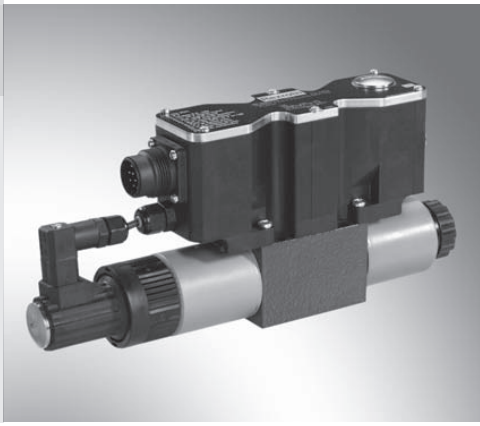
Rexroth
Bosch Group

4/3 proportional directional valve direct operated, with integrated electronics

RE 29064/03.13 1/16
Replaces: 12.12

Type 4WREEM



Sizes 6 and 10
Component series 2X
Maximum operating pressure 315 bar
Maximum flow: 90 l/min (size 6)
180 l/min (size 10)

Table of contents

Features

- Direct operated proportional directional valve for controlling flow direction and flow size
- Operation by means of proportional solenoids with central thread and detachable coil
- Electrical position feedback
- Integrated electronics (OBE) with B6 interface
- Monitoring of control spool position
- With or without step function
- Spring-centered control spool
- For subplate mounting: Porting pattern according to ISO 4401

Information on available spare parts:
www.boschrexroth.com/spc

Ordering code

4WRE	E	M				–2X	/	G24	K34	/	B6	V	*

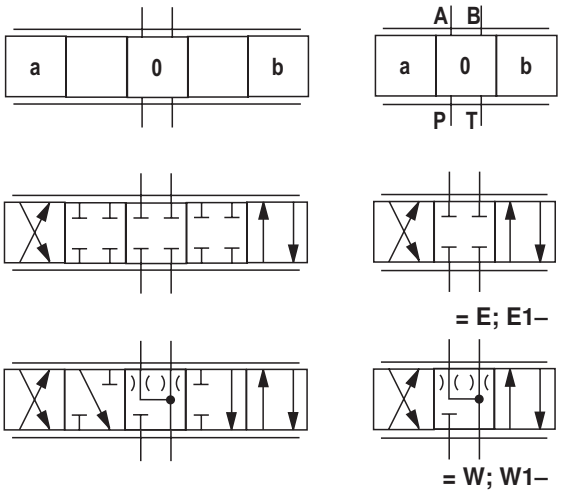
With integrated electronics (OBE) **= E**

Monitoring of control spool position **= M**

Size 6 **= 6**

Size 10 **= 10**

Control spool symbols



= E; E1–

= W; W1–

With symbols E1– and W1–:

P → A: $q_{V\,max}$ B → T: $q_V/2$

P → B: $q_V/2$ A → T: $q_{V\,max}$

Notice:

In the zero position, spools W and WA have a connection from A to T and B to T with approx. 3 % of the relevant nominal cross-section.

Further details in the plain text

Seal material

V = FKM seal

Electronics interface

B6 = Command value ±10 VDC

Electrical connection

K34 = **Without** mating connector with connector according to DIN 43 651

Mating connector - separate order, see page 5

Supply voltage

G24 = Direct voltage 24 V

2X = 20 to 29

(20 to 29: Unchanged installation and connection dimensions)

Option

no code = Without step function

J = Electr. compensation of the control spool overlap

Rated flow with valve pressure differential Δp = 10 bar

Size 6

04 = 4 l/min

08 = 8 l/min

16 = 16 l/min

32 = 32 l/min

Size 10

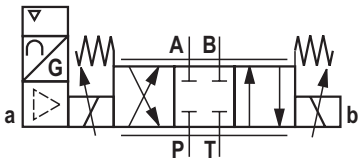
25 = 25 l/min

50 = 50 l/min

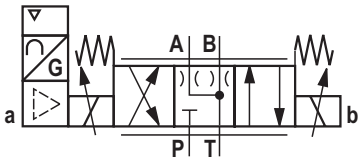
75 = 75 l/min

Symbols

Type 4WREEM . **E**…



Type 4WREEM . **W**…



Function, section

The 4/3 proportional directional valves are designed as direct operated devices in plate design. Operation is effected by proportional solenoids with central thread and detachable coil. The solenoids are controlled by the internal electronics.
In version 4WREEM..., the valve is equipped with a symmetric spool overlap and features an operating direction and spool central position monitoring function.
In addition, the 4WREEM...J... model has a step function to compensate this overlap. This means that the spool overlap is quickly passed. The valve is mainly used in machines with high safety requirements, e.g. in hydraulic press controls.

Set-up:
The valve basically consists of:

- Housing (1) with connection surface
- Control spool (2) with compression springs (3 and 4)
- Solenoids (5 and 6) with central thread
- Position transducer (7)
- Integrated electronics (8)

Functional description:

- With de-energized solenoids (5 und 6), central position of the control spool (2) by compression springs (3 and 4)
- Direct operation of the control spool (2) by controlling a proportional solenoid, e.g. solenoid "b" (6)
  - → Displacement of the control spool (2) to the left proportional to the electric input signal
  - → Connection from P to A and B to T via orifice-type cross-sections with progressive flow characteristic
- Switching off of the solenoid "b" (6)
  - → The compression spring (3) brings the control spool (2) back into the central position

If no enable signal is available, the output stage is locked and the valve is not functional. The readiness for operation of the output stages can be queried via pin 8. If the supply voltage fails or if no command value is available, the valve control spool is maintained in the central position by centering springs. In this spool position of the E spool: A, B, P and T are blocked and in the W spool: A and B are connected to T

Monitoring function:

- Monitoring the control spool position via an inductive position transducer
- Output signals of the integrated electronics can be evaluated by an external safety control in order to detect any malfunction of the valve
- The power output stages are blocked by switching off the voltage for release (pin 3)
  Notice: Not released for switching-off according to EN13849!
- The output stages are enabled via the enable input (pin 3). The status message is sent via pin 8
- Leading out the signals to the signal outputs pin 9, pin 10 and pin 11 of the connector
  Triggering of the logic switching status signals when the threshold values (+ Xw and – Xw) are exceeded
- Use of the switching signals in a superior control for monitoring functions

Precondition for the use as safety-relevant component in hydraulic circuits:

- The entire control must meet the requirements of the standards that are relevant for the application, such as e.g. EN693, EN12622 or EN13849
- If the safety is called up or if the control detects an error, switching off the supply voltage (pin 1 and pin 2) and release (pin 3) must cause the valve to be switched off
- The valve must not be operated vertically with the spool position sensor hanging upside down

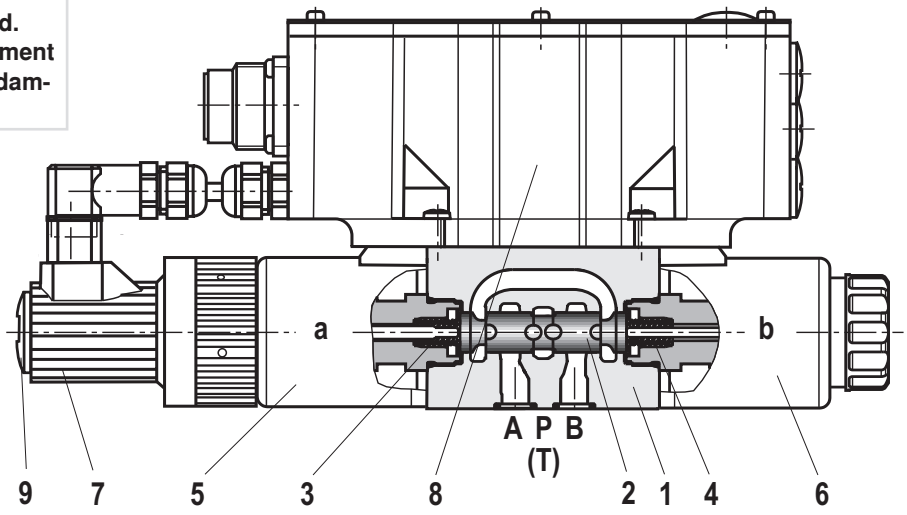
☞ **Important notice!**

The PG fitting (9) must not be opened. Mechanical adjustment of the adjustment nut located below is prohibited and damages the valve!

☞ **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) is to be installed.



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

general

Sizes	Size	6	10
Weight	kg	2.4	6.5
Installation position		Horizontal, must not be installed vertically	
Ambient temperature range	°C	–20 to +50	
Storage temperature range	°C	–20 to +80	
$MTTF_d$ values according to EN ISO 13849	Years	150 [1] (for more information see data sheet 08012)	

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

Maximum operating pressure	– Port A, B, P	bar	Up to 315	
	– Port T	bar	Up to 210	
Rated flow $q_{V\,nom}$ at Δp = 10 bar		l/min	4, 8, 16, 32	25, 50, 75
Maximum admissible flow		l/min	90	180
Maximum admissible zero flow with p_e = 100 bar		l/min	≤ 0.3	≤ 0.6
Hydraulic fluid			See table below	
Hydraulic fluid temperature range		°C	–20 to +80 (preferably +40 to +50)	
Viscosity range		mm^2/s	20 to 380 (preferably 30 to 46)	
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 20/18/15 [1]	
Hysteresis		%	≤ 0.1	
Range of inversion		%	≤ 0.05	
Response sensitivity		%	≤ 0.05	
Zero shift upon change of hydraulic fluid temperature and operating pressure		%/10 K	< 0.15	
		%/100 bar	< 0.1	

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

Hydraulic fluid	**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils and related hydrocarbons	HL, HLP	NBR, FKM	DIN 51524
Flame-resistant – containing water	HFC (Fuchs HYDROTHERM 46M, Petrofer Ultra Safe 620)	NBR	ISO 12922

☞ **Important information on hydraulic fluids!**

- For more information and data on the use of other hydraulic fluids refer to data sheet 90220 or contact us!
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.)!
- The flash point of the process and operating medium used must be 40 K higher than the maximum solenoid surface temperature.
- **Flame-resistant – containing water**: Maximum pressure differential per control edge 175 bar. Pressure pre-loading at the tank port > 20 % of the pressure differential; otherwise, increased cavitation.

  Life cycle as compared to operation with mineral oil HL, HLP 50 % to 100 %.

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

electric

Supply voltage	Nominal voltage	VDC	24
	Lower limit value	VDC	19
	Upper limit value	VDC	35
Current consumption of the amplifier	I_{max}	A	2.0 plus load of switching outputs
	Impulse current	A	3.0 plus load of switching outputs
Command value input	Voltage input "B6"	V	±10 with Re = 100 kΩ
Command value output		V	±10
Duty cycle		%	100
Maximum coil temperature [1)]		°C	Up to 150
Protection class according to DIN 40050			IP 65 with mounted and locked plug-in connectors

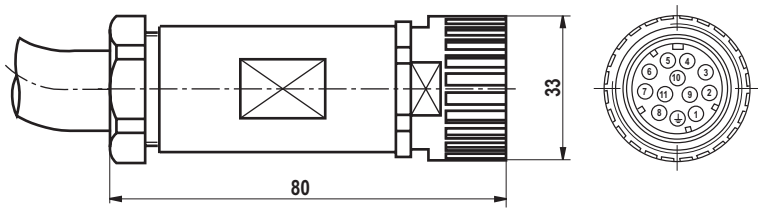
[1)] Due to the temperatures occurring at the surfaces of the solenoid coils, the European standards ISO 13732-1 and EN ISO 4413 must be adhered to!

☞ **Notice!**

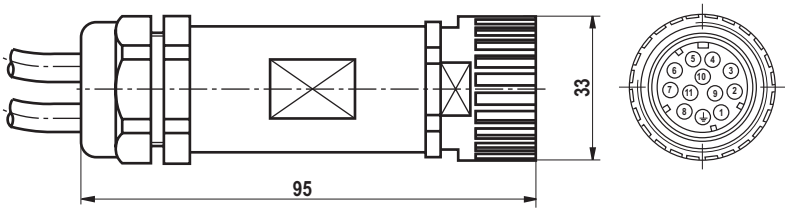
Information on the environment simulation testing for the areas EMC (Electromagnetic compatibility), climate and mechanical load see RE 29048-U (declaration on environmental compatibility).64

Electrical connection, mating connectors (dimensions in mm)

Mating connector according to DIN EN 175201-804 separate order under the material no. **R900752278** (plastic version) one cable duct with Ø 12 to 14 mm, pin assignment see below



Mating connector according to DIN EN 175201-804 separate order under the material no. **R900884671** (plastic version) two cable ducts with Ø 6 to 8 mm, pin assignment see below



Pin	Allocation interface B6	
1	24 VDC (u(t) = 19.0 V to 35 V), I_{max} = 2 A voltage supply	
2	0 V	
3	Enable input 8.5 VDC to 35 VDC	
4, 5	Differential amplifier input ±10 V command value	
6, 7	Differential amplifier input ±10 V actual value	
8	Power output stages signal output 0 V or U_B	
9	Control spool position P → B	24 VDC
10	Control spool position P → A	
11	Control spool position zero position	
PE	Connected to cooling element and valve housing	

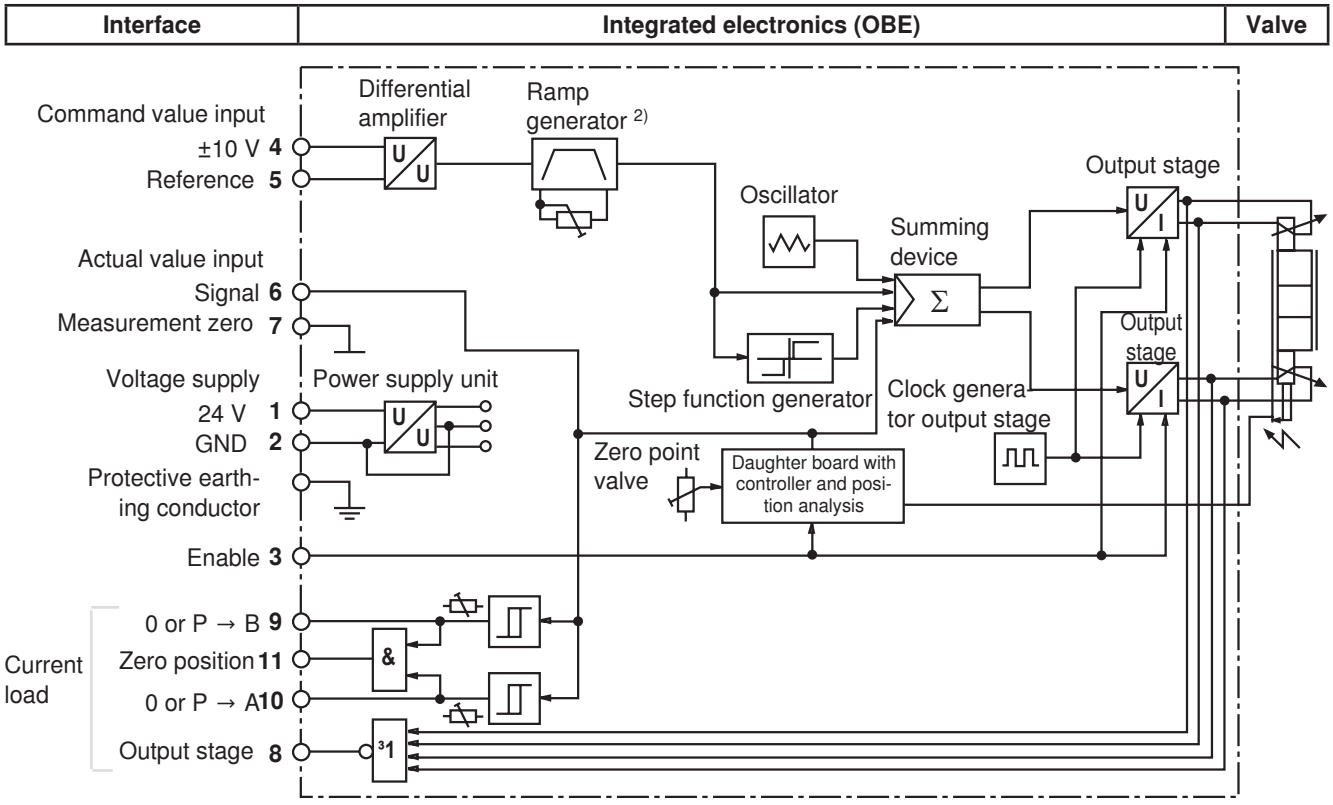
Command value: Positive command value 0 to +10 V at pin 4 and reference potential at pin 5 result in flow from P → A and B → T.
Negative command value 0 to –10 V at pin 4 and reference potential at pin 5 result in flow from P → B and A → T.

Actual value: Positive actual value 0 to +10 V at pin 6 and reference potential at pin 7 result in flow from P → A and B → T.
Negative actual value 0 to –10 V at pin 6 and reference potential at pin 7 result in flow from P → B and A → T.

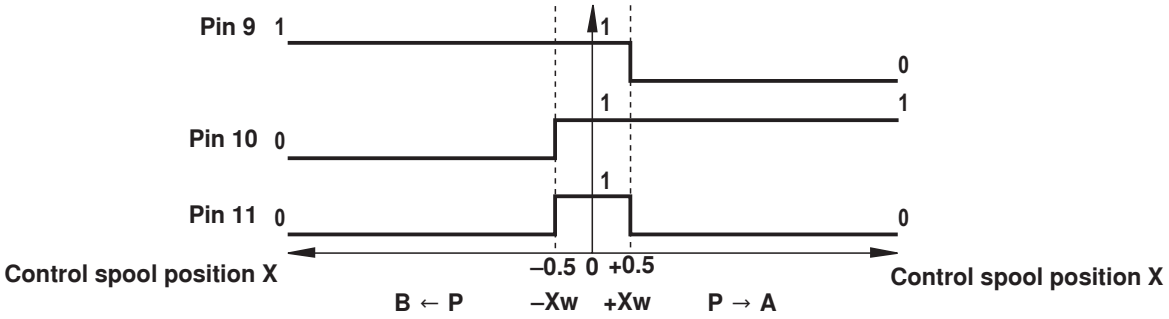
Connection cables: Recommendation: – Up to 25 m cable length type LiYCY 7 x 0.75 mm²
– Up to 50 m cable length type LiYCY 7 x 1.0 mm²

Integrated electronics

Block diagram



Logic switching statuses for control spool position monitoring



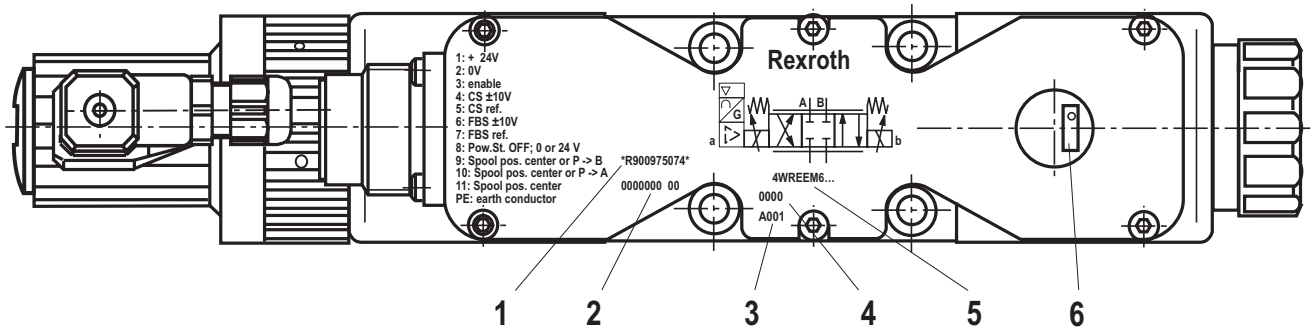
Logic signal linking

Control spool position	Direction of flow	Logic switching statuses		
		Pin 9	Pin 10	Pin 11
X < – Xw	B ← P	1	0	0
– Xw ≤ X ≤ Xw	-	1	1	1
X > Xw	P → A	0	1	0

0 ≙ 0 V
1 ≙ 24 VDC (19.0 V to 35 V)

Integrated electronics

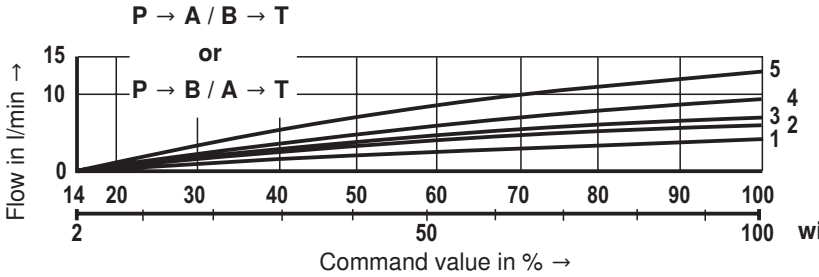
Marking and adjustment elements



1 Material no.
2 Production order number
3 Date of production
4 Serial number
5 Type designation
6 Setting the ramp time

Characteristic curves: Size 6 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p = 100 bar)

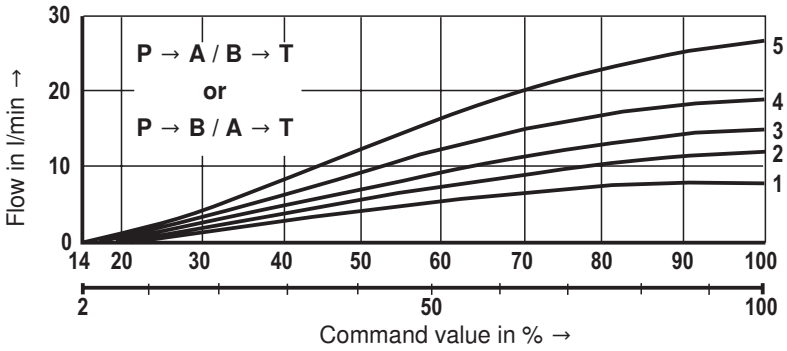
4 l/min rated flow at 10 bar valve pressure differential



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

with step function

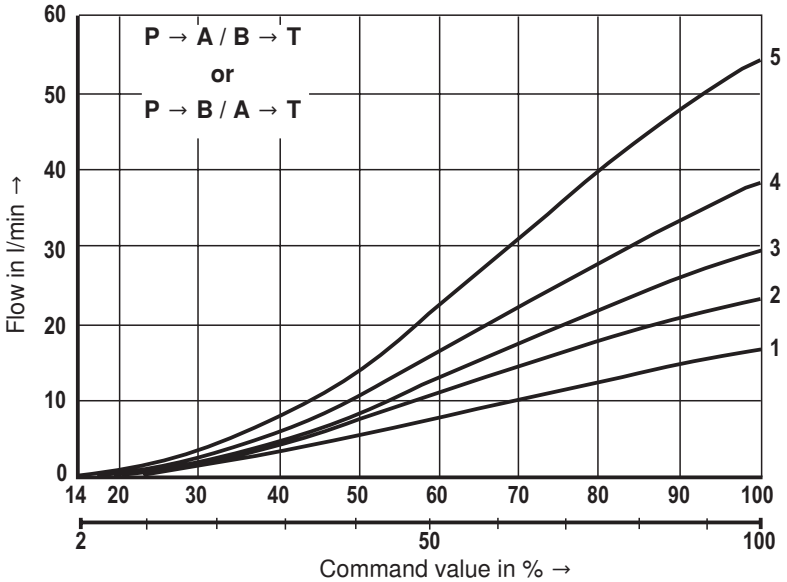
8 l/min rated flow at 10 bar valve pressure differential



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

with step function

16 l/min rated flow at 10 bar valve pressure differential



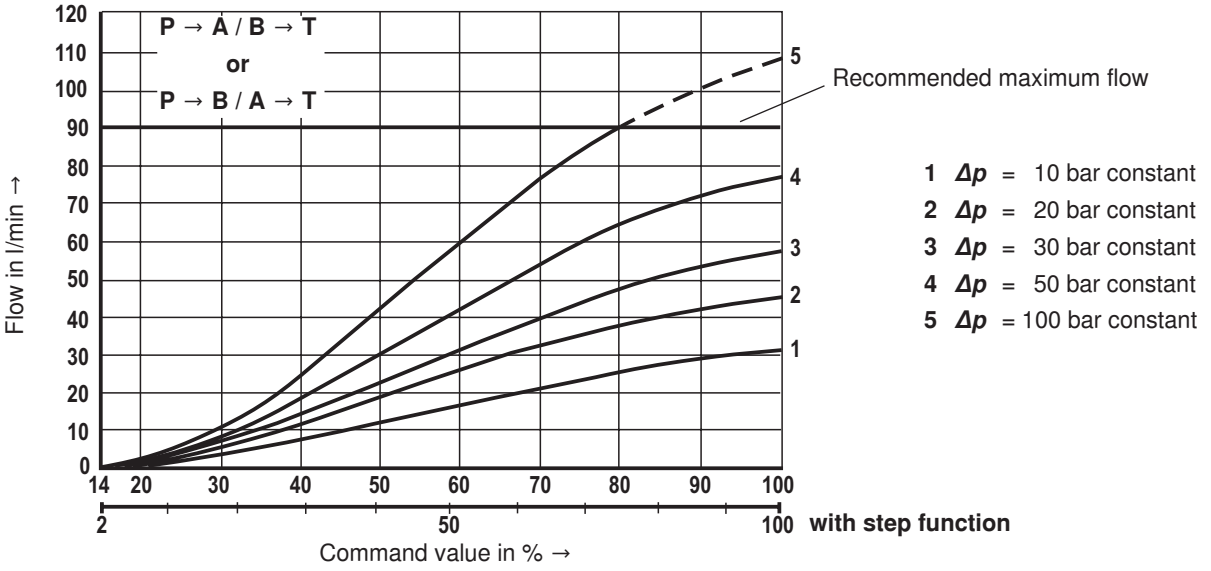
1 ***Δp*** = 10 bar constant
2 ***Δp*** = 20 bar constant
3 ***Δp*** = 30 bar constant
4 ***Δp*** = 50 bar constant
5 ***Δp*** = 100 bar constant

with step function

Δp = valve pressure differential (inlet pressure p_P minus load pressure p_L minus return flow pressure p_T)

Characteristic curves: Size 6 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p = 100 bar)

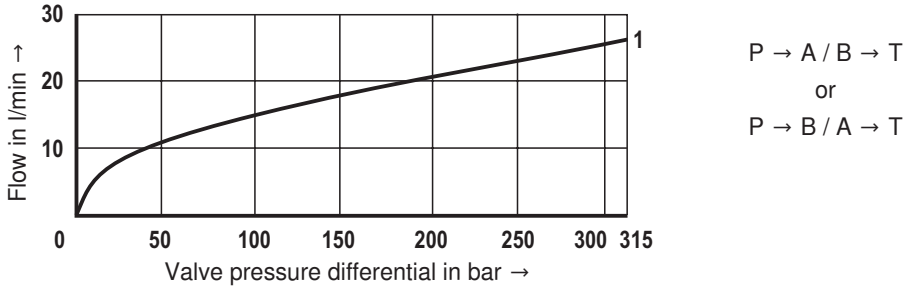
32 l/min rated flow at 10 bar valve pressure differential



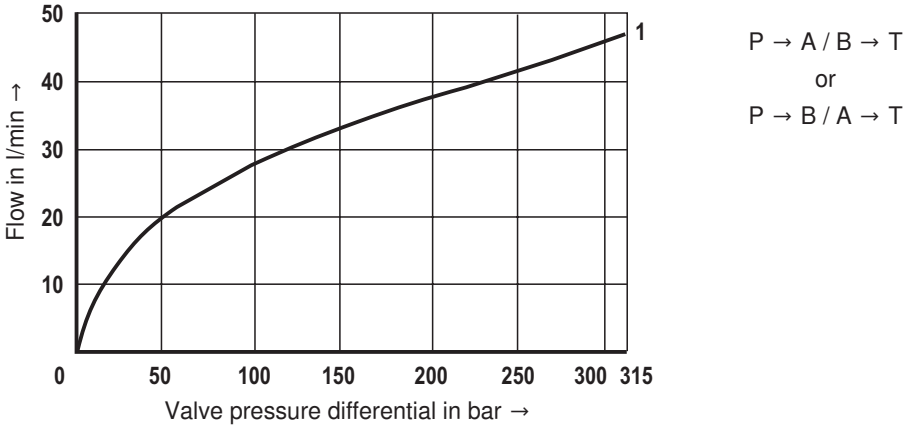
Δp = valve pressure differential (inlet pressure p_P minus load pressure p_L minus return flow pressure p_T)

Performance limit: Size 6 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C)

Rated flow 4 l/min



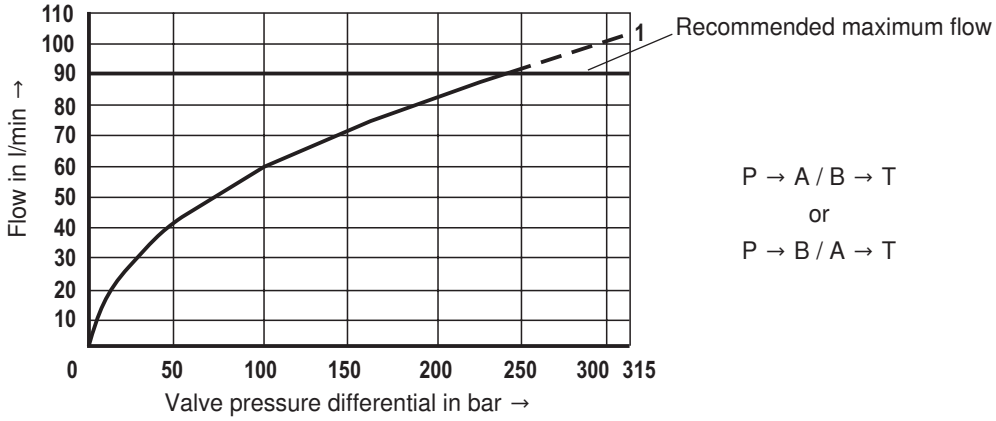
Rated flow 8 l/min



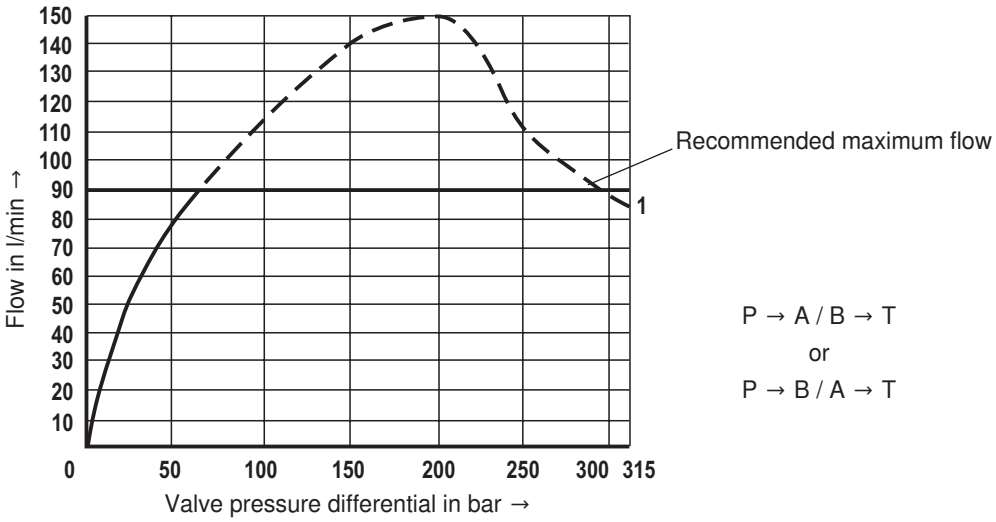
1 Command value = 100 %

Performance limit: Size 6 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C)

Rated flow 16 l/min

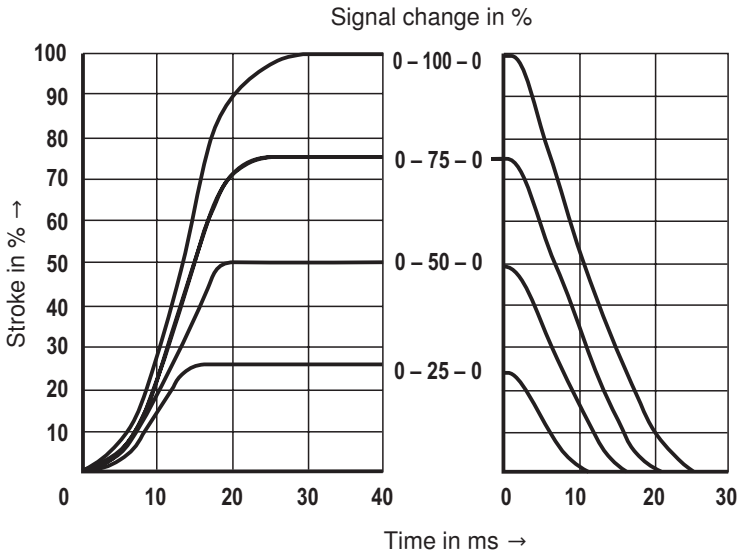


Rated flow 32 l/min

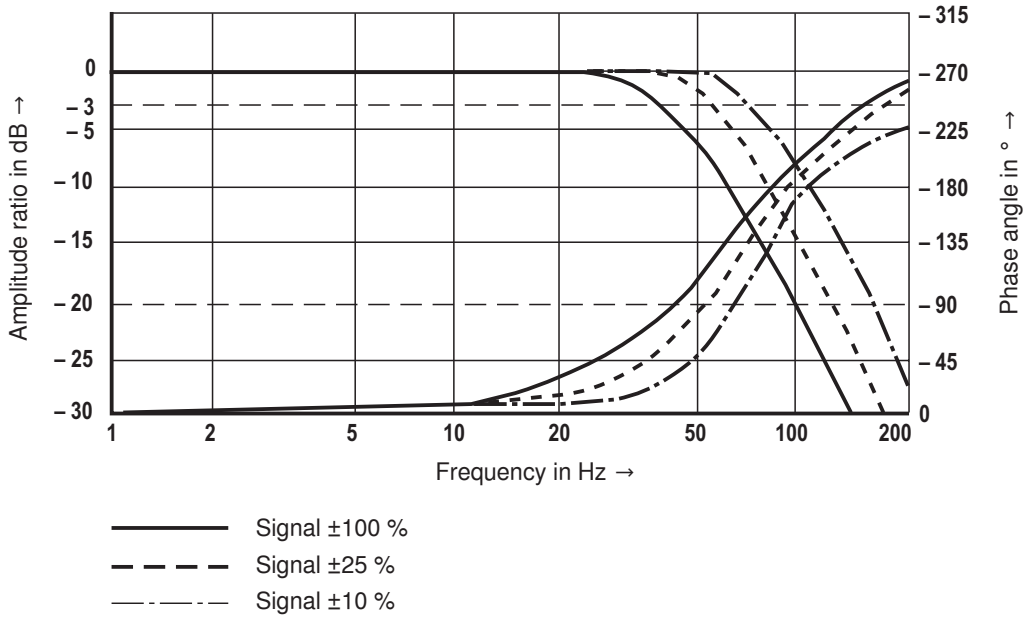


1 Command value = 100 %

Transition function with stepped electric input signals: Size 6
(measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p_s = 10 bar)

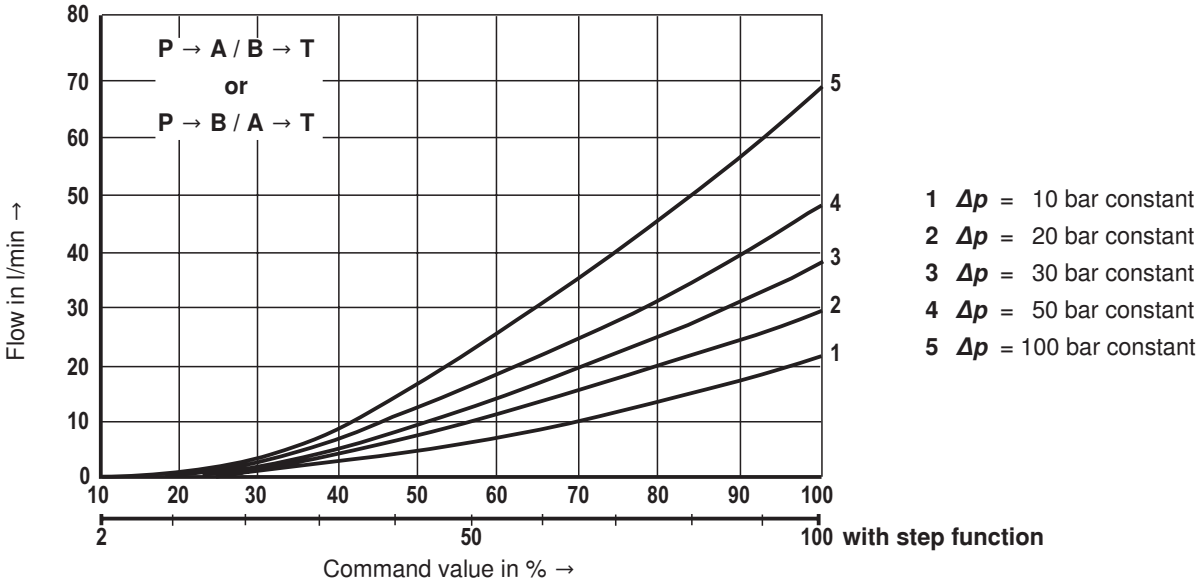


Frequency response characteristic curves: Size 6
(measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p_s = 10 bar)

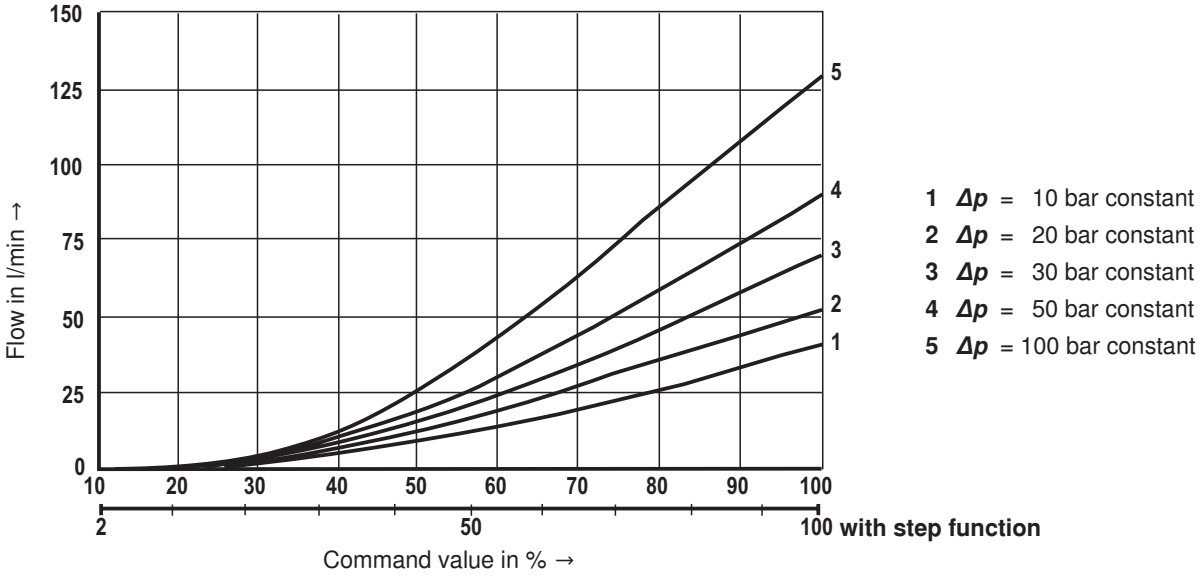


Characteristic curves: Size 10 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p = 100 bar)

25 l/min rated flow at 10 bar valve pressure differential



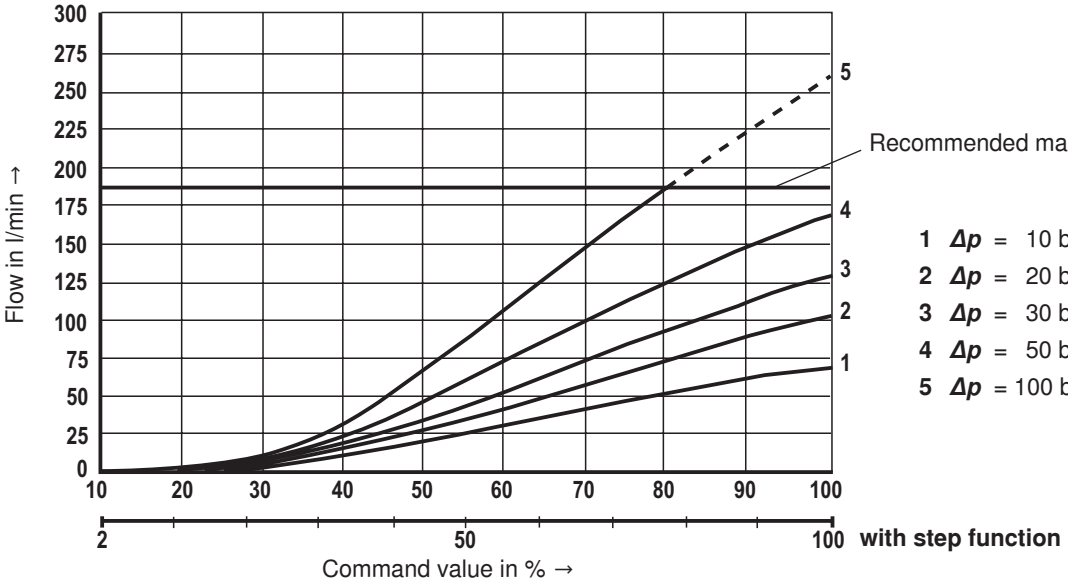
50 l/min rated flow at 10 bar valve pressure differential



Δp = valve pressure differential (inlet pressure p_P minus load pressure p_L minus return flow pressure p_T)

Characteristic curves: Size 10 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p = 100 bar)

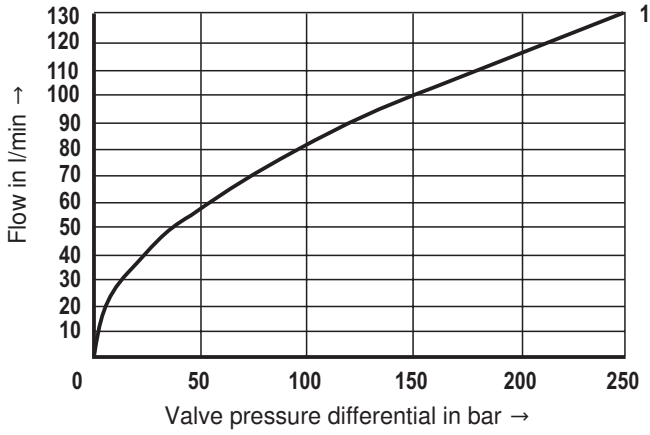
75 l/min rated flow at 10 bar valve pressure differential



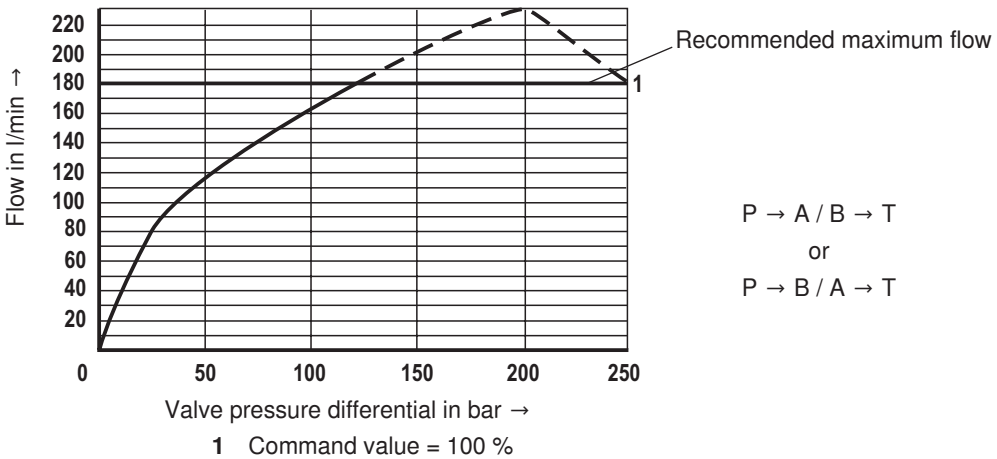
Δp = valve pressure differential (inlet pressure p_P minus load pressure p_L minus return flow pressure p_T)

Performance limit: Size 10 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C)

Rated flow 25 l/min



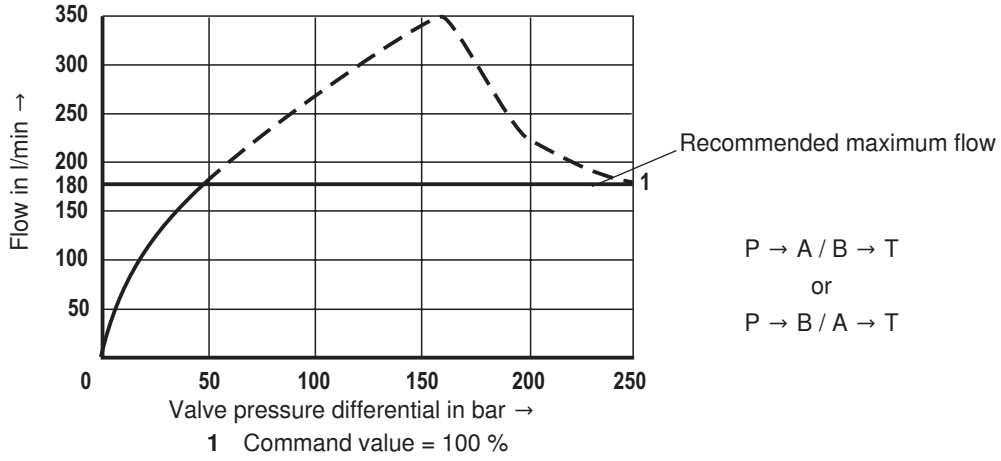
Rated flow 50 l/min



1 Command value = 100 %

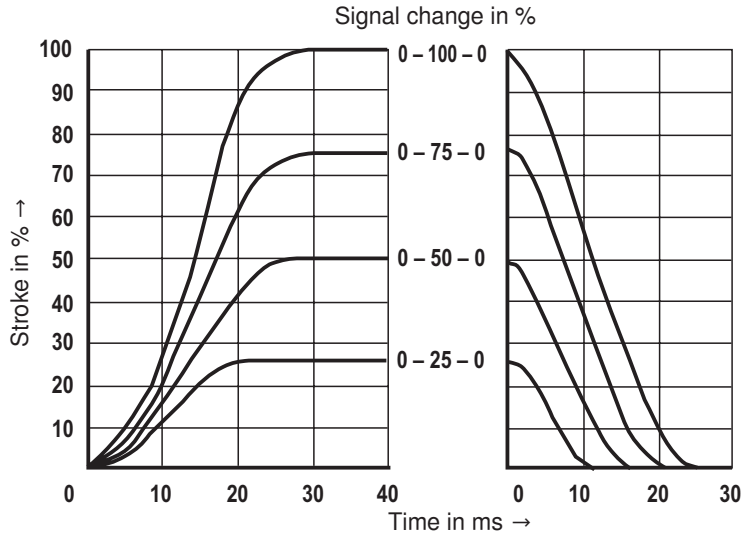
Performance limit: Size 10 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C)

Rated flow 75 l/min

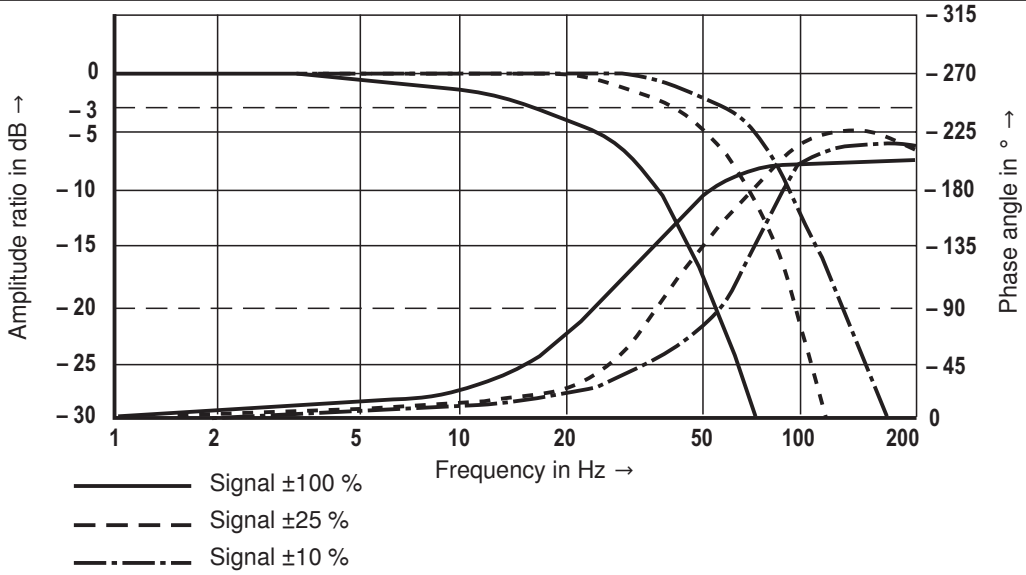


1 Command value = 100 %

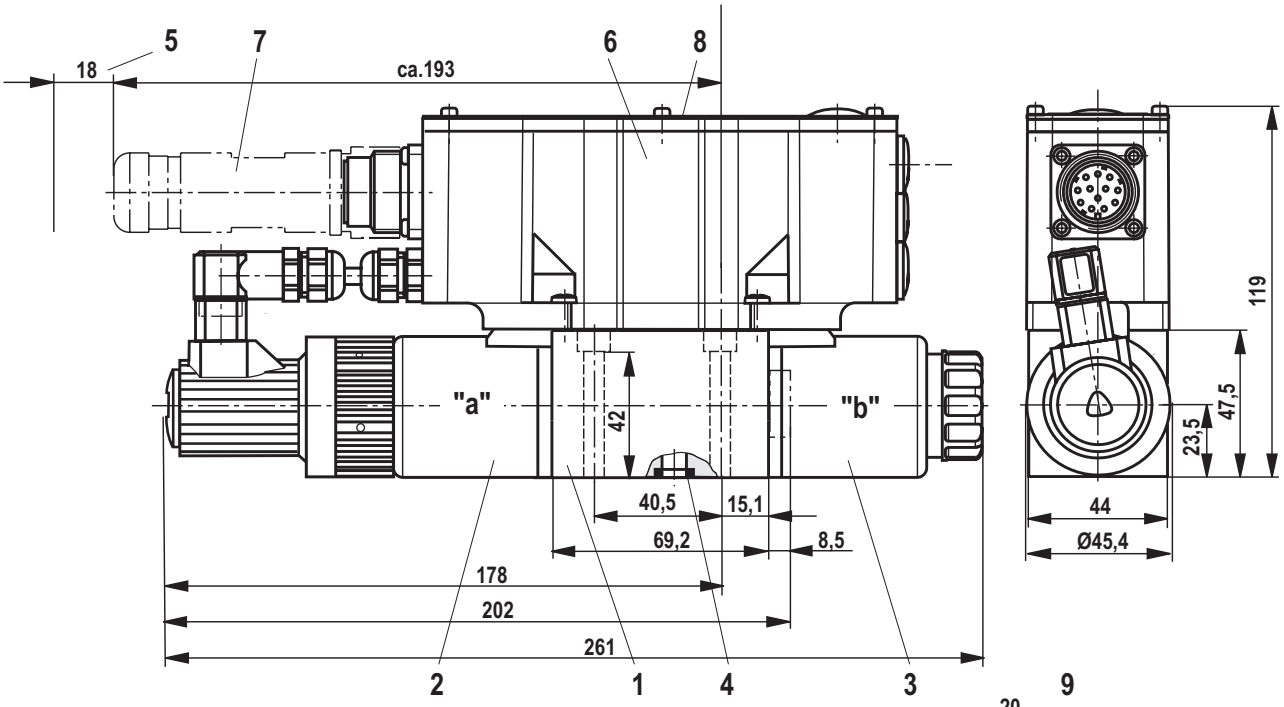
Transition function with stepped electric input signals: Size 10 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p_s = 10 bar)

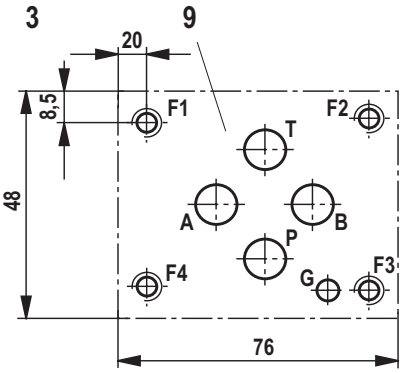


Frequency response characteristic curves: Size 10 (measured using HLP46, ϑ_{oil} = 40 °C ±5 °C, p_s = 10 bar)

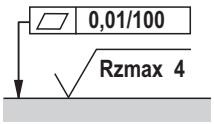


Dimensions: Size 6 (dimensions in mm)





1 Valve housing
2 Proportional solenoid "a" with inductive position transducer
3 Proportional solenoid "b"
4 R-ring 9.81 x 1.5 x 1.78 (ports P, A, B, T)
5 Space required to remove the mating connector
6 Integrated control electronics
7 Mating connector according to DIN EN 175201-804, order separately, see page 5
8 Name plate
9 Processed valve contact surface, porting pattern according to ISO 4401-03-02-0-05
Deviating from the standard:
– Ports P, A, B, T Ø8 mm
– Bore G can be eliminated, as there is no pin in the valve.

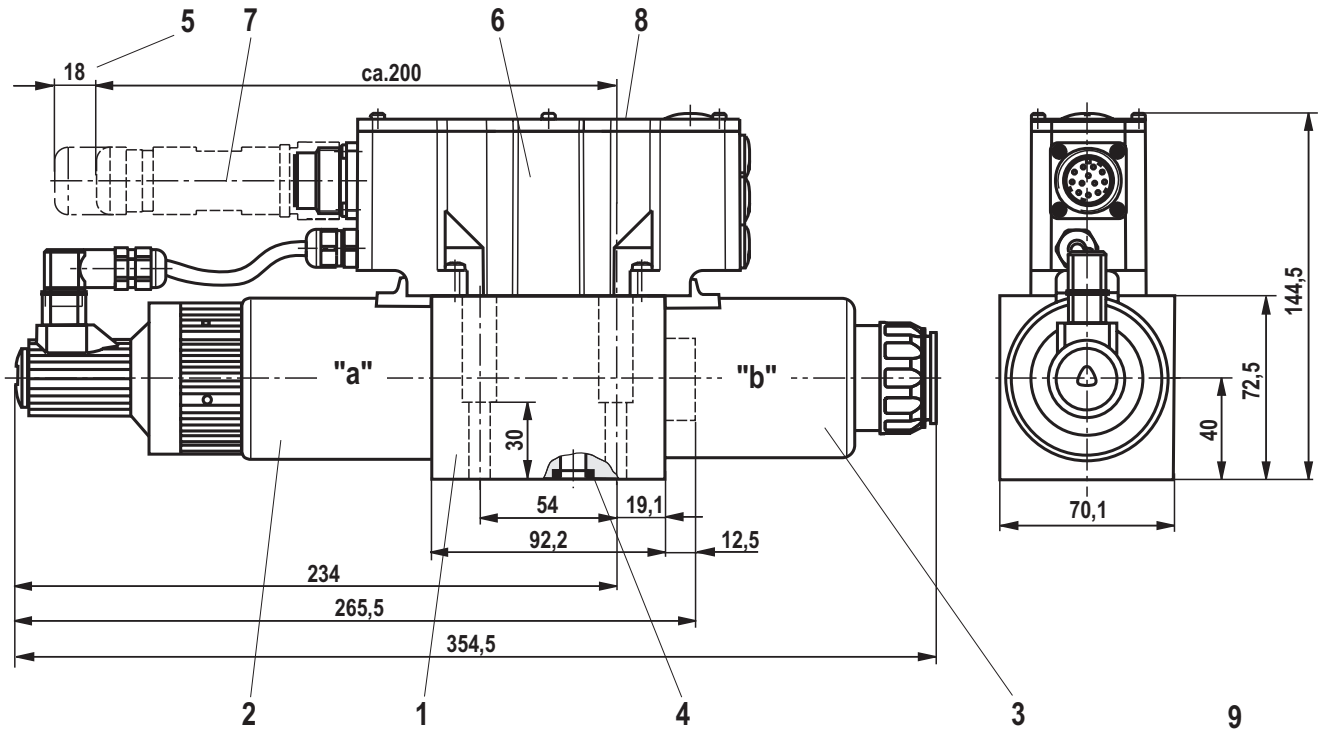


Required surface quality of the valve contact surface

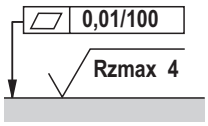
Notice!
The dimensions are nominal dimensions which are subject to tolerances.

Subplates and valve mounting screws see page 16

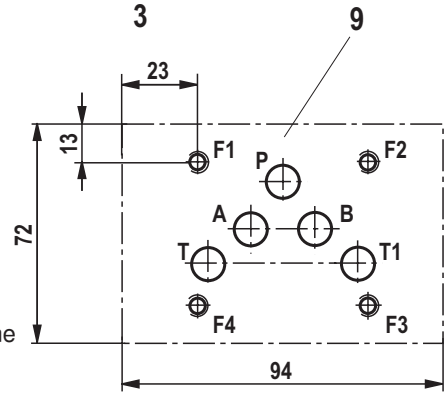
Dimensions: Size 10 (dimensions in mm)



1 Valve housing
2 Proportional solenoid "a" with inductive position transducer
3 Proportional solenoid "b"
4 R-ring 13.0 x 1.6 x 2.0 (ports P, A, B, T, T1)
5 Space required to remove the mating connector
6 Integrated control electronics
7 Mating connector according to DIN EN 175201-804, order separately, see page 5
8 Name plate
9 Processed valve contact surface, porting pattern according to ISO 4401-05-04-0-05



Required surface quality of the valve contact surface



Hexagon socket head cap screws		**Material number**
Size 6	4x ISO 4762 - M5 x 50 - 10.9 Tightening torque M_A = 8,9 Nm ±10 %	
Size 10	4x ISO 4762 - M6 x 40 - 10.9 Tightening torque M_A = 15.5 Nm ±10 %	

Notice: The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure!

Subplates	**Data sheet**
Size 6	45052
Size 10	45054

Notice!
The dimensions are nominal dimensions which are subject to tolerances.

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