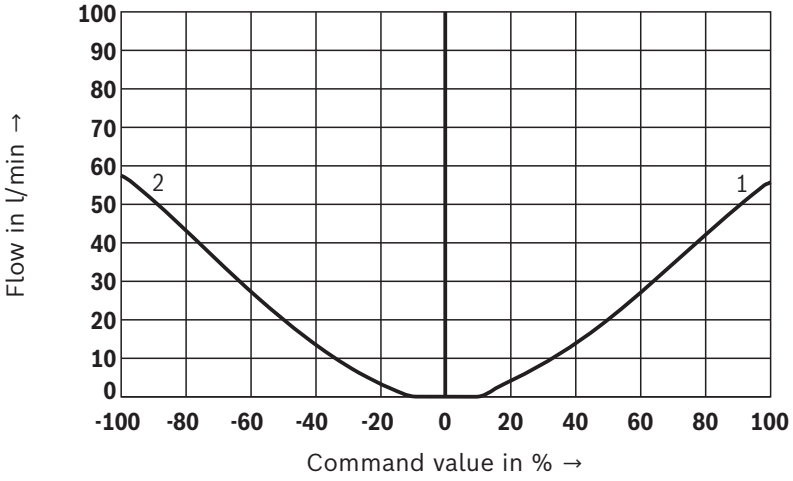
Symbol W



1 P–A; B–T

2 P–B; A–T

Symbol W1-



1 P–A; B–T

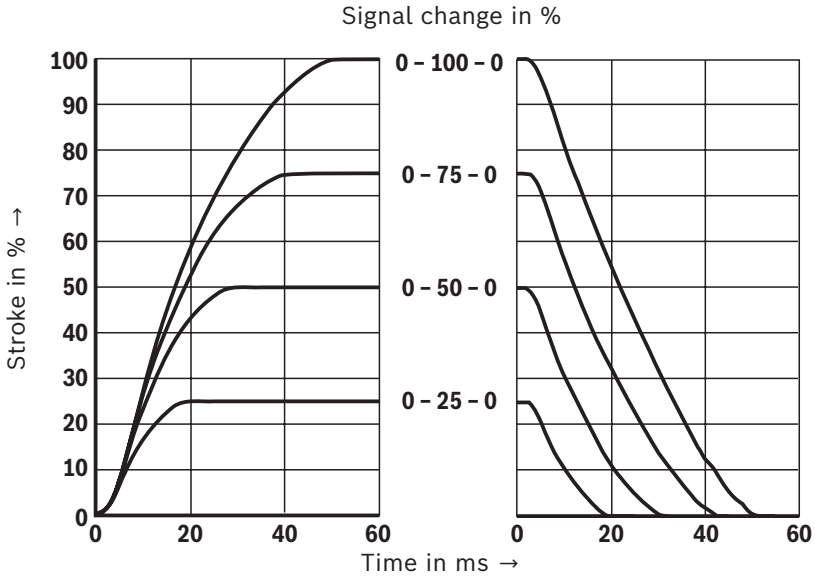
2 P–B; A–T

Characteristic curves

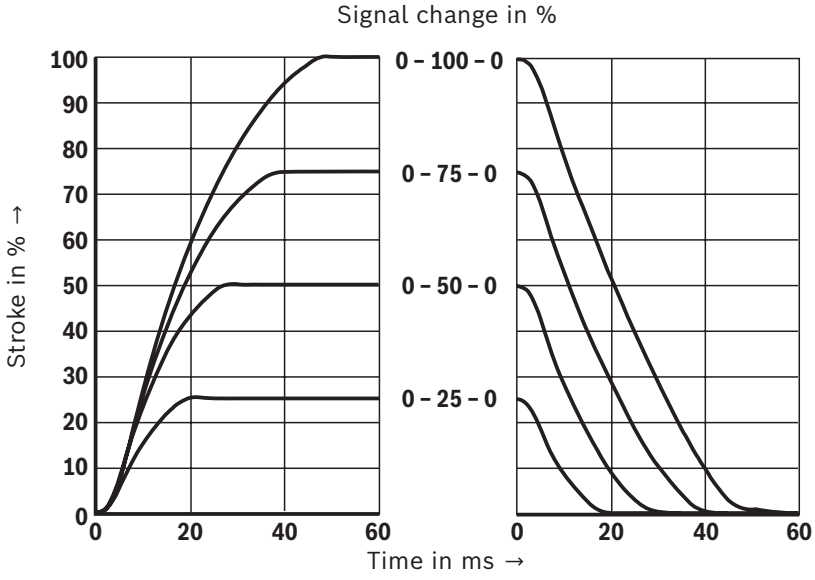
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Transition function with stepped electric input signals (4/3-way version)

Symbol V



Symbol E; W

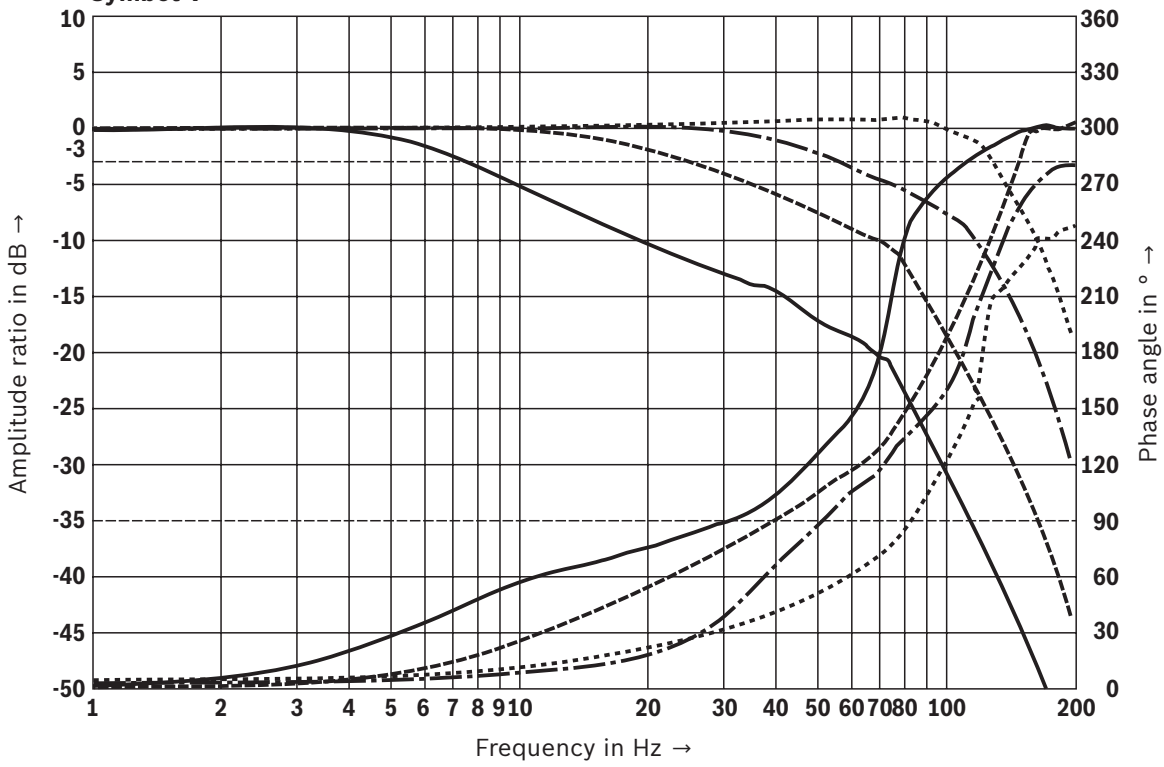


Characteristic curves

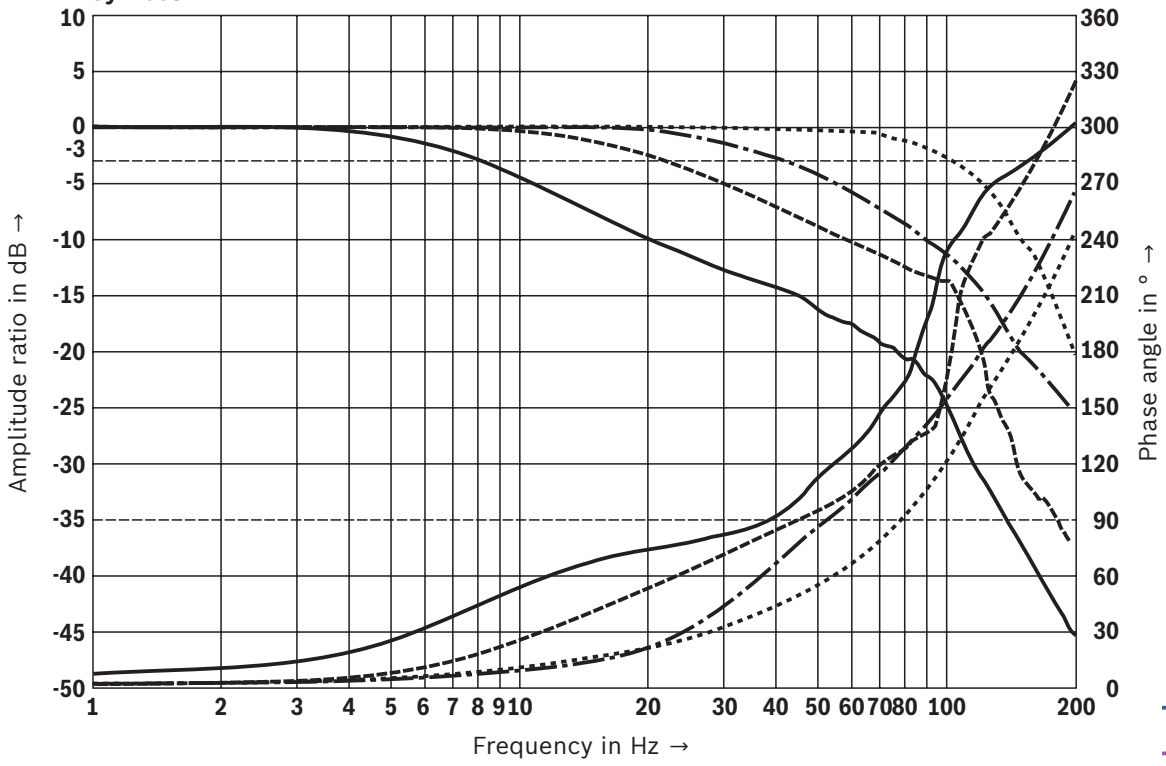
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Frequency response

Symbol V



Symbol E



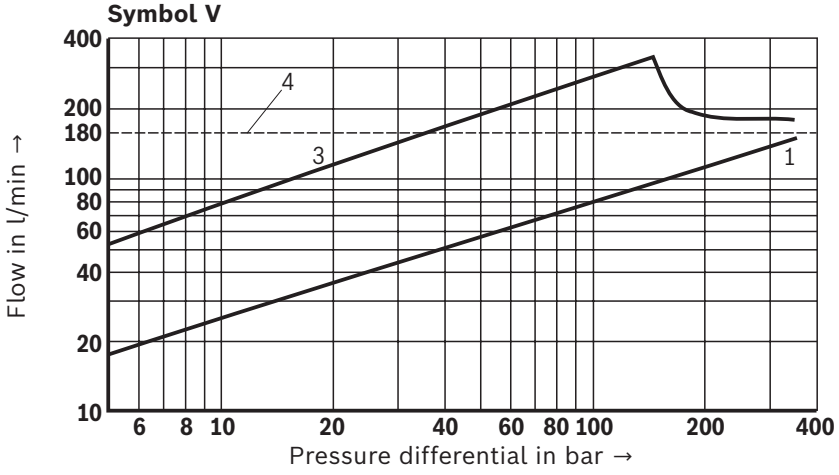
Signal ±1%
Signal ±5%
Signal ±25%
Signal ±100%

Characteristic curves

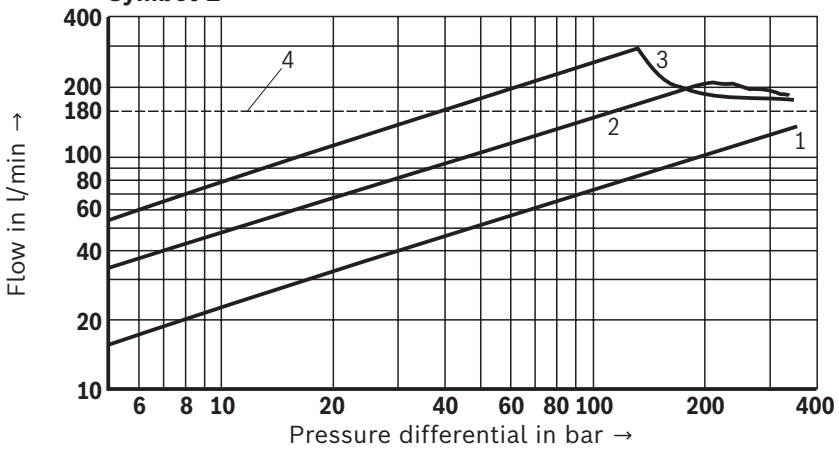
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

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

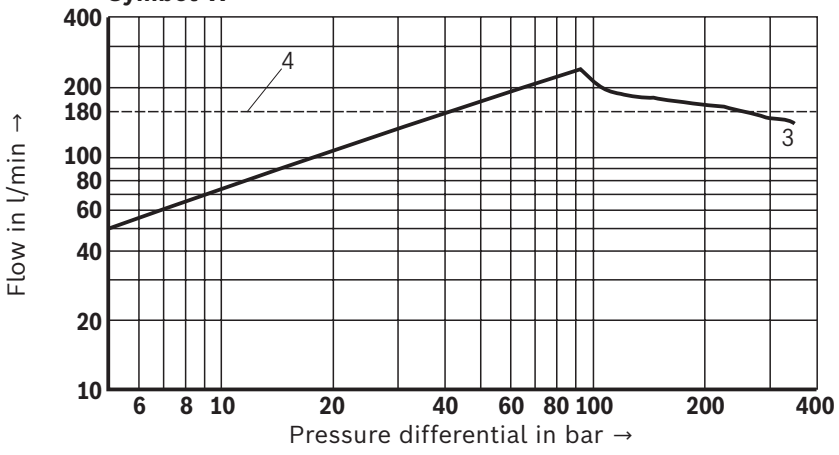
Symbol V



Symbol E



Symbol W



Rated flow

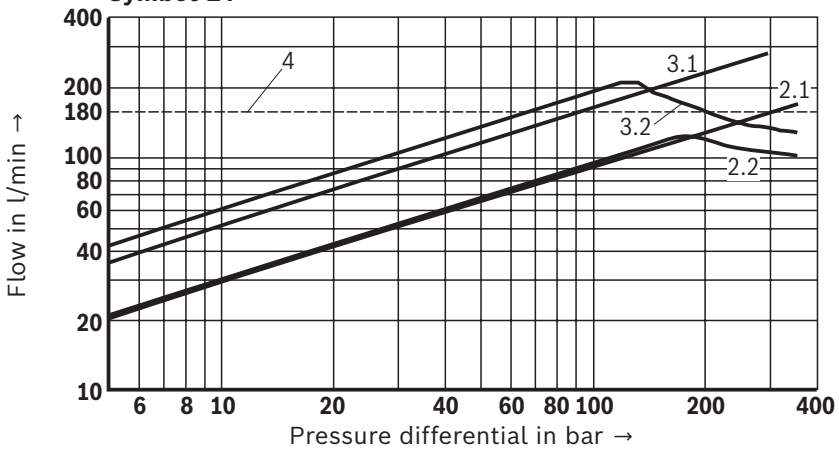
- **1** 25 l/min
- **2** 50 l/min
- **3** 75 l/min
- **4** Maximum flow

Characteristic curves

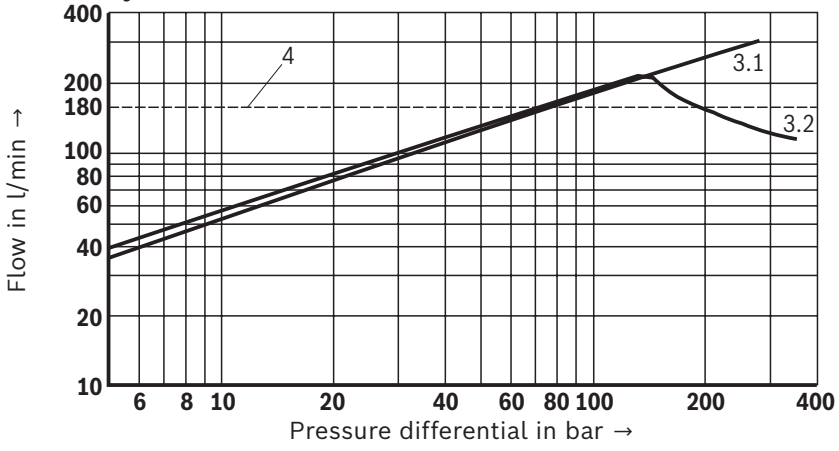
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

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

Symbol E1-



Symbol W1-



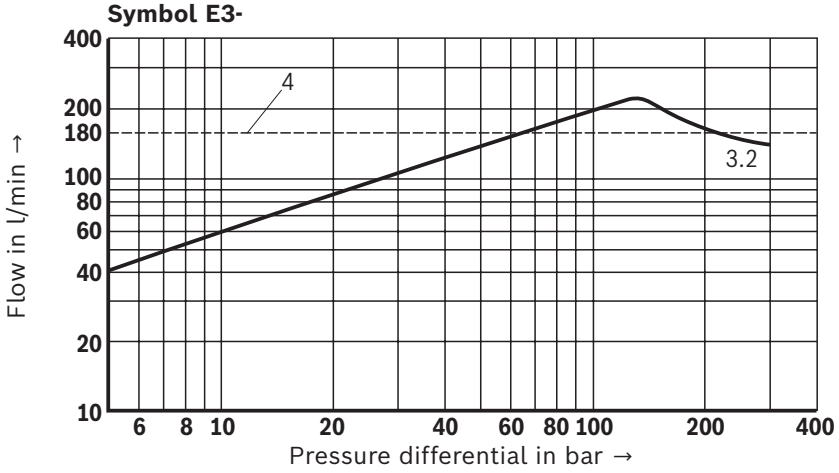
Rated flow

- **2.1** 50 l/min (P → A; B → T)
- **2.2** 50 l/min (P → B; A → T)
- **3.1** 75 l/min (P → A; B → T)
- **3.2** 75 l/min (P → B; A → T)
- **4** Maximum flow

Characteristic curves

(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

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

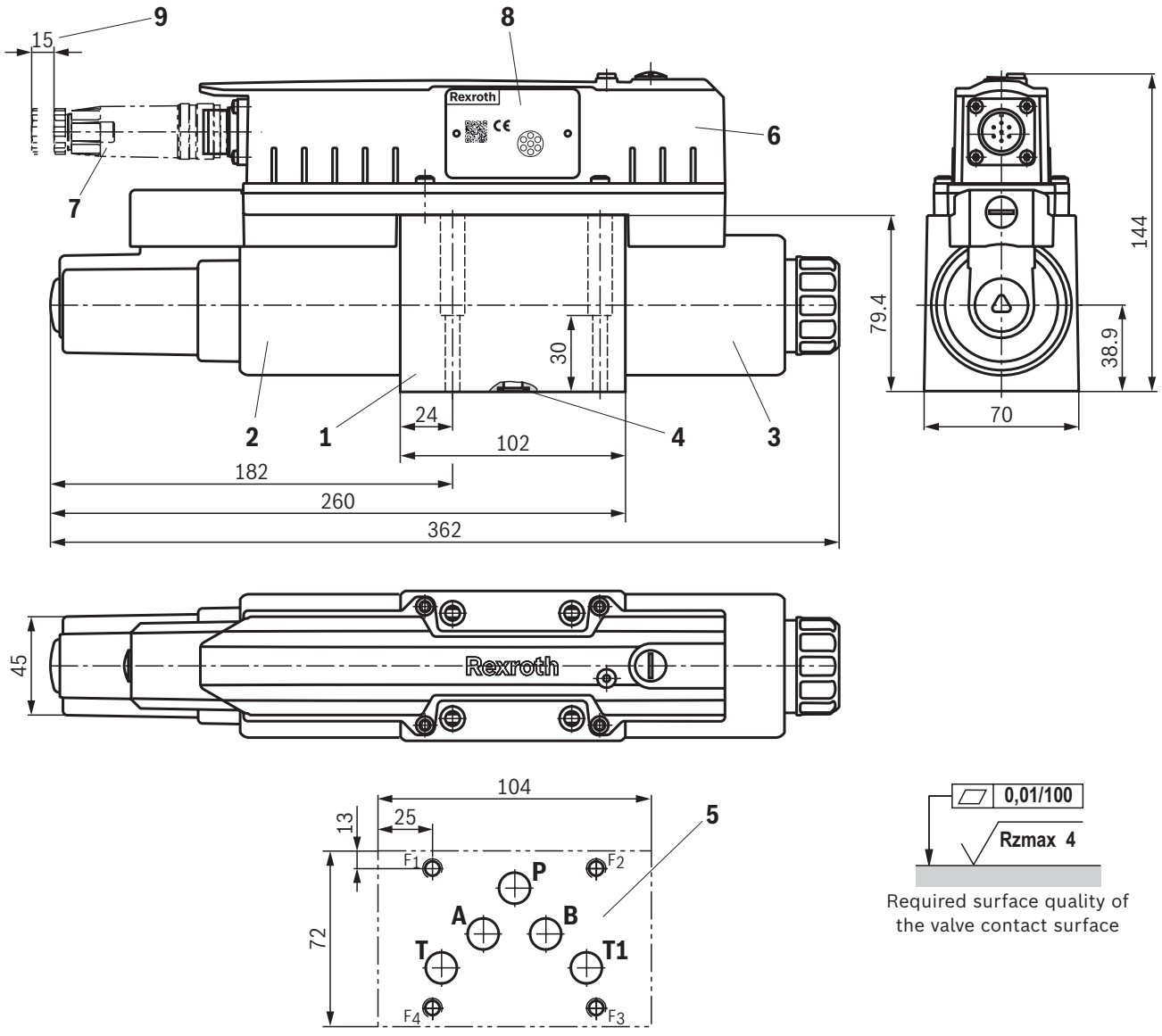


Rated flow

3.2 75 l/min (P → B; A → T)

4 Maximum flow

Dimensions
(dimensions in mm)



Required surface quality of the valve contact surface

1 Valve housing
2 Proportional solenoid "a" with inductive position transducer
3 Proportional solenoid "b"
4 Identical seal rings for ports A, B, P, and T1
5 Machined valve contact surface; porting pattern according to ISO 4401-05-04-0-05
6 Integrated electronics (OBE)
7 Mating connector, separate order, see page 23data sheet 08006
8 Name plate
9 Space required for removing the mating connector

Valve mounting screws see page 23.

Notice:
- The dimensions are nominal dimensions which are subject to tolerances.
- Mating connectors, separate order, see page 23 and data sheet 08006.

Dimensions

Valve mounting screws (separate order)

Size	Version	Quantity	Hexagon socket head cap screws	Material number
10	Standard	4	**ISO 4762 - M6 x 40 - 10.9** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 12.5 Nm ±10%	**R913051533**
	Improved corrosion protection	4	**ISO 4762 - M6 x 40 - 10.9** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 12.5 Nm ±10%	**R913000058**
	or			
	–	4	**ISO 4762 - M6 x 40 - 10.9** Tightening torque M_A = 15.5 Nm ±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	Version	Material number	Data sheet
For the connection of valves with integrated electronics, round connector 6+PE, line cross-section 0.5 ... 1.5 mm²	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 mm²	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 continuous control 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	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
▶ Hydraulic valves for industrial applications	Data sheet 07600-B
▶ Assembly, commissioning and maintenance of hydraulic systems	Data sheet 07900
▶ Information on available spares	