

Directional high-response cartridge valve, pilot-operated, with hydraulic actuation and inductive position transducer

Type 3WRCBH



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

Features

- ▶ 3-way cartridge valve
- ▶ Control spool with anti-rotation feature and control edges in servo quality
- ▶ Pressure-resistant up to 315 bar
- ▶ Control line A of the pilot control valve according to X generally required
- ▶ Dynamic reset "Z" (B to Z) possible for version "F" (only NG25 and 50)
- ▶ Inductive position transducer, position-controlled by external pilot control valve and valve electronics
- ▶ Pilot control valve at the manifold externally assigned
- ▶ Hysteresis < 0.1%, hardly measurable
- ▶ Flow characteristic, progressive with fine control edge

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	
3	WRCB	H		V			M	-	1X	/	M	*

01	3 main ports	3
02	Directional high-response cartridge valve, pilot-operated	WRCB
03	Hydraulic operation	H
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	no code
	1:1.5	F

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

07	- Size 25	
	65 l/min	65
	190 l/min	190
	- Size 32	
	380 l/min	380
	- Size 50	
	300 l/min	300
	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

Pilot oil port

10	Without	no code
	Additional pilot oil port (only version "F" and NG25 and 50)	Z

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

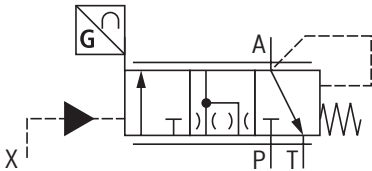
11	NBR seals	M
12	Further details in the plain text	

 **Notice:**

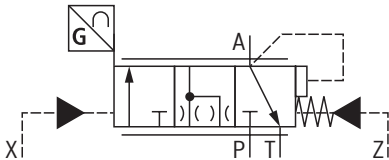
Pilot control valves and accessories see page 15.

Symbols

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

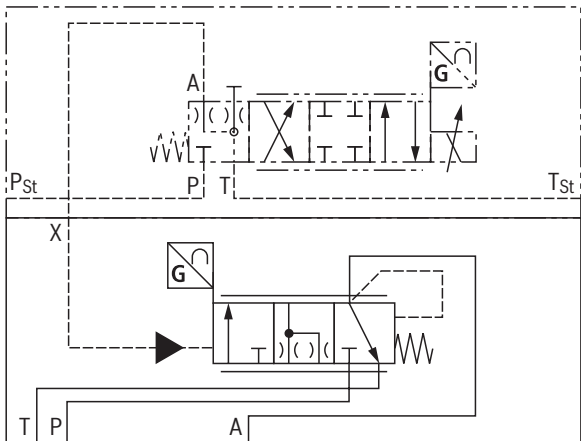


Version "F...Z" (area ratio 1:1.5)

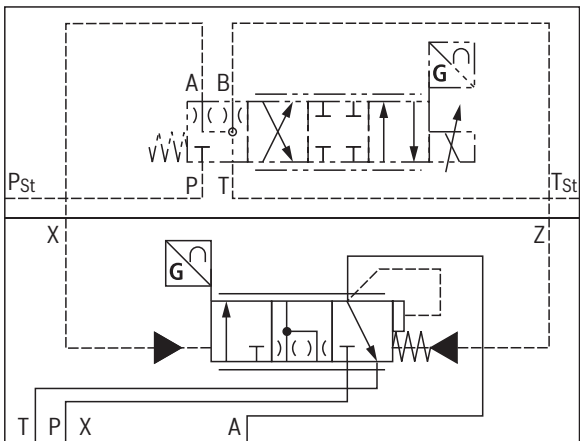


Pilot oil supply

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



Version "F...Z" (area ratio 1:1.5)



Function, section

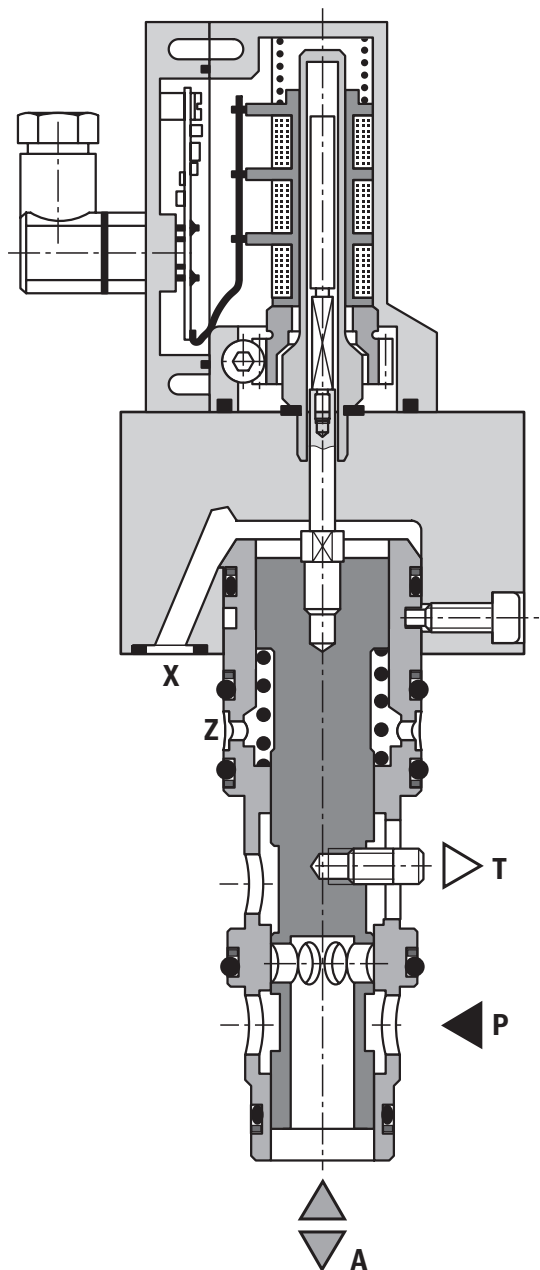
In connection with pilot control valves, valves of type 3WRCBH are pilot-operated directional high-response cartridge valves with 2 control edges in servo quality, P-A / A-T. They control size and direction of a flow. The transition was designed by means of fine control edges for minimum leakage at high and linear pressure amplification. The control spool position is deflected by the pilot oil of the pilot control valve. In case X is unloaded and/or in case of power failure, the load pressure in A and the internal spring result in a control spool reset (A-T). The control spool position is recorded by an inductive position transducer. Its signal and the valve electronics allow for position control via a pilot control valve. An additional pilot oil port Z (only version "F" and NG25 and 50) allows for fast reset in case of low load in port A. In this connection, the pilot control valve must be connected to A-X and B-Z.

For the external position control, the following components are required:

- ▶ Pilot control valve type 4WRP(E)H 6 (separate order, see page 15)
- ▶ Integrated electronics (OBE) or external control electronics (separate order, see page 15)
- ▶ Valve block (customer side).

The pilot oil guidance in the valve block and the electrical connection design the pilot-operated valve function for control tasks in the system. In most cases, this is a process for velocity and pressure control. The process controllers of the system generate the valve signal for the control loop.

Main stage
Type 3WRCBH . VF...Z



Technical data

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

General				
Size	NG	25	32	50
Installation position		Horizontal or position transducer downwards		
Ambient temperature range	°C	-20 ... +50		
Mass	kg	3.9	5.6	14.7
Vibration resistance, test condition		max. 25g, room vibration test in all directions (24h)		

Hydraulic						
Maximum operating pressure ▶ Port P, A, T, X, Z	bar	315				
Minimum pilot pressure	bar	$p_A + 4$				
Rated flow ($\Delta p = 5$ bar/control edge) ¹⁾	l/min	65	190	380	300	750
Maximum flow	l/min	350	570	820	1600	
Pilot flow ²⁾	l/min	8		16	28	
Leakage flow (at 100 bar)	▶ Pilot control valve	cm ³ /min		<300	<900	
	▶ Main stage	cm ³ /min	<350	<350	<500	<500
Hydraulic fluid		see table page 6				
Hydraulic fluid temperature range	°C	-20 ... +80				
Viscosity range	▶ Recommended	mm ² /s	20 ... 100			
	▶ Maximum admissible	mm ² /s	10 ... 800			
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)		Class 18/16/13 ³⁾				
Pilot control valve	▶ Type 4WRPH 6		see page 15			
	▶ Type 4WRPEH 6		see page 15			

Static/dynamic					
Size	NG	25	32	50	
Manufacturing tolerance q_{Vmax}	%	≤10			
Actuating time ⁴⁾	▶ A-X	ms	33	28	60
	▶ A-X; B-Z	ms	27	-	50
Switch-off behavior (after electrical shut-off)		Pilot control valve in "fail-safe" position, main valve moves to position A-T			
Temperature drift ($\Delta T = 40$ °C)	%	Zero shift < 1			
Zero compensation		Valve amplifier ±5% adjustable, pilot control valve with integrated electronics (OBE) set in the plant			

¹⁾ Flow for deviating Δp (control edge):

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



Notice:

Information on rated flow/maximum flow only in case of compliance with the installation dimensions.

²⁾ $p = 100$ bar; maximum dynamics

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

⁴⁾ Signal step 0 ... 100% at $p_x = 100$ bar / $p_A = 50$ bar

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 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:

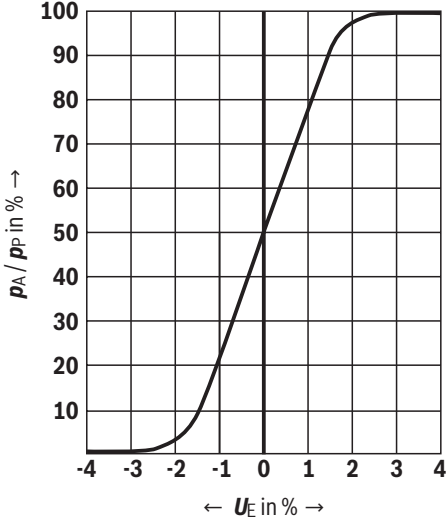
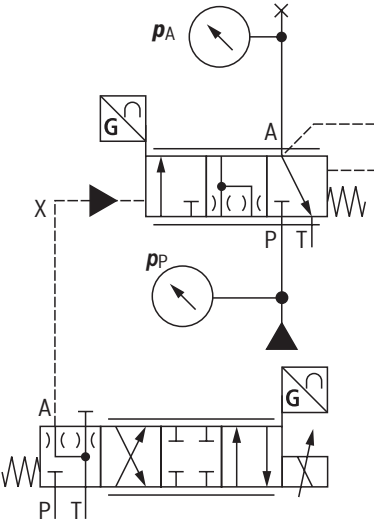
- Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – backing up the return 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.

Electric		
Position transducer	▶ Supply	+15 V/35 mA; -15 V/25 mA
DC/DC technology	▶ Signal ($R_L \geq 10 \text{ k}\Omega$)	V 0 ... ±10
Pilot control valve	▶ Type 4WRPH 6	Data sheet 29028
	▶ Type 4WRPEH 6	Data sheet 29035

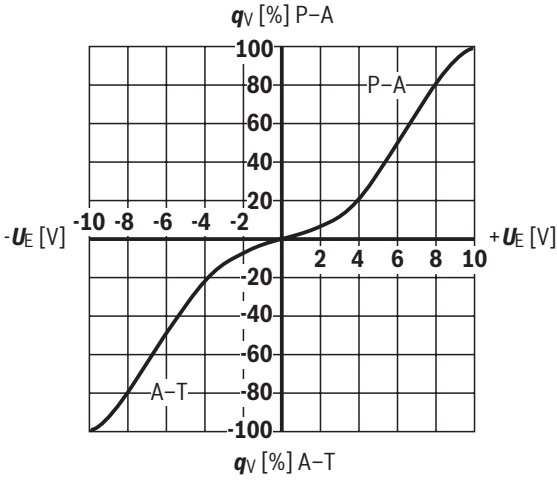
Characteristic curves

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

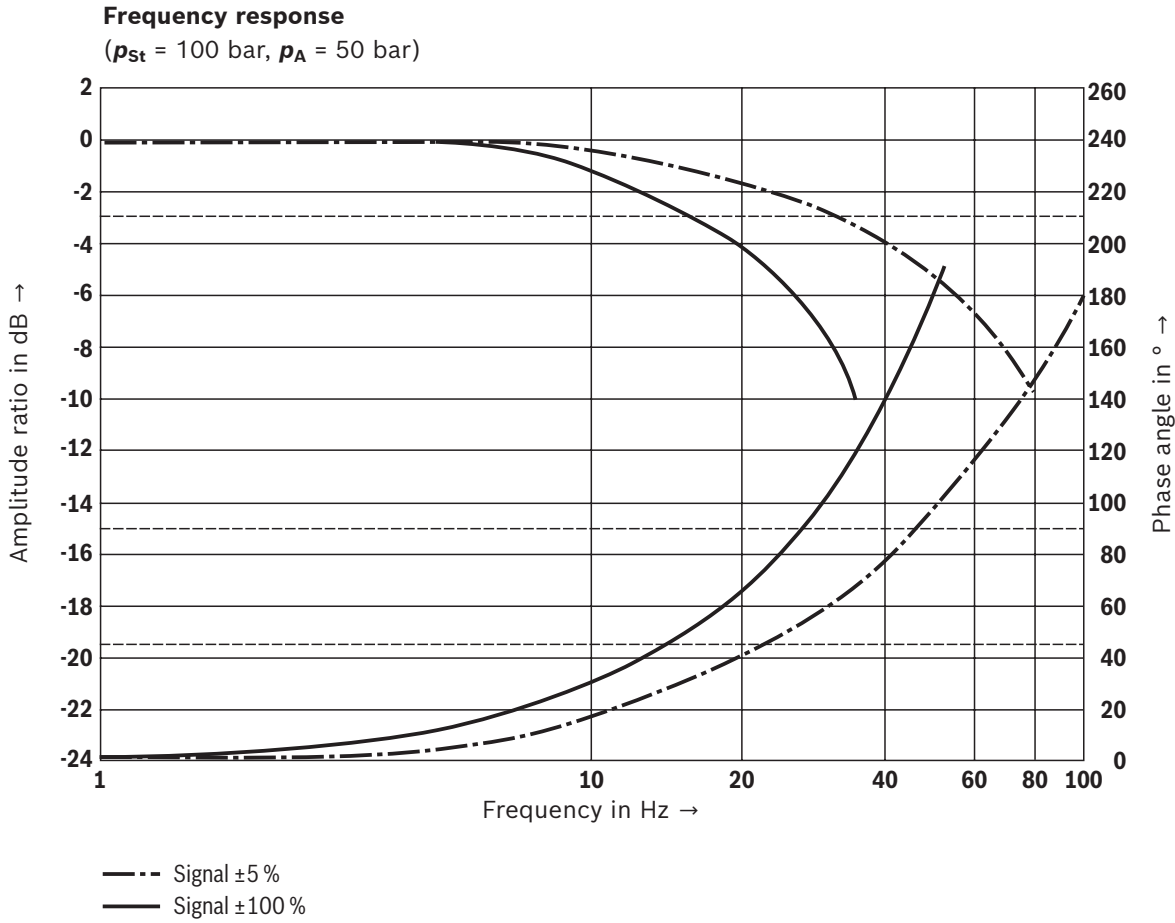
Pressure amplification



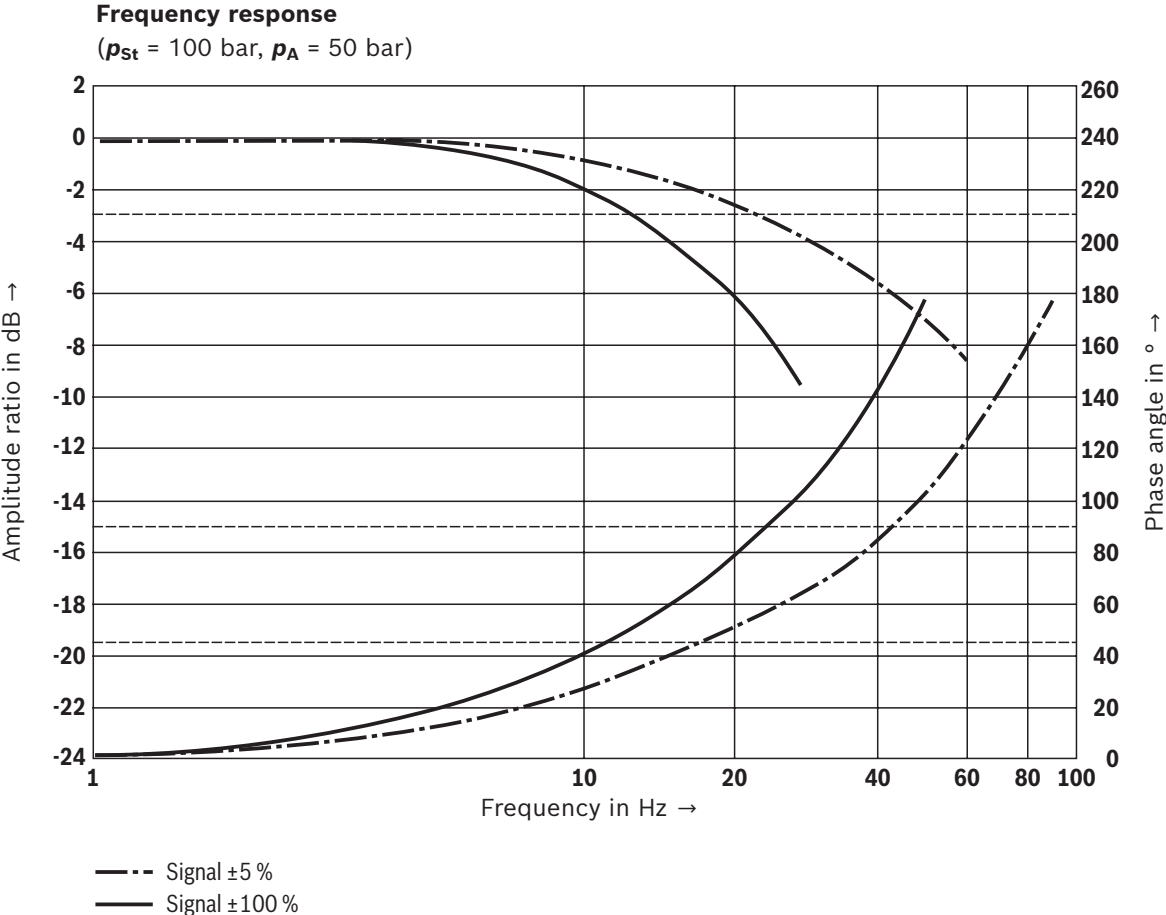
Flow/signal function



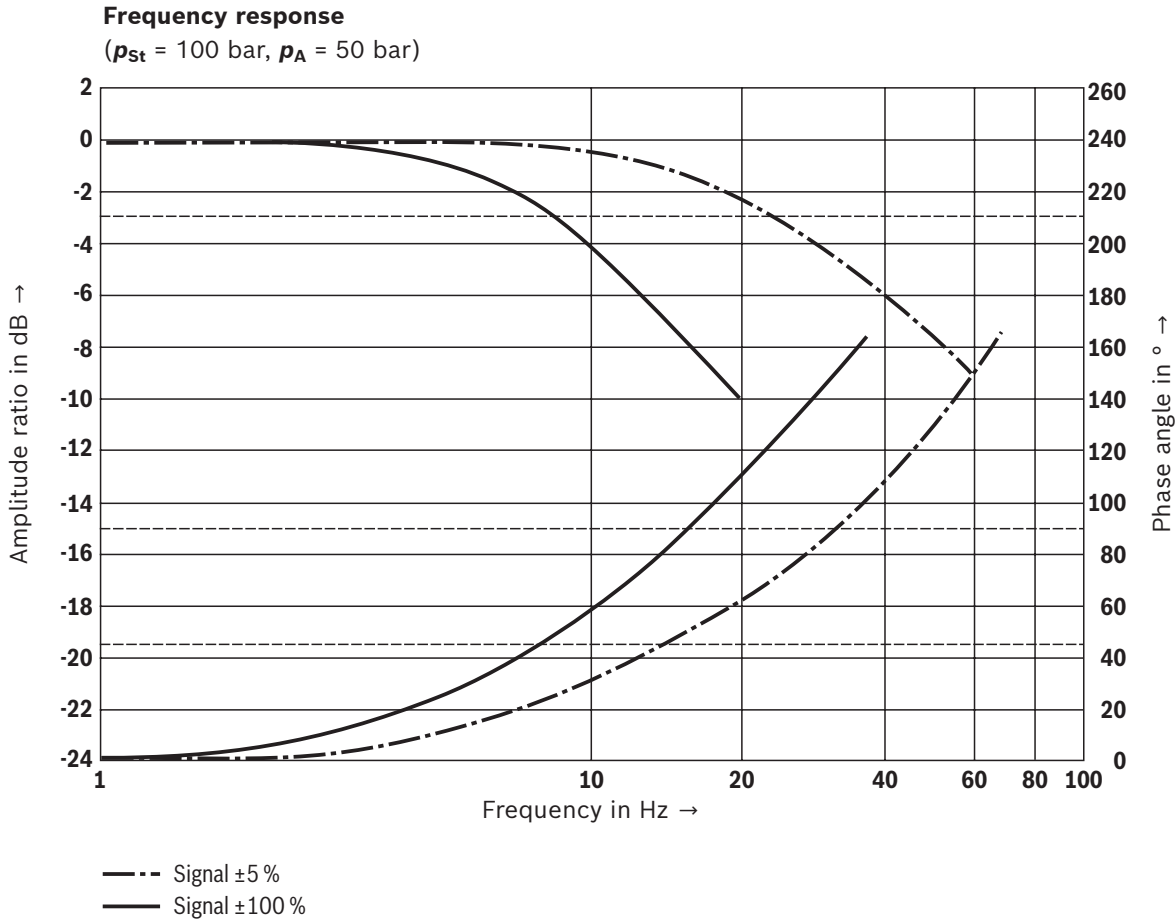
Characteristic curves: Size 25
 (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)



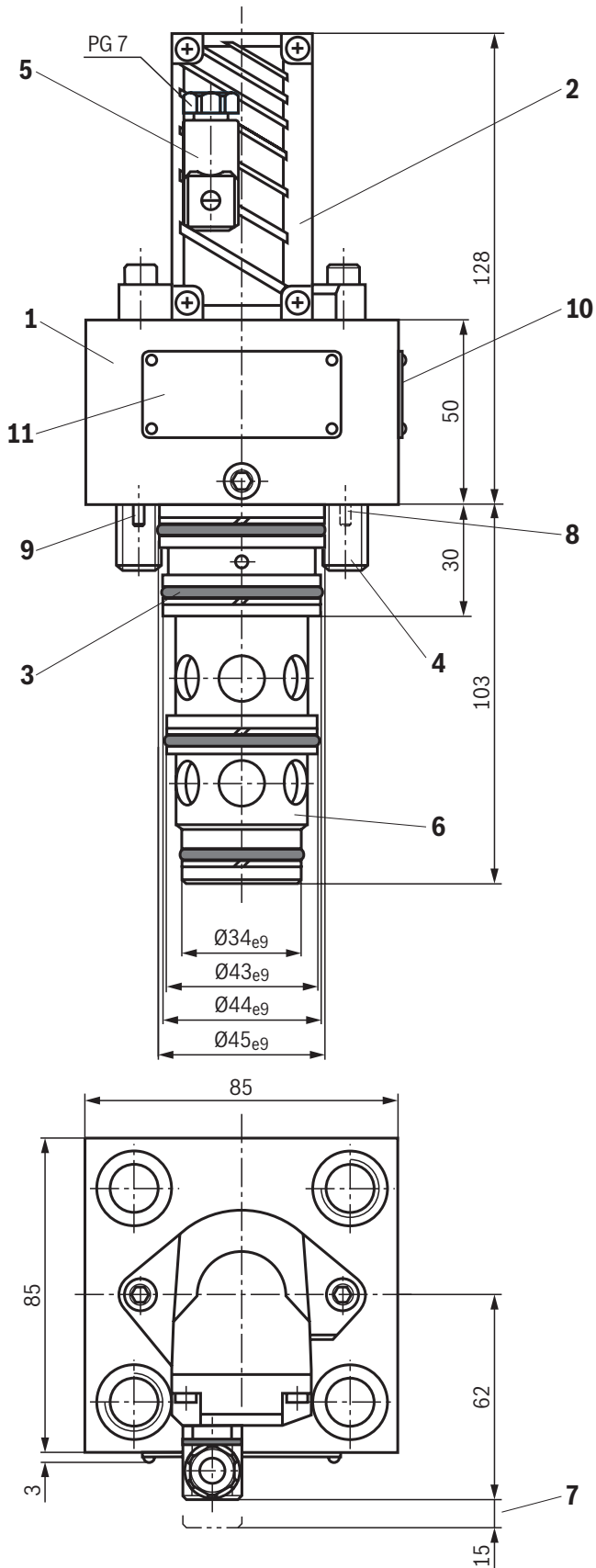
Characteristic curves: Size 32
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)



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

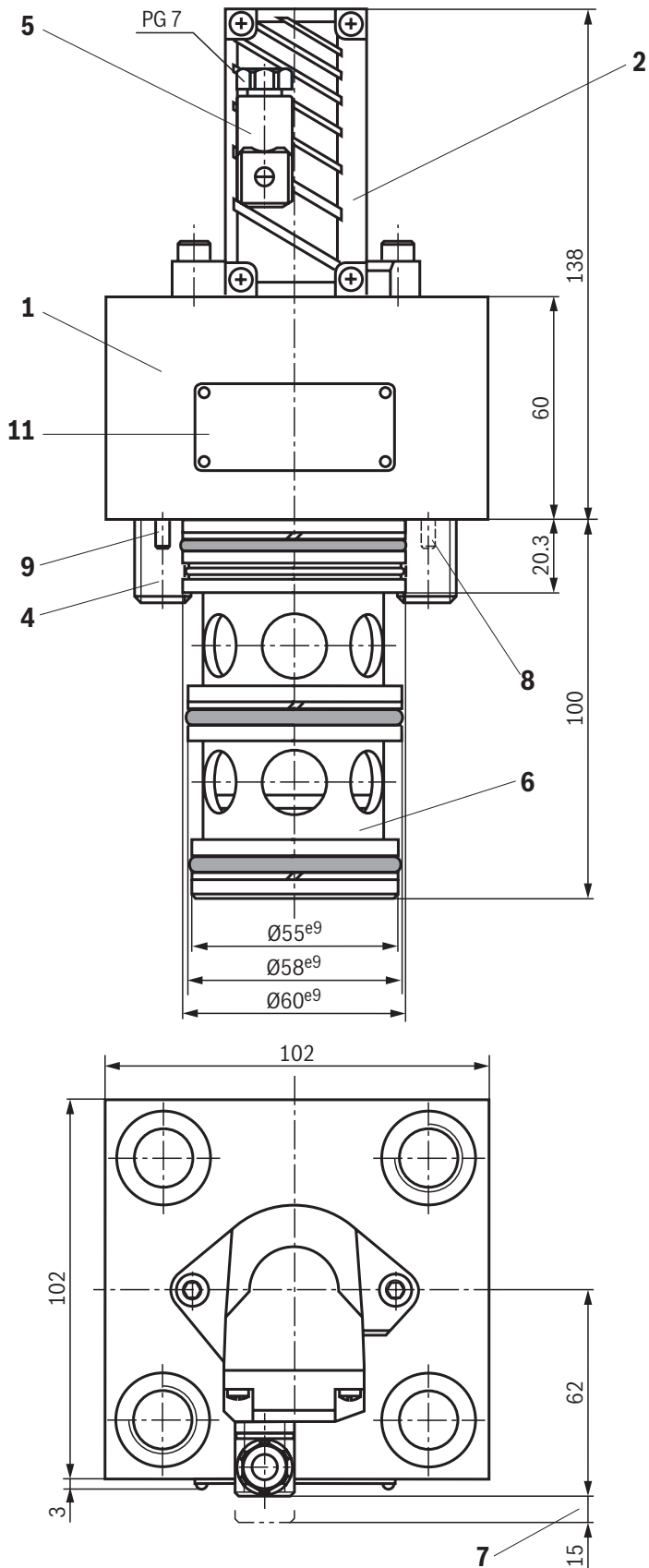


Dimensions: Size 25
(dimensions in mm)



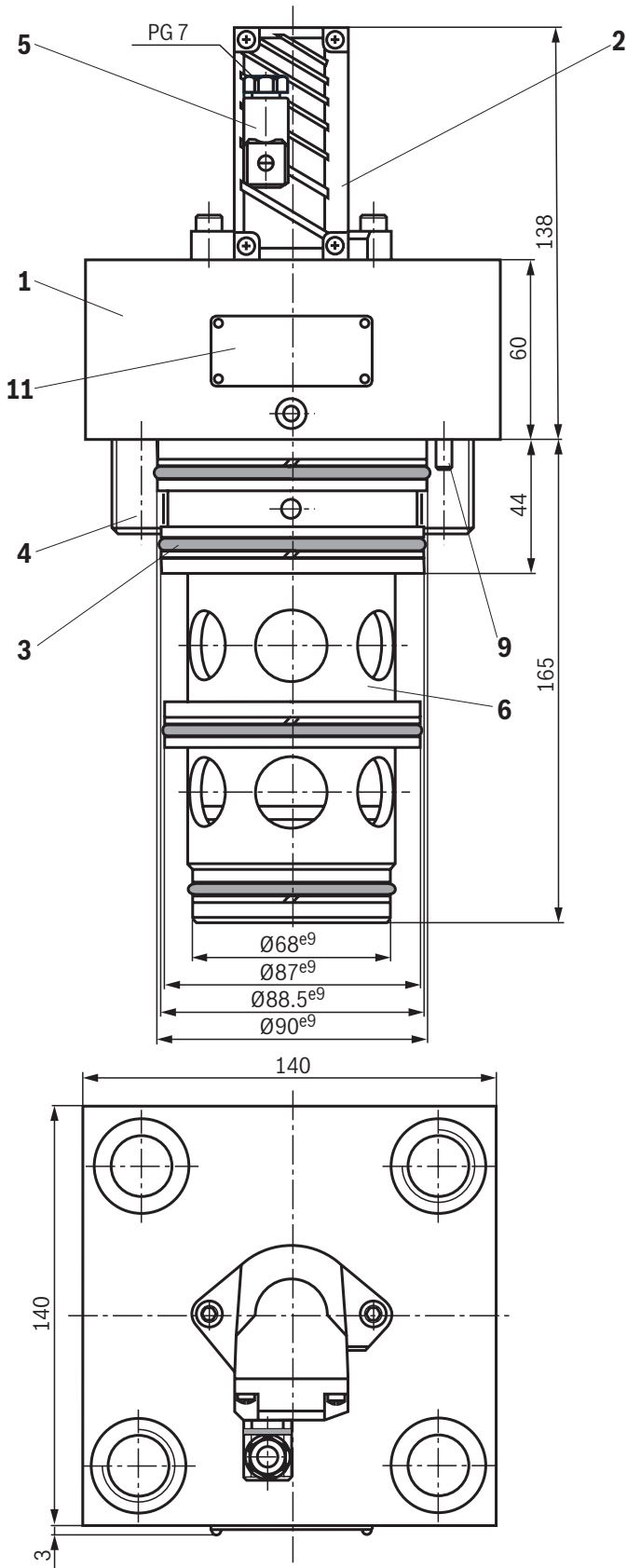
- 1 Directional high-response cartridge valve (main stage)
- 2 Position transducer
- 3 Seal ring (only version "Z")
- 4 Valve mounting screws (included in the scope of delivery, see page 15)
- 5 Mating connector (included in the scope of delivery, see page 15)
- 6 Installation bore see page 14
- 7 Space required for removing the mating connector
- 8 Locating pin version "F"
- 9 Locating pin
- 10 Name plate version "F"
- 11 Name plate

Dimensions: Size 32
(dimensions in mm)



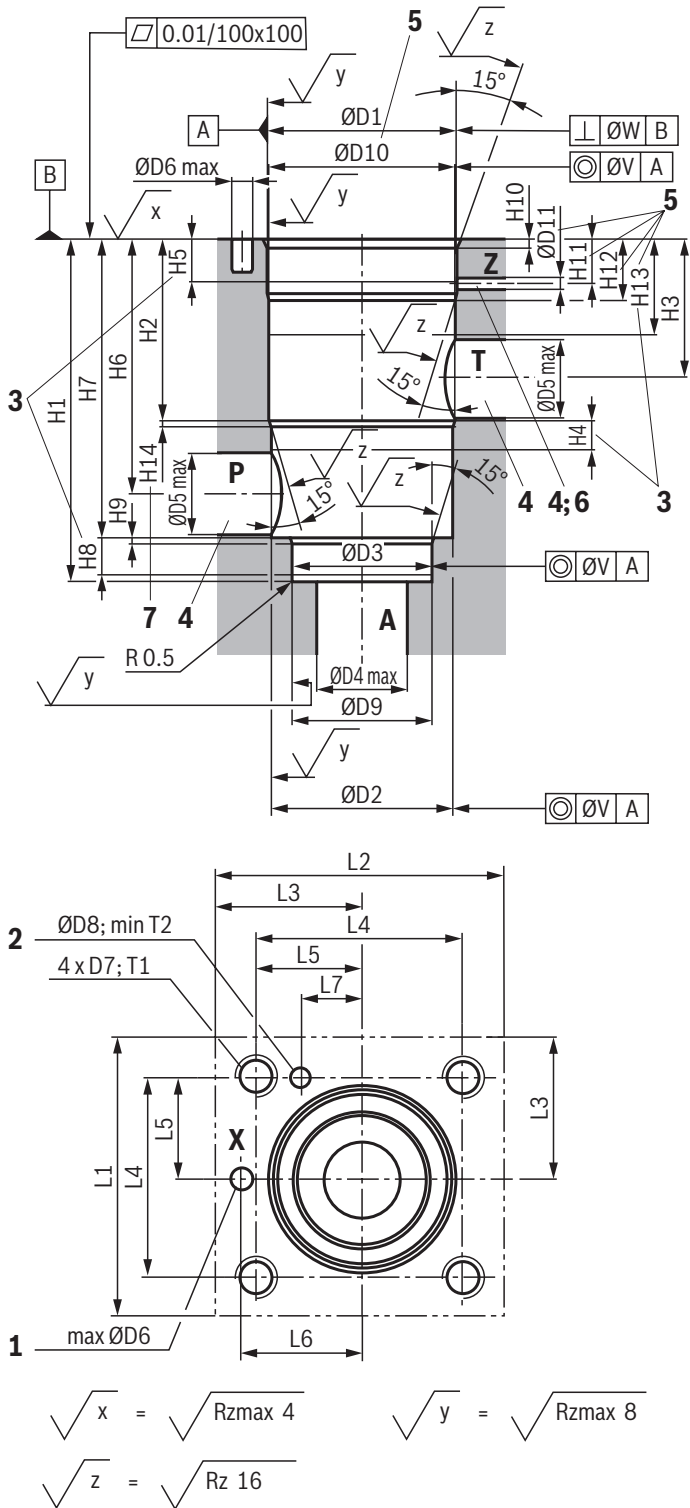
- 1 Directional high-response cartridge valve (main stage)
- 2 Position transducer
- 4 Valve mounting screws (included in the scope of delivery, see page 15)
- 5 Mating connector (included in the scope of delivery, see page 15)
- 6 Installation bore see page 14
- 7 Space required for removing the mating connector
- 8 Locating pin version "F"
- 9 Locating pin
- 11 Name plate

Dimensions: Size 50
(dimensions in mm)



- 1 Directional high-response cartridge valve (main stage)
- 2 Position transducer
- 3 Seal ring (only version "Z")
- 4 Valve mounting screws (included in the scope of delivery, see page 15)
- 5 Mating connector (included in the scope of delivery, see page 15)
- 6 Installation bore see page 14
- 9 Locating pin
- 11 Name plate

Installation bore
(dimensions in mm)



NG	25	32	50
L1	85	102	140
L2	85	102	140
L3	42.5	51	70
L4±0.2	58	70	100
L5±0.1	29	35	50
L6±0.2	33	41	58
L7±0.2	16	17	30
H1+0.1	103	100	165
H2+0.2	56	43.5	87
H3±0.2	45	30	-
H3±0.3	-	-	66
H4	15	15	16
H5	12.5	18	20
H6±0.2	78	71.5	-
H6±0.3	-	-	122
H7+0.3	89	-	-
H7+0.1	-	85	-
H7±0.3	-	-	143
H8	11.5	-	18
H8±0.2	-	13	-
H9	2.5	3	3
H10	2.5	2.5	4
H11	14.5	-	21
H12	-	-	29
H12-0.2	19	-	-
H13	32	-	46
H14	3	3	3
ØD1H7 [Ⓔ]	45	60	90
ØD2H7 [Ⓔ]	43	58	87
ØD3H7 [Ⓔ]	34	55	68
max. ØD4	22	28	44
max. ØD5	21	26	39
max. ØD6	6	8	10
D7	M12	M16	M20
ØD8H13	6	6	8
ØD9+0.2	33.7	54.7	67.7
ØD10H7 [Ⓔ]	44	-	88.5
ØD11	4	-	6
T1	25	35	45
min. T2	10	10	10
V	0.03	0.03	0.03
W	0.05	0.1	0.1

- 1 Connect port X to port A of the pilot control valve.
- 2 Bore for locating pin
- 3 Depth of fit
- 4 The ports P, T and Z 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.

- 5 Only version "Z"
- 6 Connect port Z to port B of the pilot control valve.
- 7 Not version "Z"

Tolerances according to: General tolerances ISO 2768-mK

Dimensions

Valve mounting screws (included in the scope of delivery)

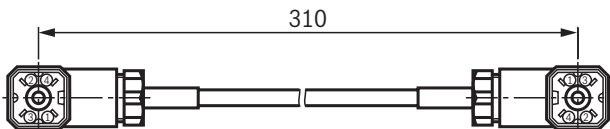
Size	Quantity	Hexagon socket head cap screws
25	4	ISO 4762 - M12 x 35 -10.9-fLZn/nc/480h/C Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 90 \text{ Nm} \pm 10\%$
32	4	ISO 4762 - M16 x 50 - 10.9-fLZn/nc/480h/C Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 250 \text{ Nm} \pm 10\%$
50	4	ISO 4762 - M20 x 70 -10.9-fLZn/nc/480h/C Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 450 \text{ Nm} \pm 10\%$

Mating connectors (included in the scope of delivery)

Item ¹⁾	Designation	Version	Material number	Data sheet
5	Mating connectors for position transducer	4P, PG7	1834484063	08008

Accessories

Connection cable (separate order)

Designation	Version	Material number	Data sheet
Cable for connection of main stage and pilot control valve (type 4WRPEH 6 ...)		1834463005	-

Pilot control valves with integrated electronics (OBE) – type 4WRPEH 6 (separate order)

Size	Material number		Data sheet
	"A1"	"F1"	
25	0811404601	0811404632	29035
32	0811404602	0811404633	
50	0811404603	0811404634	

Pilot control valves with external control electronics – type 4WRPH 6 (separate order)

Size	Material number	Data sheet
25	0811404034	29028
32	0811404035	
50	0811404036	

External control electronics – Eurocard; for pilot control valve type 4WRPH 6 (separate order)

Valve amplifier for high-response valves	Material number	Data sheet
VT-VVRA1-527-20/V0/2STV	0811405063	30045

Further information

- | | |
|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| ▶ Directional control valves, direct operated, with electrical position feedback | Data sheet 29028 |
| ▶ Directional control valves, direct operated, with electrical position feedback and integrated electronics (OBE) | Data sheet 29035 |
| ▶ Valve amplifier for high-response valves | Data sheet 30045 |
| ▶ 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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