

Proportional directional cartridge valve, pilot-operated, with on-board electronics (OBE) or external control electronics

Type 2WFC and 2WFCE



- ▶ Size 16 ... 50
- ▶ Component series 1X
- ▶ Maximum operating pressure 420 bar
- ▶ Maximum flow 1500 l/min ($\Delta p = 5$ bar)



Features

- ▶ 2-way cartridge valve
- ▶ Integrated pilot control valve in 3/2-way version
- ▶ Robust
 - 420 bar continuous pressure rating
 - High vibration resistance
- ▶ Precise
 - High response sensitivity, low hysteresis
- ▶ Normalized
 - Installation dimensions according to ISO 7368
- ▶ Flexible
 - Suitable for controlling position, pressure and velocity
- ▶ Safe
 - Fail-safe position of the pilot control valve in case of error; control spool of the main stage in seat position
- ▶ CE conformity according to EMC Directive 2014/30/EU.
- ▶ UKCA conformity according to Electromagnetic Compatibility Regulations SI 2016/1091

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	
2	WFC			S		L	-	1X	/		/		*

01	2 main ports	2
02	Pilot-operated proportional directional valve (cartridge valve)	WFC
03	External control electronics	no code
	Integrated electronics (OBE)	E
04	Size 16	16
	Size 25	25
	Size 32	32
	Size 40	40
	Size 50	50
05	Seat control spool	S

Nominal flow ($\Delta p = 5$ bar)

06	- Size 16	
	125 l/min ¹⁾	125
	160 l/min ²⁾	160
	- Size 25	
	220 l/min ¹⁾	220
	330 l/min ²⁾	330
	- Size 32	
	320 l/min ¹⁾	320
	650 l/min ²⁾	650
	- Size 40	
	500 l/min ¹⁾	500
	940 l/min ²⁾	940
	- Size 50	
	1000 l/min ¹⁾	1000
	1500 l/min ²⁾	1500

Flow characteristic

07	Linear	L
08	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X

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

09	NBR seals	M
	FKM seals	V

Electrical connection (external control electronics)

10	Connector 3-pole (2 + PE) according to EN 175301-803	K4 ^{3; 4)}
11	External control electronics	no code
	Supply voltage 24 VDC (on-board electronics (OBE) "E")	24

Electrical interface (on-board electronics (OBE) "E")

12	Command value 0.5 ... 10 VDC	A1 ^{3; 5)}
	Command value 0 ... 10 VDC	B1 ^{3; 6)}
	Command value 4 ... 20 mA	G1 ^{3; 6)}
13	Further details in the plain text	*

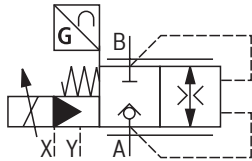
Ordering code

- 1) Control spool linear (standard)
- 2) Control spool linear – progressive
- 3) Mating connectors, separate order, see page 27 and data sheet 08006.
- 4) External control electronics, see page 27.
- 5) Switch-on of the position control at command value $\geq 0.5 \dots 10 \text{ V}$; valve seat position without position control at command value $\leq 0.3 \text{ V}$ (see page 10).
- 6) Switch-on of the position control if enable is set; valve seat position without position control by switching off the enable (see page 11).

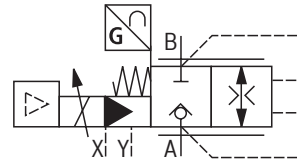
Symbols

Simplified

External control electronics "2WFC"

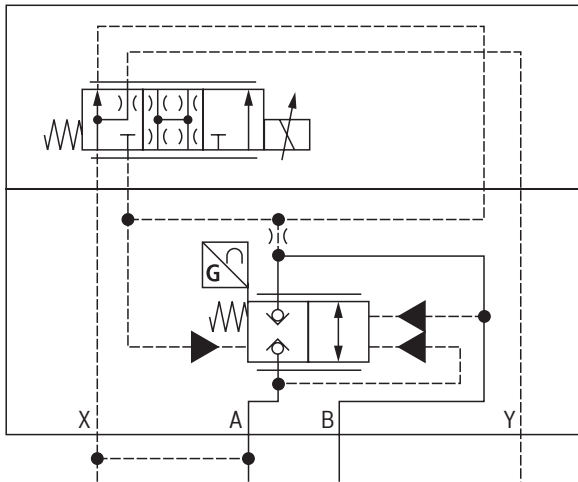


On-board electronics (OBE) "2WFCE"

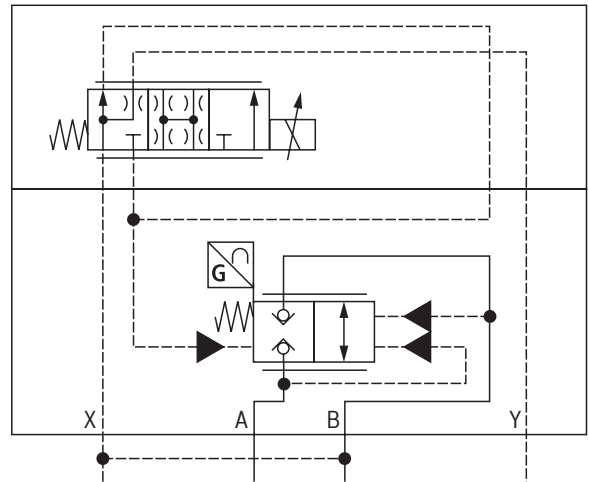


Detailed

Internal pilot oil supply (A→B)



Internal pilot oil supply (B→A)



Notice:

- External pilot oil supply (application-dependent possible)
 - A→B (pressure in X \geq pressure in A)
 - B→A (pressure in X \geq pressure in B)
- Representation according to ISO 1219-1.

Function, section

Set-up

The pilot-operated proportional directional cartridge valve type 2WFC(E) basically consists of:

- ▶ Cover (1)
- ▶ Main stage (2)
- ▶ Pilot control valve with proportional solenoid (3)
- ▶ On-board electronics with position transducer and analog interface (4) or external control electronics as module amplifier

Function

The electronics (on-board or external) compare the specified command value to the position actual value of the control spool of the main stage (2). In case of control deviations, the solenoid of the pilot control valve (3) is activated. In this way, the control spool is adjusted. Depending on the control deviation, the control chamber of the main stage (2) is either pressurized with pilot oil (the main stage closes) or unloaded (the main stage opens). Stroke and orifice cross-section are controlled proportionally to the command value until the control deviation is remedied.

For proper function, the following has to be observed:

- ▶ Direction of flow A → B (X connected to A)
- ▶ Direction of flow B → A (X connected to B)
- ▶ Port Y depressurized to the tank
- ▶ Pressure in port Y acts against the pressure in ports A and B to open the main stage.
- ▶ Pressure in ports A and B simultaneously acts against pilot pressure X
- ▶ Observe the leakage flow at the pilot control valve

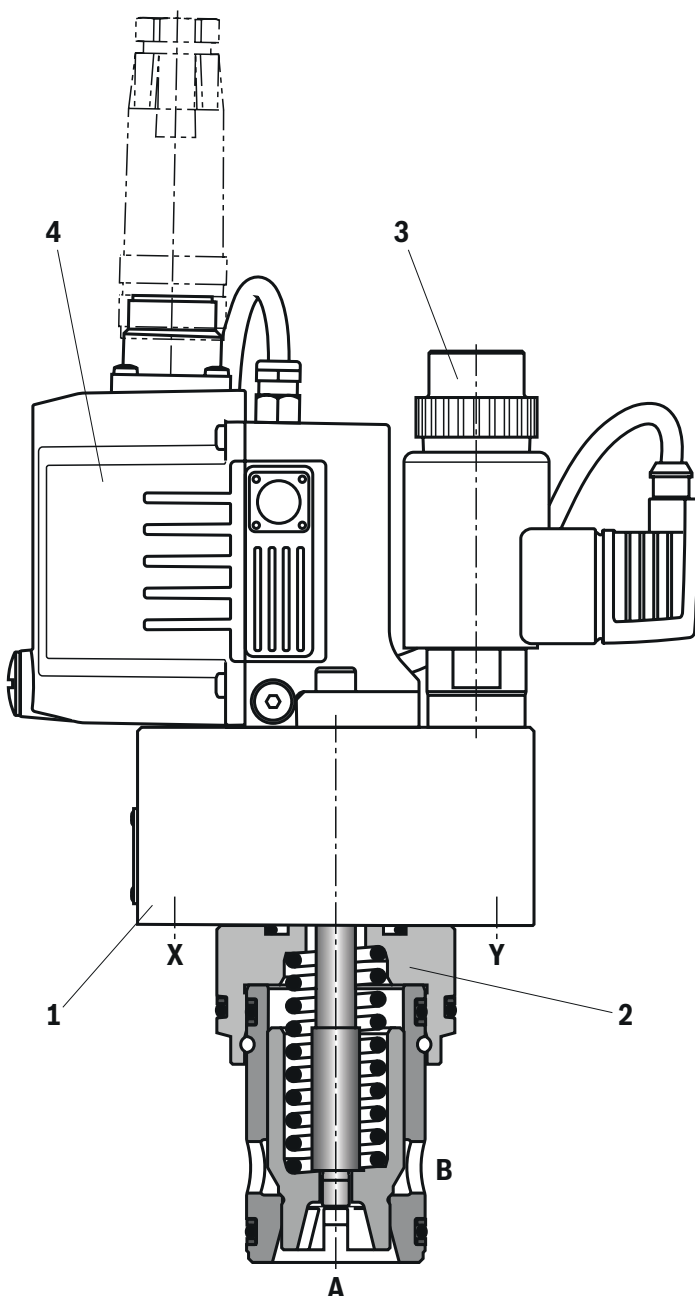
Failure of supply voltage

If the minimum supply voltage fails or is fallen below, the enable is disconnected (only interfaces "B1" and "G1") and in case of a cable break of the solenoid conductor, the electronics will de-energize the solenoid of the pilot control valve (3). The control spool of the main stage (2) moves securely to its seat using the pressure available at port X and the force of the main stage spring and blocks the flow between A and B.



Notice:

Pilot oil must be present before the electronics are switched on (also in case of error or emergency stop).



Type 2WFCE ...

Technical data

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

General							
Size	NG	16	25	32	40	50	
Type of connection	Cartridge valve						
Weight	► Type 2WFC	kg	3.3	4.4	5.6	7.7	10.3
	► Type 2WFCE	kg	3.5	4.6	5.8	7.9	10.5
Installation position	Any						
Ambient temperature range	°C	−20 ... +60					
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					
MTTF _D values according to EN ISO 13849	Years	75 (for further details see data sheet 08012)					
Sine test according to EN 60068-2-6	10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes						
Noise test according to EN 60068-2-64	20 ... 2000 Hz / 10 g _{RMS} / 30 g peak / 30 min. / 3 axes						
Transport shock according to EN 60068-2-27	15 g / 11 ms / 3 shocks / 3 axes						
Conformity	► CE according to EMC directive 2014/30/EU, tested according to	EN 61000-6-2 and EN 61000-6-3					
	► UKCA according to EMC Directive SI 2016/1091, tested according to	EN 61000-6-2 and EN 61000-6-3					
	► RoHS Directive	2015/65/EU ¹⁾					

¹⁾ The product fulfills the substance requirements of the RoHS Directive 2015/65/EU.

Technical data

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

Hydraulic							
Maximum operating pressure	► Port A, B	bar	420				
	► Port Y ²⁾	bar	100				
Minimum operating pressure	► Port A (A→B) ²⁾	bar	12				
	► Port B (B→A) ²⁾	bar	20				
Hydraulic fluid			See table page 7				
Hydraulic fluid temperature range (flown-through)		°C	-20 ... +70				
Viscosity range	► Recommended	mm ² /s	20 ... 100				
	► Maximum admissible	mm ² /s	15 ... 380				
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)			Class 18/16/13 ³⁾				
Rated flow ($\Delta p = 5$ bar ⁴⁾)	► Linear	l/min	125	220	320	500	1000
	► Linear-progressive	l/min	160	330	650	940	1500
Maximum flow ⁵⁾	► Linear	l/min	350	600	1000	1500	3000
	► Linear-progressive	l/min	400	800	2000	3000	4500
Maximum leakage flow	► Pilot control valve (at 100 bar)	cm ³ /min	<150	<200	<200	<400	<400
	► Main stage		Depending on Δp , see characteristic curves on page 13 ...22				
	– Command value 0% ⁶⁾	cm ³ /min					
	– Electric shut-off ^{7; 8; 9)}						
Maximum pilot pressure		bar	420				
Pilot flow	► Port X	l/min	3	5	7	9	9

²⁾ Pressure in port Y acts against the pressure in ports A and B to open the main stage.

³⁾ 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.

⁴⁾ Flow for deviating Δp :

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

⁵⁾ Flow velocity 30 m/s in port A or B (otherwise increased cavitation erosion)

⁶⁾ Control spool regulated, positive overlap.

⁷⁾ Pin 3:

► Version "B1" and "G1": Enable not set

► Version "A1": Command value <0.3 V

⁸⁾ Observe the leakage flow at the pilot control valve.

⁹⁾ A minimum leakage flow X→B and B→X up to 30 cm³/min is possible via the control spool clearance at the main stage.

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)	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 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	%	<0.2	
Range of inversion	%	<0.1	
Response sensitivity	%	<0.1	
Manufacturing tolerance q_{Vmax}	► Linear	%	≤±5
	► Linear–progressive	%	≤±10
Temperature drift	%/40 K	<1	
Zero point calibration	%	±1 (ex works)	

Technical data

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

Electrical, on-board electronics (OBE) – Interface "A1"				
Supply voltage	▶ Nominal value	VDC	24	
	▶ Minimum	VDC	18	
	▶ Maximum	VDC	36	
	▶ Maximum residual ripple	V	2.5 (comply with the absolute supply voltage limit values)	
	▶ Maximum power consumption	VA	50	
	▶ Current	Maximum	A	2
	consumption	Impulse current	A	3
	▶ 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 page 12	
Maximum voltage of the differential inputs against 0 V			D→B; E→B (max. 18 V)	
Command value (differential amplifier)	▶ Measurement range	V	0 ... 10	
	▶ Input resistance	Ω	>100	
Actual value (test signal)	▶ Output range	V	0 ... 10 ¹⁰⁾	
	▶ Minimum load impedance	kΩ	>1	

¹⁰⁾ Command value <0.3 V: –3 ... –5 V (seat position)

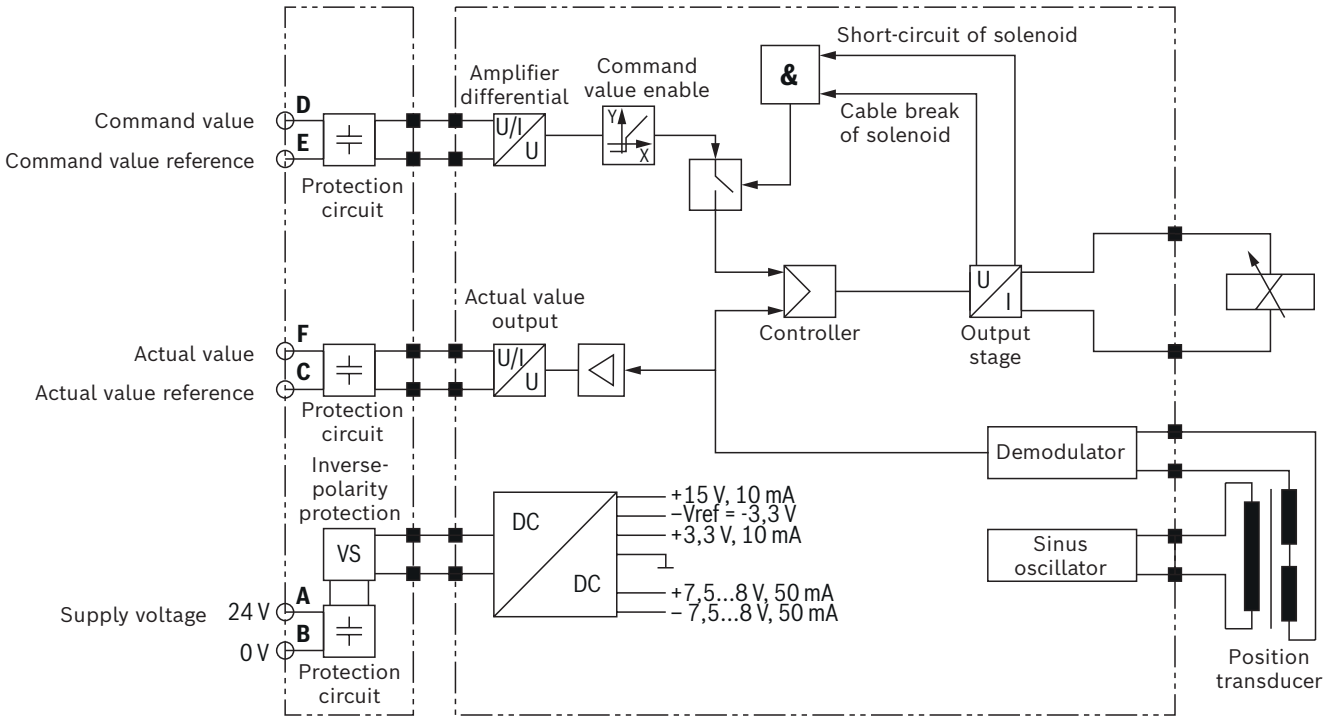
Technical data

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

Electrical, on-board electronics (OBE) – Interface "B1"			
Supply voltage	► Nominal value	VDC	24
	► Minimum	VDC	19
	► Maximum	VDC	36
	► Maximum residual ripple	V	2.5
	► Maximum power consumption	VA	50
	► Current consumption	Maximum	A 2
		Impulse current	A 3
	► 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 page 12
Maximum voltage of the differential inputs against 0 V			4→2; 5→2 (max. 18 V)
Command value (differential amplifier)	► Measurement range	V	0 ... 10
	► Input resistance	Ω	>100
Actual value (test signal)	► Output range	V	0 ... 10 (without enable negative -3 ... -5)
	► Minimum load impedance	kΩ	>1
Enable	► Low level range	V	-3 ... 5
	► High level range	V	>12
	► Maximum current consumption at high level	mA	5
Valve ready for operation (output)	► Low level range	V	<8
	► High level range	V	>16
	► Current carrying capacity	mA	50
	► Inductive load admissible		Yes

Electrical, on-board electronics (OBE) – Interface "G1"			
Supply voltage	► Nominal value	VDC	24
	► Minimum	VDC	19
	► Maximum	VDC	36
	► Maximum residual ripple	V	2.5
	► Maximum power consumption	VA	50
	► Current consumption	Maximum	A 2
		Impulse current	A 3
	► 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 page 12
Maximum voltage of the differential inputs against 0 V			4→2; 5→2 (max. 18 V)
Command value	► Input current range	mA	4 ... 20
	► Input resistance	Ω	200
Actual value (test signal)	► Output range	mA	4 ... 20 (without enable 2.7 ... 1)
	► Maximum load	Ω	500
Enable	► Low level range	V	-3 ... 5
	► High level range	V	>12
	► Maximum current consumption at high level	mA	5
Valve ready for operation (output)	► Low level range	V	<8
	► High level range	V	>16
	► Current carrying capacity	mA	50
	► Inductive load admissible		Yes

Block diagram/controller function block: Version "A1"



Switch-on procedure/fault behavior

Pilot oil must be present.
After applying the supply voltage of 24 V, the electronics are ready for operation provided that the following conditions are met:

- Supply voltage $U_B > 18$ VDC
- Connection to solenoid not interrupted
- Command value line not interrupted



Notice:

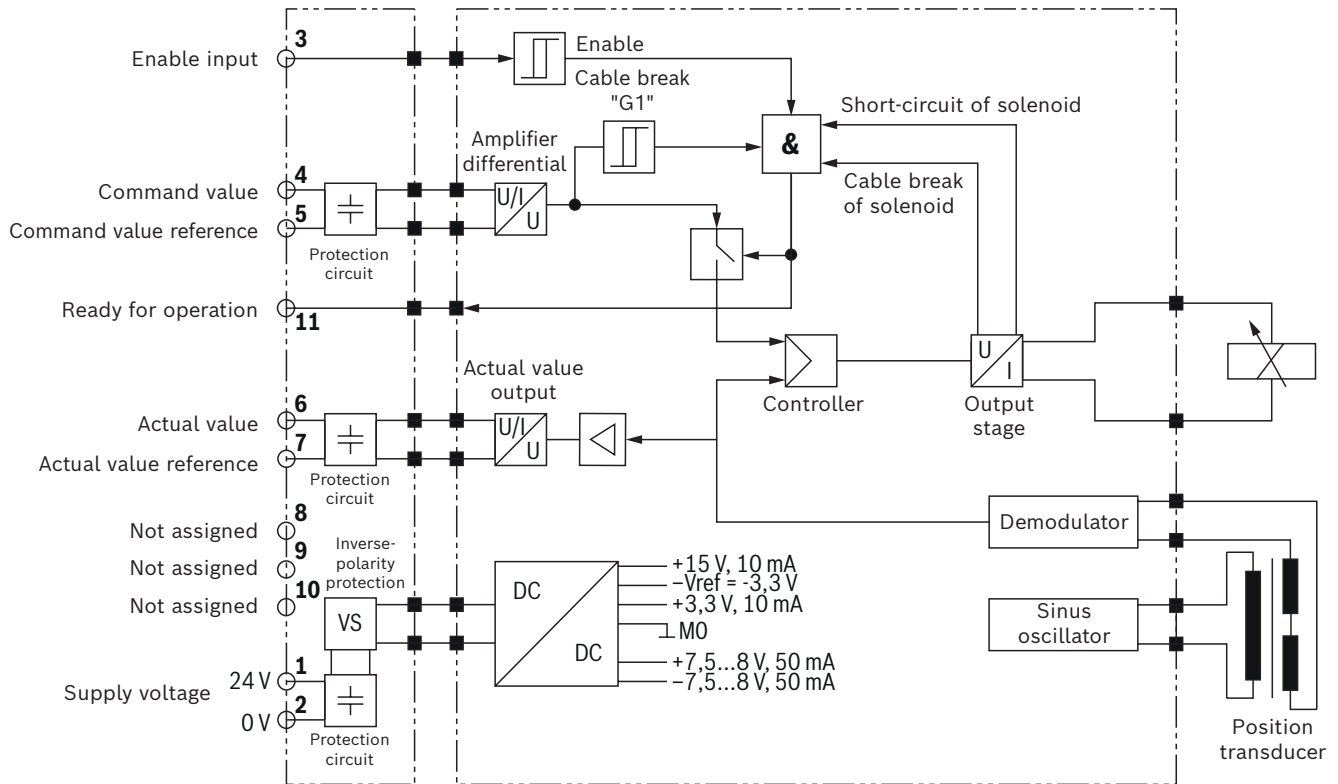
- Opening direction: Valve active if command value ≥ 0.5 V
- Closing direction: Valve deactivated if command value ≤ 0.3 V (control spool in seat position)
- Command value 0.4 V: Valve in positive overlap, but already regulated.

Actual value output signals

Pin F:

- 0.35 ... 10 V corresponds to 0 ... 100% valve opening
- Actual value < 0.3 V Control spool in seat position

Command value	Actual value	Symbol	Feature
0 ... 0.3 V	-1 ... -5 V		A→B; B→A closed
0.35 ... 0.5 V	0.35 ... 0.5 V		Positive overlap; leakage A→B; B→A
0.5 ... 10 V	0.5 ... 10 V		A→B; B→A

Block diagram/controller function block: Version "B1" and "G1"**Switch-on procedure/fault behavior**

Pilot oil must be present.

After applying the supply voltage of 24 V, the electronics are ready for operation provided that the following conditions are met:

- Supply voltage $U_B > 18$ VDC
- Connection to solenoid not interrupted
- Command value line not interrupted and command value > 2.7 mA ("G1" version only)

Actual value output signals

Pin 6:

- Version "B1"
 - 0 ... 10 V corresponds to 0 ... 100% valve opening
 - Without enable if negative actual value -1 ... -5 V: Control spool in seat position
- Version "G1"
 - 4 ... 20 mA corresponds to 0 ... 100% valve opening; control spool in seat position if actual value < 2.7 mA

**Notice:**

- Opening direction: Valve active if enable pin 3 is set; command value ≥ 0 V ("B1") or ≥ 4 mA ("G1")
- Closing direction: Valve deactivated if enable pin 3 is not set; switching off possible if command value 0 ... 10 V or 4 ... 20 mA.
- Command value 0 V ("B1") or 4 mA ("G1"): Valve in positive overlap, but already regulated.

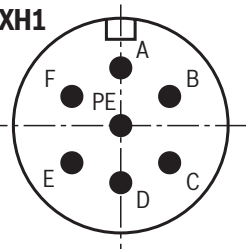
Command value	Actual value	Enable	Symbol	Feature
–	–1 ... –5 V; 2.7 ... 1 mA	Inactive		A → B; B → A closed
0 V; 4 mA	0 V; 4 mA	Active		Positive overlap; leakage A → B; B → A
0 ... 10 V; 4 ... 20 mA	0 ... 10 V; 4 ... 20 mA	Active		A → B; B → A


Electrical connections and assignment

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

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

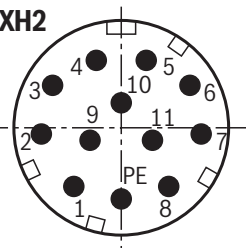
Connection cable	► Up to 20 m cable length type LiYCY 7 x 0.75 mm ²
	► Up to 40 m cable length type LiYCY 7 x 1.0 mm ²
	► EMC-compliant installation:
	– Apply screening to both line ends – Use metal mating connector (see page 27)
	► Alternatively up to 30 m cable length admissible
	– Apply screening on supply side
	– Plastic mating connector (see page 27) can be used



 **Notice:**
Mating connectors, separate order, see page 27 and data sheet 08006.

Connector pin assignment "XH2", 11-pole + PE according to EN 175201-804

Pin	Core marking		Interface assignment	
	Cable, one-part ¹⁾	Cable, split ²⁾	"B1"	"G1"
1	1	1	Supply voltage	Supply voltage
2	2	2	GND	GND
3	3	White	Enable input	Enable input
4	4	Yellow	Command value	Command value
5	5	Green	Reference potential command value	Reference potential command value
6	6	Violet	Actual value	Actual value
7	7	Pink	Reference potential actual value	Reference potential actual value
8	8	Red	Not assigned	Not assigned
9	9	Brown	Not assigned	Not assigned
10	10	Black	Not assigned	Not assigned
11	11	Blue	Switching output 24 V – fault-free operation (supply voltage -1 V) / error (0 V) or power circuit signal)	
PE	Green-yellow	Green-yellow	Functional ground (connected directly to metal housing)	

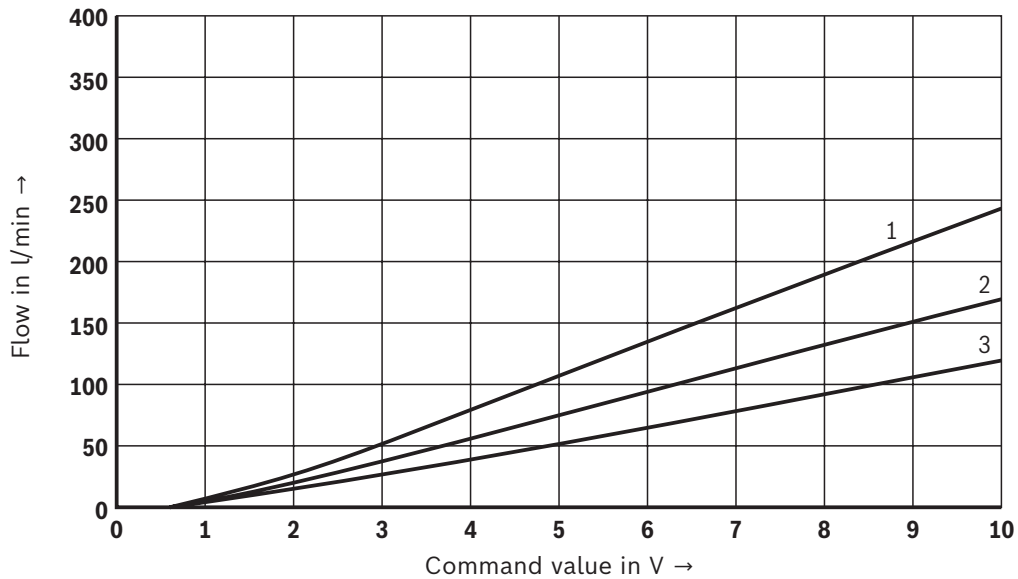


- ¹⁾ Core marking of the connection lines for mating connector with cable set (see accessories, page 27, material numbers R901268000, R901272854, R901272852)
- ²⁾ Core marking of the connection lines for mating connector with cable set (see accessories, page 27, material numbers R900884671, R900032356, R900860399)

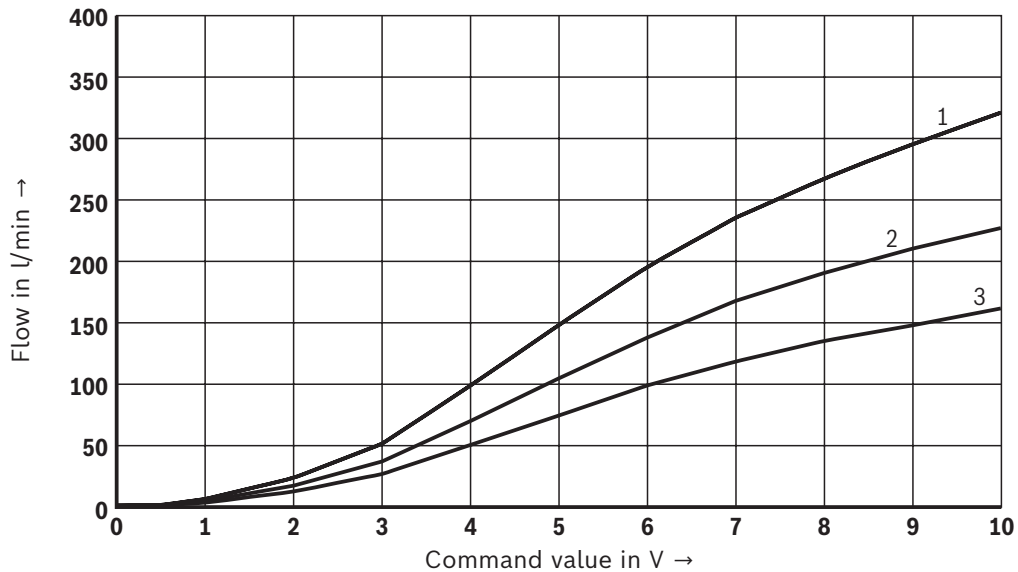
Characteristic curves: Size 16
(measured with HLP46, $\vartheta_{\text{oil}} = 40 \pm 5 \text{ }^{\circ}\text{C}$)

Flow/signal function

Version "125" (A→B; B→A; linear)



Version "160" (A→B; B→A; linear-progressive)



- 1 Pressure differential 20 bar
- 2 Pressure differential 10 bar
- 3 Pressure differential 5 bar



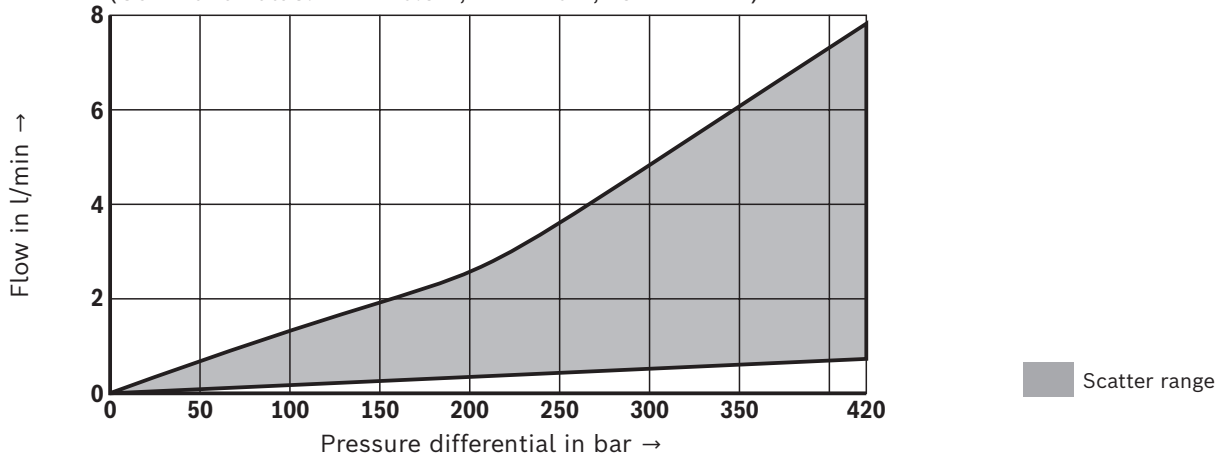
Notice:

Typical characteristic curves which are subject to tolerance variations.

Characteristic curves: Size 16
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

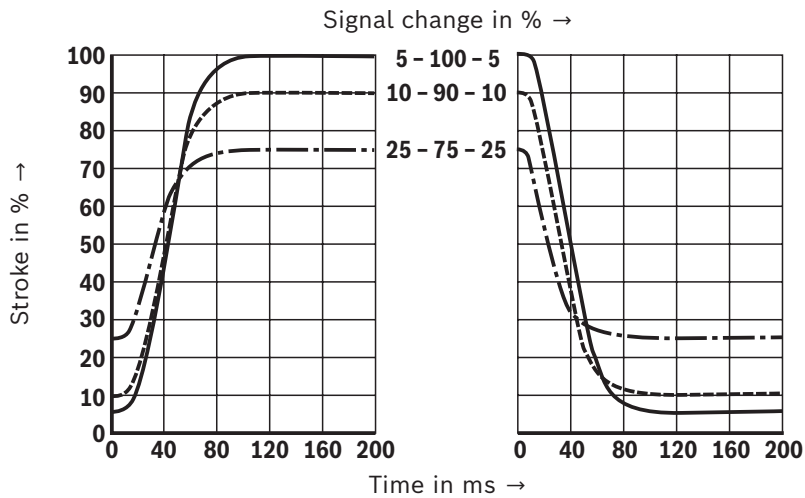
Leakage as a function of the pressure differential

(Command value: "A1" – 0.5 V; "B1" – 0 V; "G1" – 4 mA)

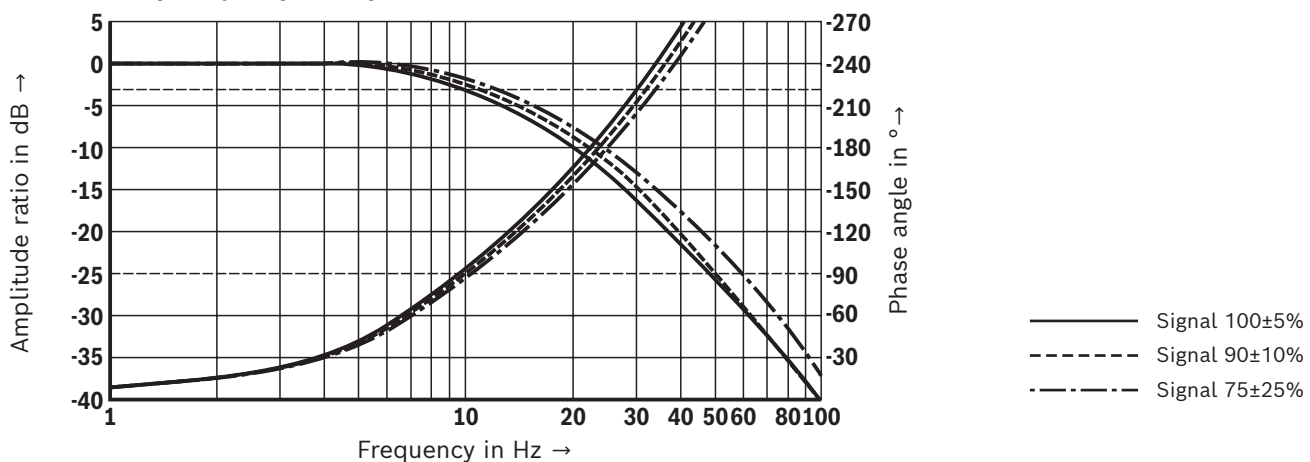


Transition function with stepped electric input signals

($p_A = p_B = 100 \text{ bar}$; port B closed; actuating time depending on port A, B, X and Y)



Frequency response ($p_A = 100 \text{ bar}$)



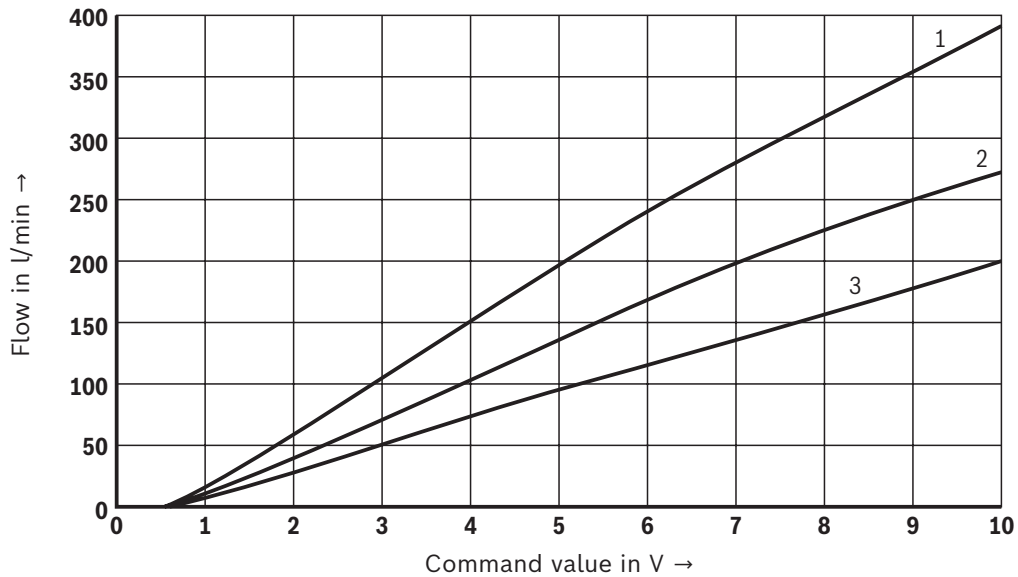
Notice:

Typical characteristic curves which are subject to tolerance variations.

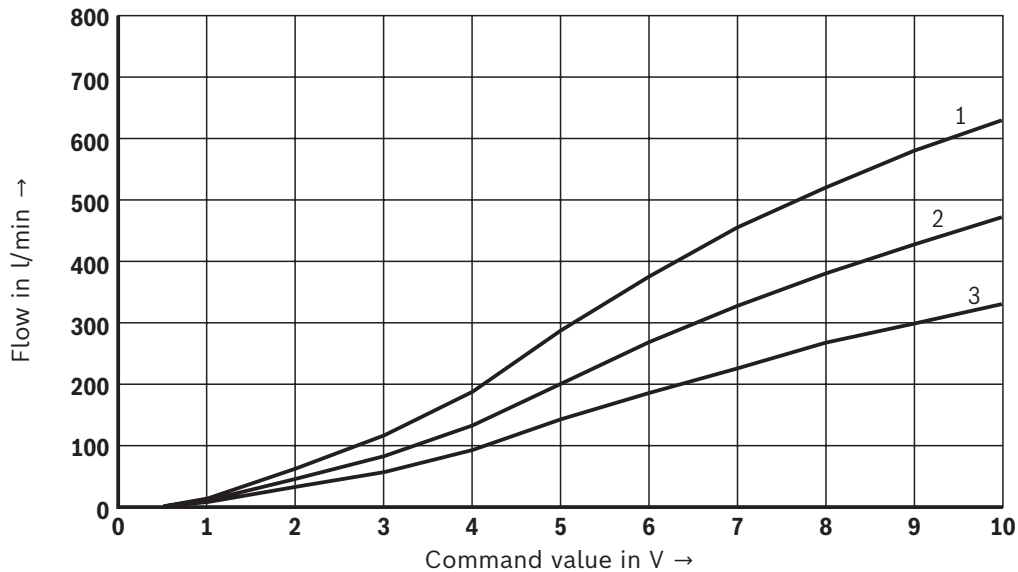
Characteristic curves: Size 25
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

Flow/signal function

Version "220" (A→B; B→A; linear)



Version "330" (A→B; B→A; linear-progressive)



- 1 Pressure differential 20 bar
- 2 Pressure differential 10 bar
- 3 Pressure differential 5 bar



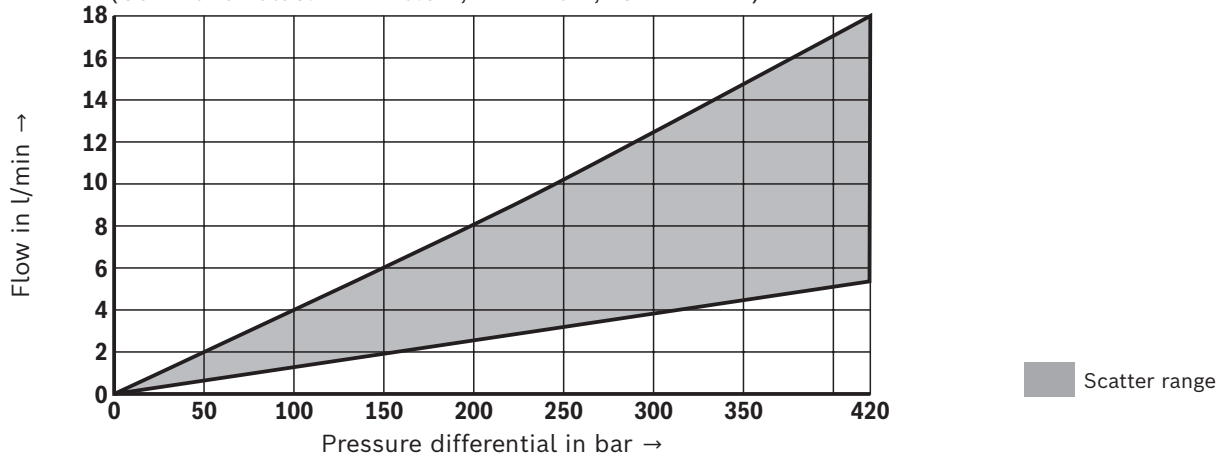
Notice:

Typical characteristic curves which are subject to tolerance variations.

Characteristic curves: Size 25
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

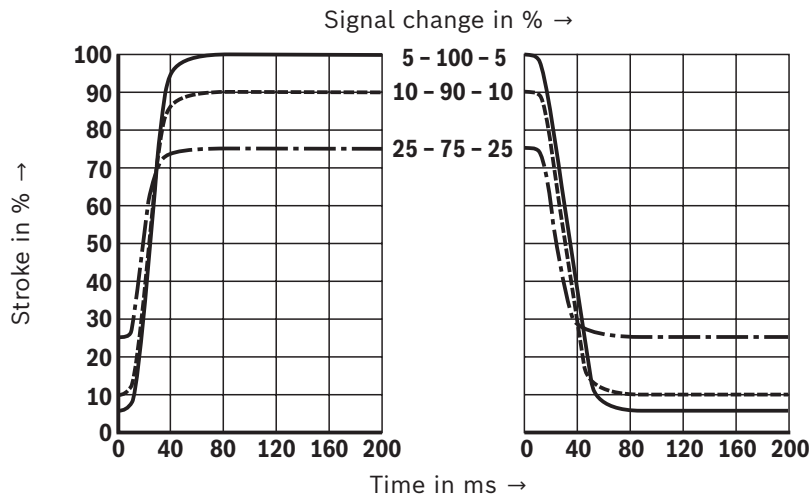
Leakage as a function of the pressure differential

(Command value: "A1" – 0.5 V; "B1" – 0 V; "G1" – 4 mA)

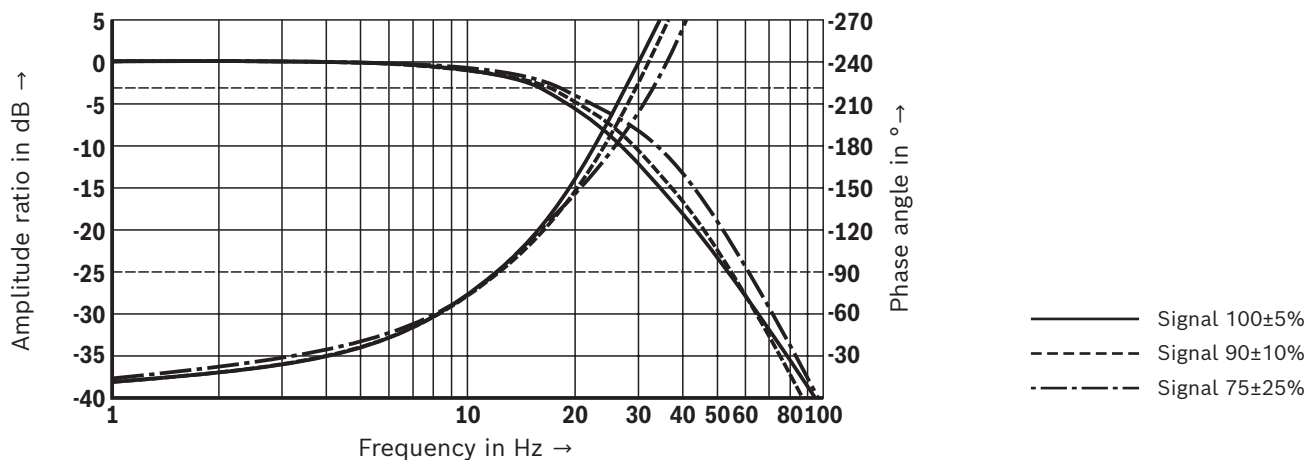


Transition function with stepped electric input signals

($p_A = p_B = 100 \text{ bar}$; port B closed; actuating time depending on port A, B, X and Y)



Frequency response ($p_A = 100 \text{ bar}$)



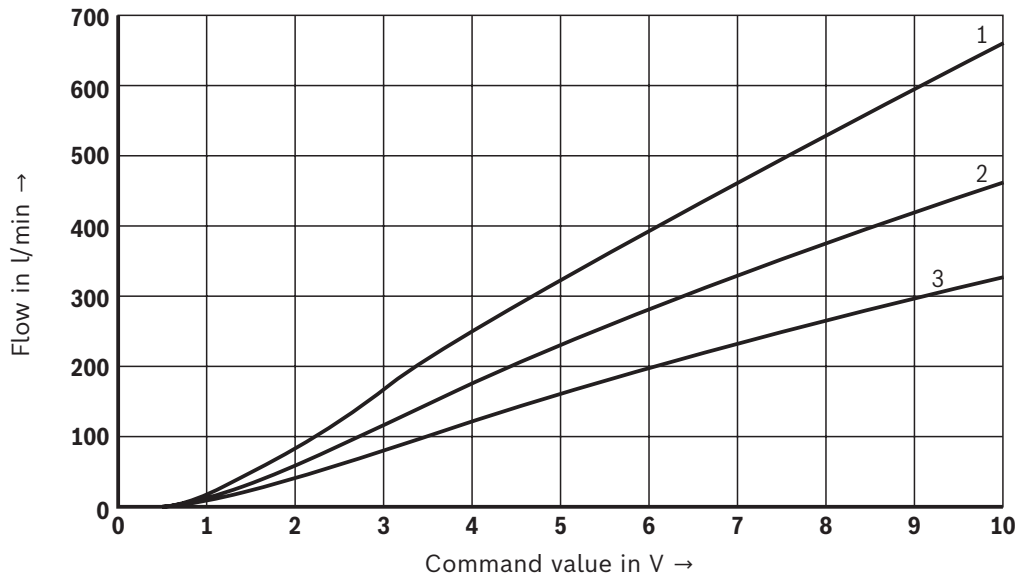
Notice:

Typical characteristic curves which are subject to tolerance variations.

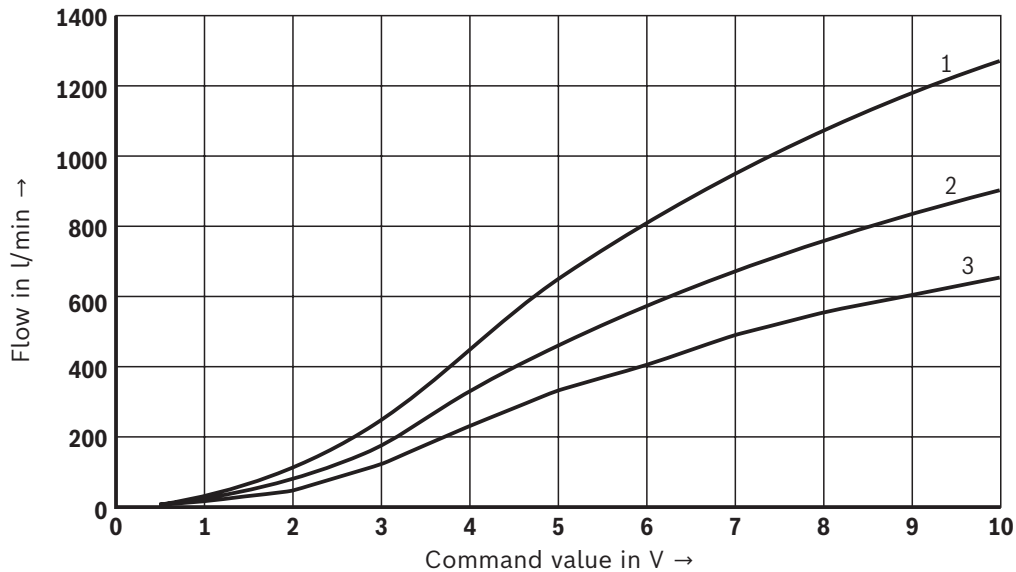
Characteristic curves: Size 32
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$)

Flow/signal function

Version "320" (A→B; B→A; linear)



Version "650" (A→B; B→A; linear-progressive)



- 1 Pressure differential 20 bar
- 2 Pressure differential 10 bar
- 3 Pressure differential 5 bar



Notice:

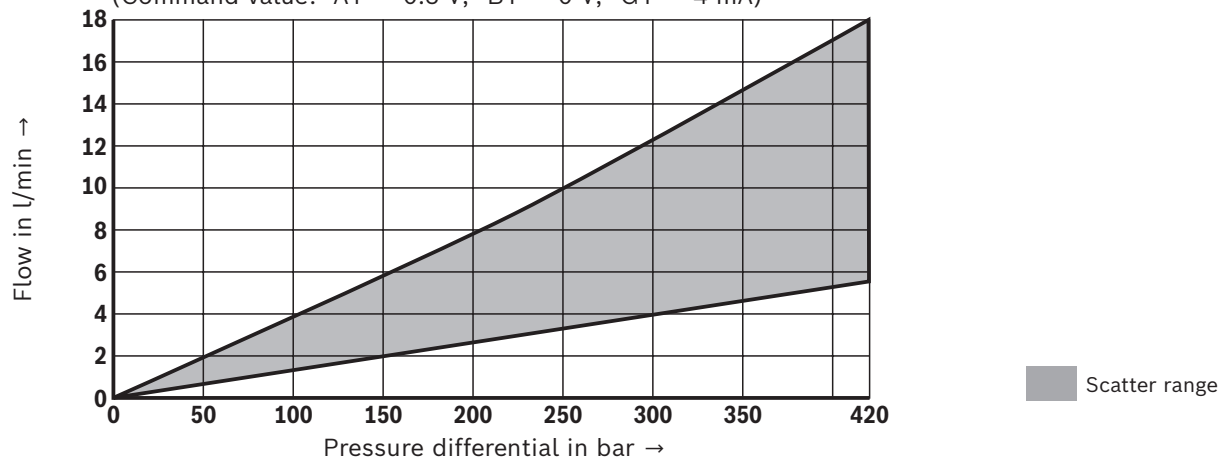
Typical characteristic curves which are subject to tolerance variations.

Characteristic curves: Size 32

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

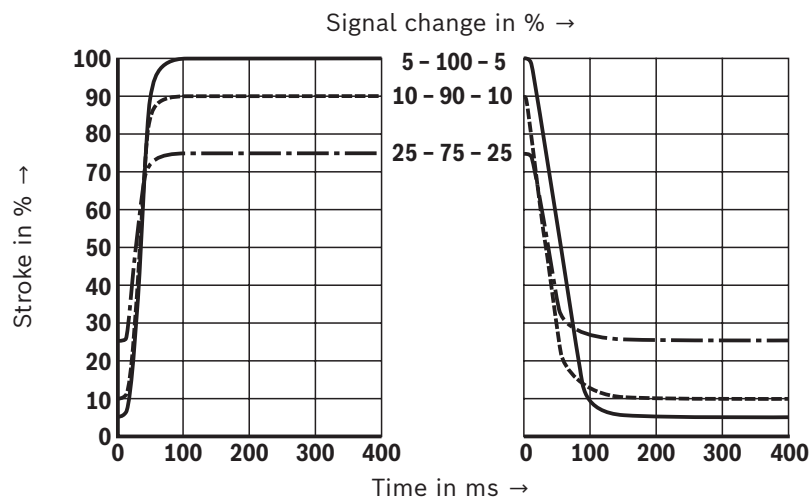
Leakage as a function of the pressure differential

(Command value: "A1" – 0.5 V; "B1" – 0 V; "G1" – 4 mA)

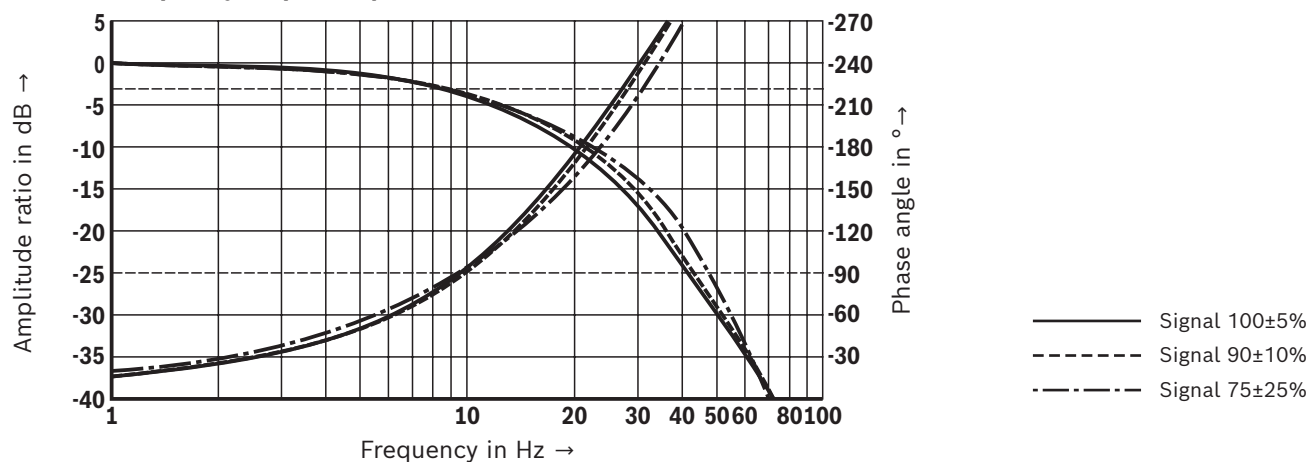


Transition function with stepped electric input signals

($p_A = p_B = 100 \text{ bar}$; port B closed; actuating time depending on port A, B, X and Y)



Frequency response ($p_A = 100 \text{ bar}$)



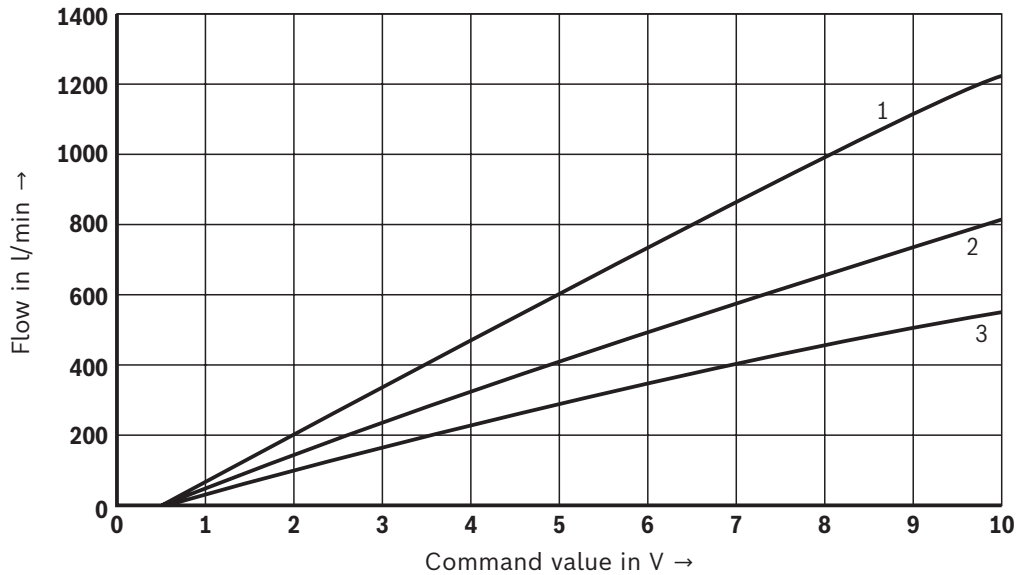
Notice:

Typical characteristic curves which are subject to tolerance variations.

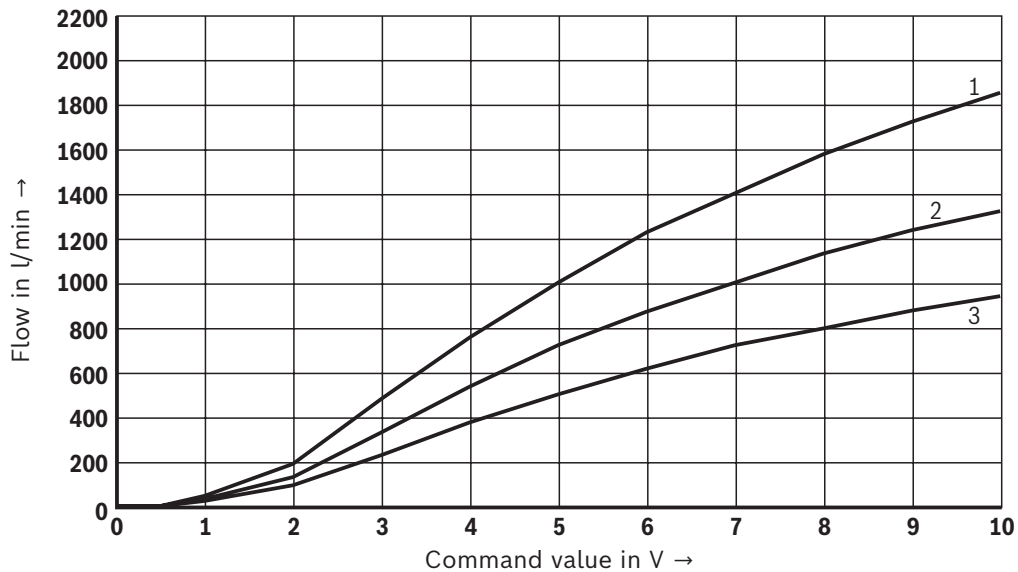
Characteristic curves: Size 40
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

Flow/signal function

Version "500" (A→B; B→A; linear)



Version "940" (A→B; B→A; linear-progressive)



- 1 Pressure differential 20 bar
- 2 Pressure differential 10 bar
- 3 Pressure differential 5 bar



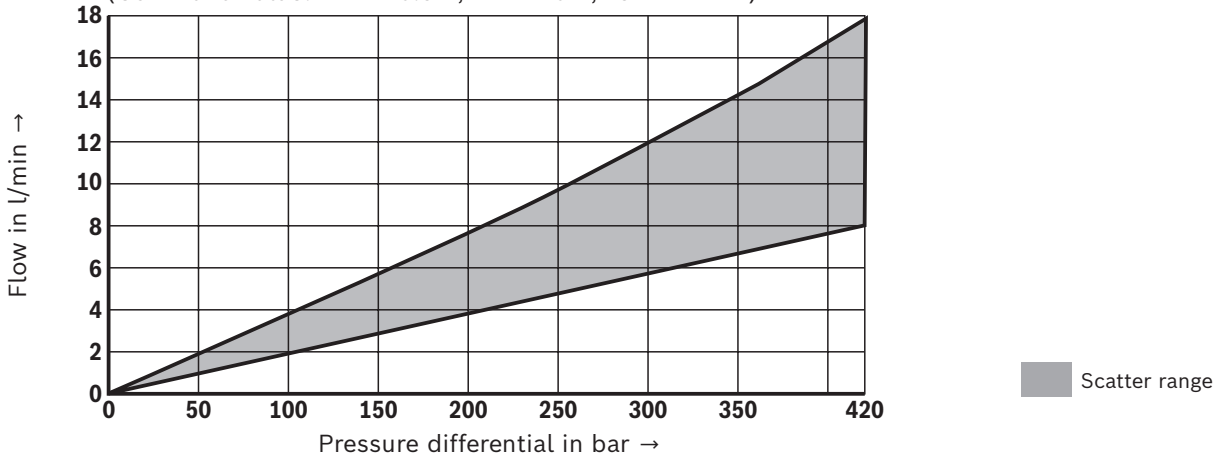
Notice:

Typical characteristic curves which are subject to tolerance variations.

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

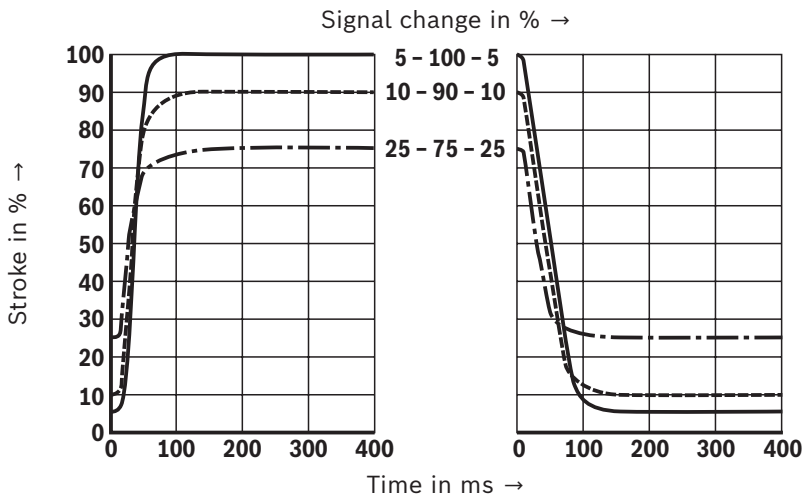
Leakage as a function of the pressure differential

(Command value: "A1" – 0.5 V; "B1" – 0 V; "G1" – 4 mA)

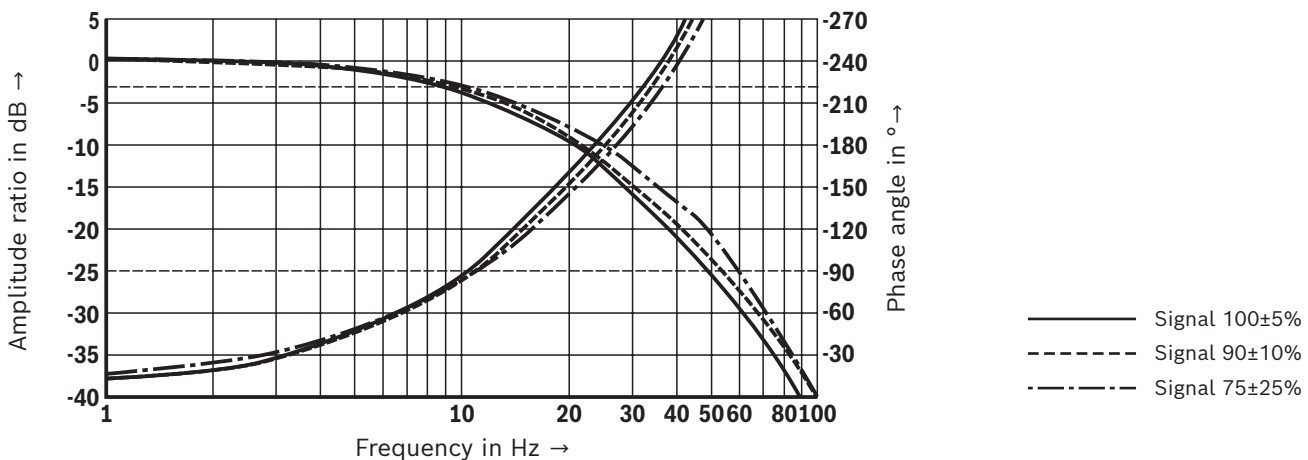


Transition function with stepped electric input signals

($p_A = p_B = 100 \text{ bar}$; port B closed; actuating time depending on port A, B, X and Y)



Frequency response ($p_A = 100 \text{ bar}$)



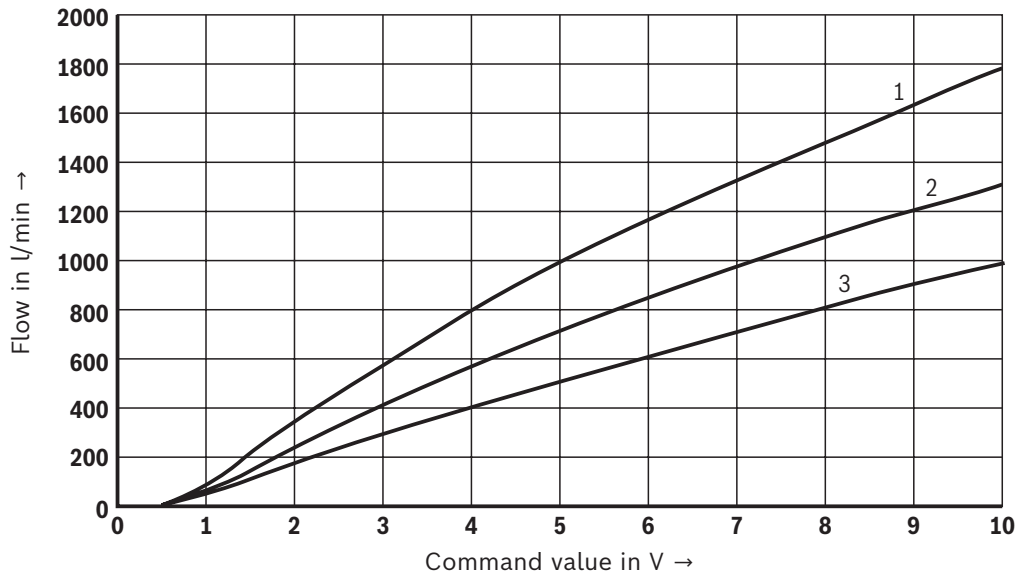
Notice:

Typical characteristic curves which are subject to tolerance variations.

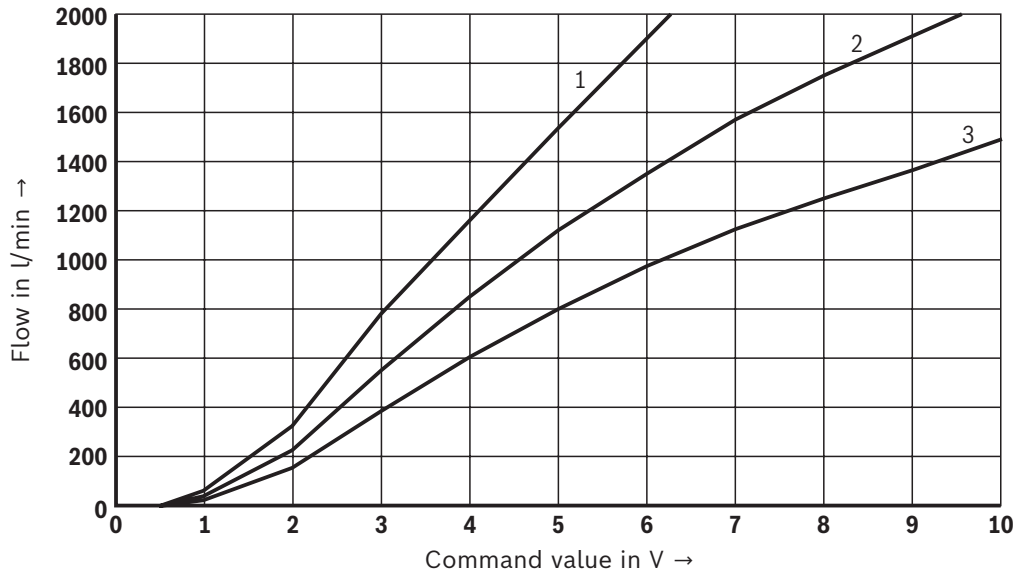
Characteristic curves: Size 50
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$)

Flow/signal function

Version "1000" (A→B; B→A; linear)



Version "1500" (A→B; B→A; linear-progressive)



- 1 Pressure differential 20 bar
- 2 Pressure differential 10 bar
- 3 Pressure differential 5 bar

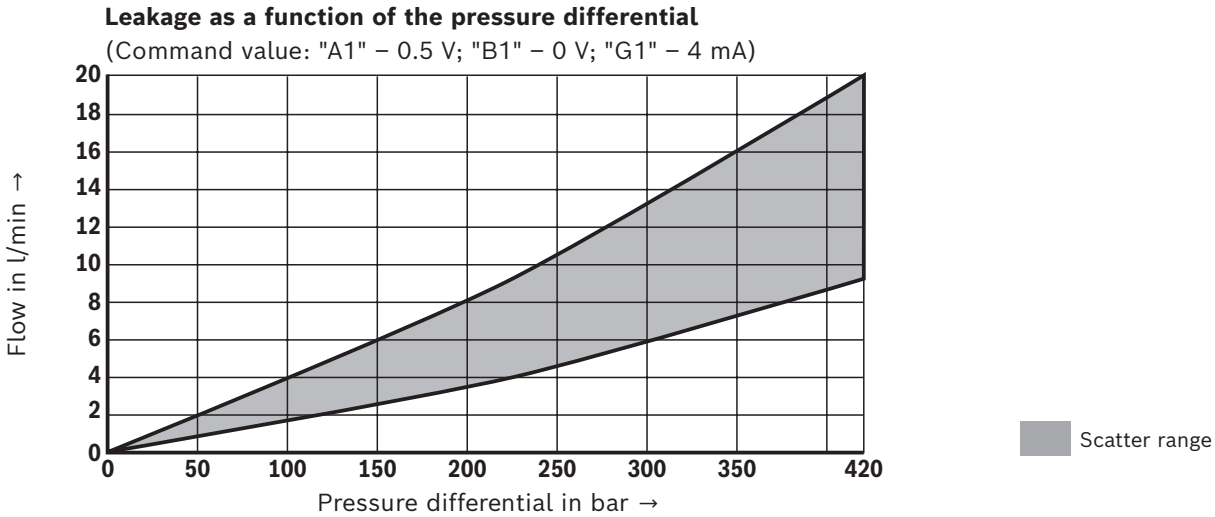


Notice:

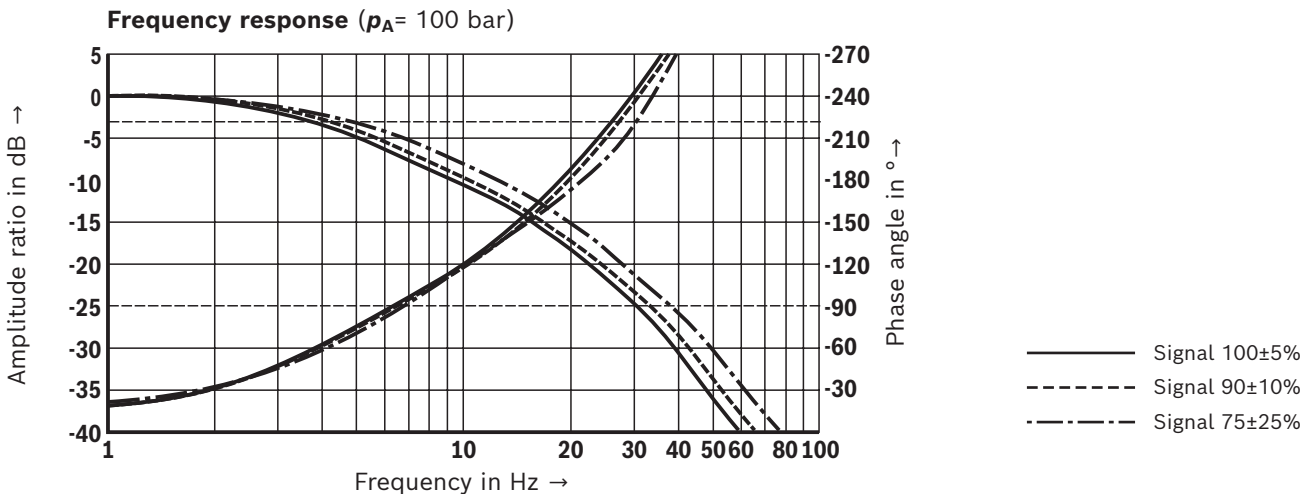
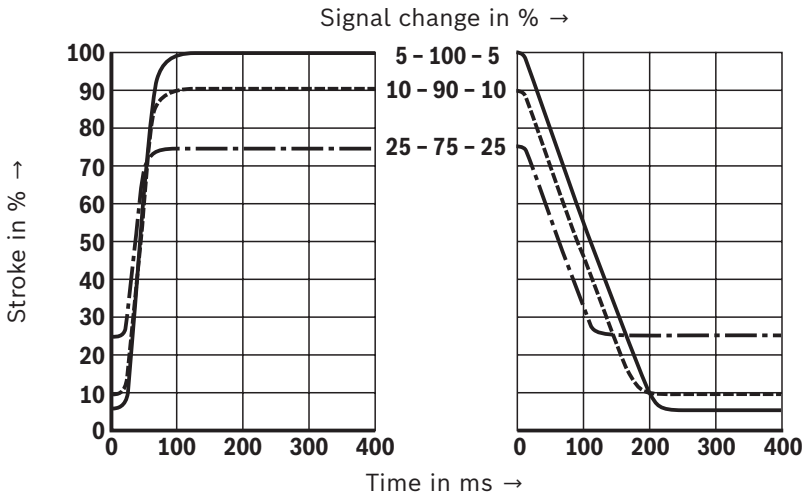
Typical characteristic curves which are subject to tolerance variations.

Characteristic curves: Size 50

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



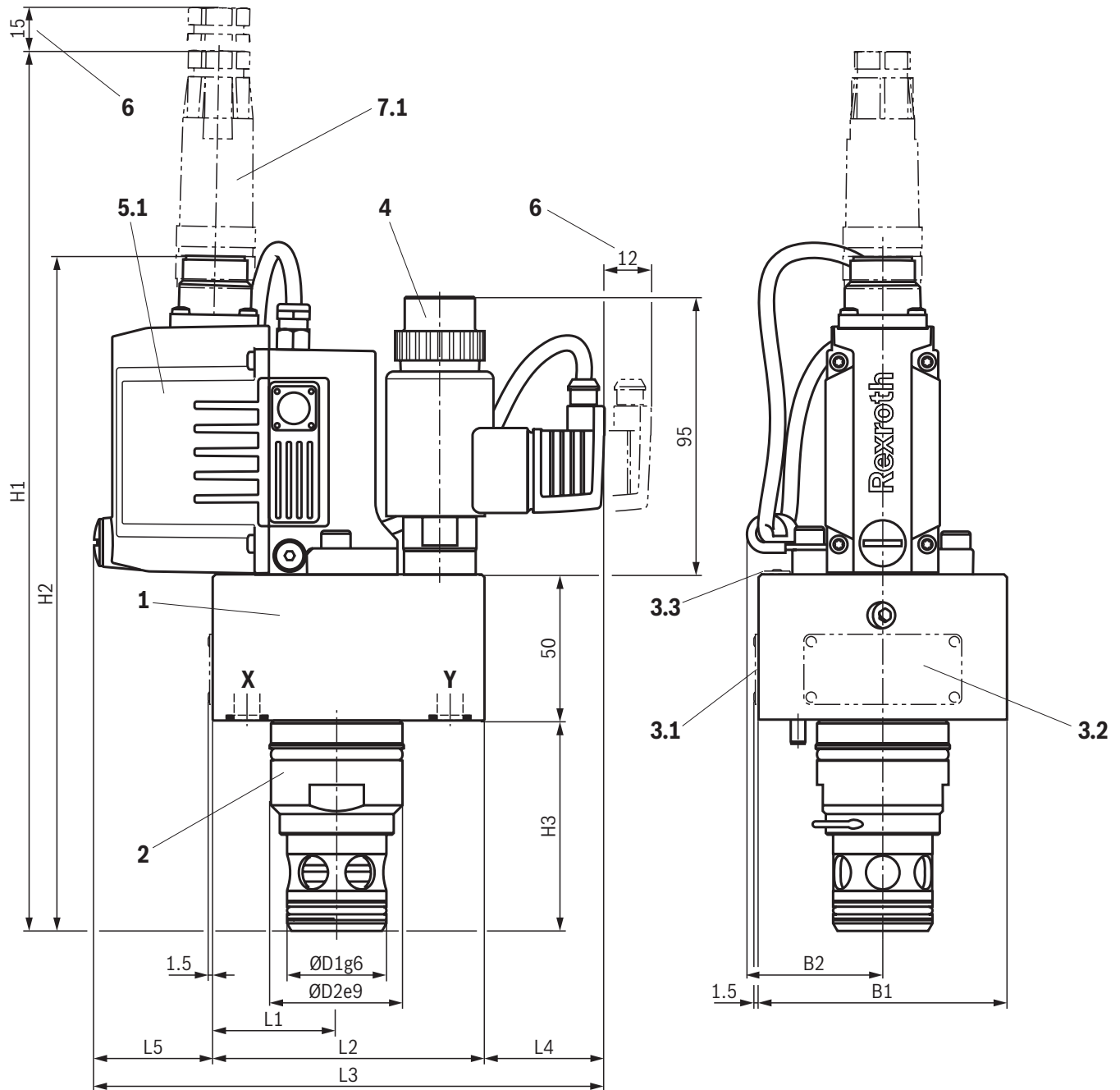
Transition function with stepped electric input signals
($p_A = p_B = 100 \text{ bar}$; port B closed; actuating time depending on port A, B, X and Y)



Notice:

Typical characteristic curves which are subject to tolerance variations.

Dimensions: With on-board electronics (OBE) "E"
(dimensions in mm)



NG	B1	B2	H1	H2	H3	L1	L2	L3	L4	L5	ØD1	ØD2
16	65	47	286	215	56	32.5	83	175	42	50	24	32
25	85	47	302	231	72	42.5	93	175	42	40	34	45
32	100	–	315	244	85	50	100	175	42	33	45	60
40	125	–	335	264	105	62.5	125	190	45	20	55	75
50	140	–	352	281	122	70	140	190	38	12	68	90

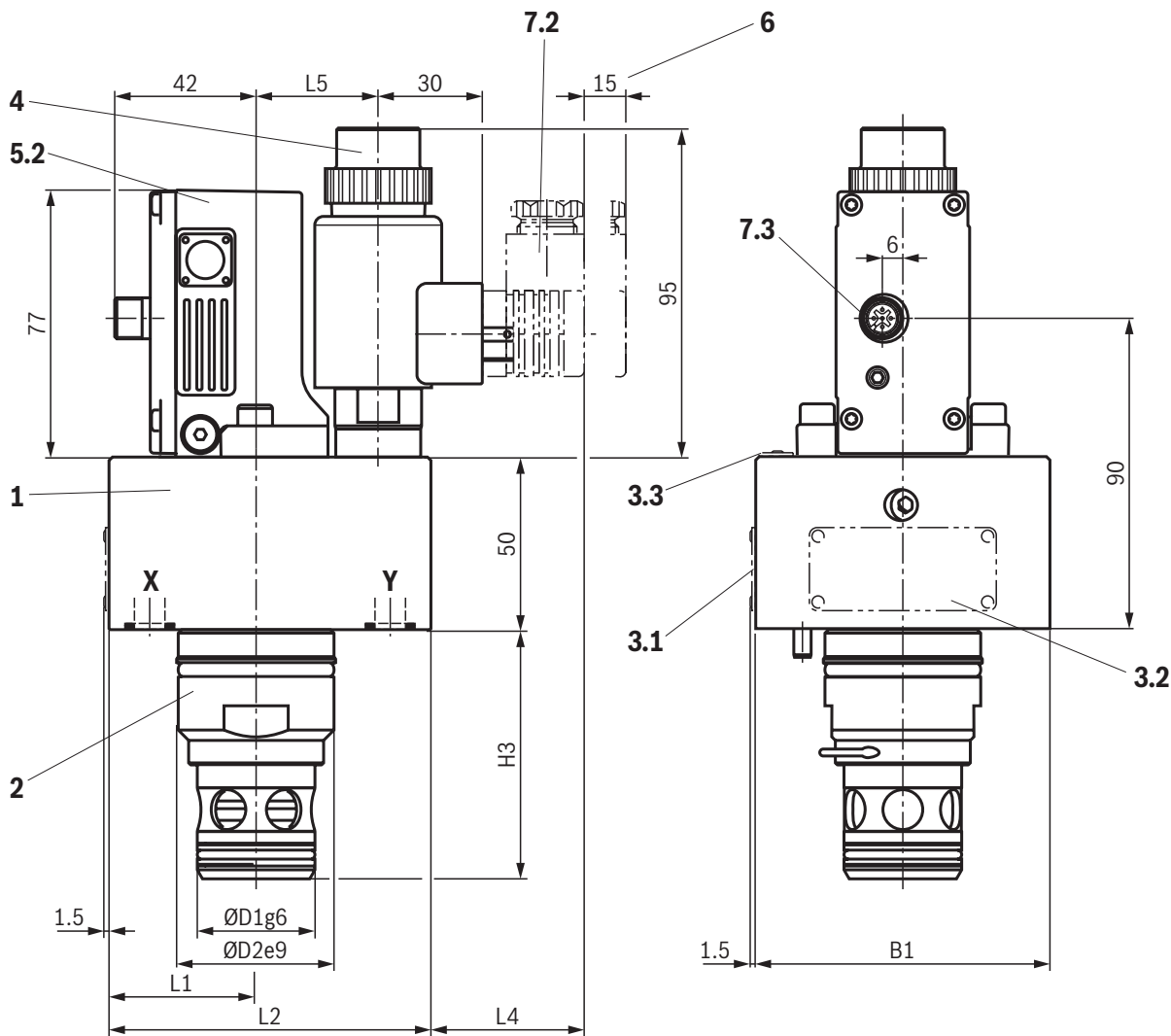


Notice:


The dimensions are nominal dimensions which are subject to tolerances.

Item explanations and valve mounting screws
see page 25.

Dimensions: With external control electronics
(dimensions in mm)



NG	B1	H3	L1	L2	L4	L5	ØD1	ØD2
16	65	56	32.5	83	42	36	24	32
25	85	72	42.5	93	42	36	34	45
32	100	85	50	100	42	36	45	60
40	125	105	62.5	125	45	42	55	75
50	140	122	70	140	38	46.5	68	90

 **Notice:**
The dimensions are nominal dimensions which are subject to tolerances.

Item explanations and valve mounting screws
see page 25.

Dimensions

- 1 Cover
- 2 Main stage
- 3.1 Name plate NG16
- 3.2 Name plate NG25 ... 40
- 3.3 Name plate NG50
- 4 Pilot control valve with proportional solenoid
- 5.1 Integrated electronics with position transducer and analog interface
- 5.2 External control electronics with position transducer. Mating connectors for valves with "M12" connector (separate order, see page 27 and data sheet 08006)
- 6 Space required for removing the mating connectors
- 7.1 Mating connectors/cable set for valves with round connector (separate order, see page 27 and data sheet 08006)
- 7.2 Mating connectors for valves with "K4" connector (separate order, see page 27 and data sheet 08006)
- 7.3 Mating connectors for sensors and valves with "M12 x 1" connector (separate order, see page 27 and data sheet 08006)

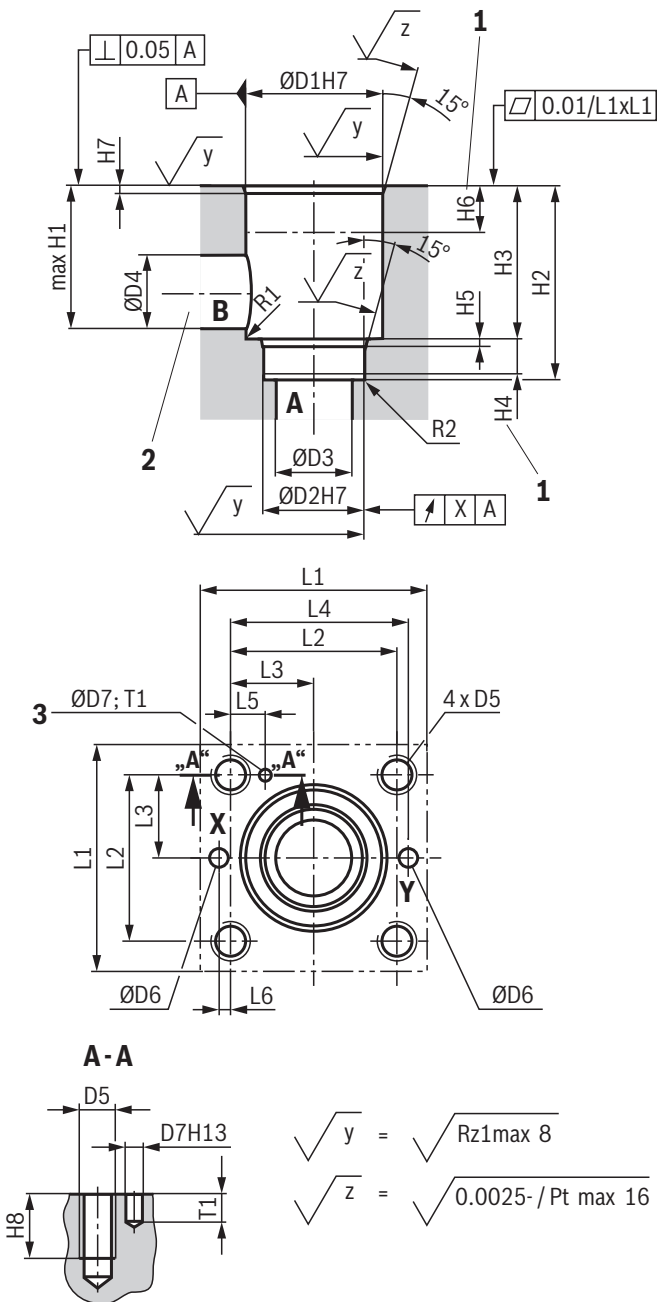
Valve mounting screws (separate order)

Size	Quantity	Hexagon socket head cap screws	Material number
16	4	ISO 4762 - M8 x 30 - 10.9-fZn/nc/480h/C Tightening torque $M_A = 30 \text{ Nm} \pm 10\%$	R913014759
	or		
25	4	ISO 4762 - M8 x 30 - 10.9 Tightening torque $M_A = 30 \text{ Nm} \pm 10\%$	Not included in the Rexroth delivery range
	or		
25	4	ISO 4762 - M12 x 40 - 10.9-fZn/nc/480h/C Tightening torque $M_A = 100 \text{ Nm} \pm 10\%$	R913015610
	or		
32	4	ISO 4762 - M12 x 40 - 10.9 Tightening torque $M_A = 110 \text{ Nm} \pm 10\%$	Not included in the Rexroth delivery range
	or		
32	4	ISO 4762 - M16 x 50 - 10.9-fZn/nc/480h/C Tightening torque $M_A = 240 \text{ Nm} \pm 10\%$	R913015664
	or		
40, 50	4	ISO 4762 - M16 x 50 - 10.9 Tightening torque $M_A = 300 \text{ Nm} \pm 10\%$	Not included in the Rexroth delivery range
	or		
40, 50	4	ISO 4762 - M20 x 60 - 10.9-fZn/nc/480h/C Tightening torque $M_A = 480 \text{ Nm} \pm 10\%$	R913014726
	or		
40, 50	4	ISO 4762 - M20 x 60 - 10.9 Tightening torque $M_A = 590 \text{ Nm} \pm 10\%$	Not included in the Rexroth delivery range
	or		

Notice:

- The tightening torques stated are guidelines when using screws with the specified friction coefficients and when using a manual torque wrench (tolerance $\pm 10\%$).
- The specified tightening torques were calculated with the total friction coefficient $\mu = 0.09 \dots 0.14$; adapt to modified surfaces.
- The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure.

Installation bore (dimensions in mm)



Installation dimensions according to ISO 7368

NG	16	25	32	40	50
ØD1H7	32	45	60	75	90
ØD2H7	25	43	45	55	68
ØD3 ^{1; 2)}	16	25	32	40	50
ØD4 ^{1; 2)}	16	25	32	40	50
ØD4 max ^{1; 2)}	25	32	40	50	63
ØD5	M8	M12	M16	M20	M20
ØD6 max	4	6	8	10	10
ØD7H13	4	6	6	6	8
H1 max	42.5	57	68.5	84.5	97.5
H2 ⁺¹	56	72	85	105	122
H3 ^{+0.1}	43	58	70	87	100
H4 min	11	12	13	15	17
H5	2	2.5	2.5	3	4
H6 min ¹⁾	20	30	30	30	35
H7	2	2.5	2.5	3	3
H8 ¹⁾	20	25	35	45	45
L1	65	85	102	125	140
L2±0.2	46	58	70	85	100
L3±0.2	23	29	35	42.5	50
L4±0.2	48	62	76	92.5	108
L5±0.2	12.5	13	18	19.5	20
L6±0.2	2	4	6	7.5	8
X	0.03	0.03	0.03	0.05	0.05
R1 max	2	2	2	4	4
R2 max ¹⁾	1	1	1	1	1
T1 min	8	8	8	8	8

1) Deviating from ISO 7368

2) Smaller bore causes a reduction of the flow

- 1 Minimum dimension of surface finish "y"
- 2 Port B can be of any size within the range between H6 min and H1 max. The durability of the block depends on its material and geometry.
Port B may be at any position around the central axis of port A. However, it must be observed that the mounting bores and the control bores are not damaged.
- 3 Bore for locating pin

NG	Installation dimensions according to ISO 7368
16	7368-06-1-1-16
25	7368-08-3-1-16
32	7368-09-5-1-16
40	7368-10-7-1-16
50	7368-11-9-1-16

Tolerances according to: General tolerances ISO 2768-mK

Valve mounting screws see page 25.

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

Pos. ¹⁾	Designation	Version	Short designation	Material number	Data sheet
7.1	Mating connector; for valves with round connector, 6-pole + PE and 6-pole	Straight, metal	7PZ31...M	R900223890	08006
		Straight, plastic	7PZ31...K	R900021267	
	Cable sets; for valves with round connector, 6-pole + PE	Plastic, 3.0 m	7P Z31 BF6	R901420483	
		Plastic, 5.0 m		R901420491	
		Plastic, 10.0 m		R901420496	
	Mating connector; for valves with round connector, 11-pole + PE	Metal, shielded	12PN11 ... EMC	R901268000	
		Plastic, two cable outlets	12PN11...2XD8	R900884671	
	Cable sets; for valves with round connector, 11-pole + PE	Metal, shielded, 5.0 m	12PN11REFS EMC...BG	R901272854	
		Metal, shielded, 20.0 m		R901272852	
		Plastic, shielded, 5.0 m	12PN11REF 2X...	R900032356	
		Plastic, shielded, 20.0 m		R900860399	
7.2	Mating connector; for valves with "K4" connector, 2-pole + PE, design A	Without circuitry, 12 ... 240 V, "a"	Z4	R901017010	
		Without circuitry, 12 ... 240 V, "b"		R901017011	
7.3	Mating connectors; for sensors and valves with "M12 x 1" connector, 4-pole	Straight, PG7	4PZ24	R900773042	
		Straight, PG9		R900031155	
		Angled, PG7		R900779509	
		Angled, PG9		R900082899	

¹⁾ See dimensions on page 23 and 24.

External control electronics

	Designation	Version	Material no.	Data sheet
Modular design	VT-MRPA1-2X	Command value 0 ... 10 V	R901476413	30220
		Command value 4 ... 20 mA	R901476414	

Further information

- 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
- Hydraulic valves for industrial applications Operating instructions 07600-B
- Information on available spare parts www.boschrexroth.com/spc

Notes

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