RE 29222
Edition: 2019-07
Replaces: 02.09

rexroth
A Bosch Company

Directional high-response cartridge valve, pilot-operated, with integrated electronics (OBE)

Type 3WRCBEE



tb0216

- Size 25, 32, and 50
- Component series 1X
- Maximum operating pressure 315 bar
- Maximum flow 2250 l/min

Features

- 3-way cartridge valves
- Control spool with anti-rotation feature and control edges in servo quality
- With inductive position transducer at the main control spool and pilot control valve
- Position-controlled with integrated electronics (OBE).
- Completely adjusted unit

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Ordering code

01	02	03	04	05	06	07	08		09		10	11		12	13	14
3	**WRCB**	**EE**		**V**			**M**	**–**	**1X**	**/**	**G24**	**K31**	**/**		**M**	*****

01	3 main ports	**3**
02	Directional high-response cartridge valve, pilot-operated	**WRCB**
03	Integrated electronics (OBE)	**EE**
04	Size 25	**25**
	Size 32	**32**
	Size 50	**50**
05	Control spool with zero overlap	**V**

Area ratio at the control spool (determined at the factory)

06	1:1 (NG50)	**no code**
	1:1.5 (NG25 and 32)	**F**

Rated flow at 5 bar pressure differential

07	**– Size 25**	
	190 l/min	**190**
	– Size 32	
	380 l/min	**380**
	– Size 50	
	750 l/min	**750**

Flow characteristic

08	Inflected characteristic curve, progressive with linear fine control range	**M**
09	Component series 10... 19 (10 ... 19: unchanged installation and connection dimensions)	**1X**

Supply voltage

10	Direct voltage 24 V	**G24**

Electrical connection

11	Without mating connector; connector according to DIN EN 175201-804	**K31** [1]

Electrical interface

12	Command value ±10 V, actual value ±10 V	**A1**
	Command value 4 ... 20 mA, actual value 4 ... 20 mA	**F1**

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

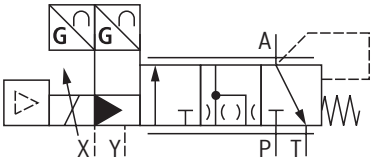
13	NBR seals	**M**
14	For further details, see the plain text	

[1] Mating connectors, separate order, see page 20 and data sheet 08008.

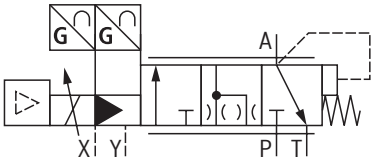
Symbols

Simplified

"No code" version (area ratio 1:1)

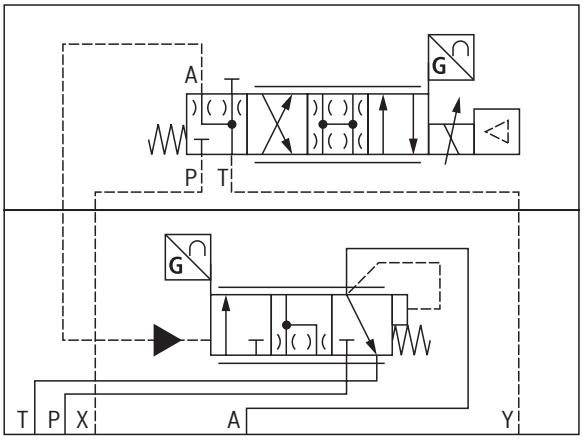


Version "F" (area ratio 1:1.5)



Detailed

Version "F"



Function, section

Valves of type 3WRCBEE are pilot-operated, 2-stage directional high-response cartridge valves. They control the flow direction and size.

Set-up

The valves consist of the following assemblies:

- Cover (1) with connection surfaces,
- Main control spool (7) with control edges,
- Socket (2),
- Pilot control valve (3) with paired control spool socket unit and inductive position transducer (6)
- Integrated electronics (OBE) (4) with inductive position transducer (12) of the main control spool

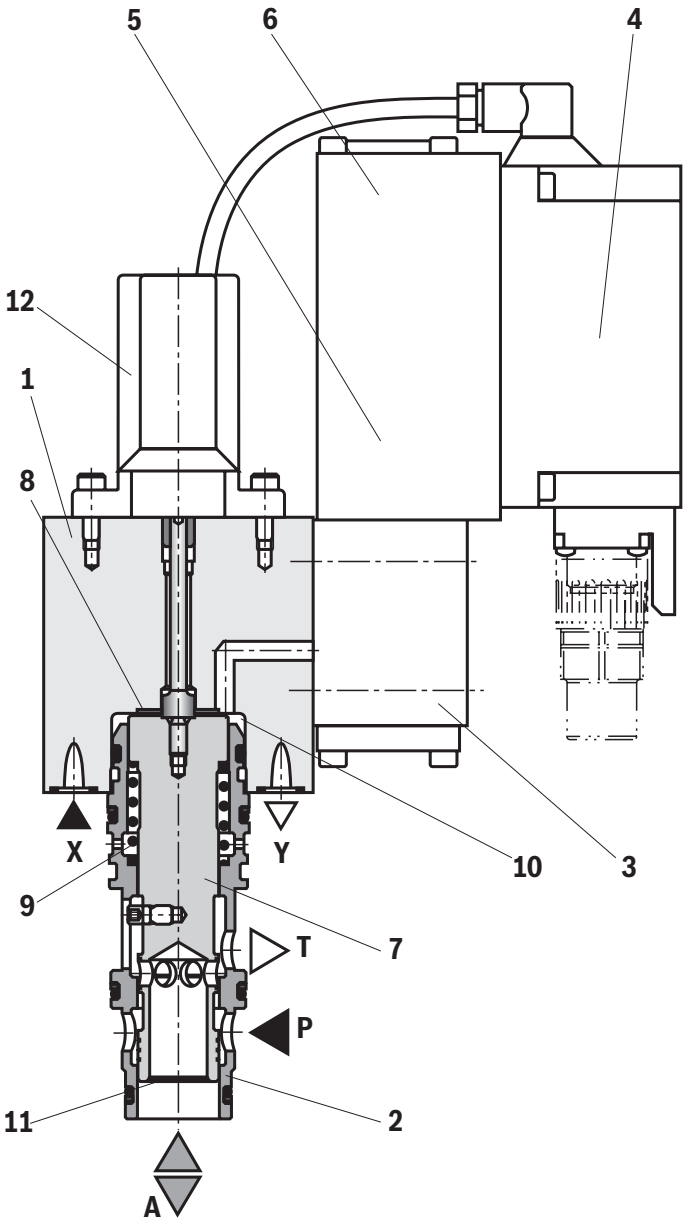
Function

- Switching of the main control spool (7) via the pilot control valve (3); pressure build-up in the control chamber (10) acts on the surface (8) – the pressure of the connection A counteracts on the area (11) and the spring force (9).
- Control of the control spool of the pilot control valve through the proportional solenoid (5) against the spring force in the pilot control valve.
- Linking the command values (4) and actual values (12 and 6) in the microcontroller of the integrated electronics (OBE) (4).
- Pilot oil supply Y to pilot control valve connection P; pilot oil drain via Y to the container.
- With a command value of 0 V or 12 mA, the electronics controls the main control spool (7) in central position. This way, fifty percent of the system pressure (p_P/2) will be set in connection A.
- Area ratio of area (11) to area (8) at:
  - Size 25 = 1:1.5
  - Size 32 = 1:1.5
  - Size 50 = 1:1

Failure of supply voltage

- Integrated electronics (OBE) de-energize the solenoid in case of supply voltage failure or cable break
- Depressurizing the control spool surface (8) via the pilot control valve (3) after Y to the container.
- Spring force (9) and pressure in connection A of the area (11) will cause the main control spool (7) to open the connection A to T and close P to A

☞ **Notice:**
Supply voltage failure will cause an abrupt standstill of the control loop. The acceleration forces occurring in this connection may cause machine damage.



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

General				
Size	NG	25	32	50
Installation position		any (for set-up of the valve on an actuator, avoid arranging the main control spool in parallel to the acceleration or delay direction of the actuator.)		
Storage temperature range	°C	-20 ... +80		
Ambient temperature range	°C	-20 ... +50		
Weight	kg	11.8	16.2	23.2

Hydraulic					
Maximum operating pressure	▶ Port P, A, T, X	bar	315		
Maximum return flow pressure	▶ Port Y	bar	250		
Rated flow (Δp = 5 bar)		l/min	190	380	750
Maximum flow		l/min	600	1000	2250
Pilot flow [1]		l/min	12	16	30
Maximum zero flow (p_P = 315 bar)		l/min	1.5	2.5	3.5
Leakage in spring-centered position (p_P = 315 bar; command value -100%)		l/min	0.2	0.4	0.8
Area ratio at the main control spool			1:1.5	1:1.5	1:1
Pressure differential main control spool spring on control spool area at port A		bar	2.5		
Hydraulic fluid			see table page 6		
Hydraulic fluid temperature range		°C	-20 ... +80		
Viscosity range		mm^2/s	15 ... 380		
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)	▶ Main stage		Class 20/18/15 [2]		
	▶ Pilot control valve		Class 18/16/13 [2]		
Hysteresis		%	≤ 0.1		
Response sensitivity		%	≤ 0.1		

[1] X or Y for minimum actuating time (command value ±100%

[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.
Available filters can be found at www.boschrexroth.com/filter.

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

Hydraulic fluid		Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils		HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	FKM	ISO 15380	90221
		HEES	FKM		
	▶ Soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	FKM	ISO 12922	90222
		HFDU (ester base)	FKM		
		HFDR	FKM		
	▶ Containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	NBR	ISO 12922	90223

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

Electric					
Sizes		NG	25	32	50
Supply voltage	▶ Nominal voltage	VDC	24		
	▶ Lower limit value	VDC	21		
	▶ Upper limit value	VDC	35		
Current consumption	▶ Maximum	A	1.8		
	▶ Impulse load	A	3		
Duty cycle		%	100		
Protection class according to EN 60529			IP65 (If suitable and correctly mounted mating connectors are used)		
Temperature drift main control spool		%/10 K	0.16	0.34	0.02

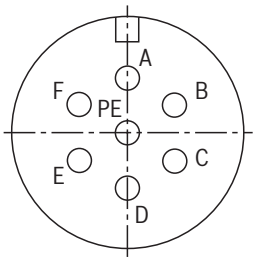
Electrical connections and assignment

Connector pin assignment

Pin 6 + PE	Signal	Interface assignment „A1“	„F1“
A	Supply voltage	24 VDC	
B		GND	
C	Reference potential actual value	Reference potential actual value	
D	Differential amplifier input	Command value ±10 V	Command value 4 ...20 mA
E		Reference potential command value	
F	Measuring output (actual value)	Actual value ±10 V	Actual value 4 ... 20 mA
PE		Functional ground (directly connected to the valve housing)	

Effect of the control:

- Version "A1"
  - Reference potential at pin E and positive command value at pin D causes volume flow P → A
  - Reference potential at pin E and negative command value at pin D causes volume flow A → T
- Version "F1"
  - Reference potential at pin E and signal 12 ... 20 mA at pin D causes volume flow P → A
  - Reference potential at pin E and signal 12 ... 4 mA at pin D causes volume flow A → T



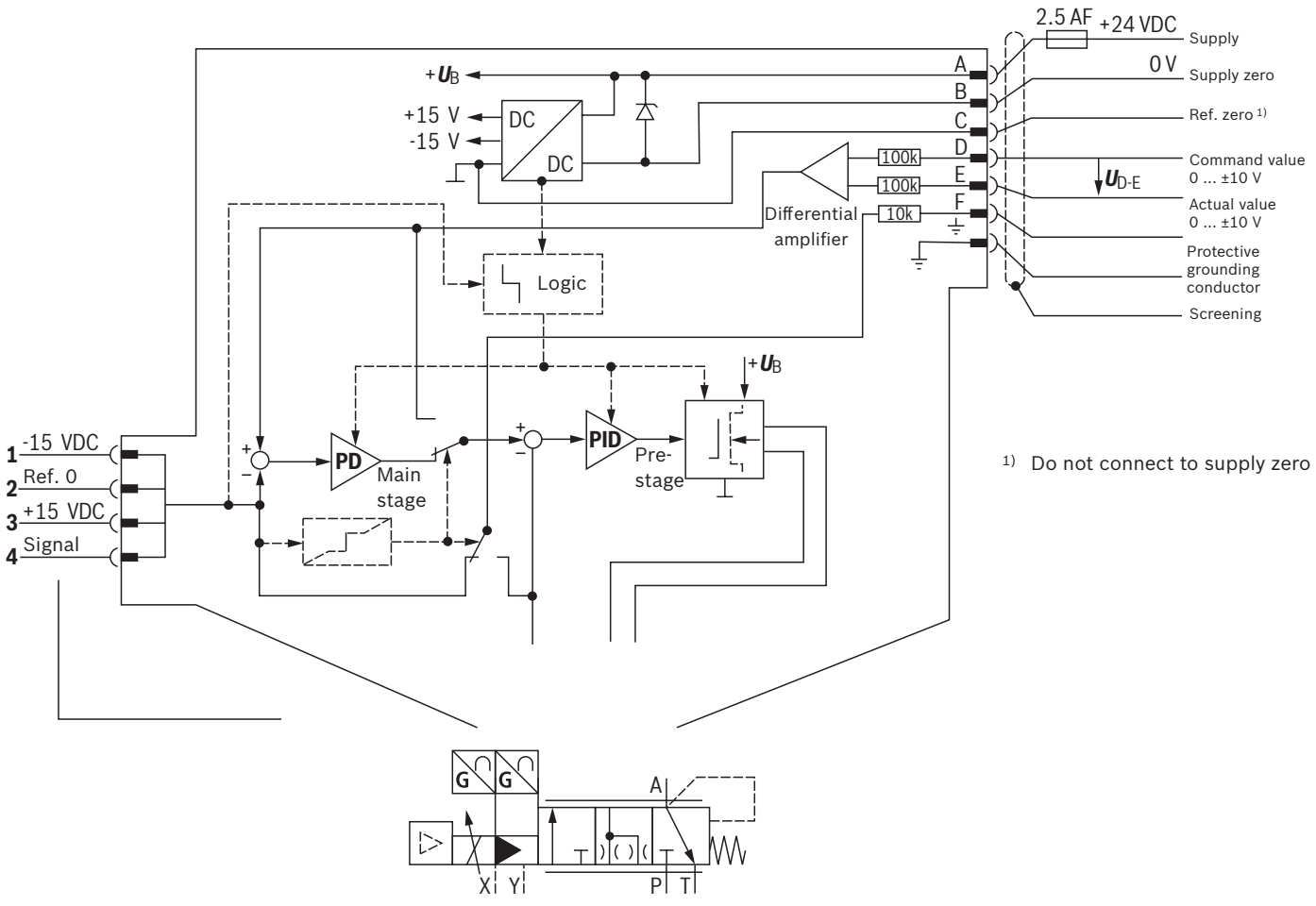
Recommendation connection cable:

- Up to 25 m – min 0.75 mm² per conductor
- Up to 50 m – min 1.5 mm² per conductor
- With shield braid (connect screening on one side of the supply zero of the power supply unit)
- Maximum external diameter 7 ... 11 mm

☞ **Notices:**

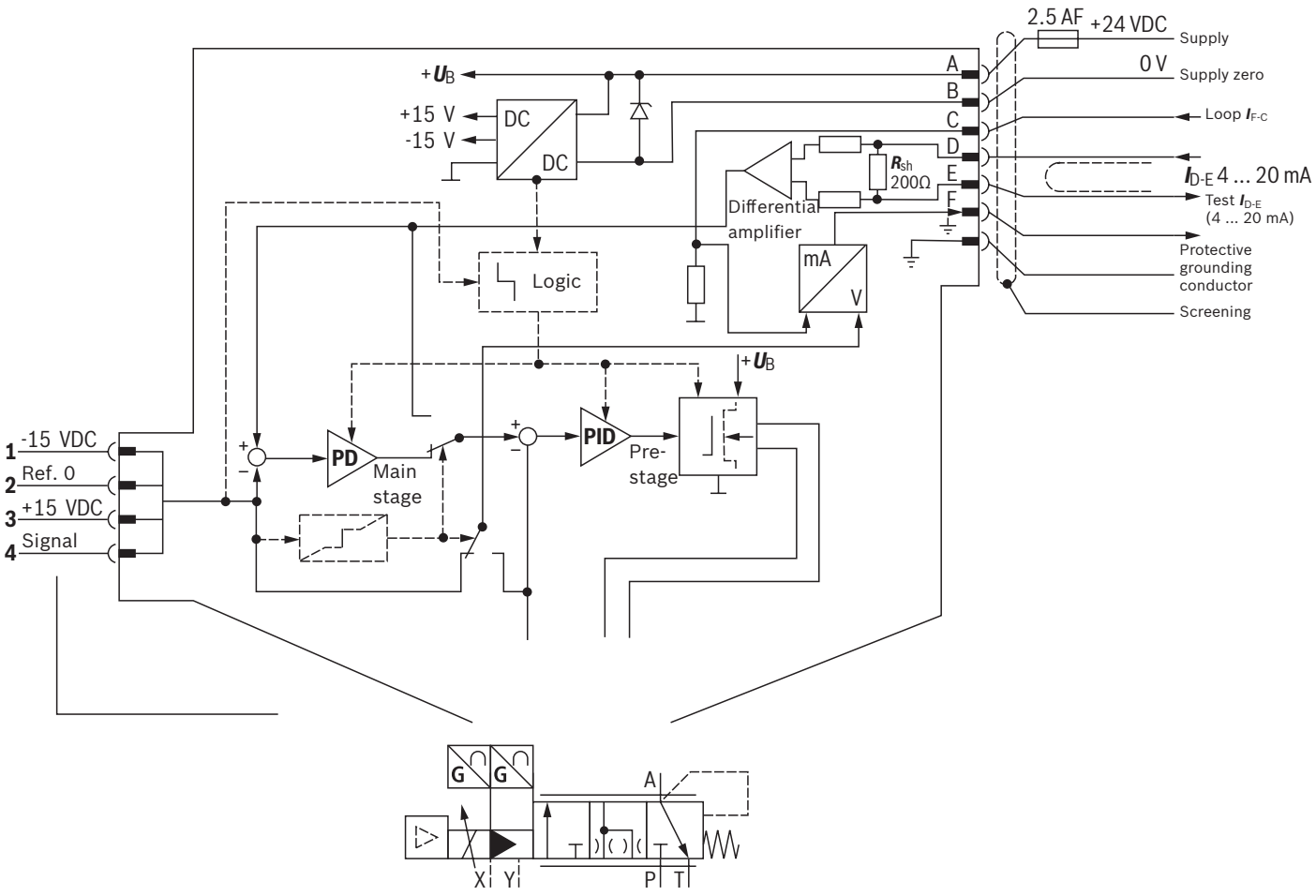
- Do not connect PE if the valve has already been grounded via the system.
- Mating connectors, separate order, see page 20 and data sheet 08008.

Block diagram/controller function block: Version "A1"



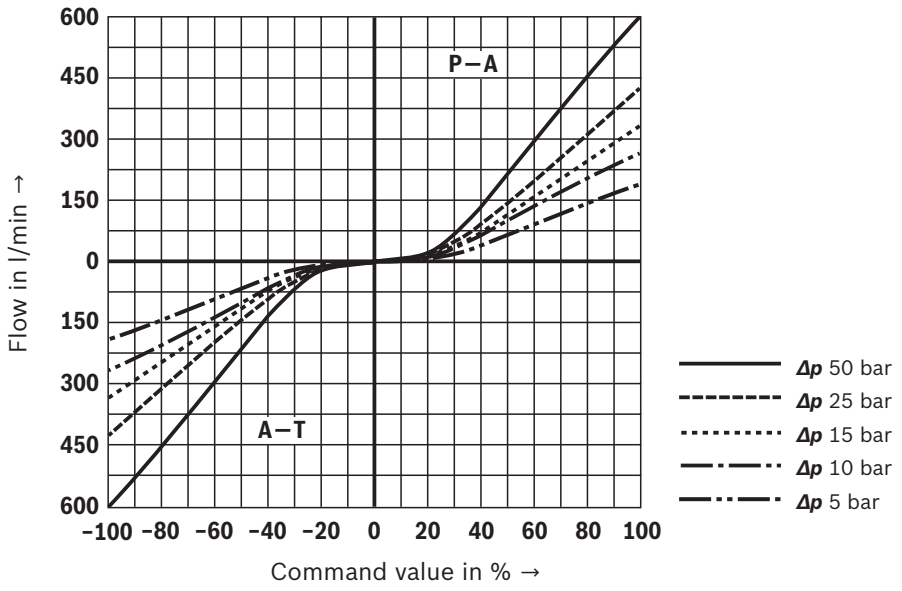
1) Do not connect to supply zero

Block diagram/controller function block: Version "F1"

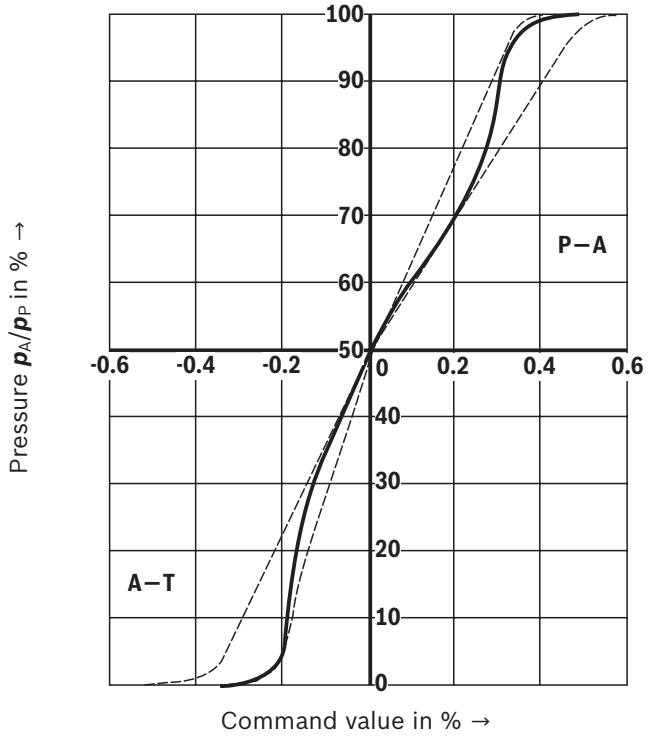


Characteristic curves: Size 25
(measured with HLP32, ϑ_{oil} = 40 ± 5 °C)

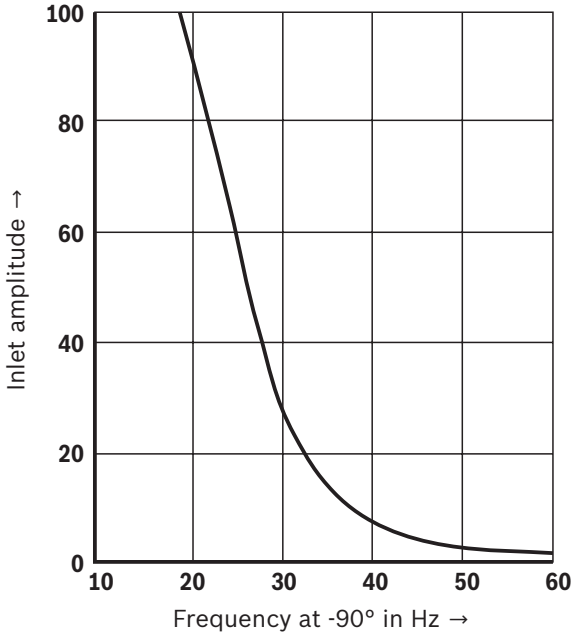
Rated flow



Pressure-signal function

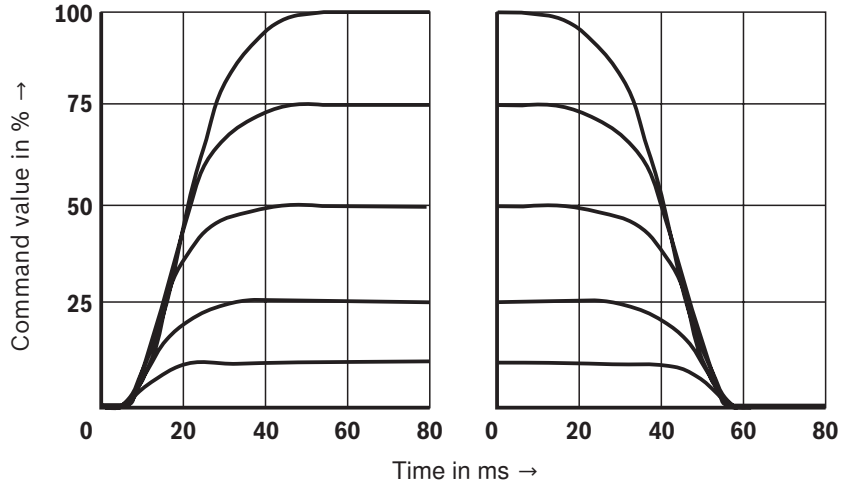


Dependent on the frequency response at -90°
(p_{St} = 100 bar, p_A = 50 bar)

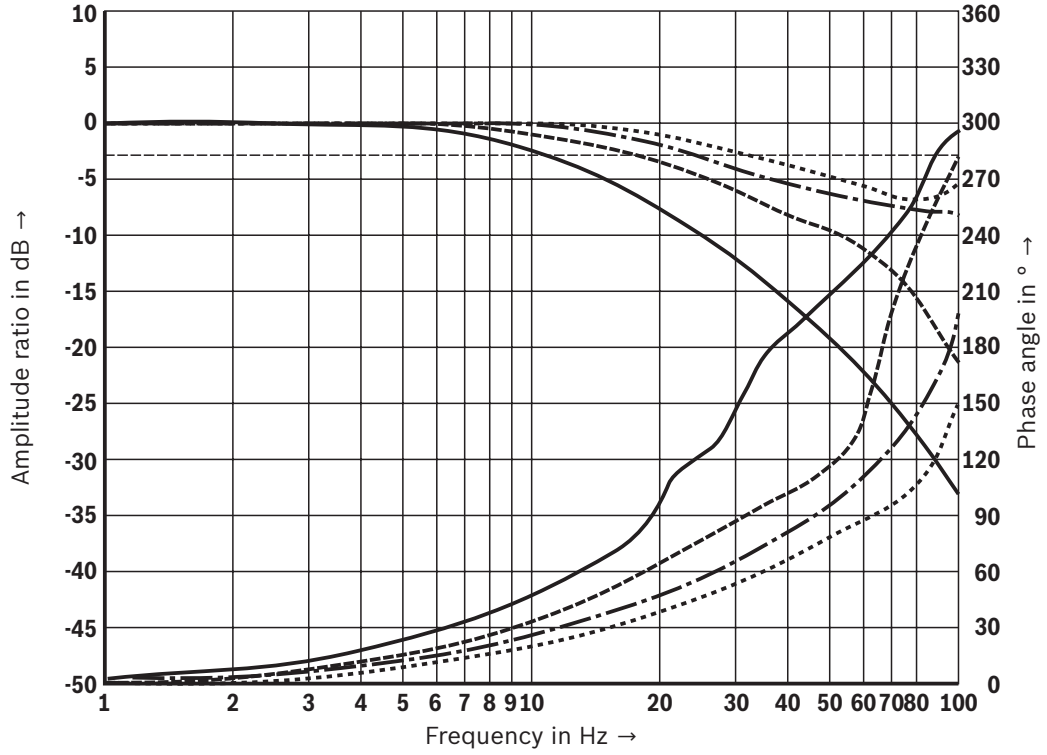


Characteristic curves: Size 25
(measured with HLP32, ϑ_{oil} = 40 ± 5 °C)

Transition function with stepped electric input signal
(p_{St} = 100 bar, p_A = 50 bar)

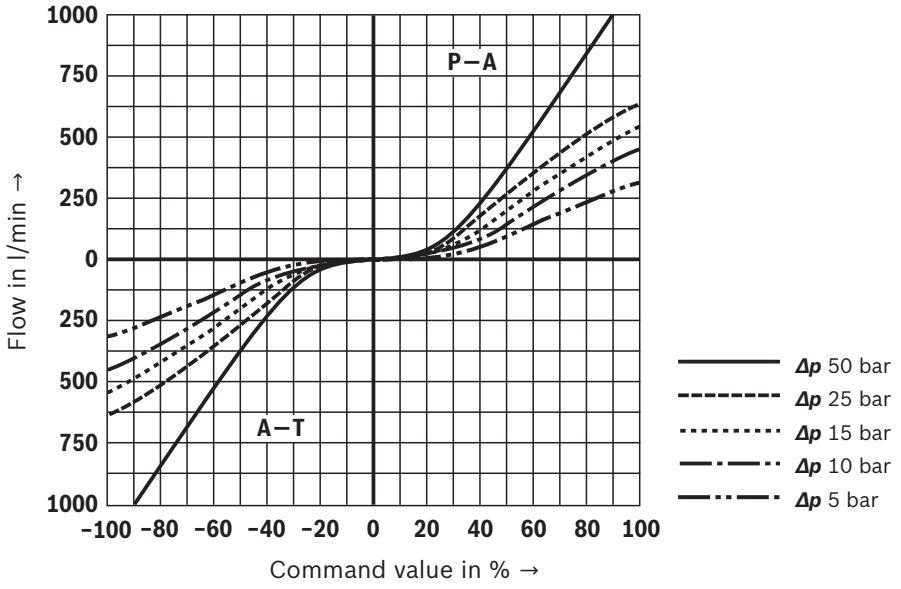


Frequency response
(p_{St} = 100 bar, p_A = 50 bar)

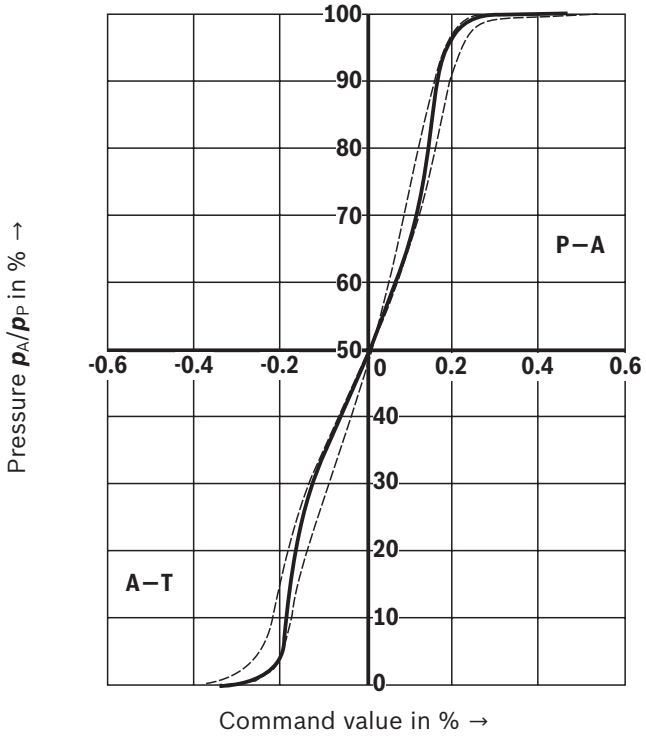


Characteristic curves: Size 32
(measured with HLP32, ϑ_{oil} = 40 ± 5 °C)

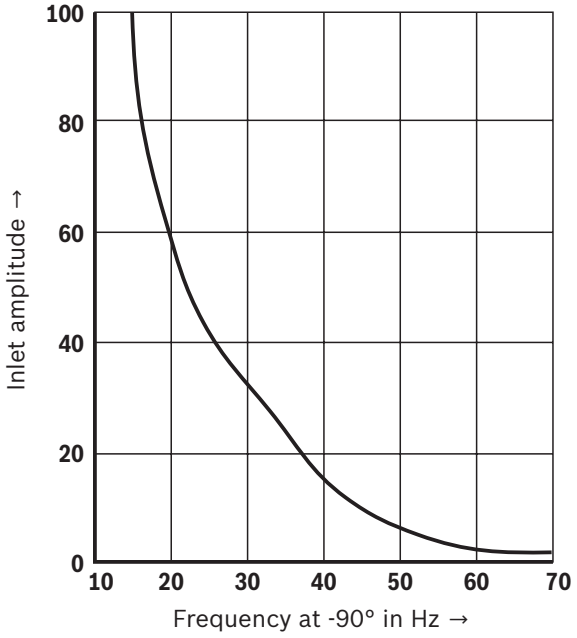
Rated flow



Pressure-signal function

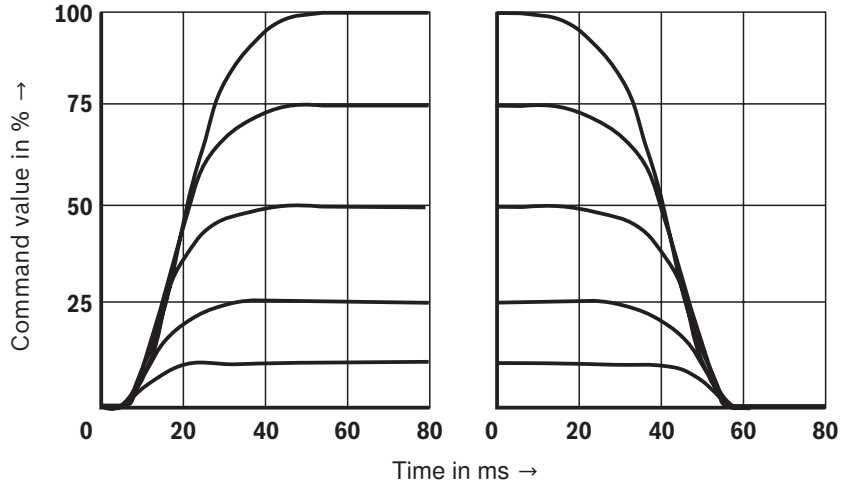


Dependent on the frequency response at -90°
(p_{St} = 100 bar, p_A = 50 bar)

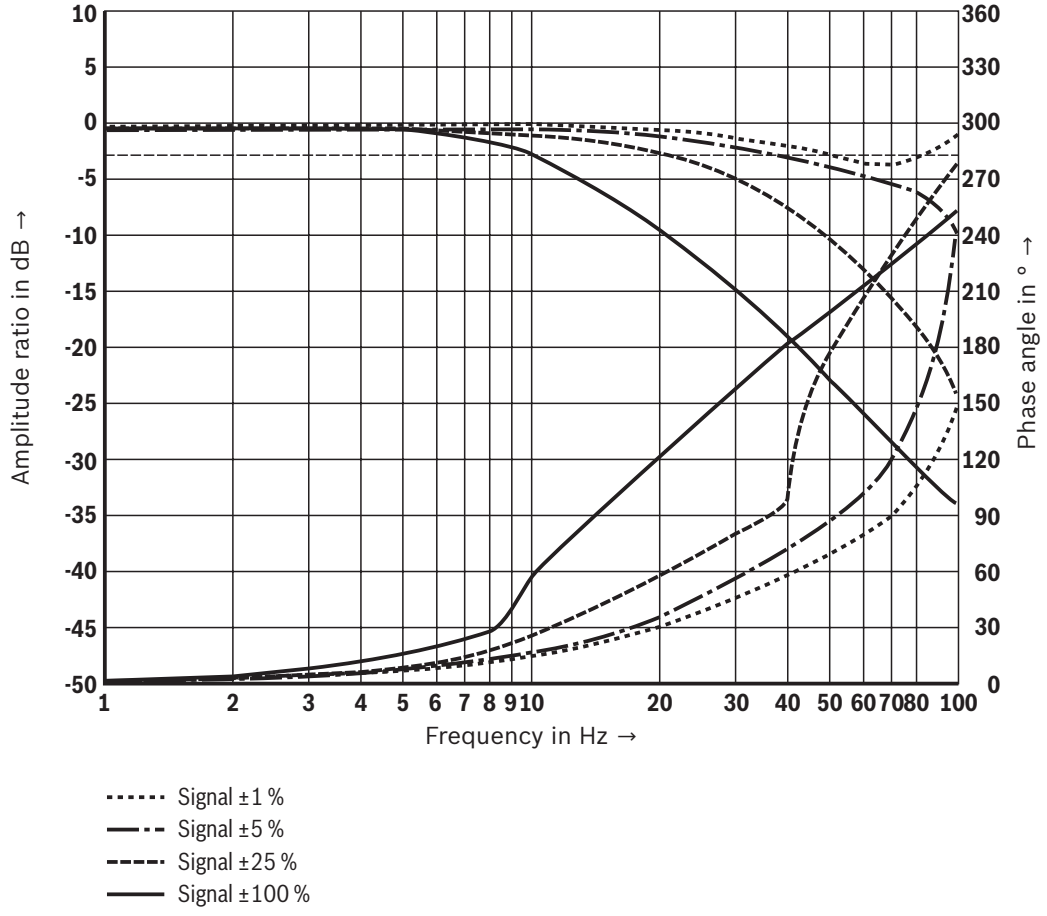


Characteristic curves: Size 32
(measured with HLP32, ϑ_{oil} = 40 ± 5 °C)

Transition function with stepped electric input signal
(p_{St} = 100 bar, p_A = 50 bar)

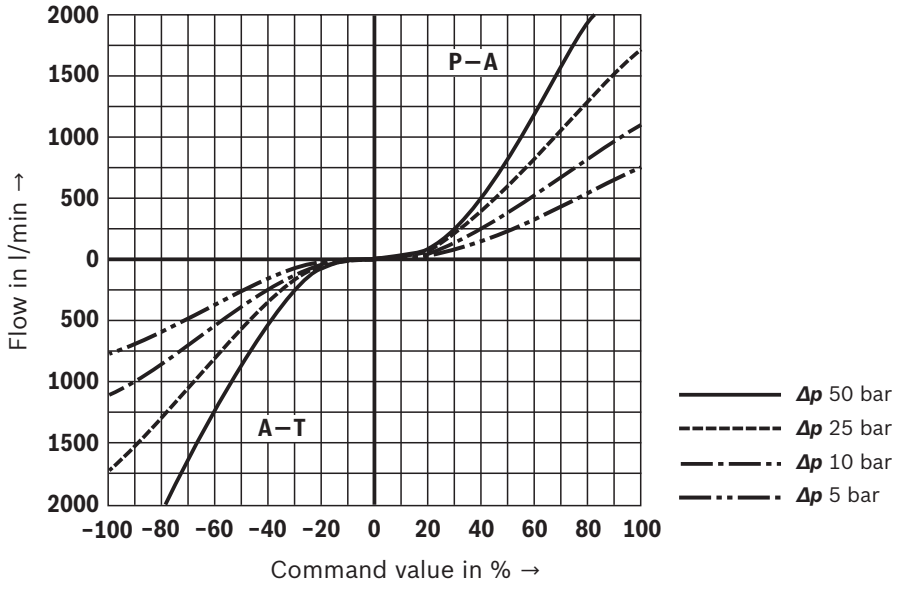


Frequency response
(p_{St} = 100 bar, p_A = 50 bar)

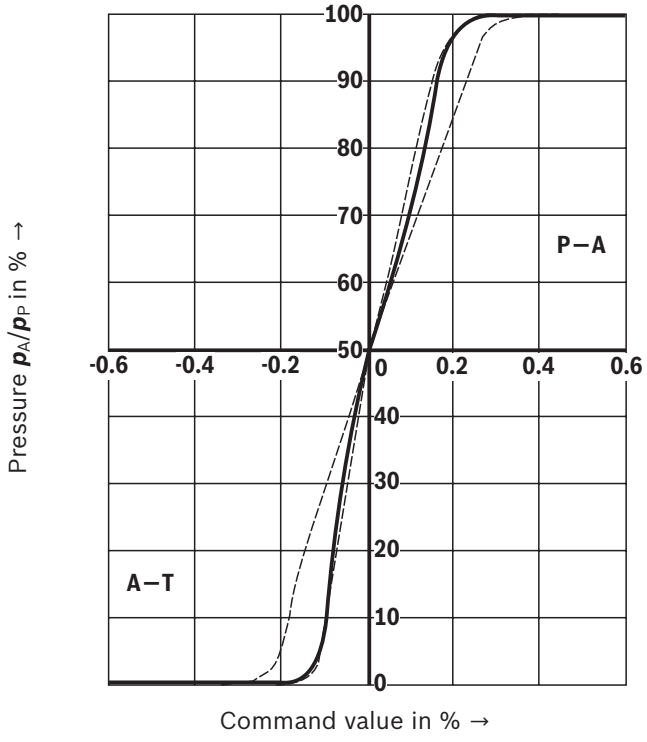


Characteristic curves: Size 50
(measured with HLP32, ϑ_{oil} = 40 ± 5 °C)

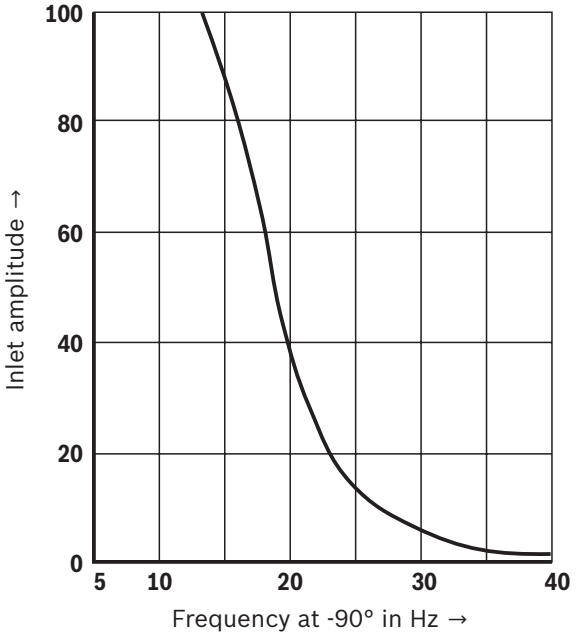
Rated flow



Pressure-signal function

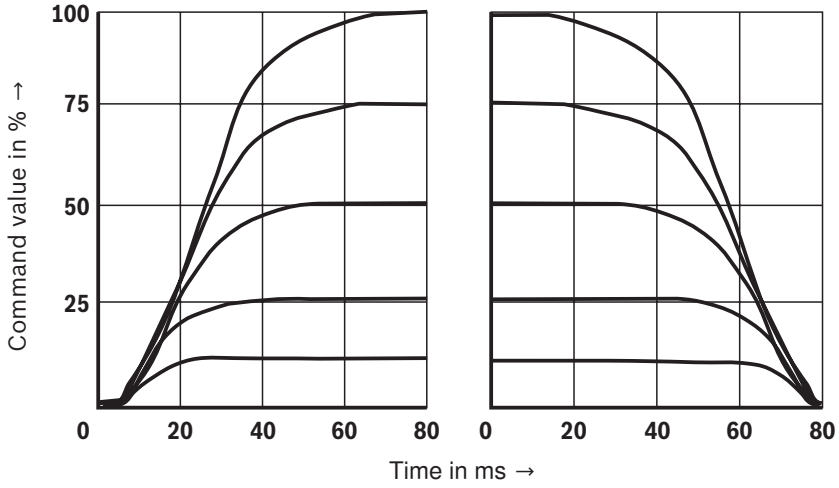


Dependent on the frequency response at -90°
(p_{St} = 100 bar, p_A = 50 bar)

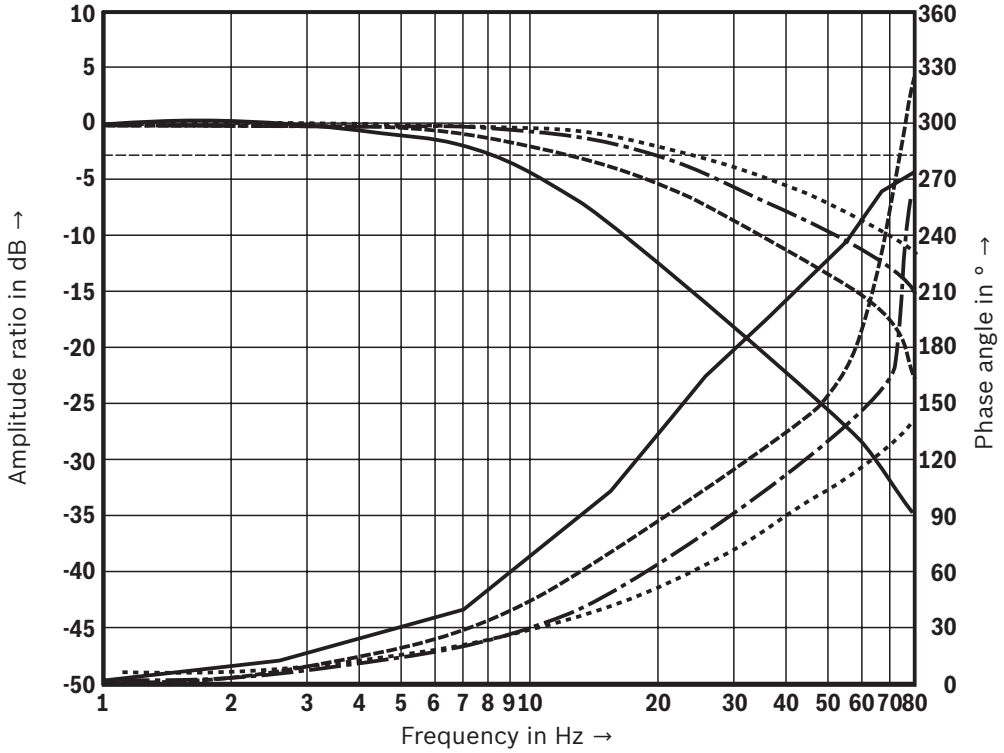


Characteristic curves: Size 50
(measured with HLP32, ϑ_{oil} = 40 ± 5 °C)

Transition function with stepped electric input signal
(p_{St} = 100 bar, p_A = 50 bar)

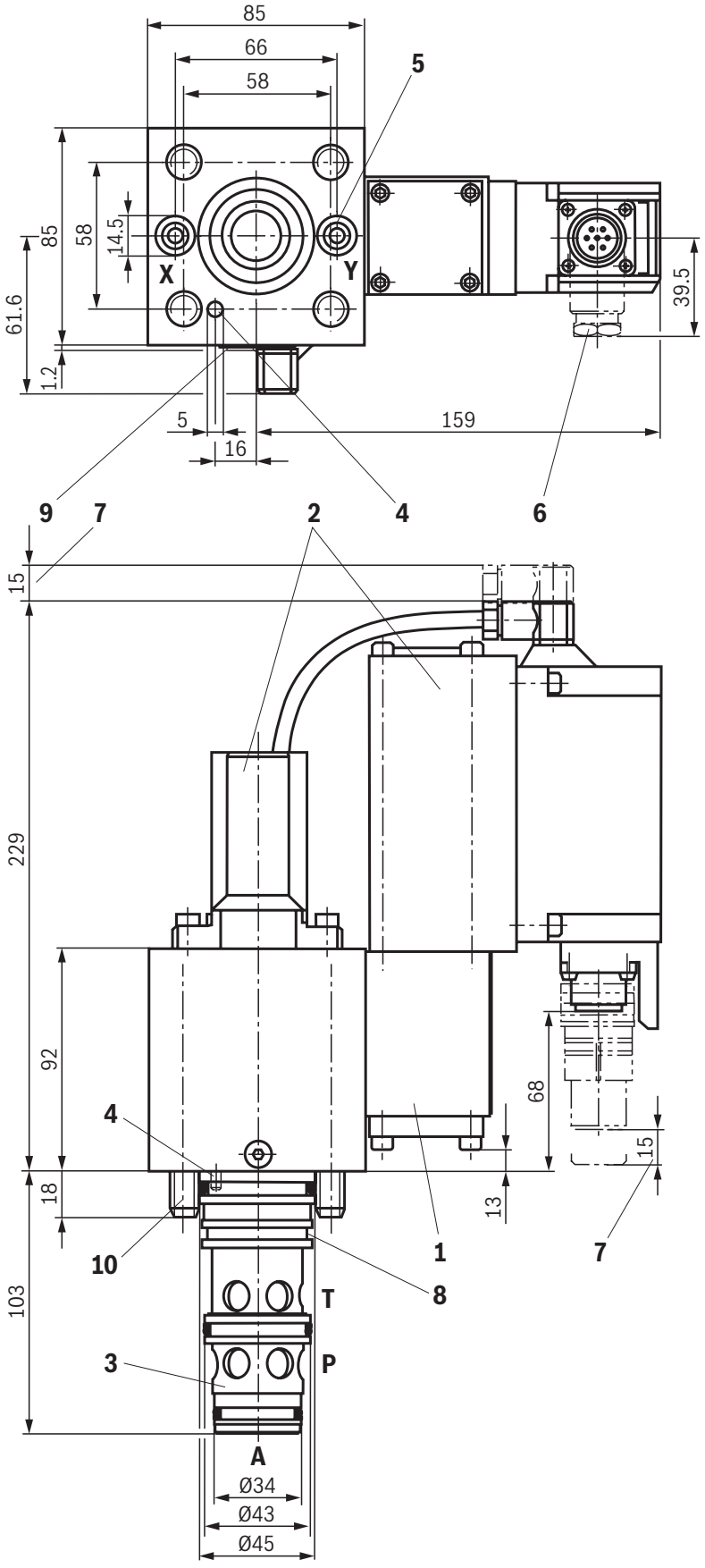


Frequency response
(p_{St} = 100 bar, p_A = 50 bar)



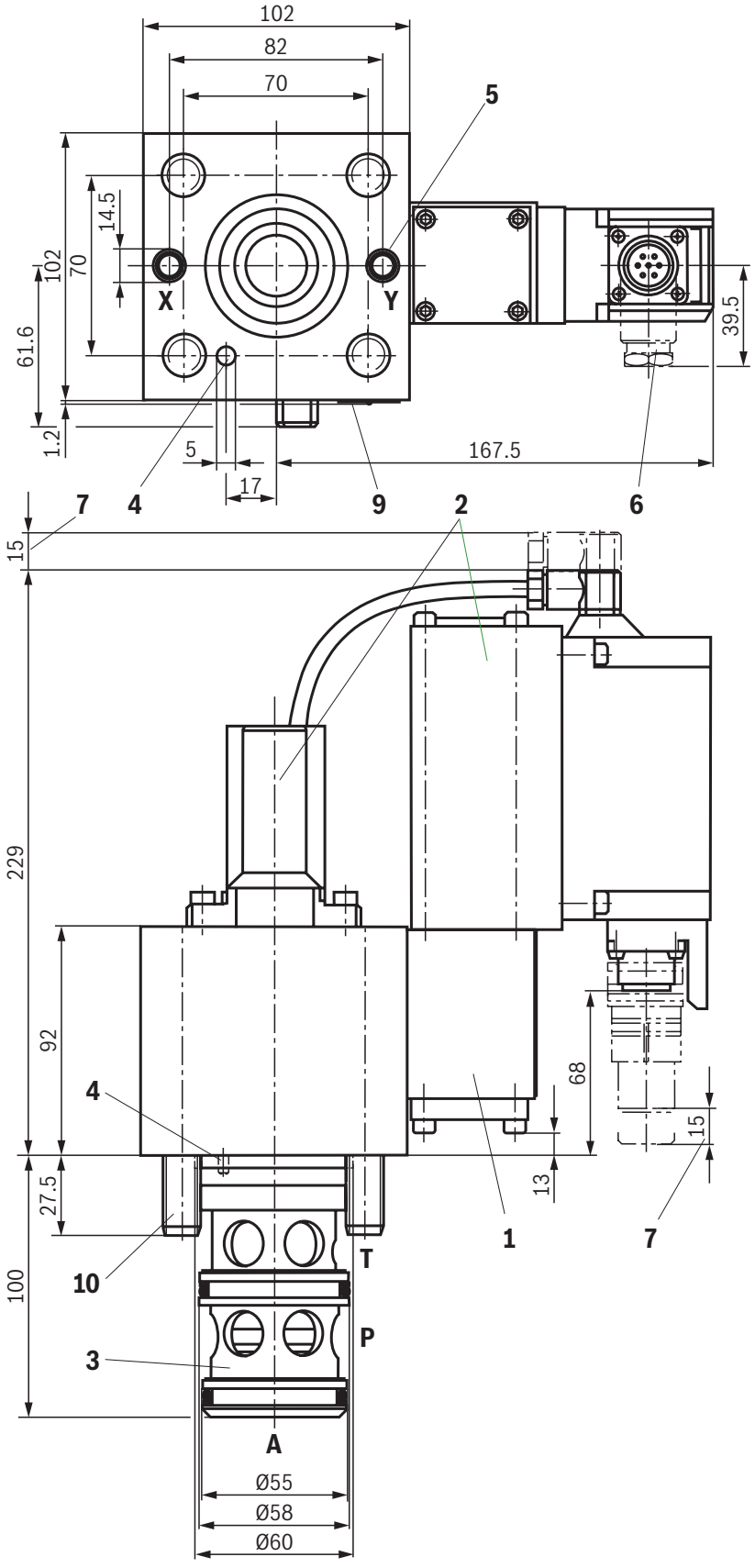
Signal ±1 %
Signal ±5 %
Signal ±25 %
Signal ±100 %

Dimensions: Size 25
(dimensions in mm)



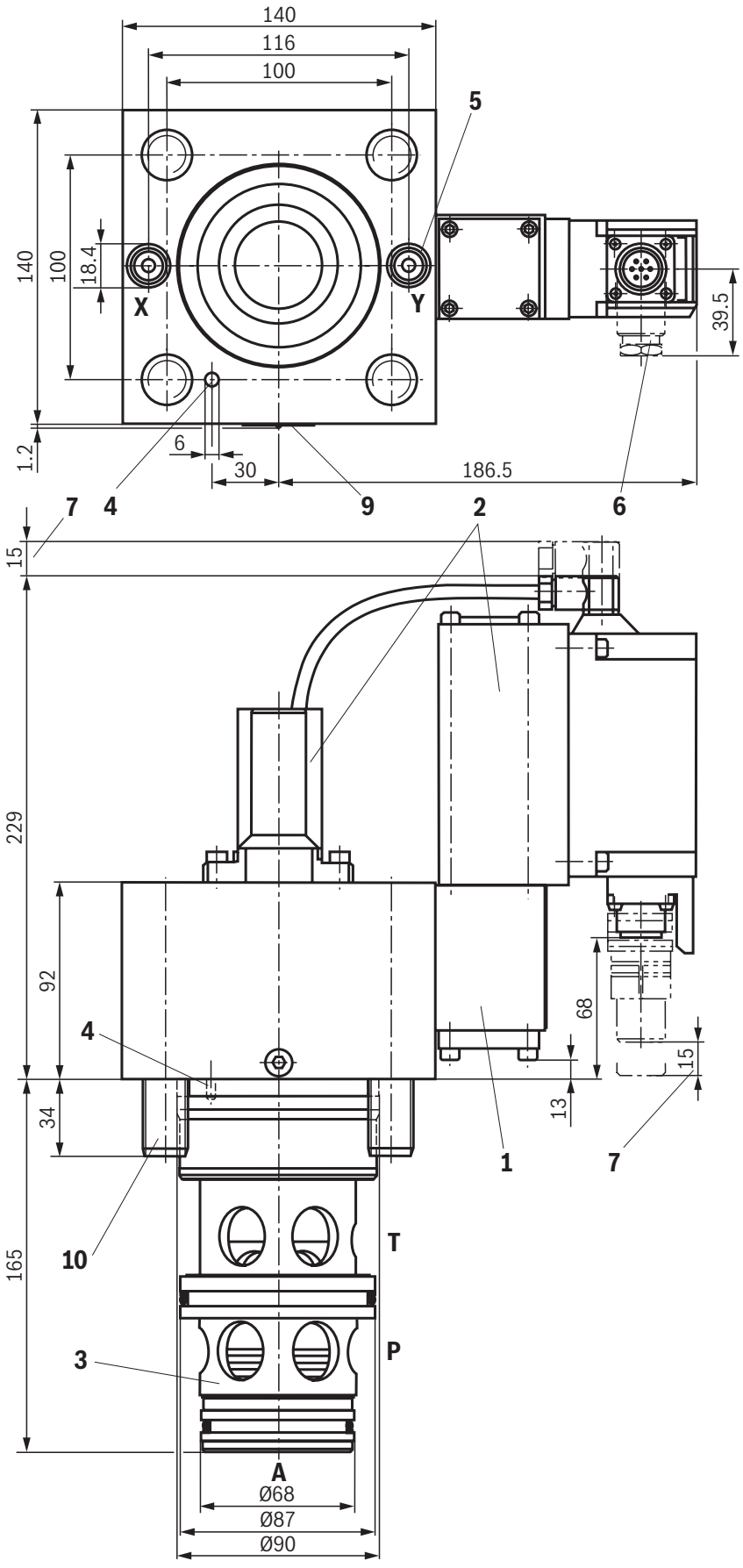
1 Pilot control valve with integrated electronics (OBE)
2 Position transducer pilot control and main stage
3 Bushing
4 Locating pin
5 Identical seal rings for ports X and Y
6 Mating connector (separate order, see page 20)
7 Space required for removing the mating connector
8 No seal admissible
9 Name plate
10 Valve mounting screws (included in the scope of delivery), see page 20

Dimensions: Size 32
(dimensions in mm)



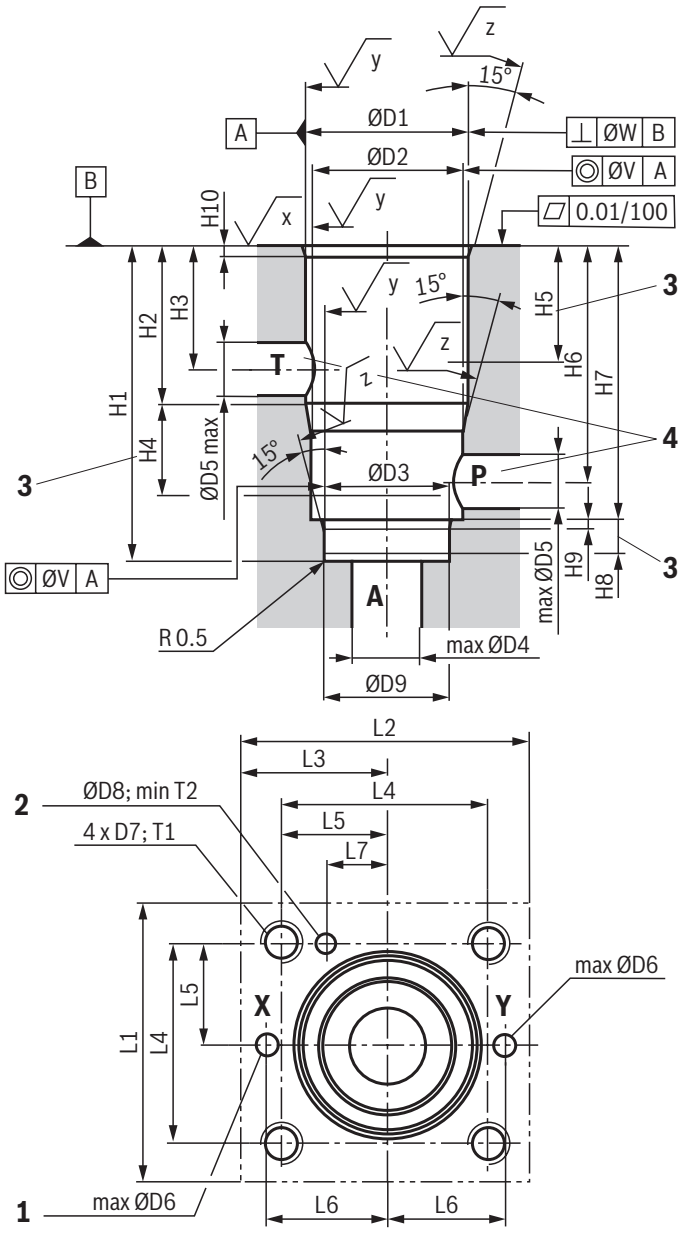
1 Pilot control valve with integrated electronics (OBE)
2 Position transducer pilot control and main stage
3 Bushing
4 Locating pin
5 Identical seal rings for ports X and Y
6 Mating connector (separate order, see page 20)
7 Space required for removing the mating connector
9 Name plate
10 Valve mounting screws (included in the scope of delivery), see page 20

Dimensions: Size 50
(dimensions in mm)



1 Pilot control valve with integrated electronics (OBE)
2 Position transducer pilot control and main stage
3 Bushing
4 Locating pin
5 Identical seal rings for ports X and Y
6 Mating connector (separate order, see page 20)
7 Space required for removing the mating connector
9 Name plate
10 Valve mounting screws (included in the scope of delivery), see page 20

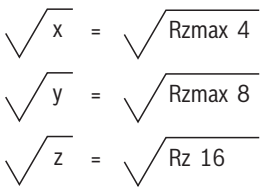
Installation bore
(dimensions in mm)



NG	25	32	50
L1	85	102	140
L2	85	102	140
L3	42.5	51	70
L4$^{\pm 0.2}$	58	70	100
L5$^{\pm 0.1}$	29	35	50
L6$^{\pm 0.2}$	33	41	58
L7$^{\pm 0.2}$	16	17	30
H1$^{+0.1}$	103	100	165
H2	56	43.5	87
H3	45	30	66
H4	15	16	40
H5	15	18	20
H6$^{\pm 0.3}$	78	70.5	122
H7$^{+0.3}$	89	85	143
H8	11.5	13.5	18
H9	2.5	3	3
H10	2.5	2.5	4
ØD1H7Ⓔ	45	60	90
ØD2H7Ⓔ	43	58	87
ØD3H7Ⓔ	34	55	68
max. ØD4	20	30	35
max. ØD5	20	24	35
max. ØD6	6	8	10
D7	M12	M16	M20
ØD8H13	6	6	8
ØD9$^{+0.2}$	33.7	54.7	67.7
T1	25	35	45
min. T2	10	10	10
V	0.03	0.03	0.03
W	0.05	0.1	0.1

Tolerances according to: General tolerances ISO 2768-mK

Valve mounting screws see page 20.



1 Connect port X to port P or connect externally

2 Bore for locating pin

3 Depth of fit

4 The ports P and T can be positioned around the central axis of port A. However, it must be observed that the mounting bores and the control bores are not damaged.

Accessories

Valve mounting screws (included in the scope of delivery)

Size	Quantity	Hexagon socket head cap screws	Material number
25	4	**ISO 4762 - M12 x 35 -10.9-flZn-240h-L** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 110 Nm ±10%	**–**
32	4	**ISO 4762 - M16 x 50 - 10.9-flZn/nc/480h/C** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 250 Nm ±10%	**–**
50	4	**ISO 4762 - M20 x 70 -10.9-flZn-240h-L** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 540 Nm ±10%	**–**

Mating connectors and cable sets (separate order)

Item [1]	Designation	Version	Short designation	Material number	Data sheet
6	Mating connectors; for valves with installed electronics (OBE)	6P+PE, angled, plastic, PG 11, crimp technology	–	**1834484252**	08008

[1] See dimensions page 16 ... 18.

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
▶ Mating connectors for controlling electrically operated valves and sensors	Data sheet 08008
▶ Hydraulic valves for industrial applications	Operating instructions 07600-B
▶ Selection of filters	www.boschrexroth.com/filter
▶ Information on available spare parts	www.boschrexroth.com/spc

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