

Directional control valves, direct operated, with electrical position feedback and integrated field bus (IFB Multi-Ethernet)

Type 4WRPF



- ▶ Sizes 6 and 10
- ▶ Component series 3X
- ▶ Maximum operating pressure 350 bar
- ▶ Rated flow 8, 18, 32, 50, 80 l/min
($\Delta p = 10$ bar)



Features

- ▶ Open
 - Integrated fieldbus (IFB Multi-Ethernet)
 - Bus connection/service interface (Sercos, Ether-CAT, EtherNet/IP, PROFINET RT, VARAN)
- ▶ Scalable
 - External (input 0 ... 10 V) or integrated pressure sensors
- ▶ Safe
 - Internal safety function (can be used up to category 4/PL e according to EN 13849-1)
 - CE conformity according to EMC Directive 2014/30/EU

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	
4	WRP	F				S		-	3X	/		/		24	/	D9	*

01	4 main ports	4
02	Directional control valve, direct operated	WRP
03	With integrated fieldbus	F
04	Size 6	6
	Size 10	10
05	Symbols; possible version see page 3	

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

06	- Size 6	
	8 l/min (only symbols E, V- and W-)	8
	18 l/min (only symbols E, E1-, V-, V1-, W- and W1-)	18
	32 l/min	32
	- Size 10	
	50 l/min (only symbols E, E1-, V- and W6-)	50
	80 l/min	80

Flow characteristic

07	Progressive	S
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Overlap jump

08	Without	no code
	With (opening point 5% command value with symbols E, E1-, W-, W1-, W6- and W8-)	J
09	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	3X

Seal material (observe compatibility of seals with hydraulic fluid used, see page 7)

10	NBR seals	M
	FKM seals	V

Pressure sensor (pressure rating)

11	Without pressure rating	0
	Pressure rating 280 bar	G

Internal pressure sensor (position)

12	Without internal pressure sensors	0
	In port A	A
	In port B	B
	In ports A and B	C
13	Supply voltage 24 V	24

Ethernet interface

14	EtherNET/IP	E
	PROFINET RT	N
	Sercos	S
	EtherCAT (CANopen profile)	T
	VARAN	V

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	
4	WRP	F				S		-	3X	/		/		24	/	D9	*

Connector

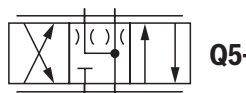
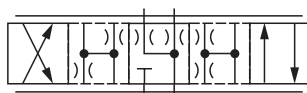
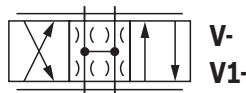
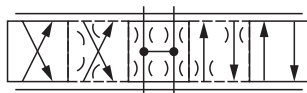
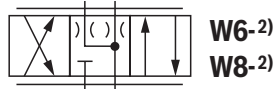
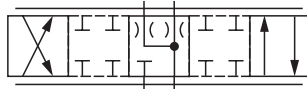
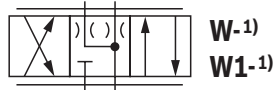
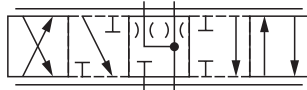
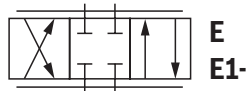
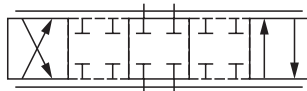
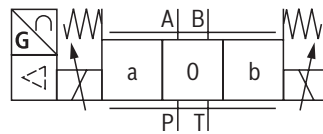
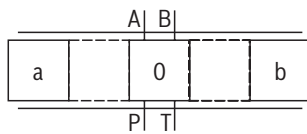
15	Voltage supply, enable acknowledgment	D9
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Pressure sensor interface

16	Without interface	0
	Analog, a maximum of 3 external pressure sensors (0 ... 10 VDC)	5 ¹⁾
17	Further details in the plain text	*

¹⁾ Only with version "0" at positions 11 and 12

Symbols



With symbols E1-, V1-, W1- and W8-:

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

¹⁾ Only size 6

²⁾ Only size 10

Notice:

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

Function

General information

The **IFB Multi-Ethernet** valve (Integrated **F**ield**b**us) is a digital directional control valve with integrated fieldbus.

The following operating modes are possible:

- ▶ Standard:
 - Valve direct control
 - Flow control
- ▶ With external (version "00..D95") or internal pressure sensors:
 - Pressure/force control
 - Active damping
 - Substitutional control (flow – pressure/force); pQ function (flow-controlled)

Communication is done via the digital Multi-Ethernet interface (X7E1 or X7E2) only. The following data may be exchanged:

- ▶ Command values
- ▶ Actual values
- ▶ Configuration and setting of the system control parameters
- ▶ Status messages, faults or warnings

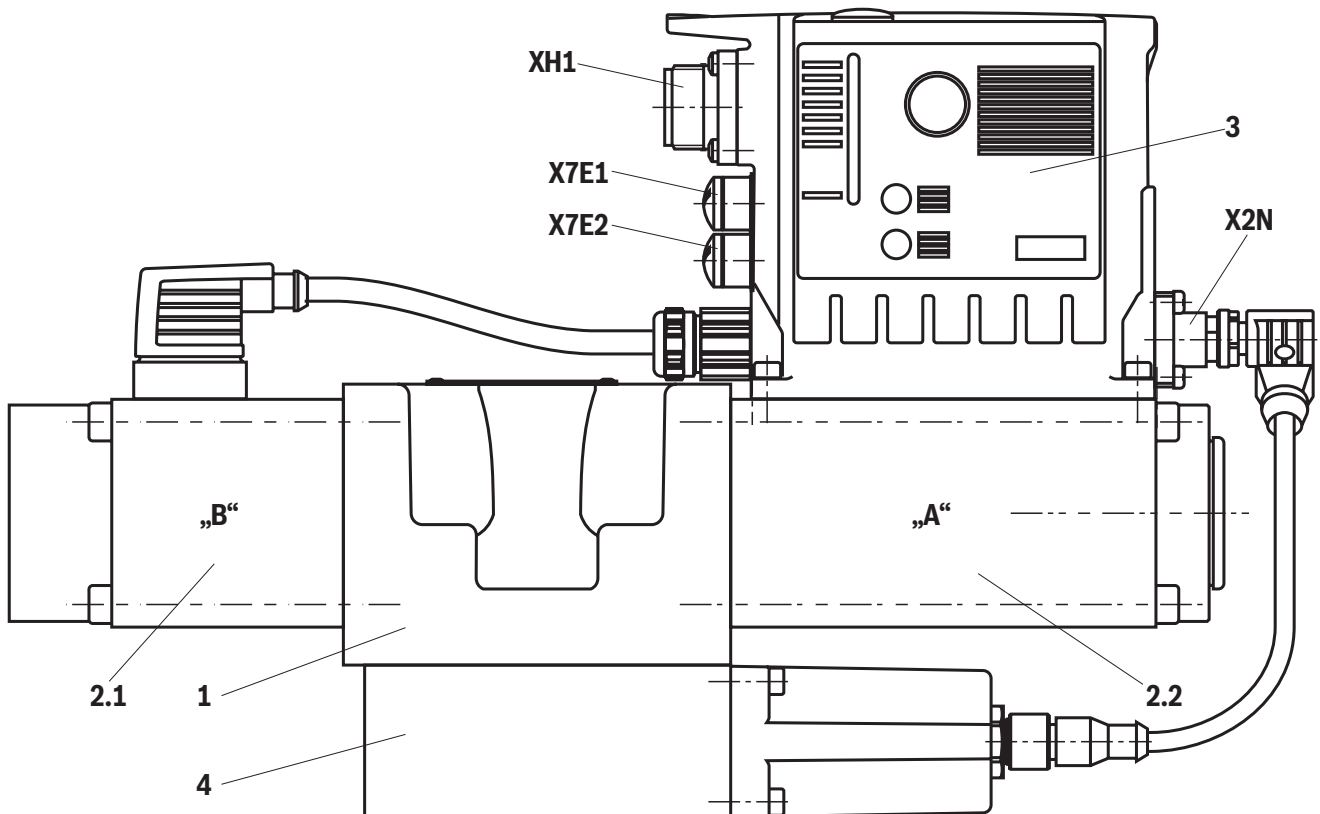
Set-up

The directional control valve with IFB Multi-Ethernet electronics mainly consists of:

- ▶ Main housing with control spool (1)
- ▶ Control electronics with integrated fieldbus (3)
 - Connector, voltage supply, safety shut-down (XH1)
 - Ethernet interfaces (X7E1, X7E2)
 - Analog sensor interfaces (X2N), optional
- ▶ Pressure sensor sandwich plate (4), optional
- ▶ Stroke solenoid (2.1)
- ▶ Control solenoid with electrical position feedback (2.2)

Notice:

With version "V32", the control spool may rotate in case of single-sided flow through the supply flow edges (P–A or P–B) causing damage or failure of the valve. This can be solved by reduction of the pressure differential over the supply flow edge to a maximum of 80 bar or by simultaneous use of both control edges (P–A/B–T or P–B/A–T).



Function

The integrated electronics (OBE) compares the specified command value to the position actual value. In case of control deviations, the relevant solenoid (2) will be activated and will compensate the COMMAND/ACTUAL difference by changing the solenoid force. Stroke/control spool cross-section is regulated proportionally to the command value. In case of a command value presetting of "0", the electronics adjust the control spool (1) to central position (zero flow).

Safety function

Thanks to the two control solenoids (enable pin D and E, low signal) at the connector (XH1), direction-dependent shut-off is enabled. The control spool of the valve is in spring-centered central position for this purpose (fail-safe position).

Enable acknowledgment pin C for solenoid A and pin F for solenoid B are "high". By connecting both control solenoids (enable pin D and E, high signal), the valve can be controlled by a command value presetting (command value positive, solenoid B or command value negative, solenoid A).

Enable acknowledgment pin C for solenoid A and pin F for solenoid B are "low".

Separate shut-off of solenoid A or solenoid B will moreover allow for the direction-dependent activation or shut-off of the drive.

Notice for safe shut-off according to EN 13849-1

Enable acknowledgment

The enable acknowledgment is not set (pin C and F):

- ▶ For failure of supply voltage.
- ▶ In case of a cable break (the integrated electronics (OBE) will de-energize both control solenoids and the control spool will move to the spring-centered central position).
- ▶ If the control spool is not in a hydraulically safe position (insufficient safety overlap of the control spool or safe position is not reached).

Safety function

The integrated electronics (OBE) of the valve enables the additional shut-off of a channel according to EN 13849-1 in both directions (depending on the symbol, the valve can be considered as safely shut-off).

When using symbol V, the valve cannot be used in a safety-relevant manner according to EN 13849-1.

Monitoring

The digital control electronics enable comprehensive monitoring functions/error detection including:

- ▶ Undervoltage
- ▶ Communication error
- ▶ Cable break for analog sensor inputs
- ▶ Monitoring of the microcontroller (watchdog)
- ▶ Temperature of the integrated electronics

IndraWorks DS PC program

To implement the project planning task and to parameterize the valve, the user may use the IndraWorks DS engineering tool (see accessories):

- ▶ Project planning
- ▶ Parameterization
- ▶ Commissioning
- ▶ Diagnosis
- ▶ Comfortable administration of all data on a PC
- ▶ PC operating systems: Windows 7-10

Notes:

- ▶ When using symbol V, V1, the enable inputs (enable pin D and E) may only be activated and deactivated together.
- ▶ For all other symbols, a unilateral shut-off will cause reduced performance data.
- ▶ 4/3 directional control valves do not have a leakage-free basic locking when deactivated. Leakage must be considered when designing the drive.
- ▶ Valve type 4WRPF can be used as shut-off element cat. 3 or 4 (up to PL e according to EN 13849-1). For both categories, an additional shut-off element is required to achieve a two-channel shut-off. For further information on the safety application, see operating instructions 29391-B.

Technical data

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

General			
Size	NG	6	10
Installation position	any		
Ambient temperature range	°C	-20 ... +60	
Storage temperature range	°C	+5 ... +40	
Maximum storage time	Years	1 (if the storage conditions are observed; refer to the operating instructions 07600-B)	
Vibration resistance	▶ 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	
Weight	▶ Without pressure sensor sandwich plate	kg	3.9
	▶ With pressure sensor sandwich plate	kg	4.7
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 2011/65/EU ▶ REACH ordinance (EC) no. 1907/2006		

Hydraulic			
Maximum operating pressure	▶ Ports A, B, P	bar	350
	▶ Port T	bar	200
Rated flow ($\Delta p = 5$ bar/control edge ¹⁾)		l/min	8 18 32 50 80
Flow unloading central position ($\Delta p = 5$ bar/control edge)	▶ Symbol W-; A - T	l/min	0.8 1.2 1.2 - -
	▶ Symbol W-; B - T	l/min	0.8 1.2 1.2 - -
	▶ Symbol W1-; A - T	l/min	- 1.2 1.2 - -
	▶ Symbol W1-; B - T	l/min	- 0.8 1.2 - -
	▶ Symbol W6-; A - T	l/min	- - - 0.7 0.7
	▶ Symbol W6-; B - T	l/min	- - - 0.7 0.7
	▶ Symbol W8-; A - T	l/min	- - - - 0.7
	▶ Symbol W8-; B - T	l/min	- - - - 0.7
Hydraulic fluid	See table page 7		
Viscosity range	▶ recommended	mm ² /s	20 ... 100
	▶ maximum admissible	mm ² /s	10 ... 800
Hydraulic fluid temperature range (flown-through)	°C	-20 ... +70	
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)	Class 18/16/13 ²⁾		

1) Flow for deviating Δp (control edge):

$$q_x = q_{Vnom} \cdot \sqrt{\frac{\Delta p_x}{5}}$$

2) 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. For the selection of filters, see 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, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	ISO 15380	90221
		HEES		
	▶ Soluble in water	HEPG	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (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)	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 components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.

▶ Flame-resistant – containing water:

- Due to the 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 – backing 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 environment 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	%	< 0.25
Range of inversion	%	< 0.05
Response sensitivity	%	< 0.05
Manufacturing tolerance q_{Vmax}	%	< 10
Temperature drift (temperature range 20 °C ... 80 °C)	%/10 K	Zero shift < 0.25
Pressure drift	%/100 bar	Zero shift < 0.2
Zero compensation		Ex plant ±1%

Technical data

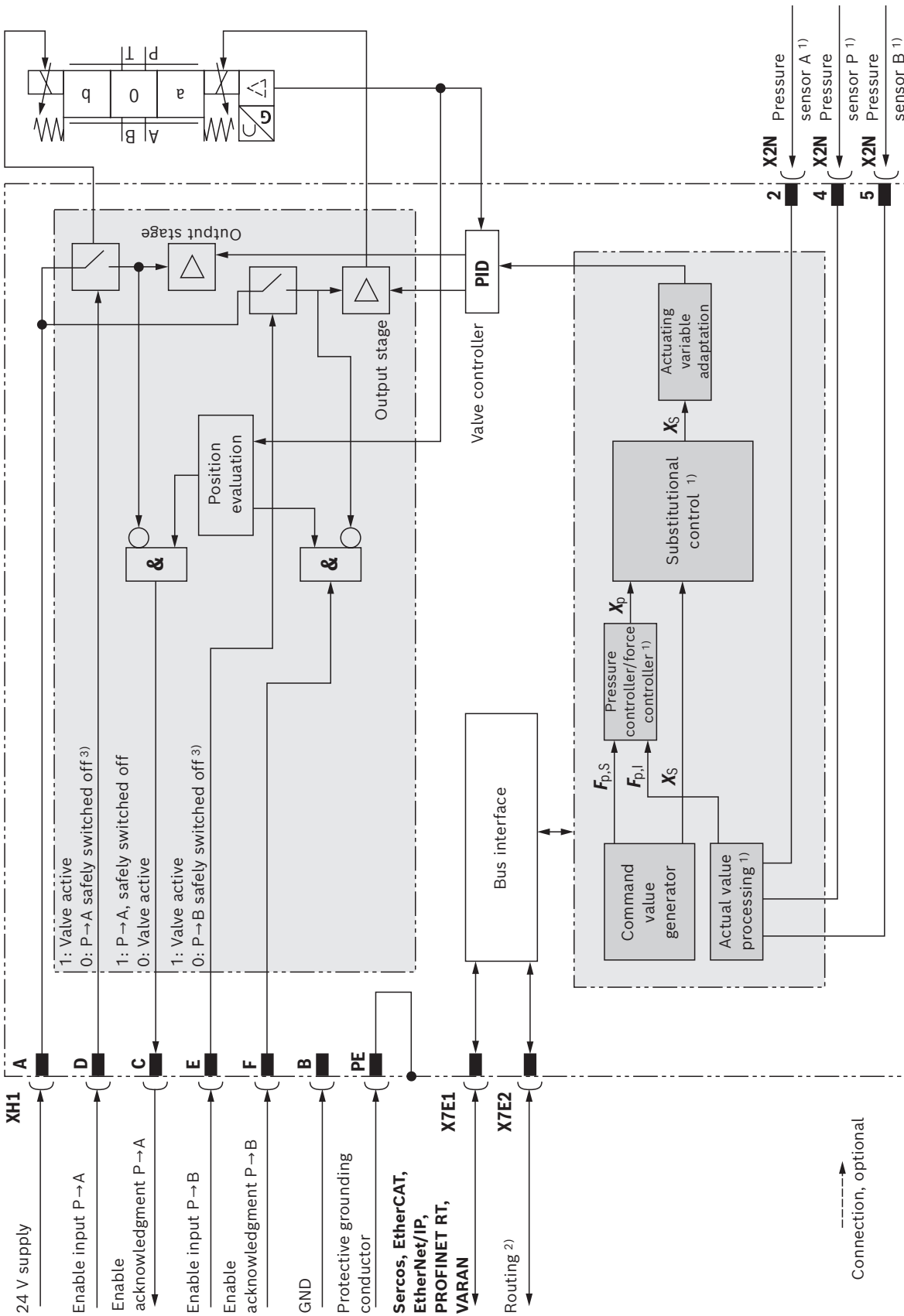
(For applications outside these values, please consult us!)

Electrical, integrated electronics (OBE)				
Size	NG	6	10	
Relative duty cycle	%	100 (continuous operation)		
Protection class according to EN 60529		IP65 (if suitable and correctly mounted mating connectors are used)		
Supply voltage ³⁾	▶ Nominal voltage	VDC	24	
	▶ Lower limit value	VDC	18	
	▶ Upper limit value	VDC	36	
	▶ Maximum admissible residual ripple	Vpp	2.5 (comply with absolute supply voltage limit values)	
Current consumption (at nominal voltage)	▶ Maximum ⁴⁾	A	2.5	2.8
	▶ Impulse current	A	4	
Maximum power consumption	W	40	65	
AD/DA resolution	▶ Analog inputs		12 bit	
Protective grounding conductor and screening		See connector pin assignment (CE-compliant installation) page 10		
Required fuse protection, external	A	4, time-lag		
Adjustment		Calibrated in the plant		
Conformity		CE according to EMC Directive 2014/30/EU tested according to EN 61000-6-2 and EN 61000-6-3		
Parameterization interface		Ethernet		
Scan time pressure and force controller (minimum)	ms	0.5		
Booting time	s	< 15		
Switching input Enable XH1	▶ Quantity		1	
	▶ Low level	V	-3 ... 5	
	▶ High level	V	15 ... U_B	
	▶ Current consumption at high level	mA	< 1	
	▶ Reference potential		Pin 5	
Switching output Enable acknowledgment XH1	▶ Quantity		1	
	▶ Low level	V	0 ... 3	
	▶ High level	V	15 ... U_B	
	▶ Current carrying capacity	mA	50 (short-circuit-proof)	
	▶ Signal delay time	ms	See operating instructions 29391-B	
	▶ Reference potential		GND	
Analog sensors X2N	▶ Quantity of voltage inputs		3 (version "5")	
	▶ Supply voltage	V	24	
	▶ Maximum supply current	mA	50	
	▶ AD resolution	bit	12	
	▶ Voltage inputs			
	– Measurement range	V	0 ... 10	
	– Input resistance	kΩ	100 +10%	
– Temperature drift		< 15 mV/10 K		

³⁾ Voltage limit values must be observed directly at the connector of the valve (observe line length and cable cross-section!)

⁴⁾ When using the sensor inputs or the switching output, the maximum current consumption will increase according to the external load

Block diagram/controller function block



- 1) Only with version "5"
- 2) Not with "VARAN"
- 3) Safe deactivation with simultaneous use of enable acknowledgment

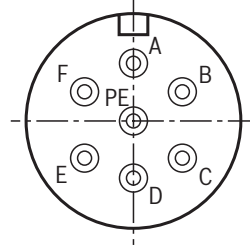
Detailed description of the safety function:
 After both enable signals have been removed, both output stages, and thus the solenoid A and B of the valve, are internally separated from the available supply voltage. The enable acknowledgment will only be activated for shut-off of A and B separately after the safe valve spool position has been achieved.
 For a detailed description of the safety function, refer to the operating instructions 29391-B.

Electrical connections, assignment

Connector pin assignment XH1, 6-pole + PE according to DIN 43563

Pin	Assignment of interface D9
A	24 VDC supply voltage ¹⁾
B	GND
C	Enable acknowledgment 24 VDC ($I_{\max} = 50 \text{ mA}$) ²⁾ (high $\geq 15 \text{ V}$; low $< 2 \text{ V}$); Flow from P→A
D	Enable input 24 VDC (high $\geq 15 \text{ V}$; low $< 2 \text{ V}$); Flow from P→A
E	Enable input 24 VDC (high $\geq 15 \text{ V}$; low $< 2 \text{ V}$); Flow from P→B
F	Enable acknowledgment 24 VDC ($I_{\max} = 50 \text{ mA}$) ²⁾ (high $> 15 \text{ V}$; low $< 2 \text{ V}$); Flow from P→B
PE	Functional ground (connected directly to metal housing)

XH1

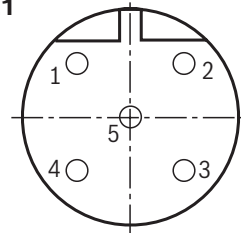


- 1) A load increases the current consumption on pin A
 2) Enable acknowledgment is issued only if the valve has safely switched off according to EN 13849-1, see operating instructions 29391-B.

Connector pin assignment for Ethernet interfaces "X7E1" and "X7E2" (coding D), M12, 4-pole, socket

Pin	Assignment
1	TxD +
2	RxD +
3	TxD -
4	RxD -
5	Not used

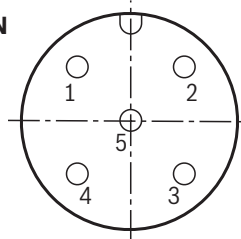
X7E1



Analog configurable sensor interface, port "X2N" (coding A), M12, 5-pole, socket

Pin	Assignment
1	+24 V voltage output
2	Analog sensor input 2 (0 ... 10 V)
3	GND
4	Analog sensor input 4 (0 ... 10 V)
5	Analog sensor input 3 (0 ... 10 V)

X2N



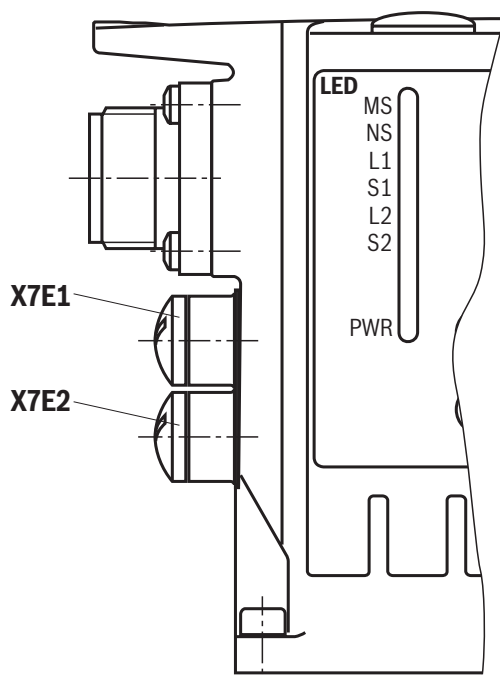
Only with version "5"

Notes:

- ▶ Reference potential for all signals: GND
- ▶ We recommend connecting the shields on both sides via the metal housings of the plug-in connectors.

LED displays

LED	Interface	Sercos	EtherNET/IP	EtherCAT	PROFINET RT	VARAN
MS	Electronics module	Module Status	Module Status	Module Status	Module Status	Module Status
NS		S	Network status and others	Network status and others	Network status and others	Network status and others
L1	X7E1	Link and others	Link and others	Link/Activity	Link and others	Link and others
S1		Activity and others	Activity and others	not used	Activity and others	Active and others
L2	X7E2	Link and others	Link and others	Link/Activity	Link and others	not used
S2		Activity and others	Activity and others	not used	Activity and others	not used
PWR	XH1	Power	Power	Power	Power	Power



Displays of the status LEDs

Power LED (LED PWR)	Display status
Off	No voltage supply
Green	Operation

Module status LED (LED MS)	Display status
Off	No voltage supply
Green-red, flashing	Initialization
Green, flashing	Drive ready for operation
Green	Drive active
Orange, flashing	Warning
Red, flashing	Error
Green, rapidly flashing	Firmware must be loaded

Link LED (LED L1)	Display status
Permanently lit	Cable plugged in, connection established

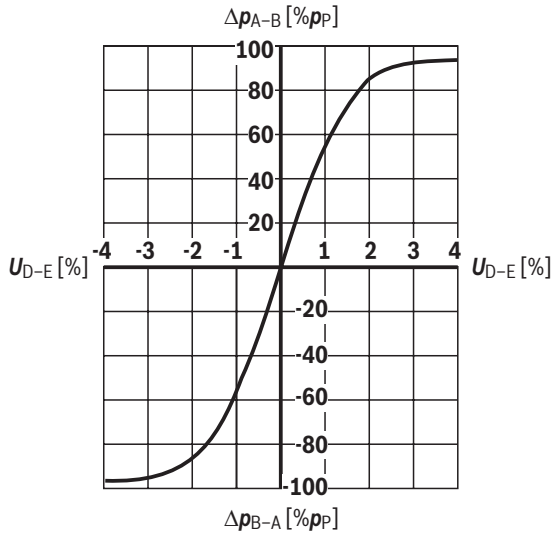
Activity LED (LED S1)	Display status
Flashing	Data sent/received

Notes:

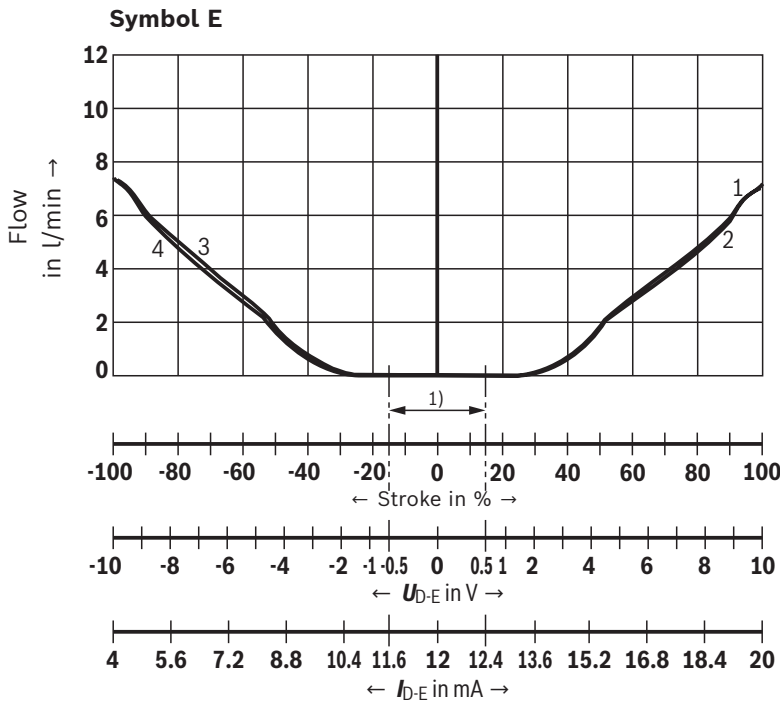
- ▶ For the connection to the M12 sockets, we recommend using self-locking mating connectors
- ▶ Module status LED MS relates to the electronics module
- ▶ The network status LED NS indicates the status of the control communication, see application description 30338-FK
- ▶ LEDs L1, S1, L2 and S2 relate to interfaces "X7E1" and "X7E2"
- ▶ For a detailed description of the diagnosis LEDs, please refer to the functional description Rexroth HydraulicDrive HDx.
- ▶ Function is only available after start-up of the electronics.

Characteristic curves: Size 6
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Pressure/signal characteristic curve (symbol V)



Flow/signal function (rated flow 8 l/min with $\Delta p = 5 \text{ bar/control edge}$)



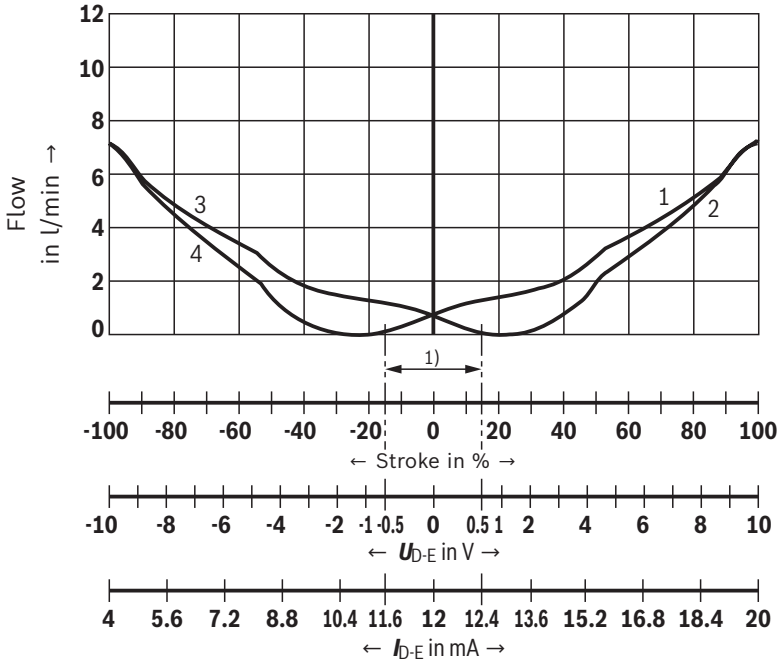
1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 6
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 8 l/min with $\Delta p = 5 \text{ bar/control edge}$)

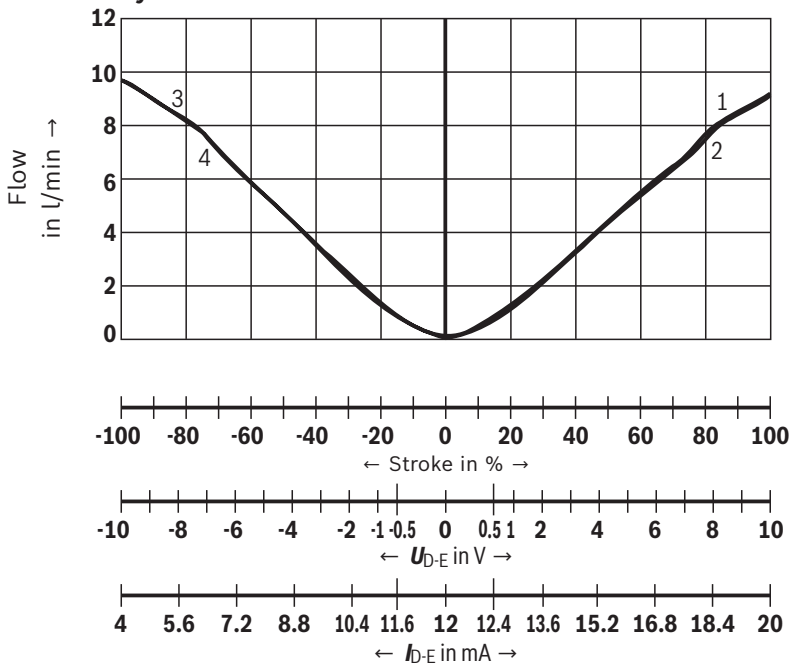
Symbol W-



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

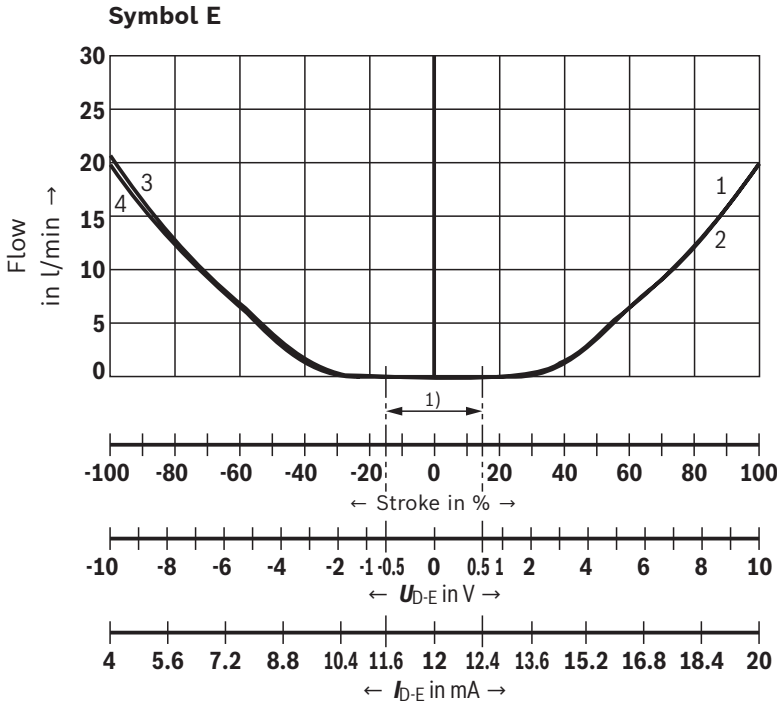
Symbol V-



- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

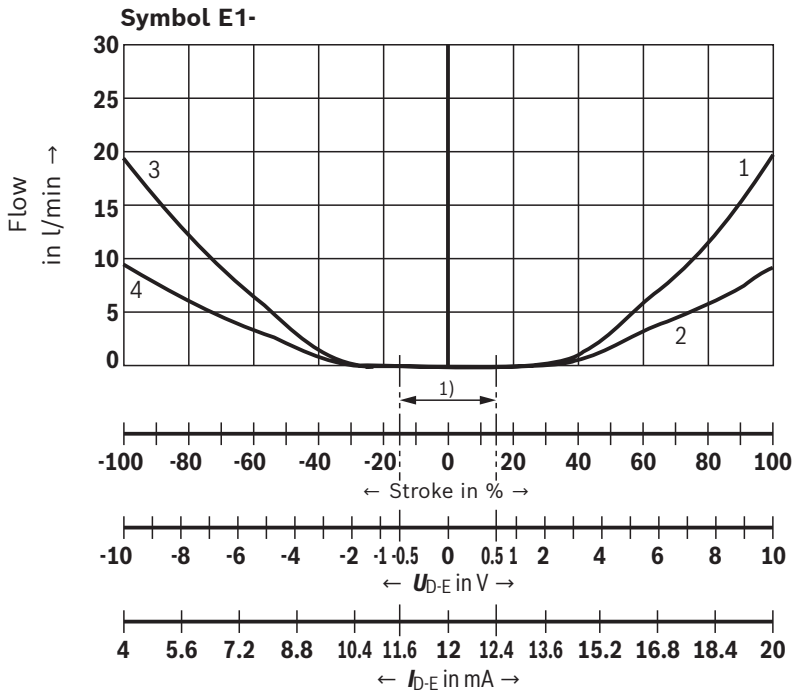
Characteristic curves: Size 6
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 18 l/min with $\Delta p = 5 \text{ bar/control edge}$)



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

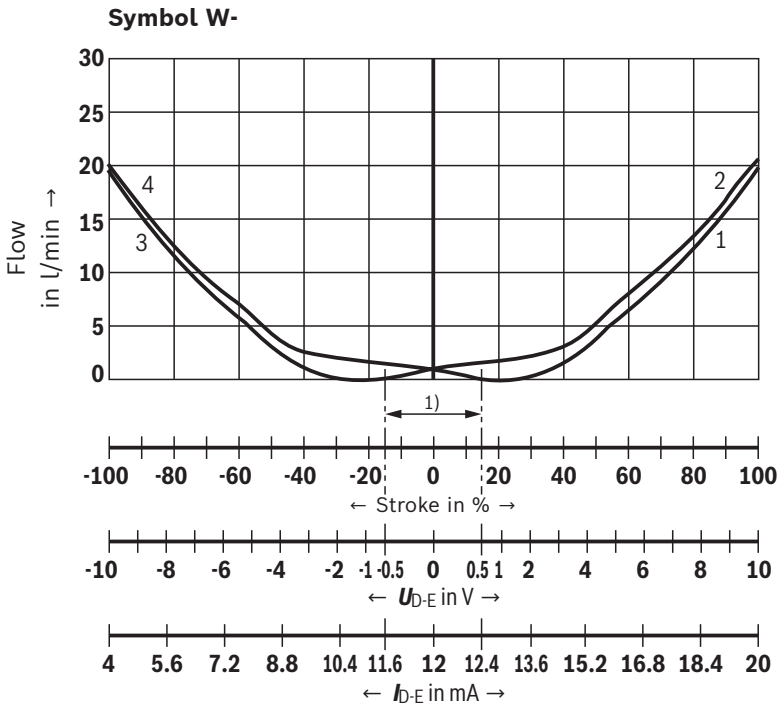


1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

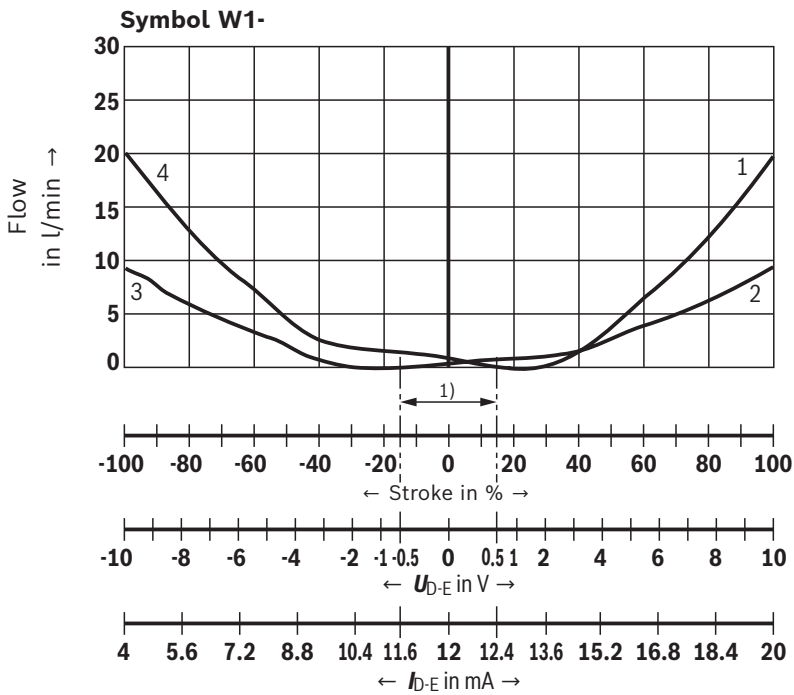
Characteristic curves: Size 6
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

Flow/signal function (rated flow 18 l/min with $\Delta p = 5 \text{ bar/control edge}$)



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T



1) Step compensation

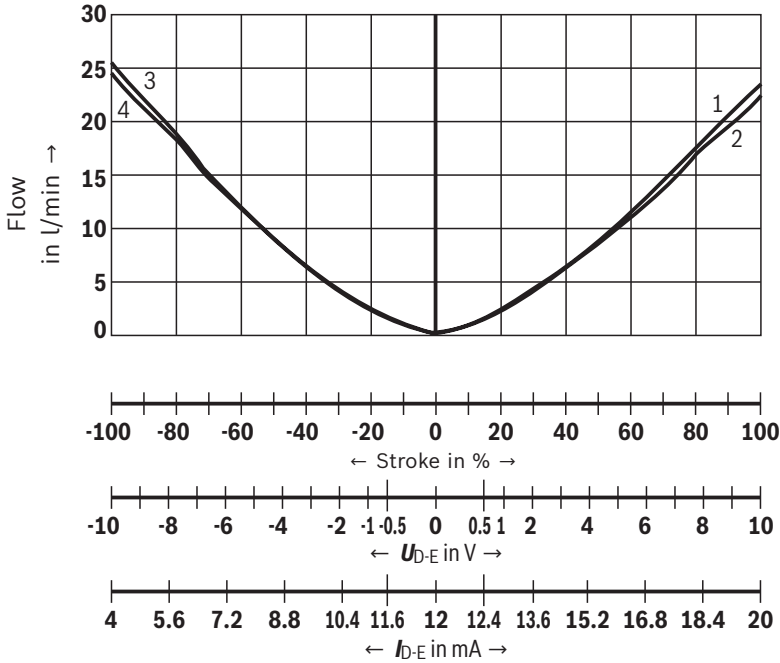
- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 6

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

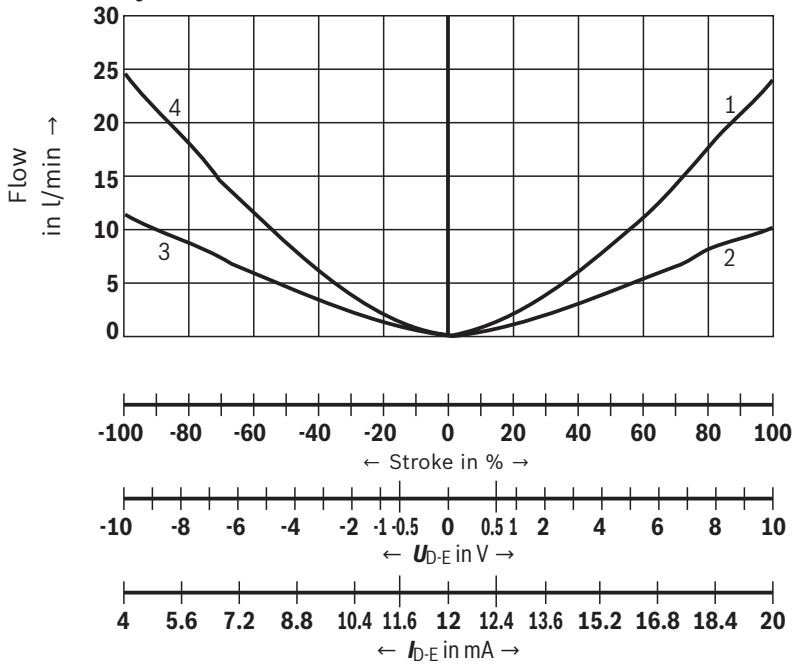
Flow/signal function (rated flow 18 l/min with $\Delta p = 5 \text{ bar/control edge}$)

Symbol V-



- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

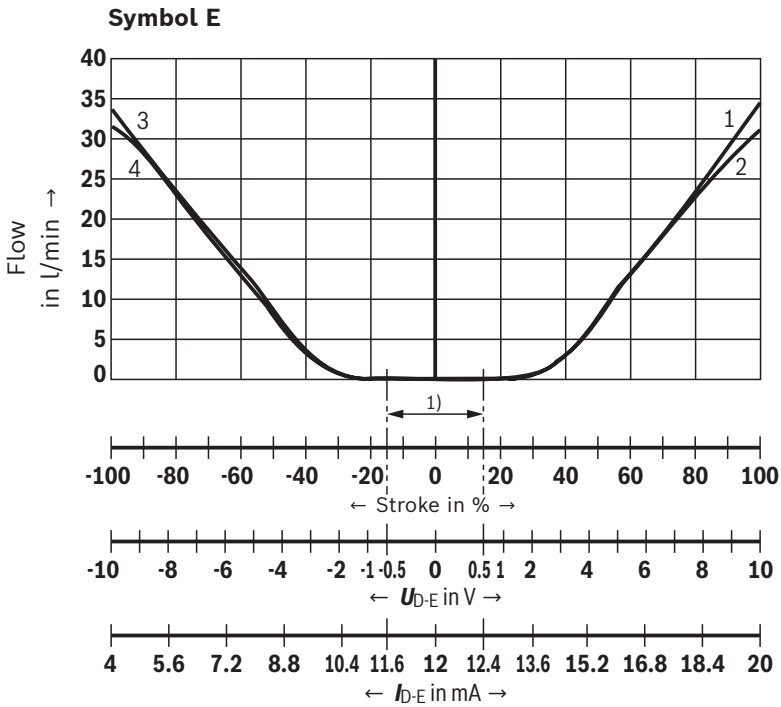
Symbol V1-



- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

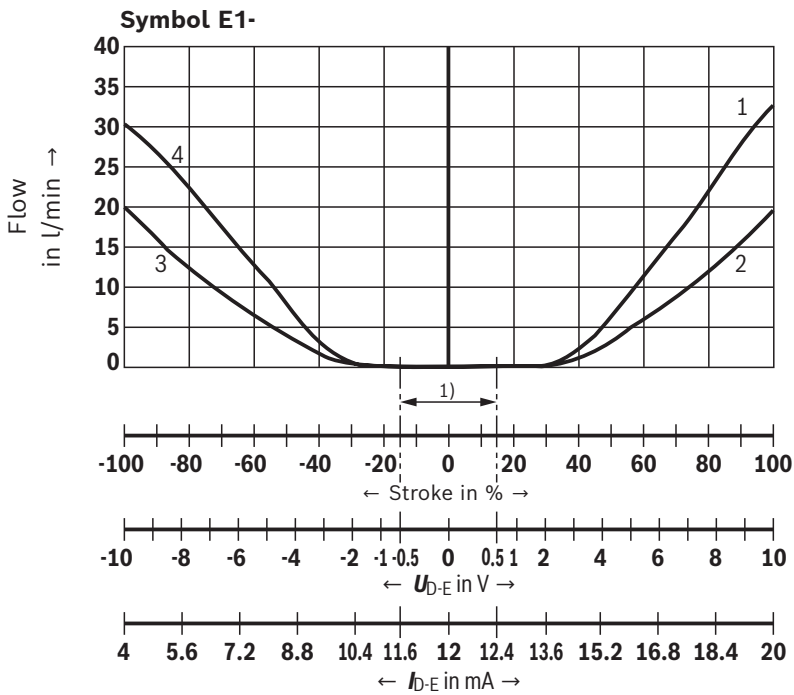
Characteristic curves: Size 6
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 32 l/min with $\Delta p = 5 \text{ bar/control edge}$)



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

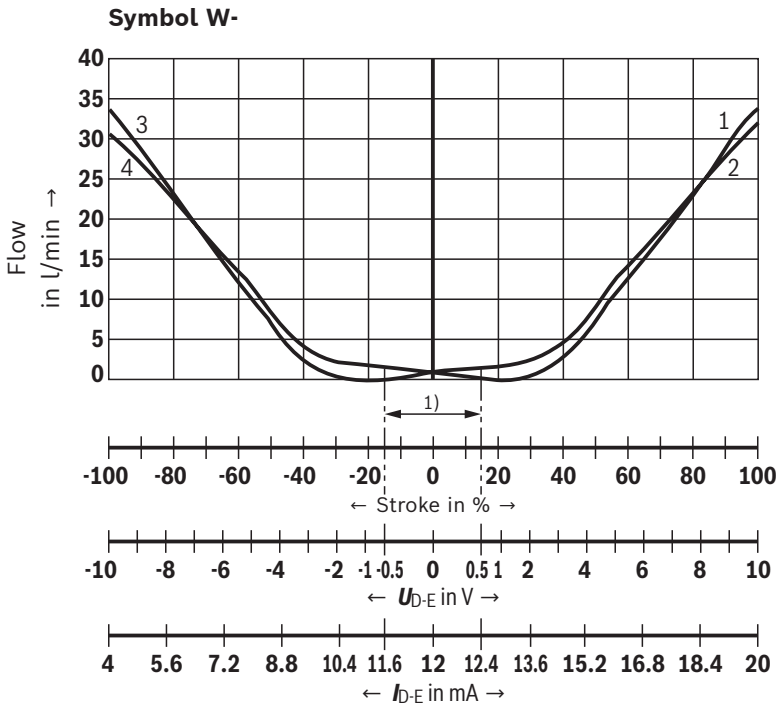


1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

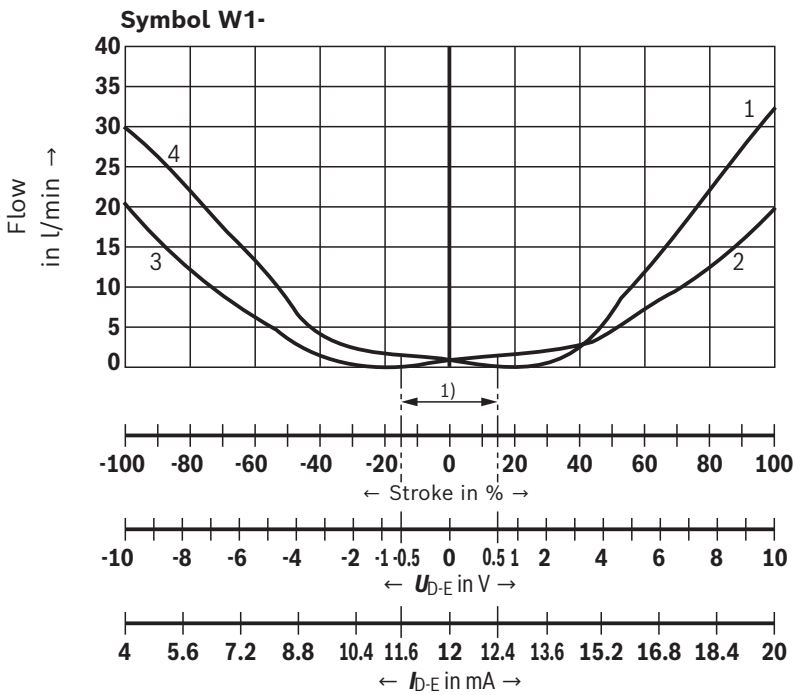
Characteristic curves: Size 6
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 32 l/min with $\Delta p = 5 \text{ bar/control edge}$)



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T



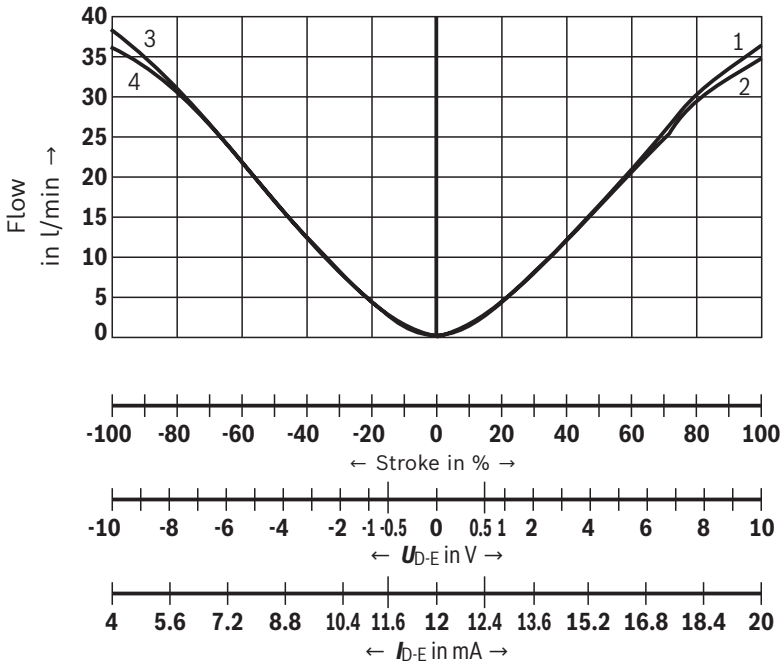
1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 6
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 32 l/min with $\Delta p = 5 \text{ bar/control edge}$)

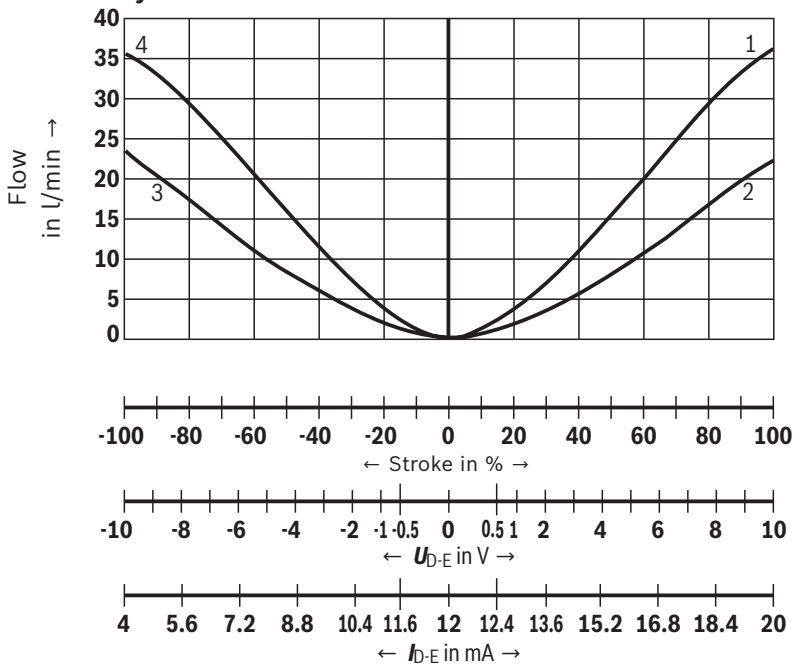
Symbol V-



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

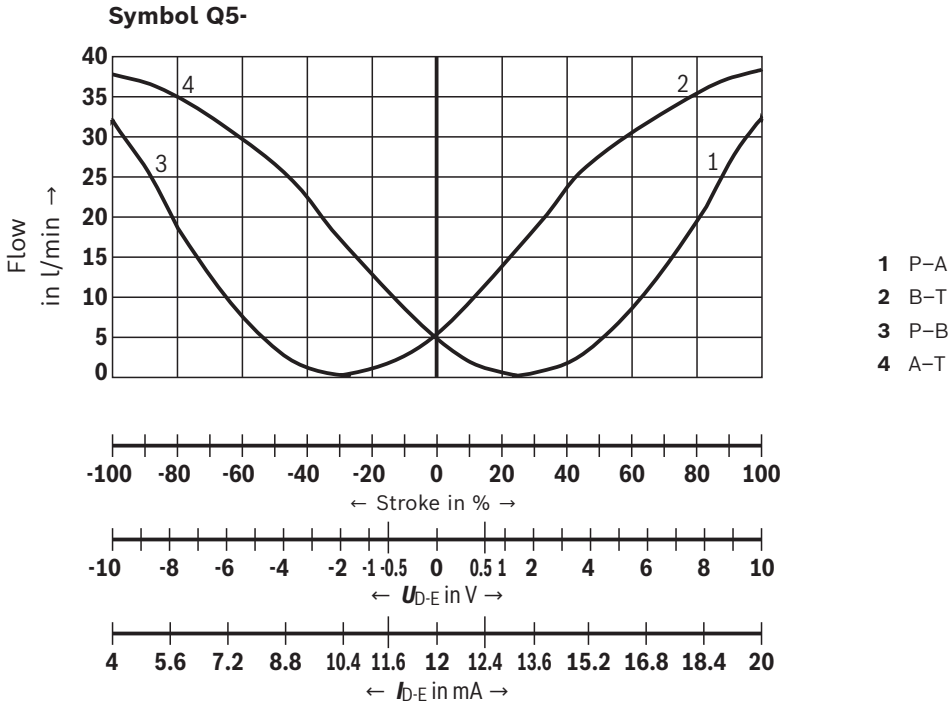
Symbol V1-



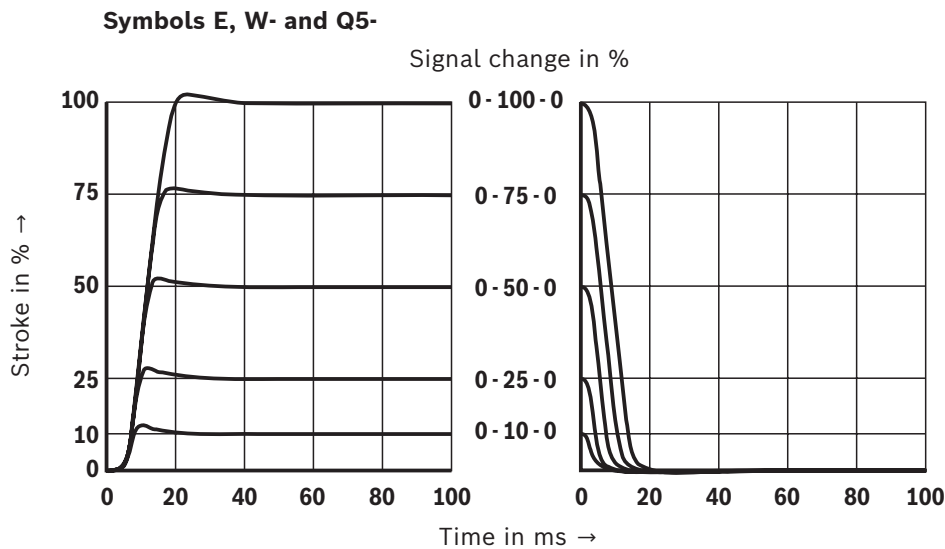
- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 6
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 32 l/min with $\Delta p = 5 \text{ bar/control edge}$)

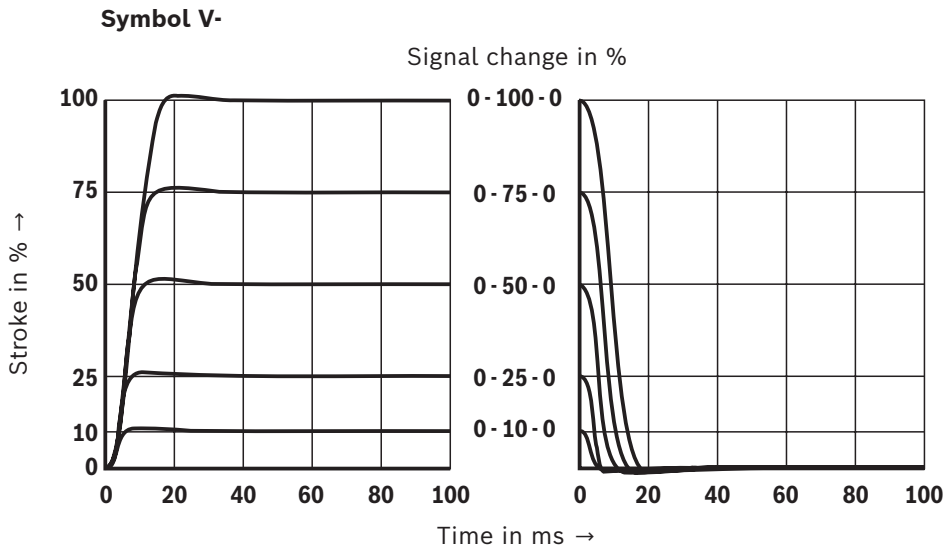


Transition function with stepped electric input signals

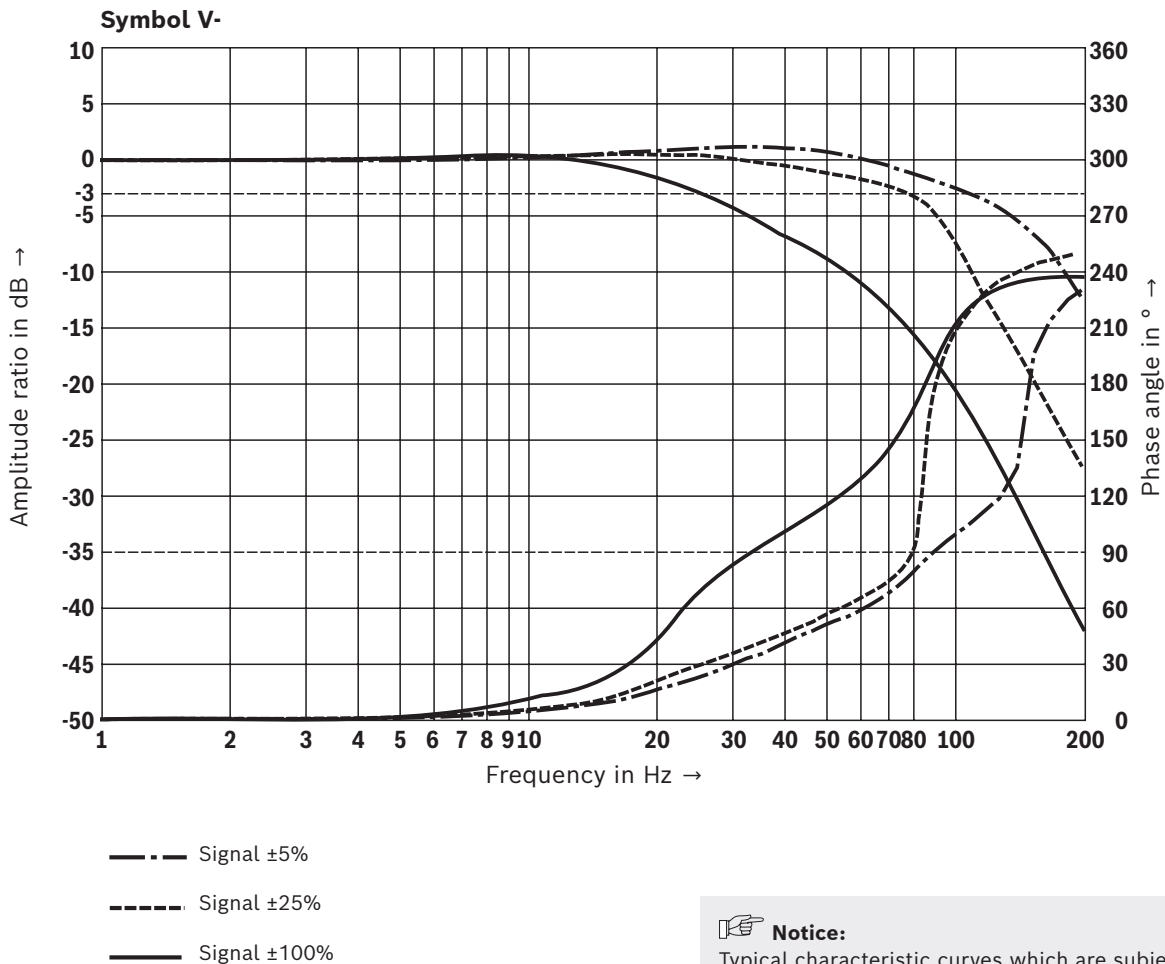


Characteristic curves: Size 6
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

Transition function with stepped electric input signals



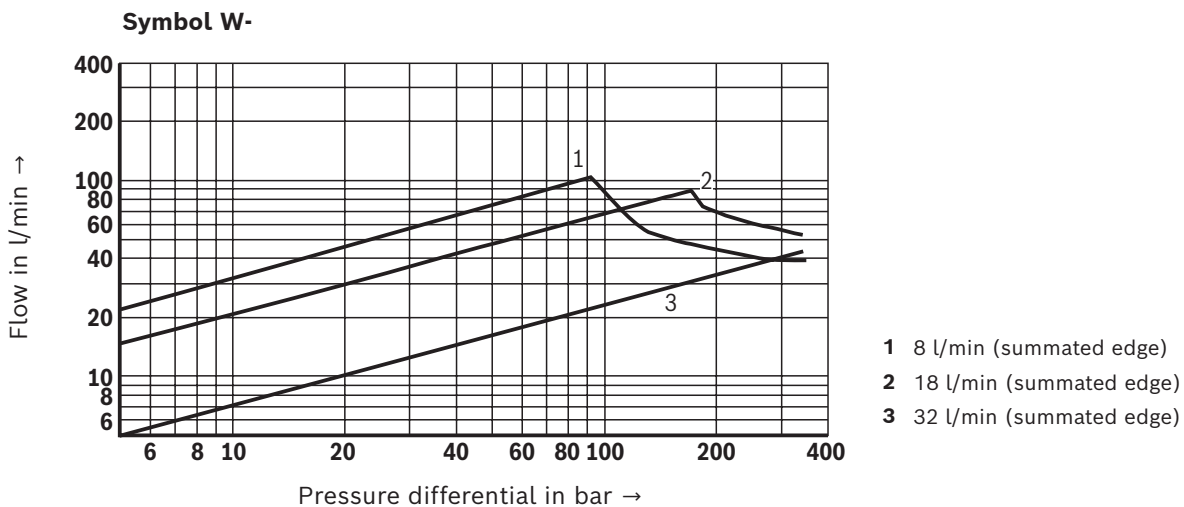
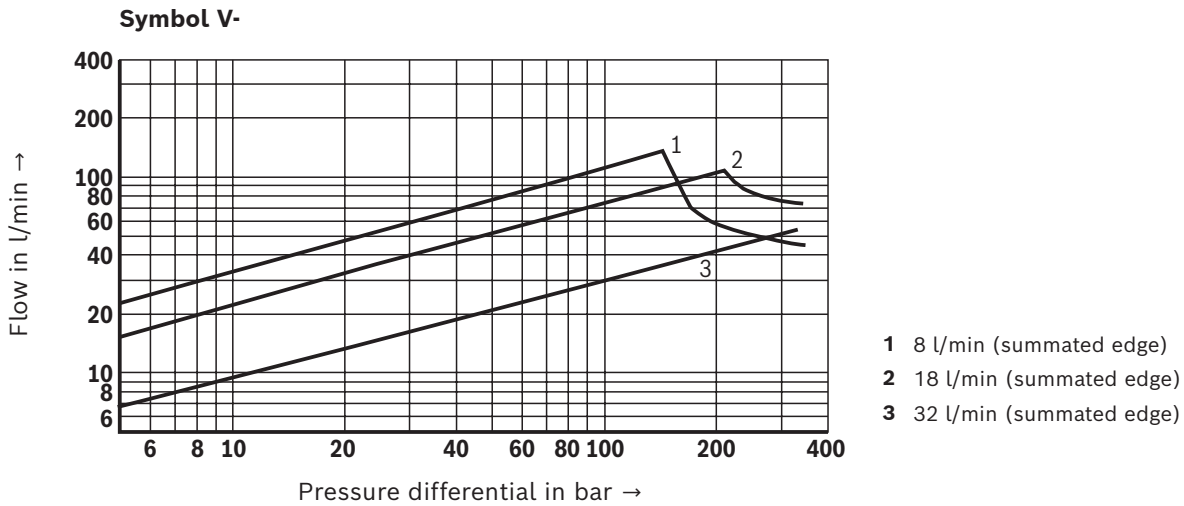
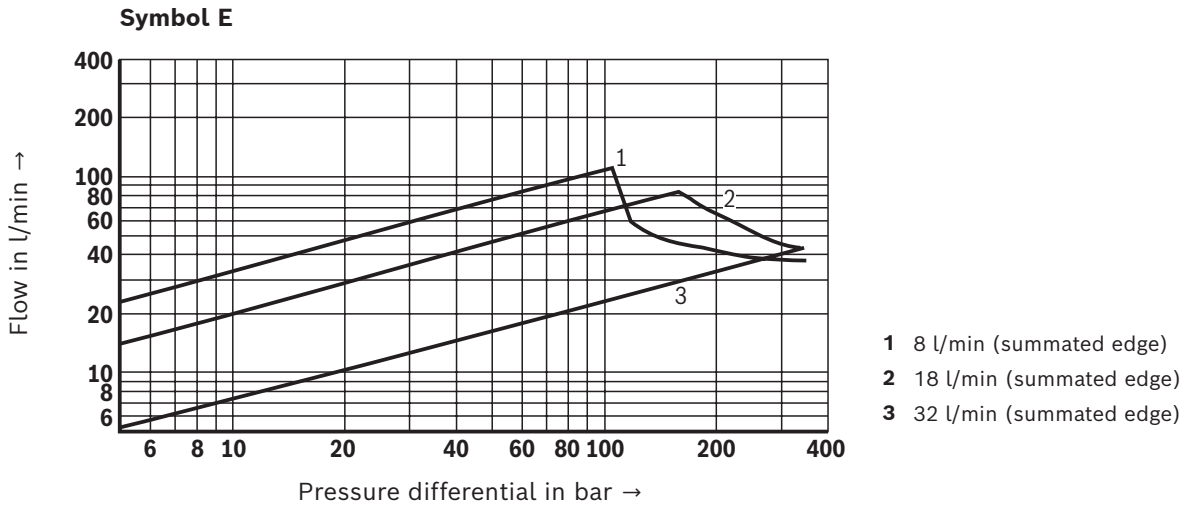
Frequency response



Notice:
 Typical characteristic curves which are subject to tolerance variation.

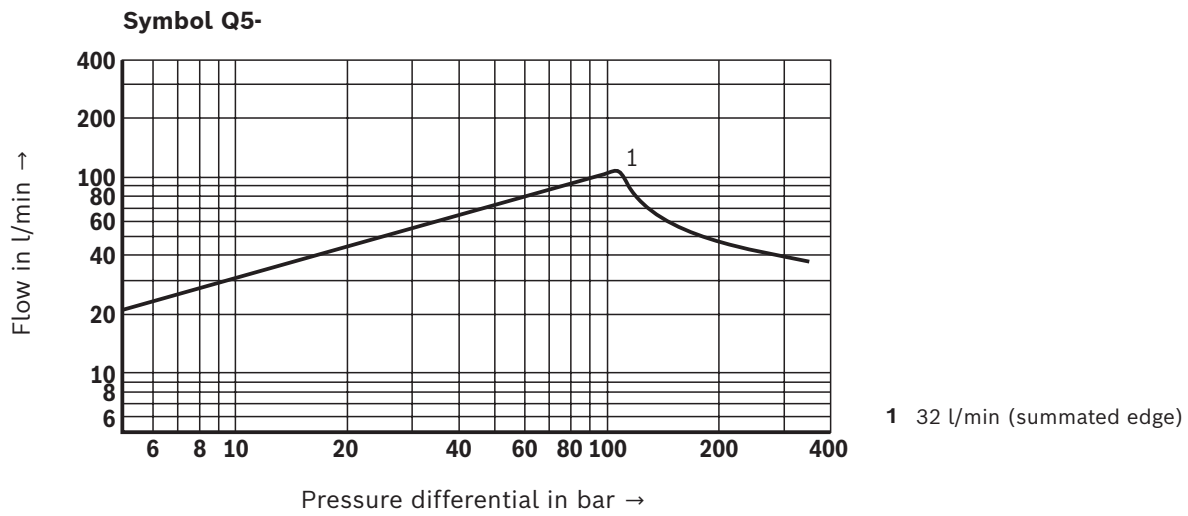
Characteristic curves: Size 6
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/load function with maximum valve opening (tolerance $\pm 10\%$) (4/3-way version)



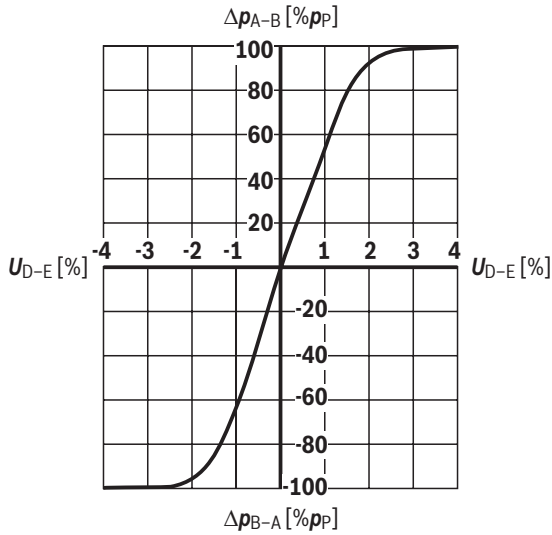
Characteristic curves: Size 6
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/load function with maximum valve opening (tolerance $\pm 10\%$) (4/3-way version)

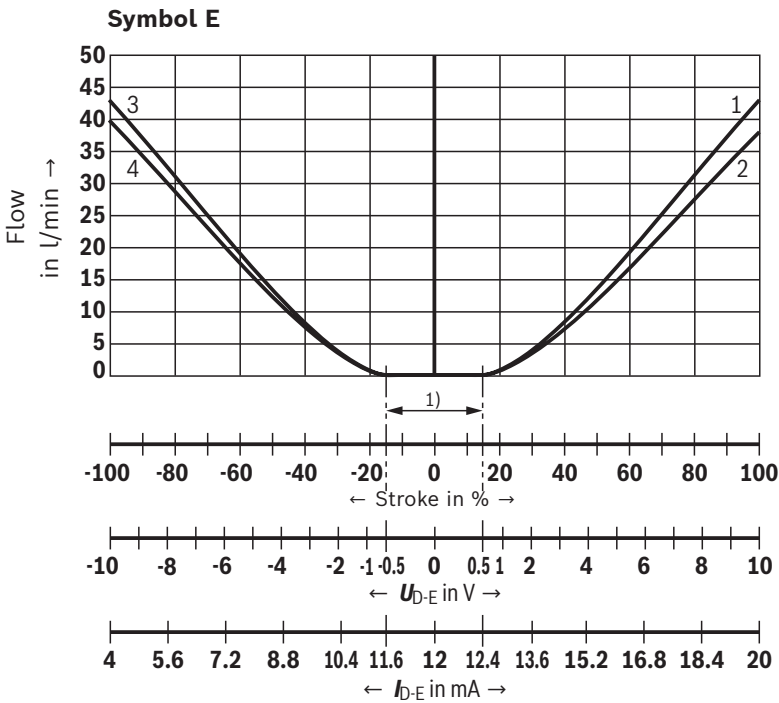


Characteristic curves: Size 10
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Pressure/signal characteristic curve (symbol V)



Flow/signal function (rated flow 50 l/min with $\Delta p = 5 \text{ bar/control edge}$)



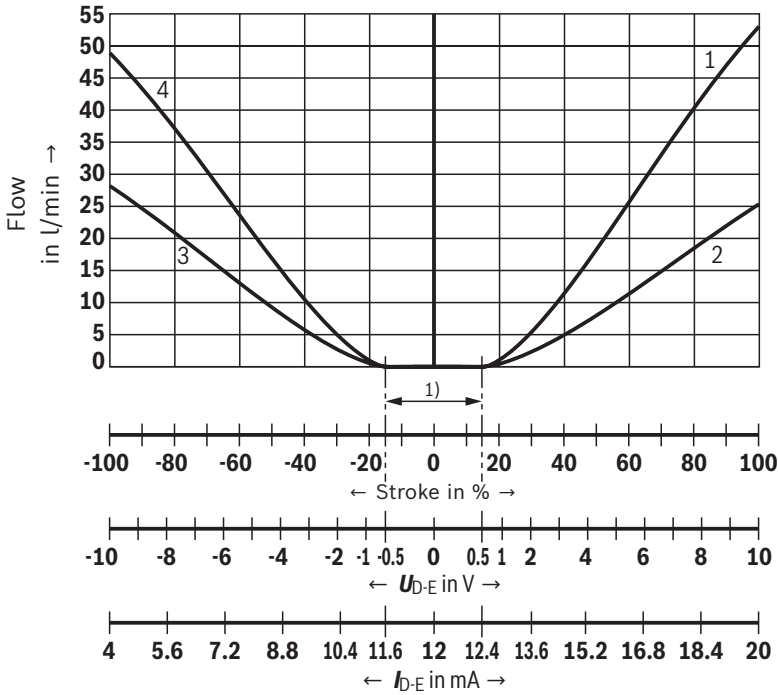
1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 10
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 50 l/min with $\Delta p = 5 \text{ bar/control edge}$)

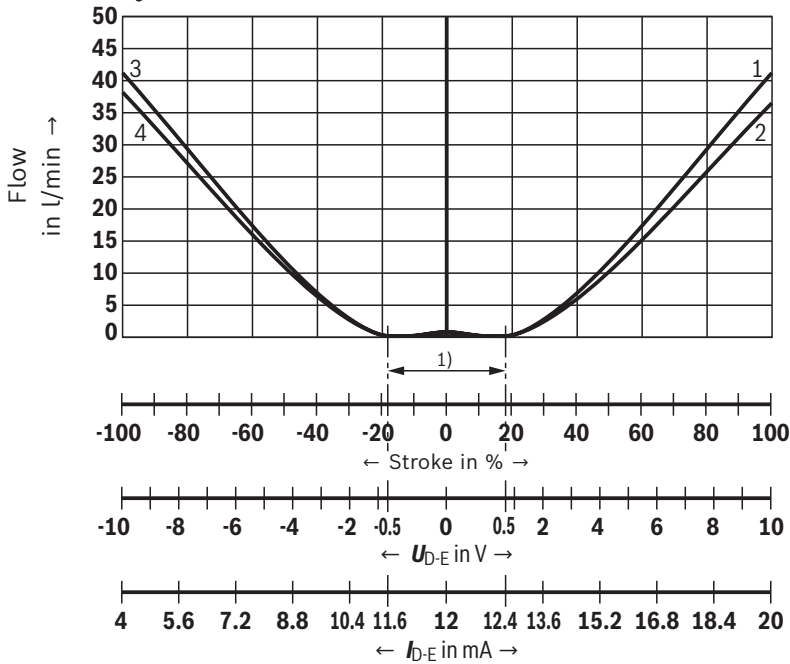
Symbol E1-



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Symbol W6-

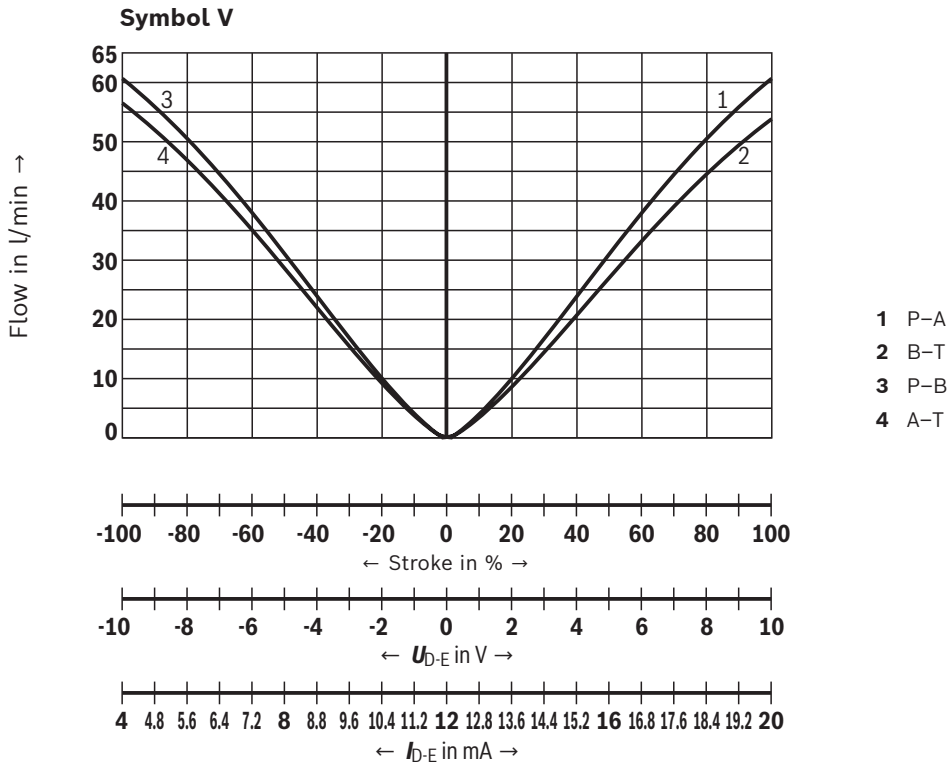


1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

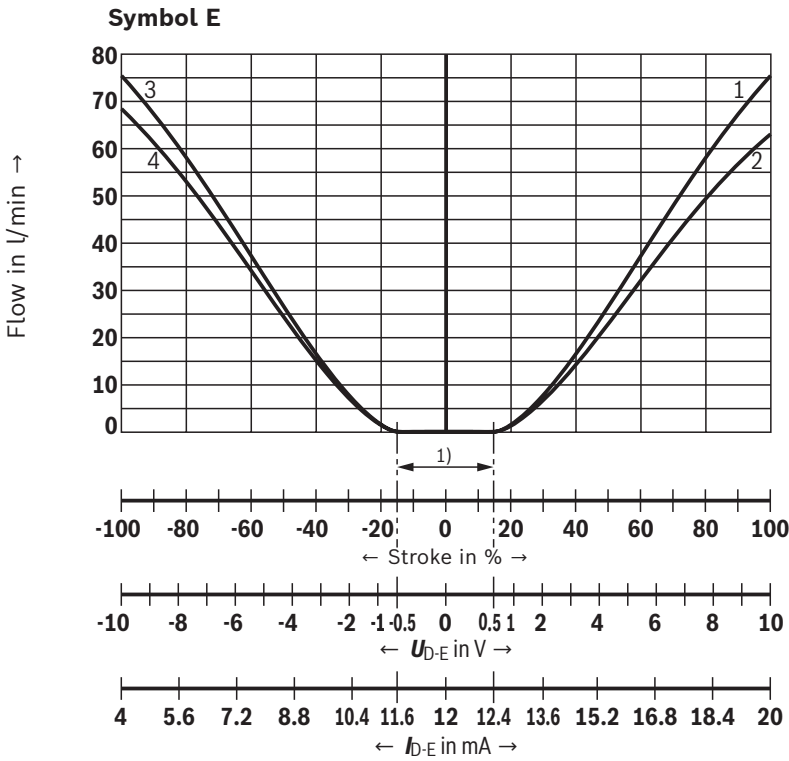
Characteristic curves: Size 10
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 50 l/min with $\Delta p = 5 \text{ bar/control edge}$)



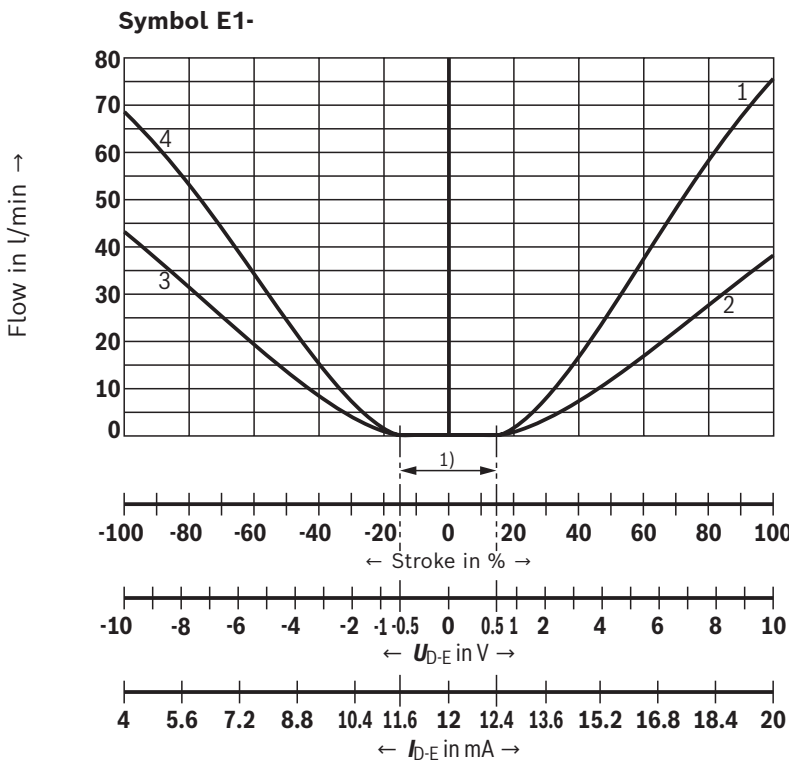
Characteristic curves: Size 10
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

Flow/signal function (rated flow 80 l/min with $\Delta p = 5 \text{ bar/control edge}$)



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T



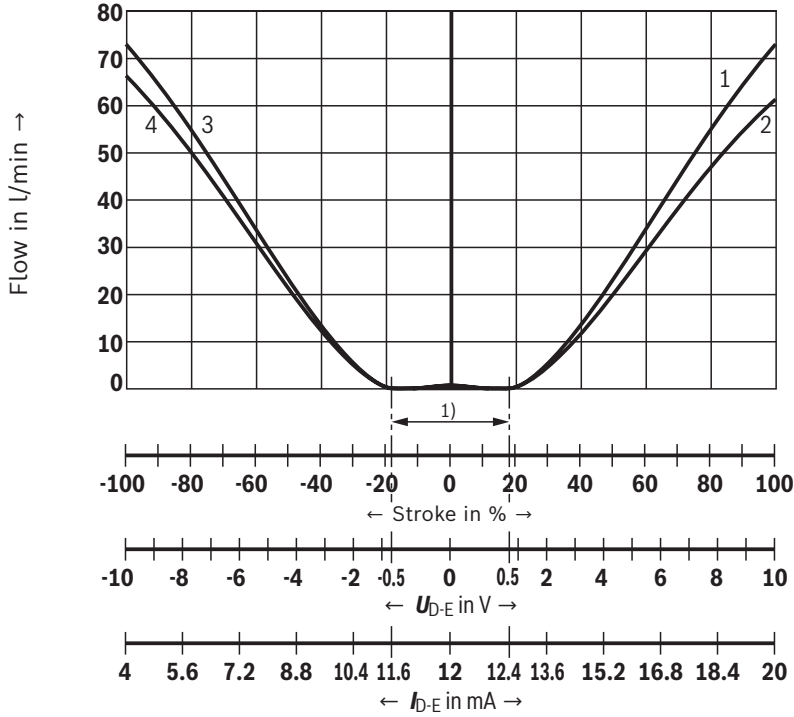
1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 10
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 80 l/min with $\Delta p = 5 \text{ bar/control edge}$)

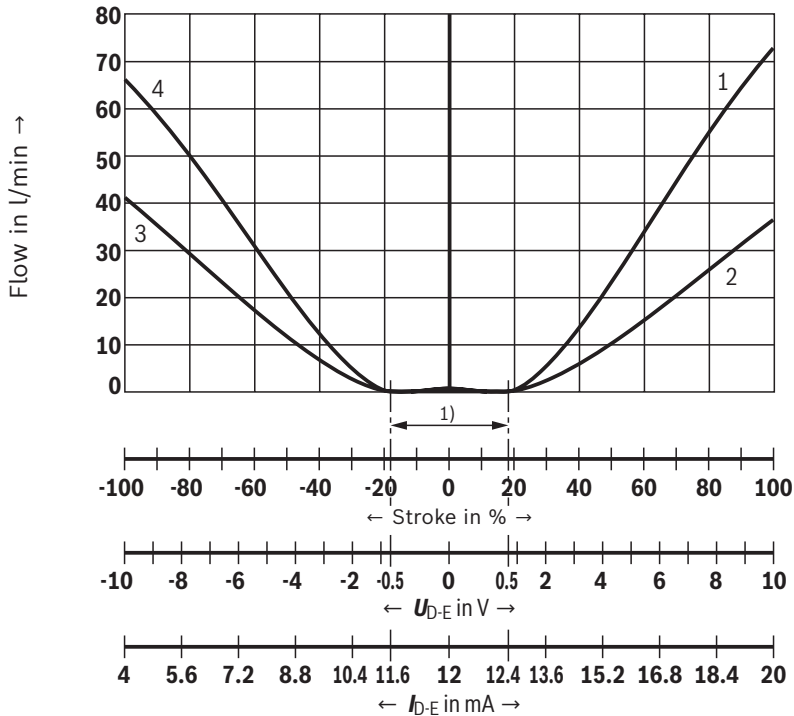
Symbol W6-



1) Step compensation

- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Symbol W8-

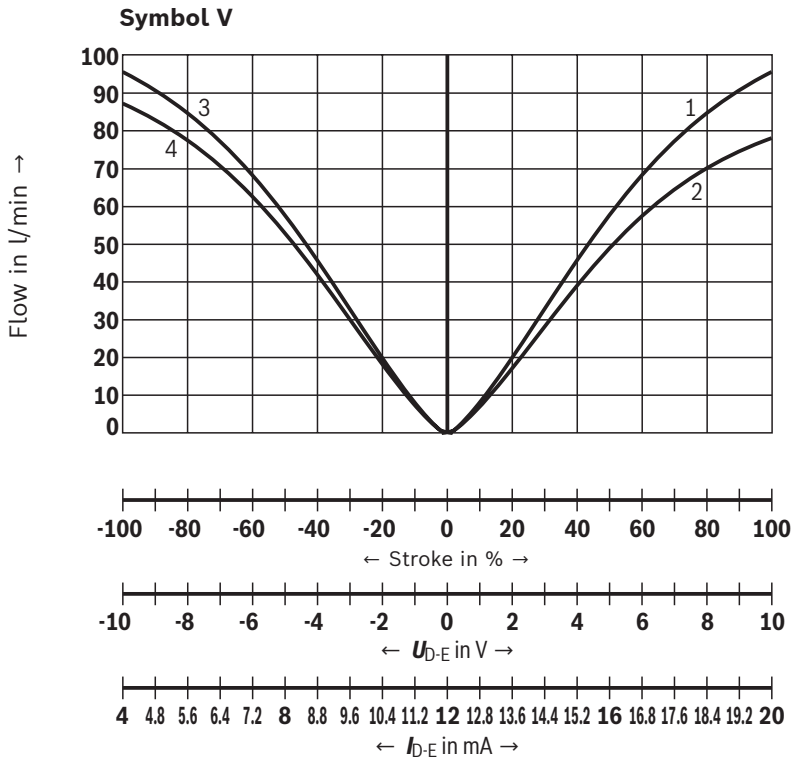


1) Step compensation

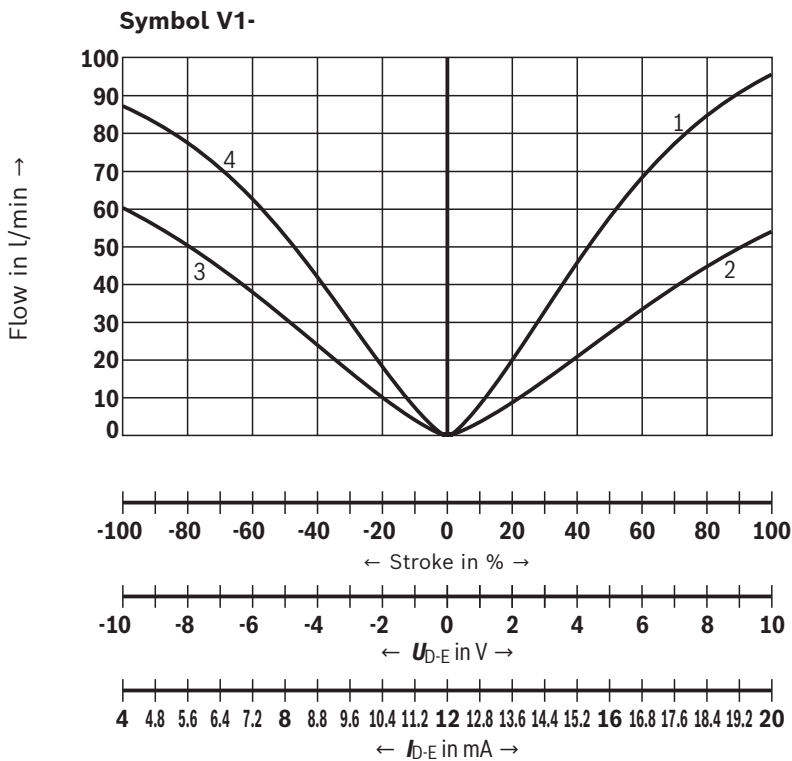
- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 10
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

Flow/signal function (rated flow 80 l/min with $\Delta p = 5 \text{ bar/control edge}$)



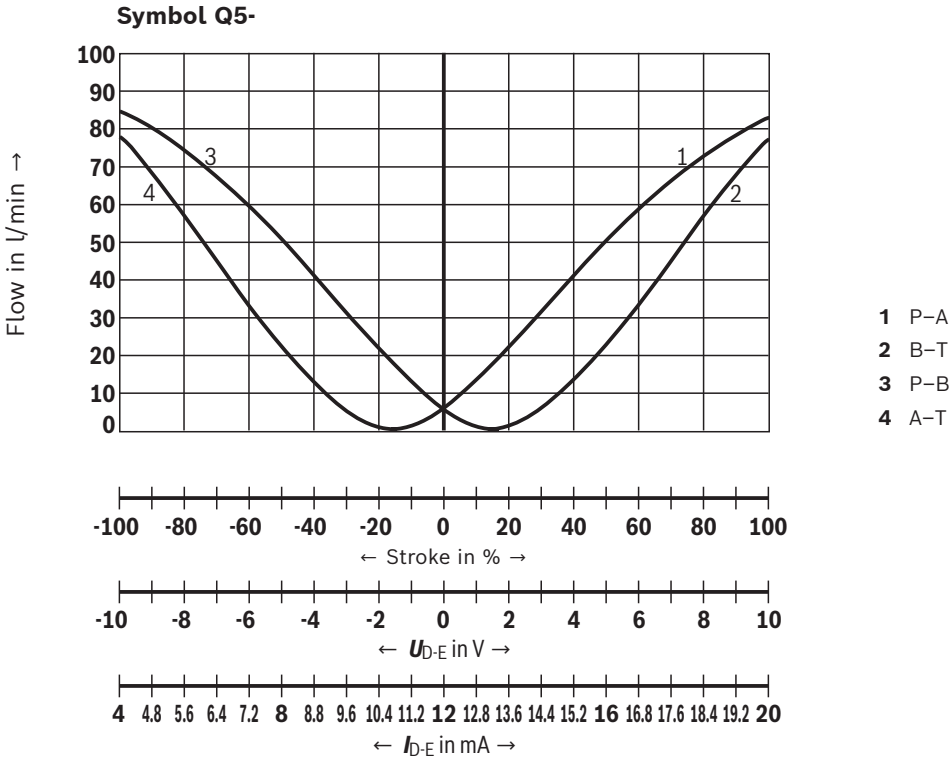
- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T



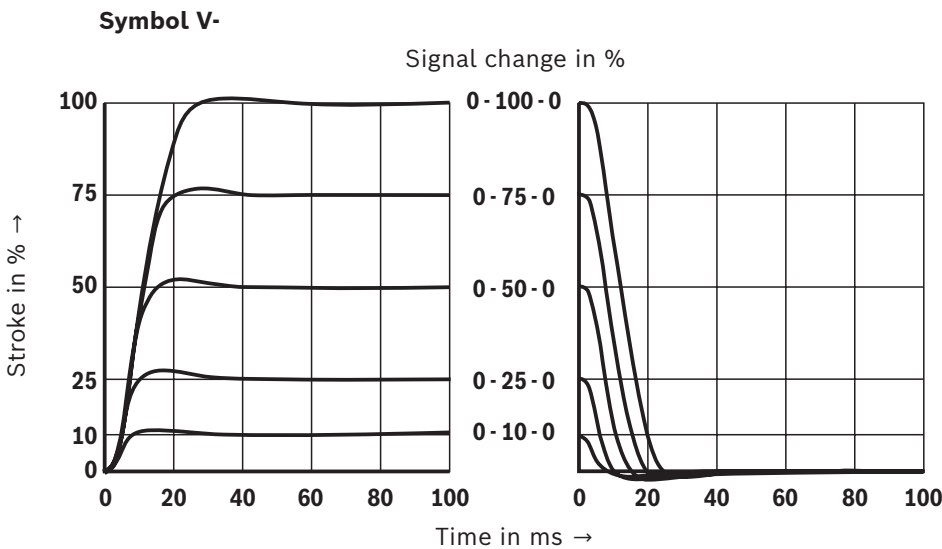
- 1 P-A
- 2 B-T
- 3 P-B
- 4 A-T

Characteristic curves: Size 10
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function (rated flow 80 l/min with $\Delta p = 5 \text{ bar/control edge}$)

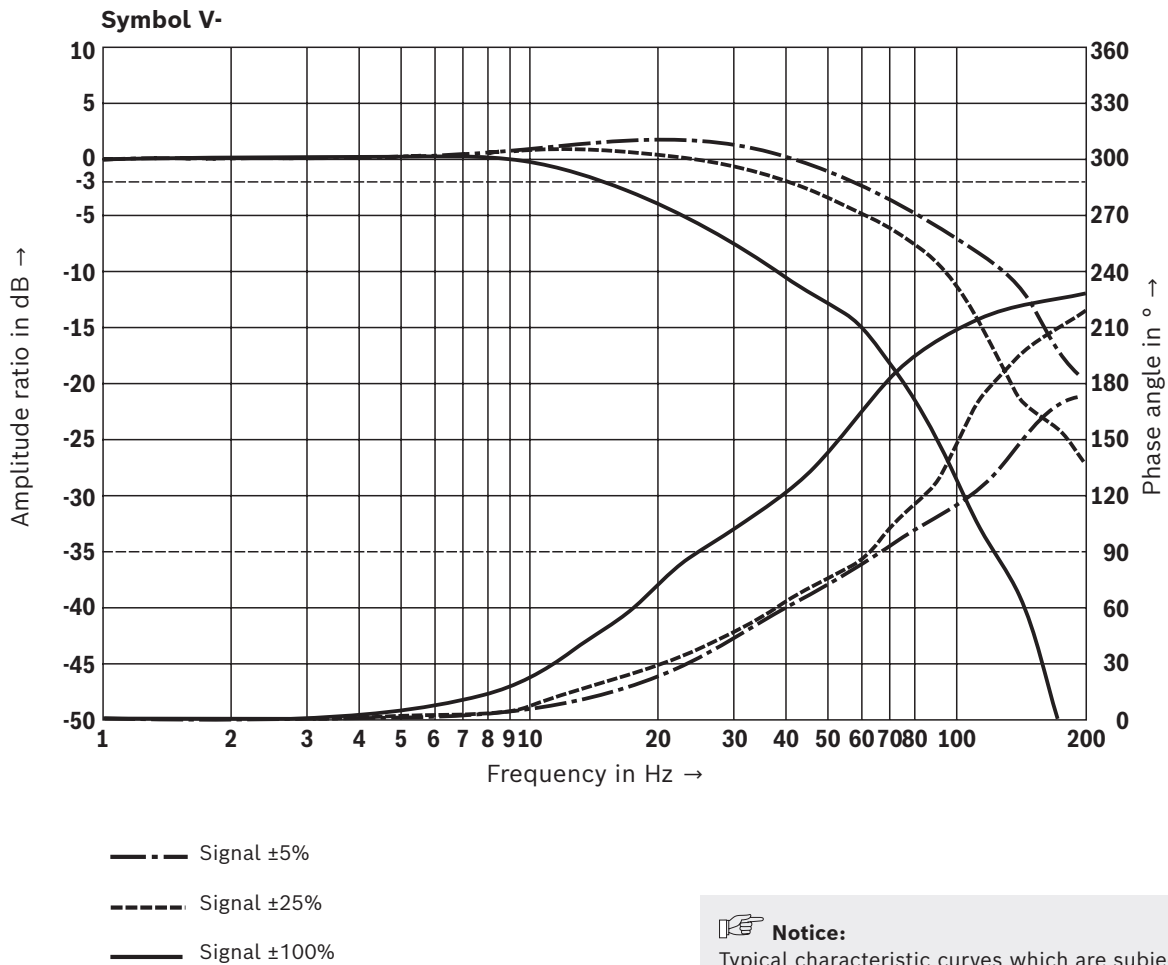


Transition function with stepped electric input signals



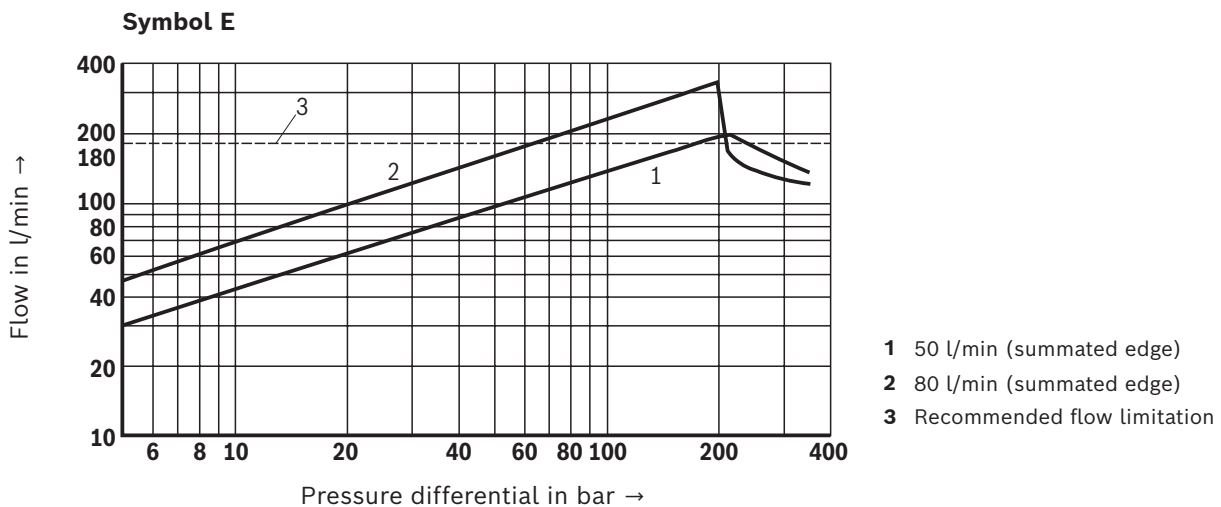
Characteristic curves: Size 10
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Frequency response characteristic curves



Notice:
 Typical characteristic curves which are subject to tolerance variation.

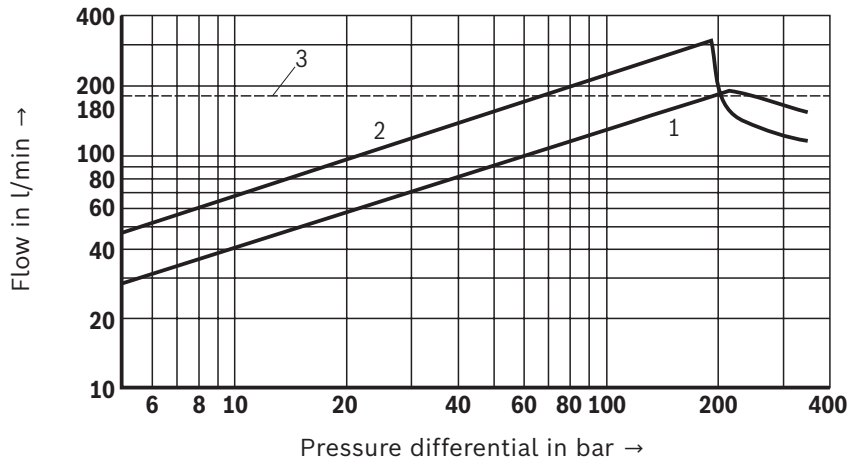
Flow/load function with maximum valve opening (tolerance ±10%) (4/3-way version)



Characteristic curves: Size 10
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

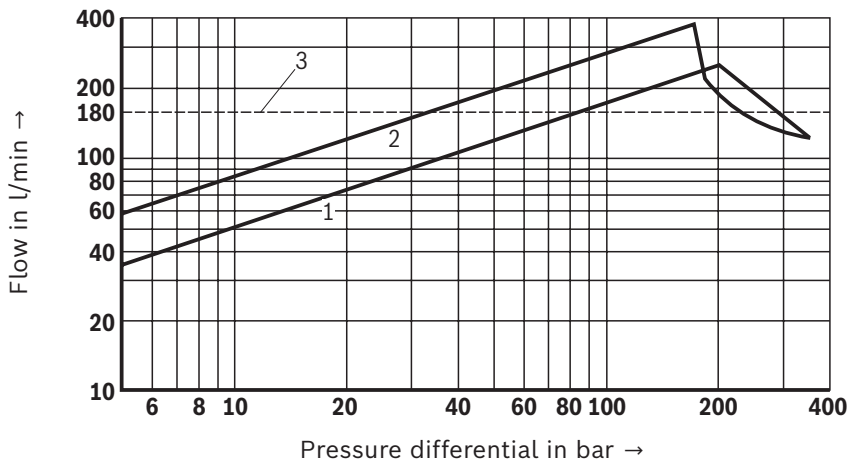
Flow/load function with maximum valve opening (tolerance $\pm 10\%$) (4/3-way version)

Symbol W6-



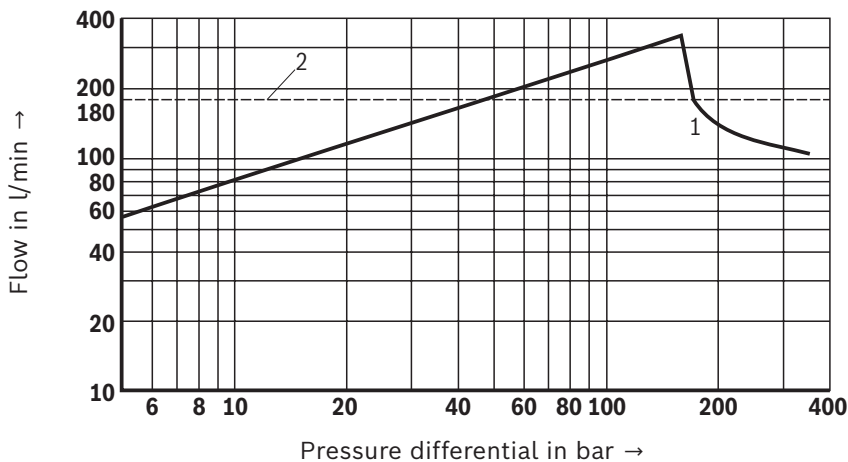
- 1 50 l/min (summated edge)
- 2 80 l/min (summated edge)
- 3 Recommended flow limitation

Symbol V-



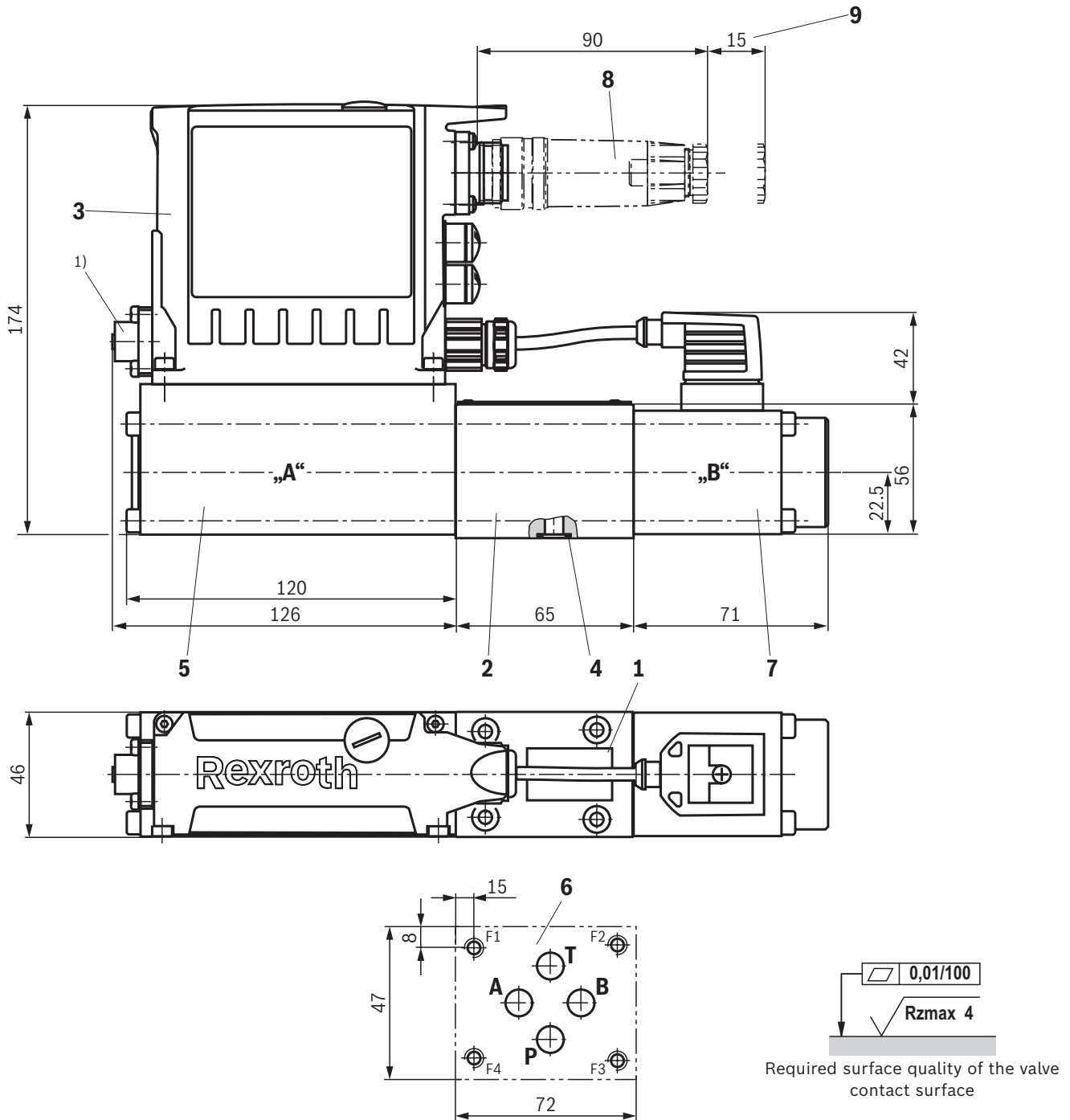
- 1 50 l/min (summated edge)
- 2 80 l/min (summated edge)
- 3 Recommended flow limitation

Symbol Q5-



- 1 80 l/min (summated edge)
- 2 Recommended flow limitation

Dimensions: Size 6 – versions "00..D90" and "00..D95"
(dimensions in mm)



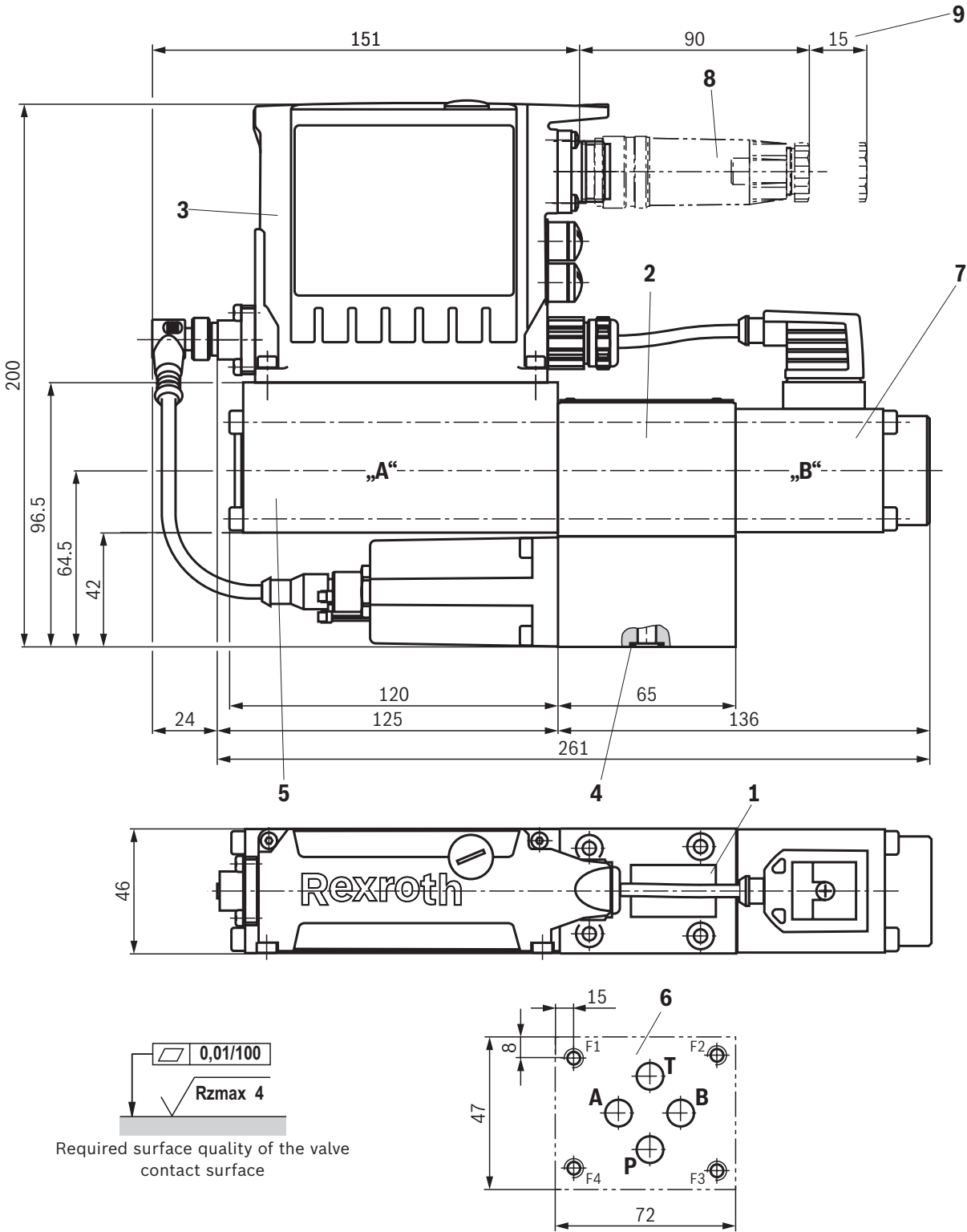
Notes:

- ▶ The dimensions are nominal dimensions which are subject to tolerances.
- ▶ Mating connectors, separate order, see page 38 and data sheet 08006.

For item explanations, valve mounting screws and subplates, see page 37.

1) Version "00..D95" only

Dimensions: Size 6 – versions "GA..D90", "GB..D90" and "GC..D90"
(dimensions in mm)

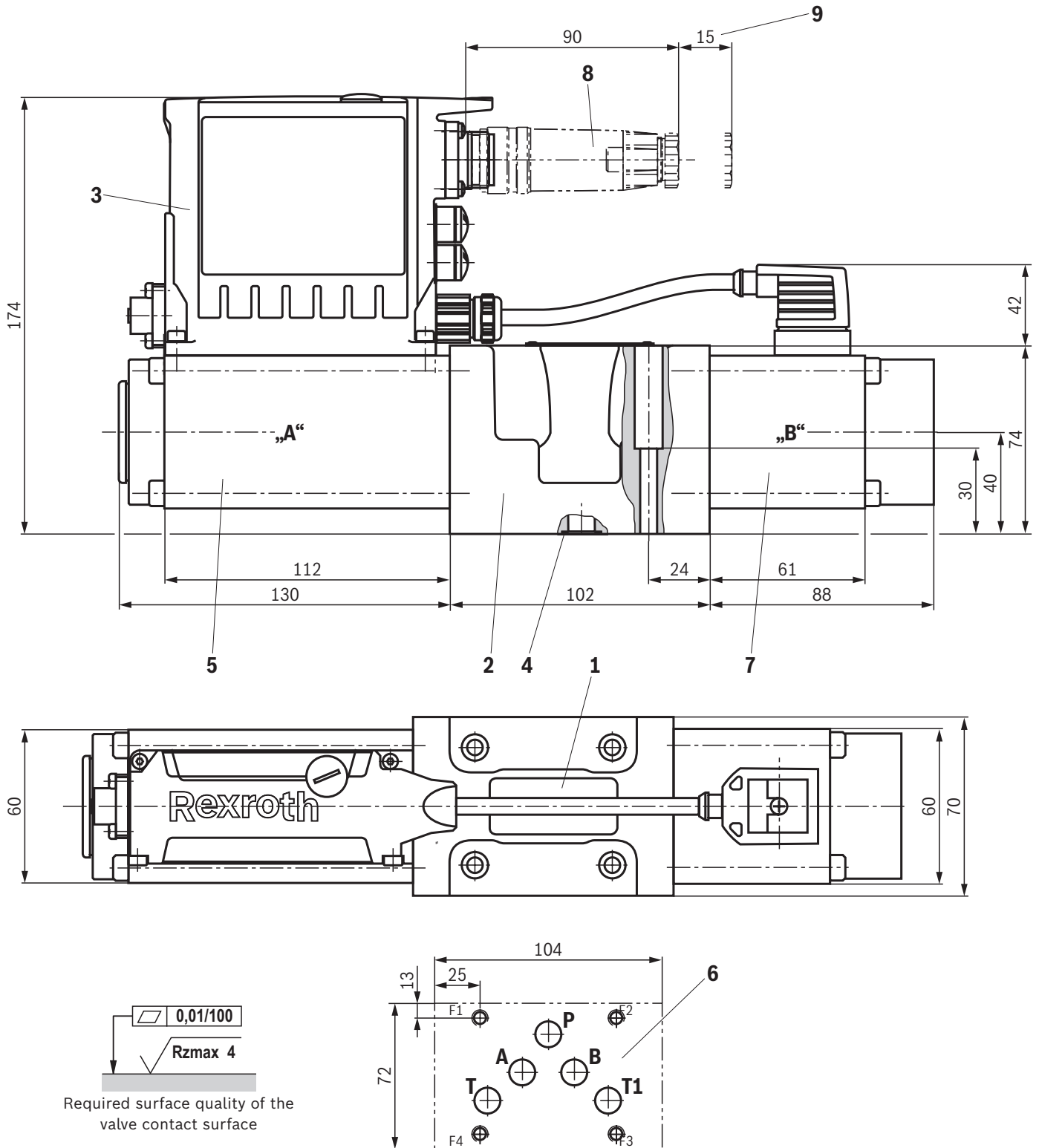


Notes:

- ▶ The dimensions are nominal dimensions which are subject to tolerances.
- ▶ Mating connectors, separate order, see page 38 and data sheet 08006.

For item explanations, valve mounting screws and subplates, see page 37.

Dimensions: Size 10 – versions "00..D90" and "00..D95"
(dimensions in mm)

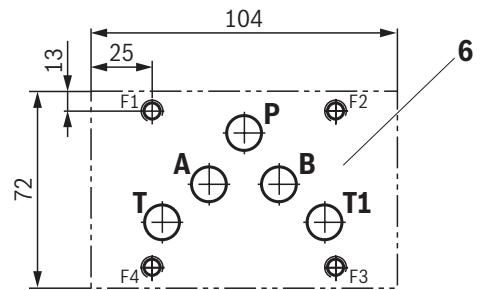
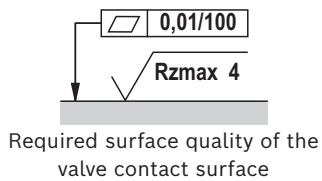
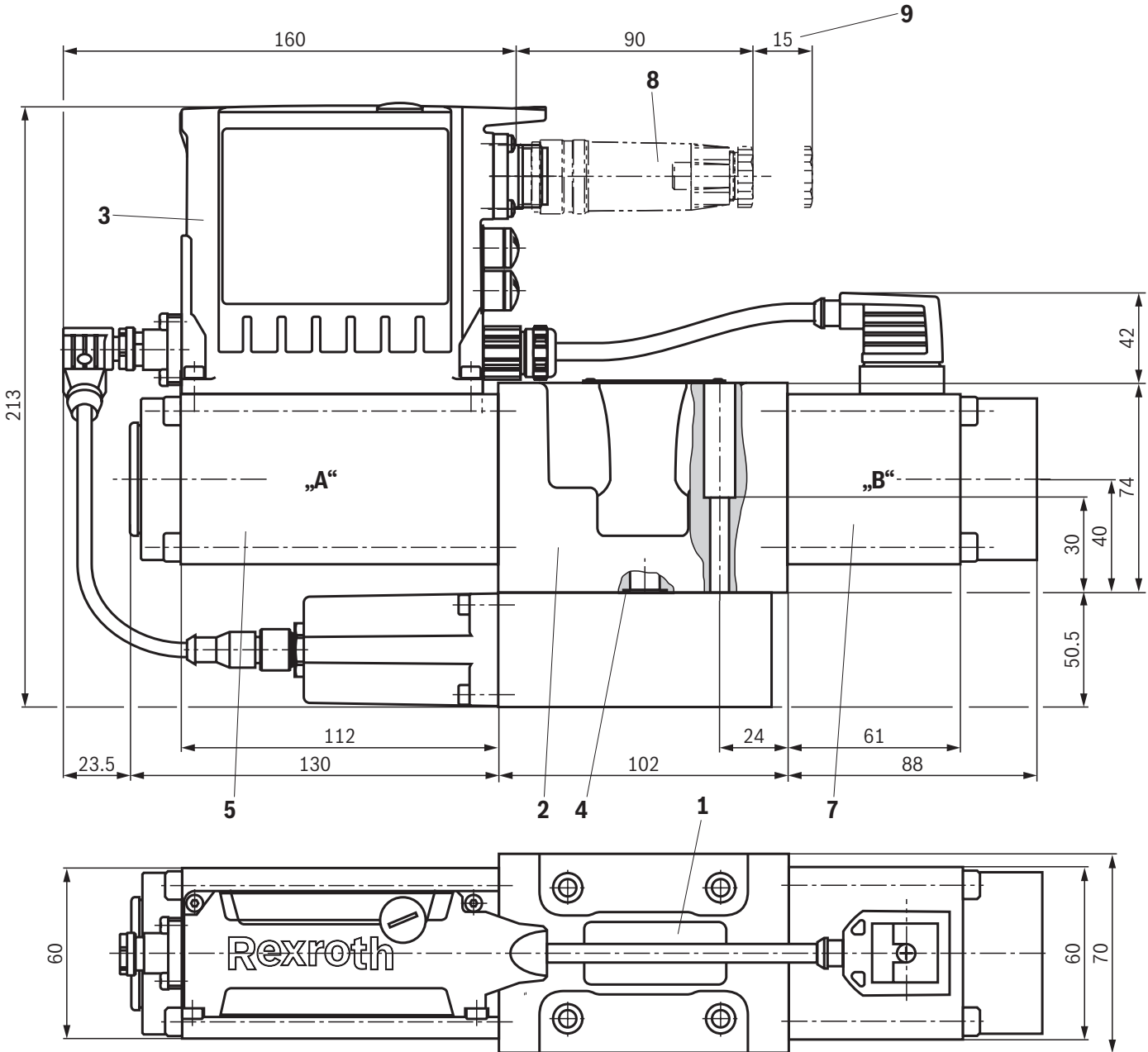


Notes:

- ▶ The dimensions are nominal dimensions which are subject to tolerances.
- ▶ Mating connectors, separate order, see page 38 and data sheet 08006.

For item explanations, valve mounting screws and subplates, see page 37.

Dimensions: Size 10 – versions "GA..D90", "GB..D90" and "GC..D90"
(dimensions in mm)



Notes:

- ▶ The dimensions are nominal dimensions which are subject to tolerances.
- ▶ Mating connectors, separate order, see page 38 and data sheet 08006.

For item explanations, valve mounting screws and subplates, see page 37.

Dimensions

- 1 Name plate
- 2 Valve housing
- 3 Integrated digital control electronics
- 4 Identical seal rings for ports A, B, P, T, T1
- 5 Control solenoid with position transducer
- 6 Machined valve contact surface, porting pattern according to ISO 4401-03-02-0-05 (NG6) and ISO 4401-05-04-0-05 (NG10)
- 7 Stroke solenoid
- 8 Mating connectors, separate order, see page 38 and data sheet 08006.
- 9 Space required for removing the mating connector

Valve mounting screws (separate order)

Size	Version	Quantity	Hexagon socket head cap screws	Material number
6	"00..D90", "00..D95"	4	ISO 4762 - M5 x 30 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 7 \text{ Nm} \pm 10\%$	R913048086
		or		
	4	ISO 4762 - M5 x 30 - 10.9 Tightening torque $M_A = 8.9 \text{ Nm} \pm 10\%$	Not included in the Rexroth delivery range	
	"GA..D90", "GB..D90", "GC..D90"	4	ISO 4762 - M5 x 70 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 8.9 \text{ Nm} \pm 10\%$	R913043762
		or		
	4	ISO 4762 - M5 x 70 - 10.9 Tightening torque $M_A = 8.9 \text{ Nm} \pm 10\%$	Not included in the Rexroth delivery range	
10	"00..D90", "00..D95"	4	ISO 4762 - M6 x 40 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 12.5 \text{ Nm} \pm 10\%$	R913051533
		or		
	4	ISO 4762 - M6 x 40 - 10.9 Tightening torque $M_A = 15.5 \text{ Nm} \pm 10\%$	Not included in the Rexroth delivery range	
	"GA..D90", "GB..D90", "GC..D90"	4	ISO 4762 - M6 x 80 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 13 \text{ Nm} \pm 10\%$	R913049927
		or		
	4	ISO 4762 - M6 x 80 - 10.9 Tightening torque $M_A = 13 \text{ Nm} \pm 10\%$	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, see data sheet 45100.

Accessories (separate order)**Mating connectors and cable sets**


Port	Designation	Version	Short designation	Material number	Data sheet	
XH1	Mating connector; for valves with round connector, 6-pole + PE	Straight, metal	7PZ31...M	R900223890	08006	
		Straight, plastic	7PZ31...K	R900021267		
		Angled, plastic	–	R900217845	–	
	Cable sets; for valves with round connector, 6-pole + PE	Plastic, 3.0 m	7P Z31 BF6	–	R901420483	08006
		Plastic, 5.0 m			R901420491	
		Plastic, 10.0 m			R901420496	
Plastic, 20.0 m		–	R901448068	–		
X7E1, X7E2	Cable set; shielded, 4-pole, D coding	Straight connector M12, on straight connector M12, line cross-section 0.25 mm ² , CAT 5e, length freely selectable (= xx.x)	–	R911172111 ¹⁾	–	
	Cable set; shielded, 4-pole	Straight connector M12, on straight connector RJ45, line cross-section 0.25 mm ² , CAT 5e, length freely selectable (= xx.x)	–	R911172135 ²⁾	–	
X2N ³⁾	Cable set; shielded, 5-pole, for connecting Rexroth pressure sensors, type HM20, A coding	PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm ² , 0.6 m	–	R901111709	–	
		PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm ² , 1.0 m	–	R901111712	–	
		PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm ² , 2.0 m	–	R901111713	–	
	Cable set; shielded, 5-pole, A coding	Straight connector M12, on free line end, line cross-section 0.34 mm ² , 1.5 m	–	R901111752	–	
		Straight connector M12, on free line end, line cross-section 0.34 mm ² , 3.0 m	–	R901111754	–	
		Straight connector M12, on free line end, line cross-section 0.34 mm ² , 5.0 m	–	R901111756	–	
		Straight connector M12, on free line end, line cross-section 0.34 mm ² , 10.0 m	–	R913005147	–	

¹⁾ Additional indication of type designation RKB0040/xx.x

²⁾ Additional indication of type designation RKB0044/xx.x

³⁾ Only with connection of an external sensor, type HM20

Protective cap

Protective cap M12	Version	Material number
		R901075563

Parameterization

The following is required for the parameterization with PC		Material number/download
1 Commissioning software	IndraWorks, Indraworks D, Indraworks DS	www.boschrexroth.com/IFB
2 Connection cable, 3 m	Shielded, M12 on RJ45, length can be freely selected (= xx.x)	R911172135 (additional indication of type designation RKB0044/xx.x)

Project planning and maintenance instructions

- ▶ The supply voltage must be permanently connected; otherwise, bus communication is not possible.
- ▶ If electro-magnetic interference is to be expected, take appropriate measures to ensure the function (depending on the application, e.g. shielding, filtration).
- ▶ The devices have been tested in the plant and are supplied with default settings.
- ▶ Only complete devices can be repaired. Repaired devices are returned with default settings. User-specific settings will not be applied. The machine end-user will have to retransfer the corresponding user parameters.

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 |
| ▶ General product information on hydraulic products | Data sheet 07008 |
| ▶ High-response/proportional valve with Multi-Ethernet interface | Data sheet 29391-B |
| ▶ Hydraulic valves for industrial applications | Data sheet 07600-B |
| ▶ Assembly, commissioning and maintenance of hydraulic systems | Data sheet 07900 |
| ▶ Operation fieldbus electronics (xx = software version): | |
| – Functional description Rexroth HydraulicDrive HDx-20 | 30338-FK |
| – Parameter description Rexroth HydraulicDrive HDS-16, HDx-17 ... 20 | 30330-PA |
| – Description of diagnosis Rexroth HydraulicDrive HDS-16, HDx-17 ... 20 | 30330-WA |
| ▶ Selection of filters | www.boschrexroth.com/filter |
| ▶ Information on available spare parts | www.boschrexroth.com/spc |
| ▶ "IFB" hydraulic field bus valves | www.boschrexroth.com/ifb |

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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