

# Directional control valve, pilot-operated, with electrical position feedback and integrated electronics (OBE)

## Type 4WRDE

**RE 29097**

Edition: 2018-11

Replaces: 2018-10



H8092

- Size 10 ... 27
- Component series 6X
- Maximum operating pressure 350 bar
- Rated flow 25 ... 500 ml/min

## Features

- Precise – High response sensitivity and little hysteresis
- High-quality – Pilot control valve type 4WS2EM6-2X with control spool and sleeve
- Flexible – Suitable for position, velocity, force and pressure control in very exact and dynamic applications
- Reliable – Proven and robust design

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**Ordering code**

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
<b>4</b>	<b>WRD</b>	<b>E</b>						<b>— 6X</b>	<b>/</b>			<b>/</b>	<b>24</b>	<b>*</b>

01	4 main ports	<b>4</b>
02	Directional control valve	<b>WRD</b>
03	With integrated electronics (OBE)	<b>E</b>
04	Size 10	<b>10</b>
	Size 16	<b>16</b>
	Size 25	<b>25</b>
	Size 27	<b>27</b>
05	Symbols e.g. E, E1, W etc.; possible version see page 3	

**Control spool position in de-energized state**

06	Not defined	<b>no code</b>
	100% P → A / B → T	<b>P</b>
	100% P → B / A → T	<b>N</b>

**Rated flow** at 10 bar pressure differential (5 bar per control edge)

07	<b>– Size 10</b>	
	25 l/min (only symbol E, W6-, W8- and V with version "L")	<b>25</b>
	50 l/min	<b>50</b>
	90 l/min	<b>100</b>
	<b>– Size 16</b>	
	150 l/min (only symbol V1 with version "L")	<b>150</b>
	220 l/min	<b>220</b>
	<b>– Size 25</b>	
	220 l/min	<b>220</b>
	350 l/min	<b>350</b>
	<b>– Size 27</b>	
	500 l/min	<b>500</b>

**Flow characteristic**

08	Linear	<b>L</b>
	Linear with fine control range	<b>P</b>
09	Component series 60 ... 69 (60 ... 69: unchanged installation and connection dimensions)	<b>6X</b>

**Seal material**

10	NBR seals	<b>M</b>
	FKM seals	<b>V</b>
	Observe compatibility of seals with hydraulic fluid used.	

**Pilot oil flow**

11	External pilot oil supply, external pilot oil return	<b>XY</b>
	Internal pilot oil supply, external pilot oil return	<b>PY</b>
	Internal pilot oil supply, internal pilot oil return	<b>PT</b>
	External pilot oil supply, internal pilot oil return	<b>XT</b>
12	<b>Without</b> sandwich plate shut-off valve	<b>no code</b>
	<b>With</b> sandwich plate shut-off valve, 24 V	<b>WG</b>
13	Supply voltage 24 V	<b>24</b>

Ordering code

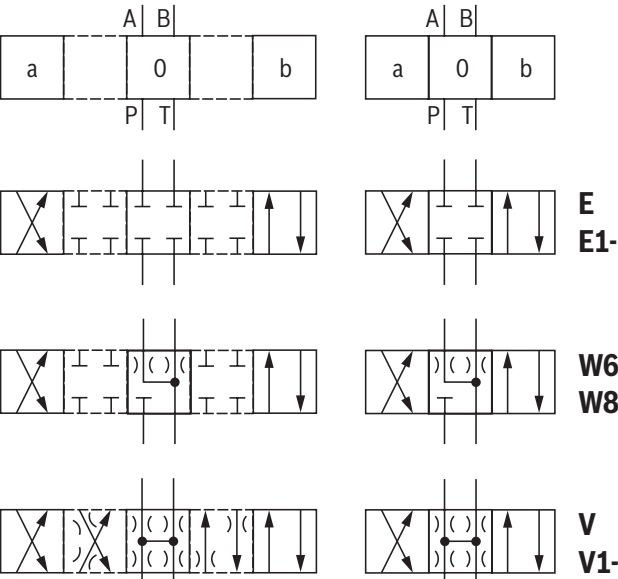
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
4	WRD	E						— 6X	/			/	24	*

Electrical interface

14	Command value ±10 VDC, actual value ±10 VDC (connector 6+PE)	<b>A1</b> <sup>1)</sup>
	Command value 4 ... 20 mA, actual value 4 ... 20 mA (connector 6+PE)	<b>F1</b>
	Command value ±10 mA, actual value 4 ... 20 ma (connector 6+PE), only in connection with version "P" and "N" (de-energized control spool position)	<b>C6-972</b>
15	For further information, see the plain text	

1) When replacing the component series 5X by the functionally compatible component series 6X, the electronics interface is to be defined with "A5" (as version "A1", however additionally with enable input +24V at pin C)

Symbols



With symbol E1-, W8 and V1-:

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

- Notes:**
- Representation according to DIN ISO 1219-1. Hydraulic interim positions are shown by dashes.
  - With symbols W6 and W8 there is a connection from A to T and B to T with approx. 3% of the relevant nominal cross-section in zero position.

Symbols

Design	simple	detailed
"XY"		
"PY"		
"PT"		
"XT"		

1 Pilot control valve  
2 Main valve  
3 Directional sandwich plate valve  
4 Integrated electronics (OBE)

## Function, section

Valves of type 4WRDE are 3-stage, pilot-operated directional control valves with electrical position feedback and integrated electronics (OBE).

### Set-up

The valves basically comprise of:

- ▶ Servo pilot control valve, 2-stage, type 4WS2EM6-2X (1)
- ▶ Main stage (2), consisting of housing and main stage control spool
- ▶ Integrated electronics (3) with inductive position transducer of the main stage

### Function

In the integrated electronics (OBE), the specified command value is compared with the position actual value of the main stage control spool. In case of a difference (control deviation), the first stage of the pilot control valve is controlled (dry torque motor and nozzle flapper plate system). This way, a deflection of the flapper plate of the nozzle flapper plate system is realized. The distance of the flapper plate to one of the two control nozzles flow-through by pilot oil is reduced and increased to the other one. Through the connecting bore, the resulting flow difference leads to deflection of the control spool in the pilot control valve (2nd stage) similarly to the control signal. The flow released by the pilot control valve leads to deflection of the control spool of the main stage (3rd stage) until its position actual value corresponds to the command value. The stroke of the control spool is controlled proportionally to the command value.

### Valve features

The valves are factory-set with a dither default setting with the constant frequency of 400 Hz.

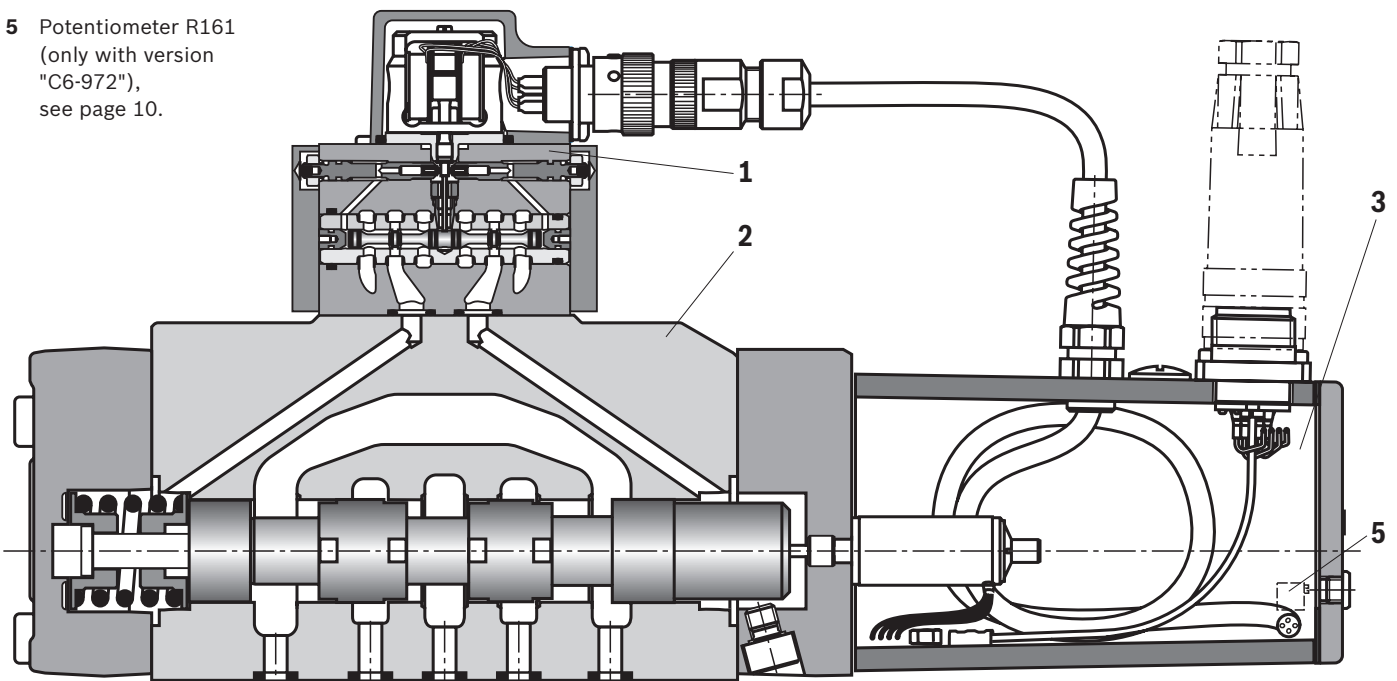
### Failure of supply voltage

- ▶ With applied pilot oil pressure, the main stage control spool moves into an undefined end position. The acceleration forces occurring in this connection may cause machine damage.
- ▶ If a directional sandwich plate valve is used (see ordering code), the two pilot oil chambers in the main stage will be short-circuited in case of power failure.
  - With symbol E, E1-, W6 and W8, the main stage spool will take the spring-centered central position.
  - With symbol V and V1, the main stage spool takes the offset position, operated by the spring (P-B and A-T) (in the tolerance range 1 ... 11% of the control spool stroke).

### Notes:

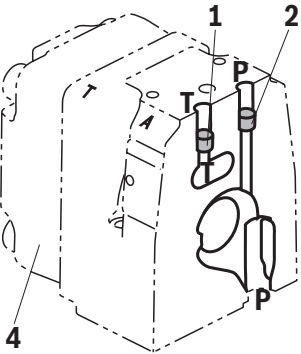
- ▶ Changes in the zero point and/or the dither amplitude may result in damage to the system and may only be implemented by instructed specialists.
- ▶ The pilot control valve may only be maintained by Rexroth employees. An exception is the replacement of the filter and the sealing according to accessories list. It has to be ensured that during the assembly, the sealing is properly seated and the plug screw is tightened. The tightening torque for the plug screw is 30 Nm.

5 Potentiometer R161  
(only with version  
"C6-972"),  
see page 10.

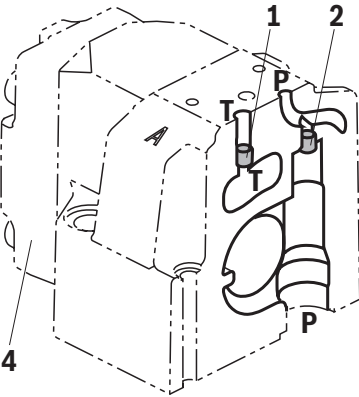


Pilot oil supply (schematic illustration)

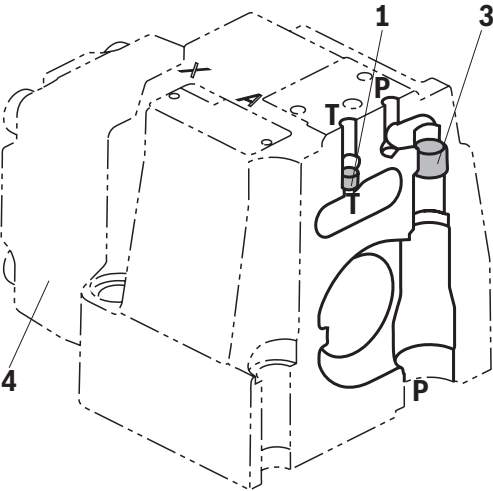
NG10



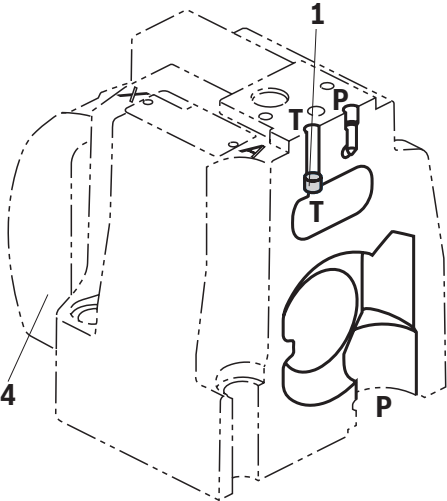
NG16



NG25



NG27



- 1 Plug screw M6 according to DIN 906, wrench size 3 – pilot oil return
- 2 Plug screw M6 according to DIN 906, wrench size 3 – pilot oil supply
- 3 Plug screw M12 x 1.5 according DIN 906, wrench size 6 – pilot oil supply
- 4 Main stage housing cover (opposite the OBE)

Pilot oil supply		Pilot oil return	
external	internal	external	internal
2, 3	2, 3	1	1
closed	open	closed	open

Further explanations on page 7.

## Pilot oil supply

### Version "XY"

#### External pilot oil supply

#### external pilot oil return

With this version, the pilot oil is supplied from a separate pilot oil circuit (external).

The pilot oil return is not directed into channel T of the main valve, but is separately directed to the tank via port Y (external).

### Version "PY"

#### Internal pilot oil supply

#### external pilot oil return

With this version, the pilot oil is supplied from channel P of the main valve (internal).

The pilot oil return is not directed into channel T of the main valve, but is separately directed to the tank via port Y (external).

In the subplate, port X is to be closed.

### Version "PT"

#### Internal pilot oil supply

#### internal pilot oil return

With this version, the pilot oil is supplied from channel P of the main valve (internal).

The pilot oil is directly returned to channel T of the main valve (internal).

In the subplate, ports X and Y are to be closed.

### Version "XT"

#### External pilot oil supply

#### internal pilot oil return

With this version, the pilot oil is supplied from a separate pilot oil circuit (external).

The pilot oil is directly returned to channel T of the main valve (internal).

In the subplate, port Y is to be closed.

**Technical data**

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

general					
Size	NG	10	16	25	27
Weight	kg	7.5	10.5	17.5	19.5
Installation position		any (preferably horizontal)			
Ambient temperature range		°C	−20 ... +60		
Maximum storage time		Years	1 (if the storage conditions are observed; refer to the operating instructions 07600-B)		
Vibration resistance	▶ Sine test according to DIN EN 60068-2-6	10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes			
	▶ Noise test according to DIN EN 60068-2-64	20 ... 2000 Hz / 10 g <sub>RMS</sub> / 30 g peak / 30 min. / 3 axes			
	▶ Transport shock according to DIN EN 60068-2-27	15 g / 11 ms / 3 axes			
Maximum relative humidity (no condensation)		%	95		
hydraulic					
Maximum operating pressure	▶ Port A, B, P				
	– Pilot oil supply external <sup>1)</sup>	bar	350	350	350
	– Internal pilot oil supply	bar	25 ... 250		
	▶ Port X	bar	25 ... 250		
Maximum return flow pressure	▶ Port T				
	– External pilot oil return	bar	315	250	250
	– Pilot oil return internal	bar	Pressure peaks < 100 static < 10 admissible		
	▶ Port Y	bar	Pressure peaks < 100 static < 10 admissible		
Rated flow ( <b>Δp</b> = 5 bar per control edge) <sup>2)</sup>		l/min	25	–	–
			50	150	220
			90	220	350
Maximum flow		l/min	170	460	870
Maximum pilot oil flow at stepped input signal (0 → 100%, pilot pressure 250 bar)		l/min	8.3	15.6	8.6
Pilot oil volume 0 ... 100%		cm <sup>3</sup>	1.1	2.9	2.3
Zero flow pilot control valve (pilot pressure 100 bar)		l/min	0.7	0.8	0.8
Maximum zero flow	▶ Symbol V, V1-		see characteristic curves page 14		
Maximum leakage flow (inlet pressure 100 bar)	▶ Symbol E, E1-				
	– Main valve	l/min	0.1	0.2	0.3
	– Main + pilot control valve	l/min	0.8	1	1.1
	▶ Symbol W6-, W8-				
	– Main valve	l/min	0.2	0.4	0.5
	– Main + pilot control valve	l/min	0.9	1.2	1.4
Hydraulic fluid			see table page 9		
Hydraulic fluid temperature range (flown-through)		°C	−20 ... +80		
Viscosity range	▶ Maximum	mm <sup>2</sup> /s	20 ... 380		
	▶ Recommended	mm <sup>2</sup> /s	30 ... 45		
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Pilot control valve: Class 18/16/13 <sup>3)</sup> Main stage: Class 20/18/15 <sup>3)</sup>		

<sup>1)</sup> For perfect system behavior, an external pilot oil supply is recommended for pressures above 210 bar.

<sup>2)</sup> Flow for deviating  $\Delta p$ :

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

<sup>3)</sup> 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](http://www.boschrexroth.com/filter).



## Technical data

(For applications outside these parameters, 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, Fuchs Renosafe 500, Petrofer Ultra Safe 620, Houghton Houghto 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.

### ▶ 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.

static /dynamic			
Hysteresis	%	< 0.2	
Response sensitivity	%	< 0.1	
Range of inversion	%	< 0.1	
Manufacturing tolerance $q_{Vmax}$	%	10	
Zero shift upon change of	▶ Hydraulic fluid temperature	%/10 K	< 0.2
	▶ Ambient temperature	%/10 K	< 0.2
	▶ Operating pressure	%/100 bar	< 0.5
	▶ Return flow pressure 0 ... 10% of $p$	%/100 bar	< 0.2
Zero compensation <sup>4)</sup>			Ex plant ±1%

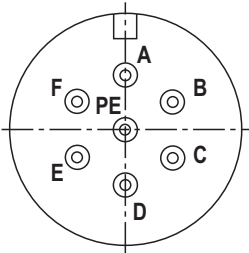
electrical, integrated electronics (OBE)			
Protection class according to EN 60529		IP 65 with mating connector mounted and locked	
Supply voltage	▶ Nominal voltage	VDC	24 (full bridge rectification with smoothing capacitor 2200 µF, $I_{max} = 230$ mA)
	▶ Lower limit value	VDC	18
	▶ Upper limit value	VDC	36
Maximum current consumption		mA	< 200
Functional ground and screening	see page 10 (CE-compliant installation)		
Adjustment	Calibrated in the plant, see valve characteristic curves page 14 ... 20		

<sup>4)</sup> Related to the pressure-signal characteristic curve (symbol V)

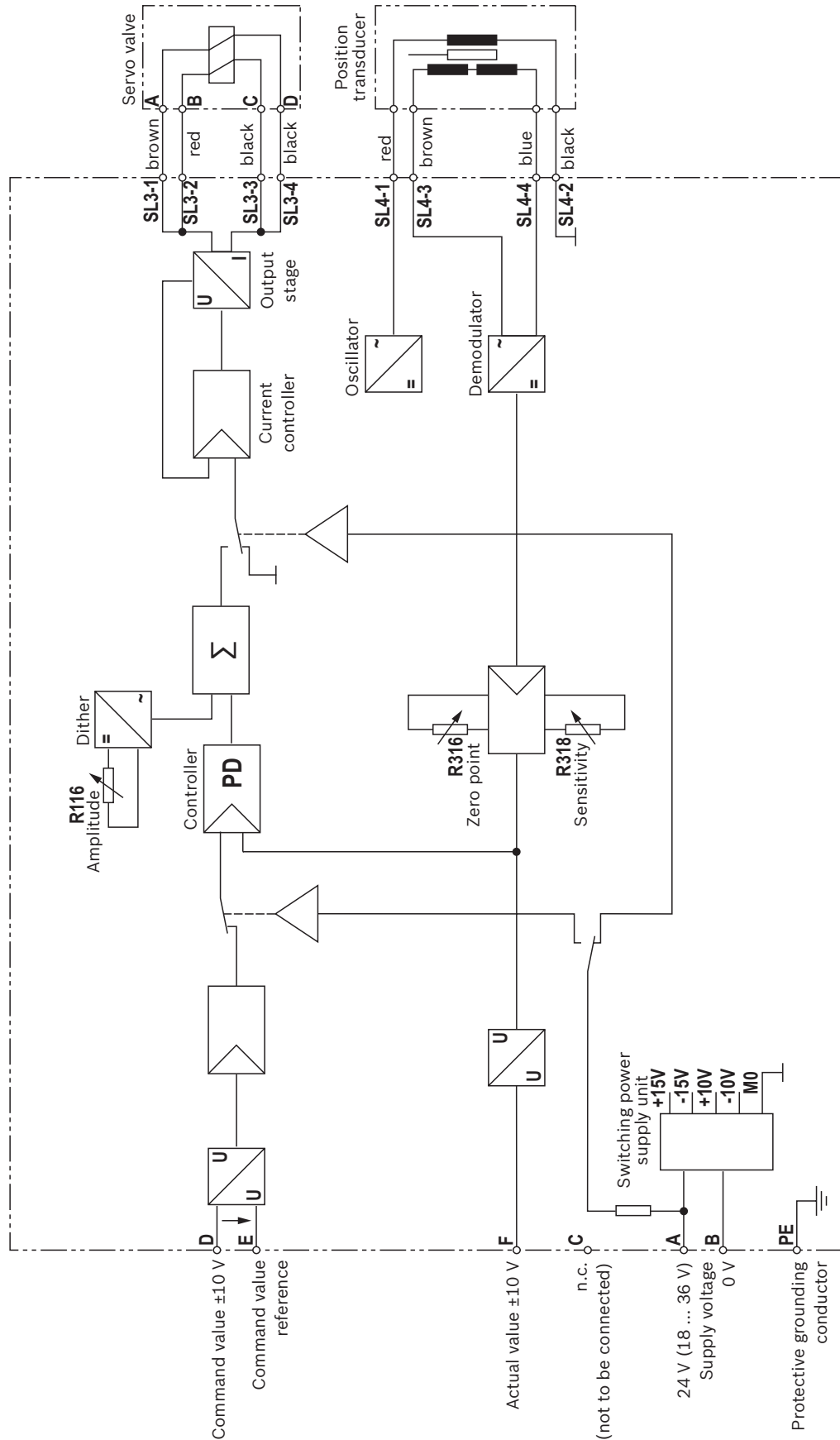
Electrical connections, assignment

Contact	Interface assignment		
	"A1" (6 + PE)	"F1" (6 + PE)	"C6-972" (6 + PE)
A	24 VDC supply voltage		
B	GND		
C	n.c.	n.c. (not to be connected)	Enable input 24 VDC (high ≥ 8.5 V; low ≤ 6.5 V) <sup>1)</sup>
D	Command value ±10 V <sup>2)</sup> ( <i>Re</i> > 100 kΩ)	Command value 4 ... 20 mA <sup>3)</sup> ( <i>Re</i> = 100 Ω)	Command value ±10 mA <sup>2)</sup> ( <i>Re</i> = 200 Ω)
E	Reference potential command value	Reference potential command value	Reference potential command value
F	Actual value ±10 V ( <i>Ri</i> ≈ 1 kΩ)	Actual value 4 ... 20 mA (load max. 500 Ω)	Actual value 4 ... 20 mA (load max. 500 Ω)
PE	Functional ground (directly connected to the valve housing)		

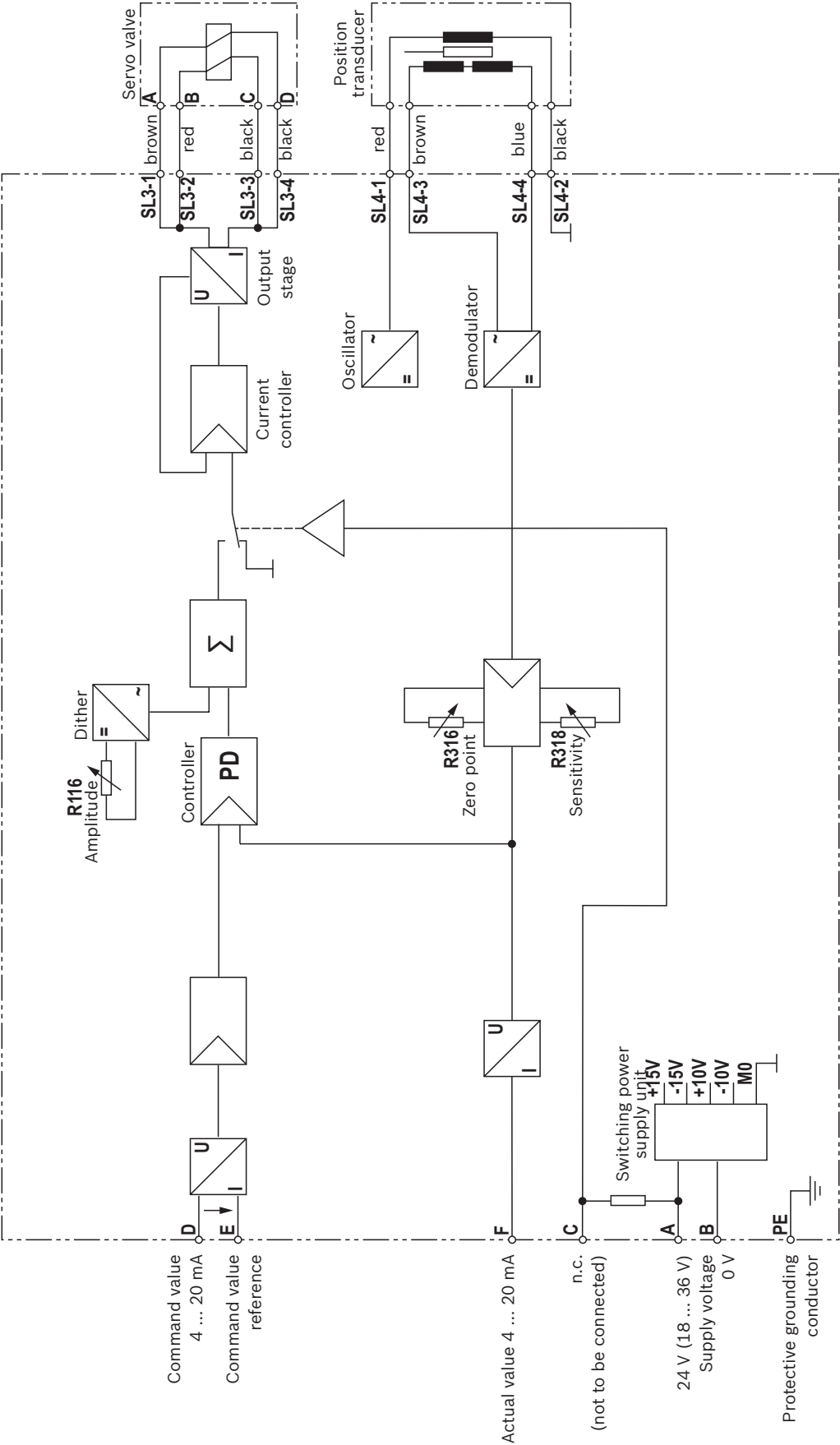
- <sup>1)</sup> At active hydraulic pressure and "low" enable signal, the control spool of the main stage is in a regulated central position (preferred direction adjustable by ±10% by means of potentiometer R161).  
If a directional sandwich plate valve (version "WG") is used between pilot control valve and main stage, the control chambers are unloaded from the pilot control valve to the main stage control spool. With symbols E, E1-, W6- and W8-, the centering springs set the main stage control spool in central position, symbols V- and V1 are switched to preferred direction P → B and A → T in a tolerance range of 1% to 11% of the control spool stroke. As a consequence, the cylinder axis leaves its position at minimum velocity.
- <sup>2)</sup> Differential command value input: Positive command value at D compared to E results in flow from P → A and B → T at the main stage.
- <sup>3)</sup> Differential command value input: Command value of 12 ... 20 mA at D compared to E results in flow from P → A and B → T at the main stage.



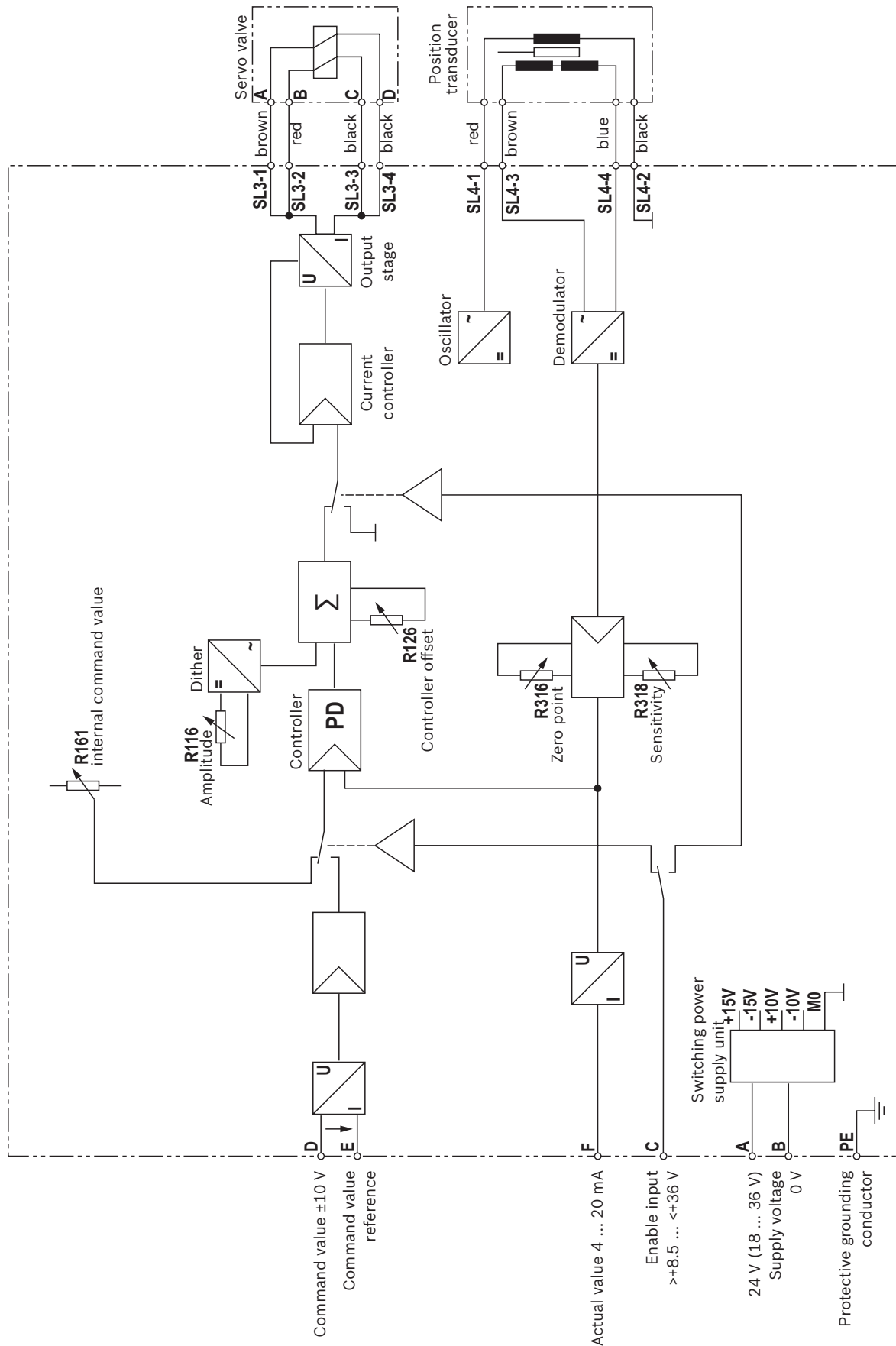
# Block diagram/controller function block: Version "A1"



Block diagram/controller function block: Version "F1"



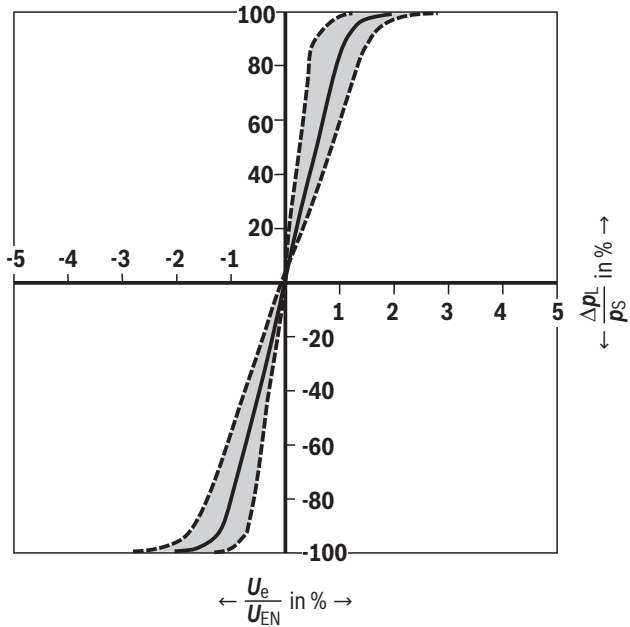
# Block diagram/controller function block: Version "C6-972"



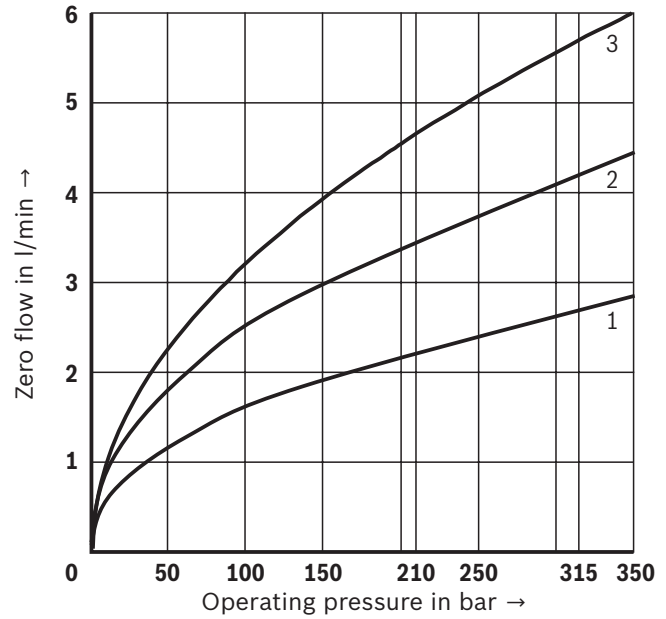
## Characteristic curves

(measured with HLP46,  $\vartheta_{\text{Oil}} = 40 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$  and  $p = 100 \text{ bar}$ )

**Pressure-signal characteristic curve** (symbol V)



**Zero flow of the main stage** (symbol V), without pilot control valve

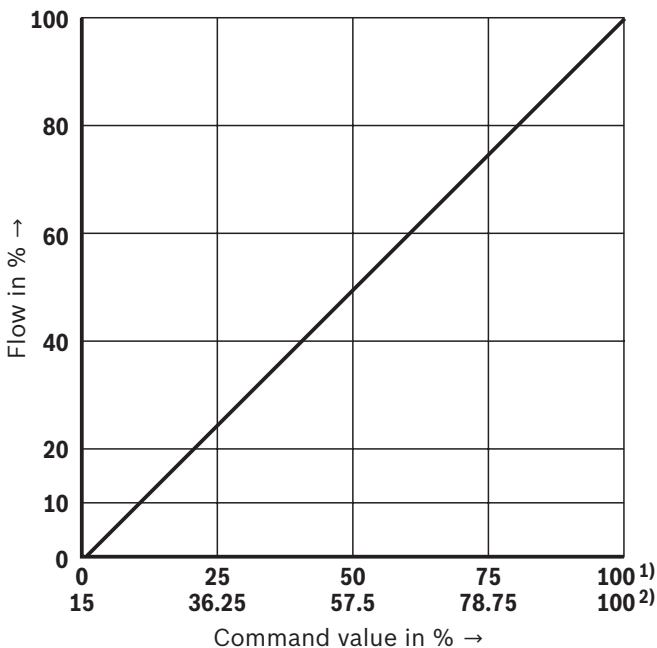


- 1 Size 10
- 2 Size 16
- 3 Size 25 and 27

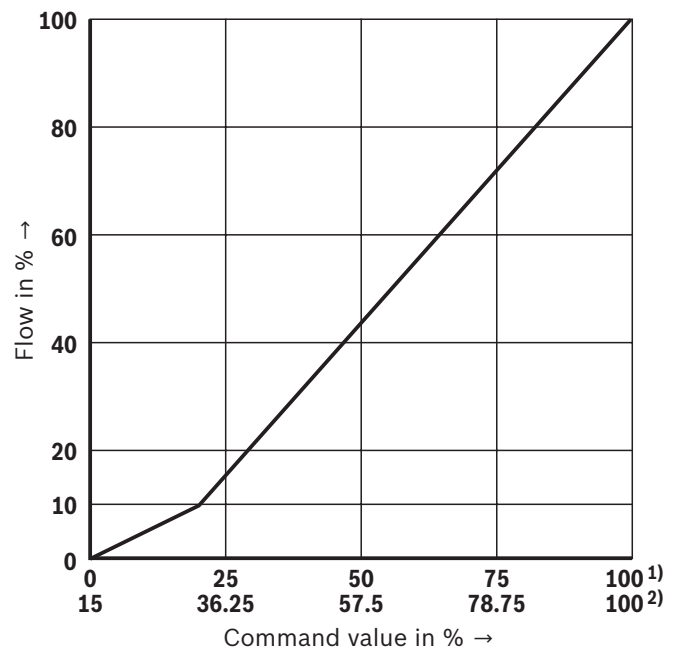
## Flow command value function

(at e.g.  $P \rightarrow A / B \rightarrow T$  and 10 bar pressure differential or  $P \rightarrow A$  or  $A \rightarrow T$  and 5 bar per control edge)

**Version "L"** (symbols E, W and V)



**Version "P"** (symbols E, W and V)

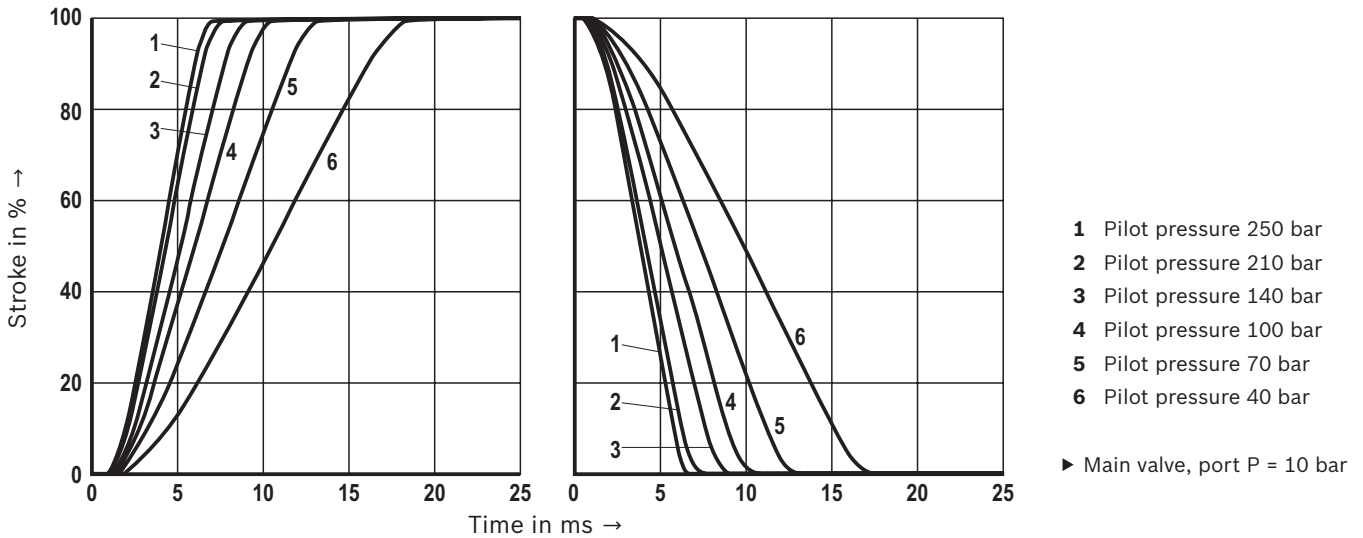


1) Positive overlap 0 ... 0.5% at symbol V

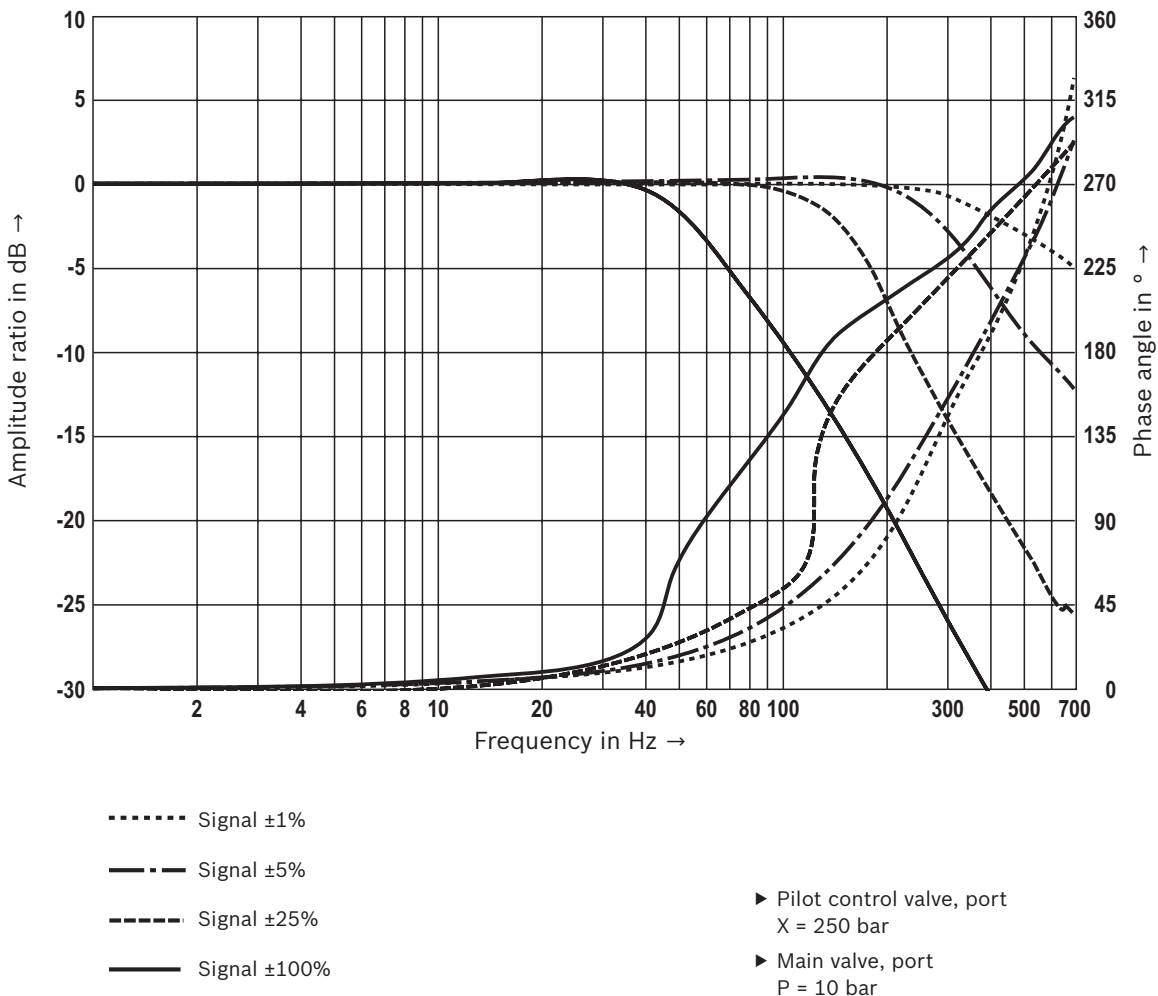
2) Positive overlap 15% at symbols E and W

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

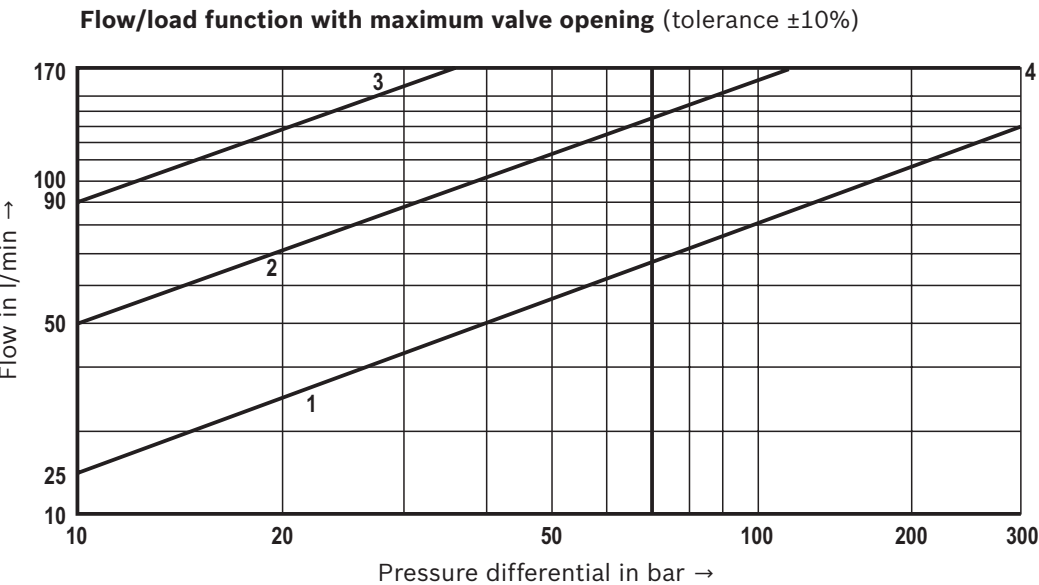
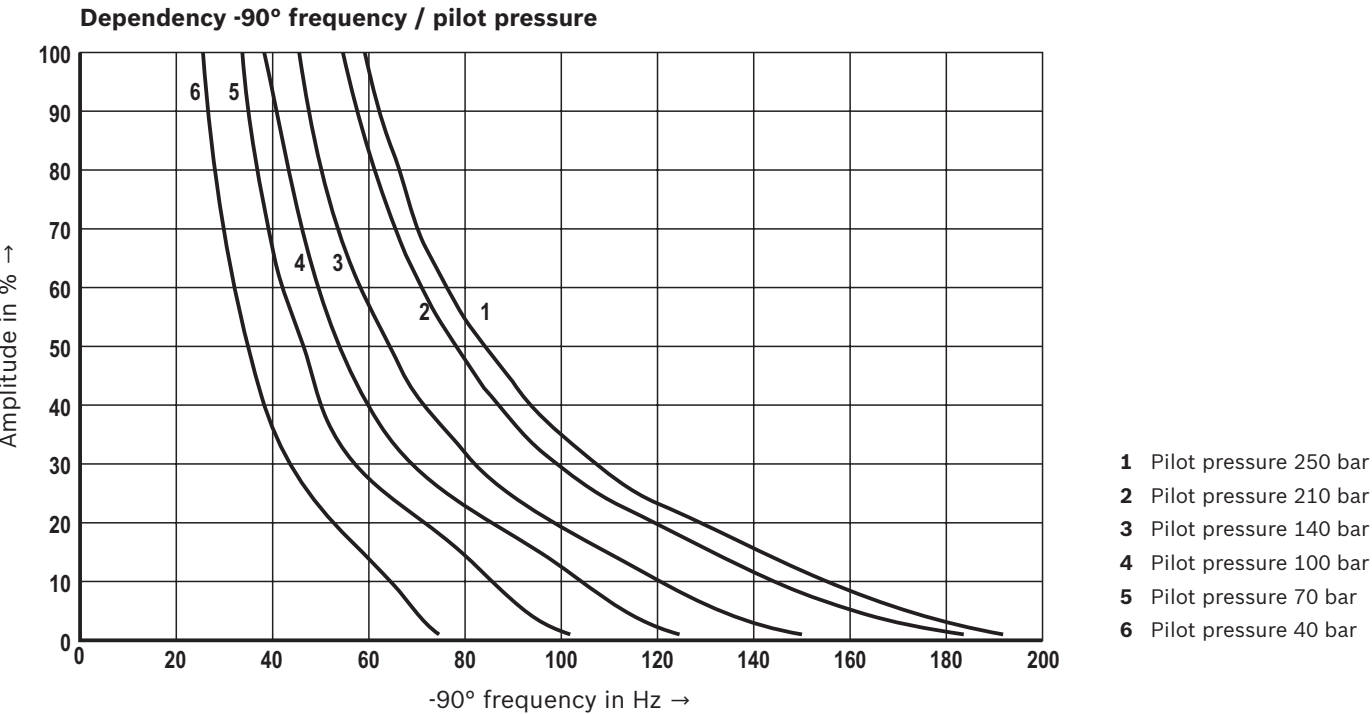
**Transition function with stepped electric input signals**



**Frequency response characteristic curves**



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



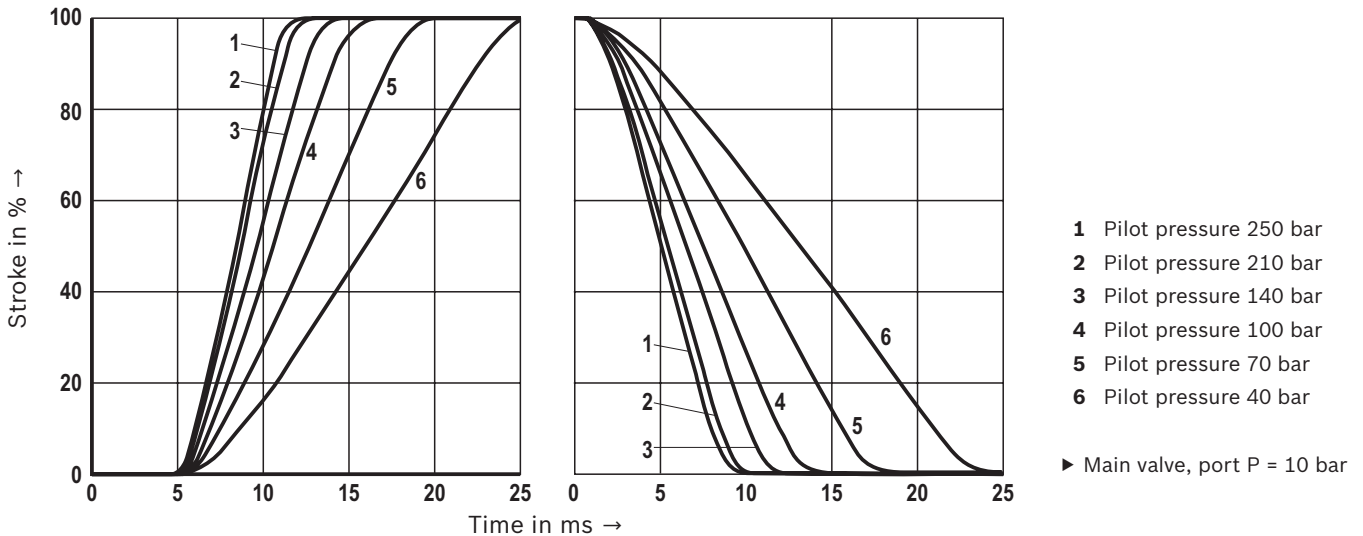
$$\Delta p = p_P - p_L - p_T$$

$\Delta p$  Pressure differential  
 $p_P$  Inlet pressure  
 $p_L$  Load pressure  
 $p_T$  Return flow pressure

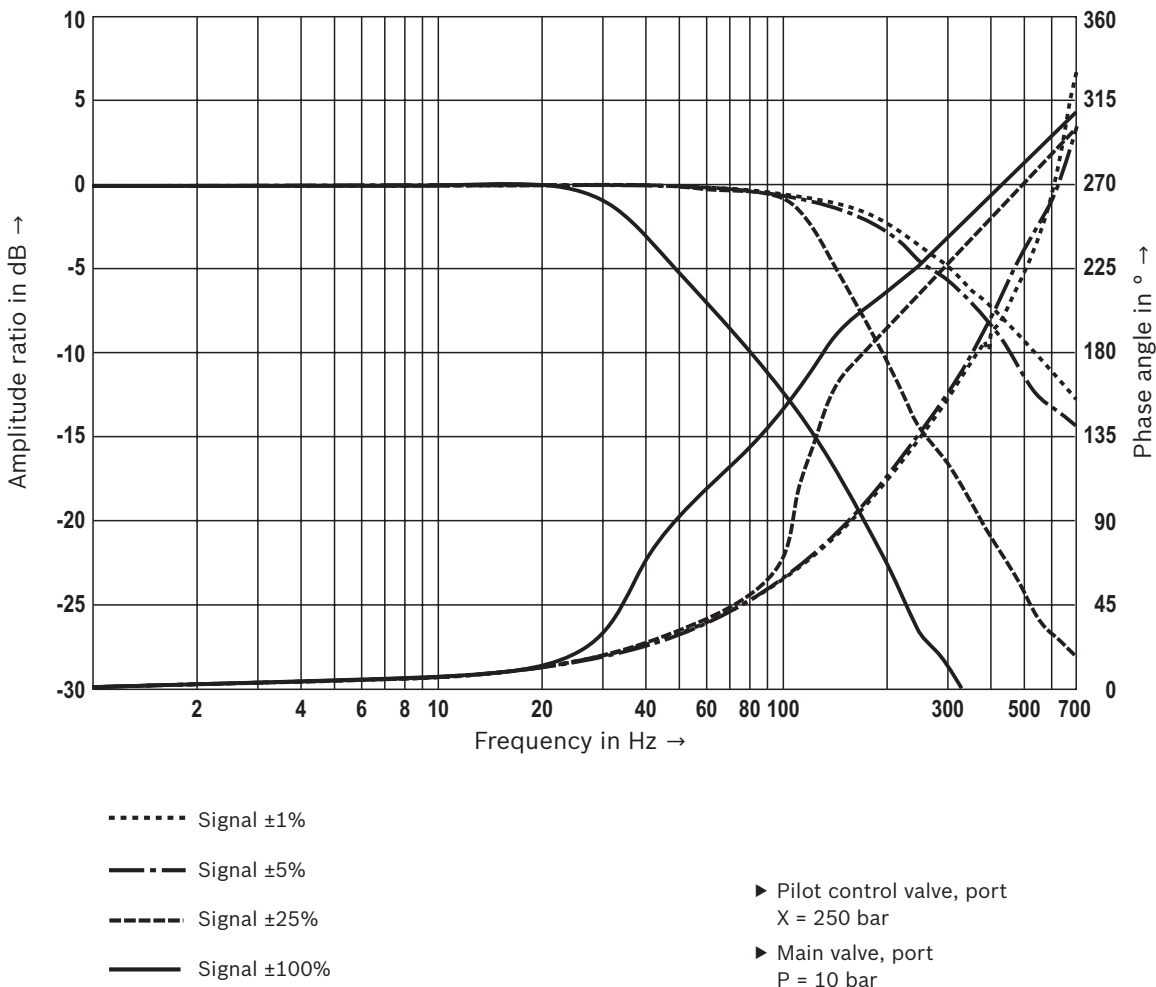


**Characteristic curves: Size 16**  
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ } ^\circ\text{C}$ )

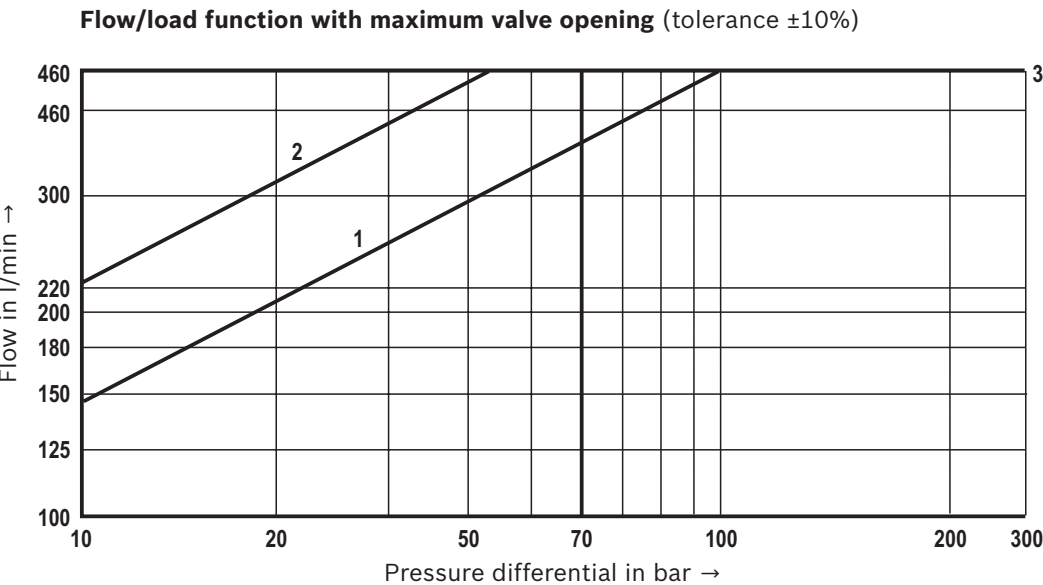
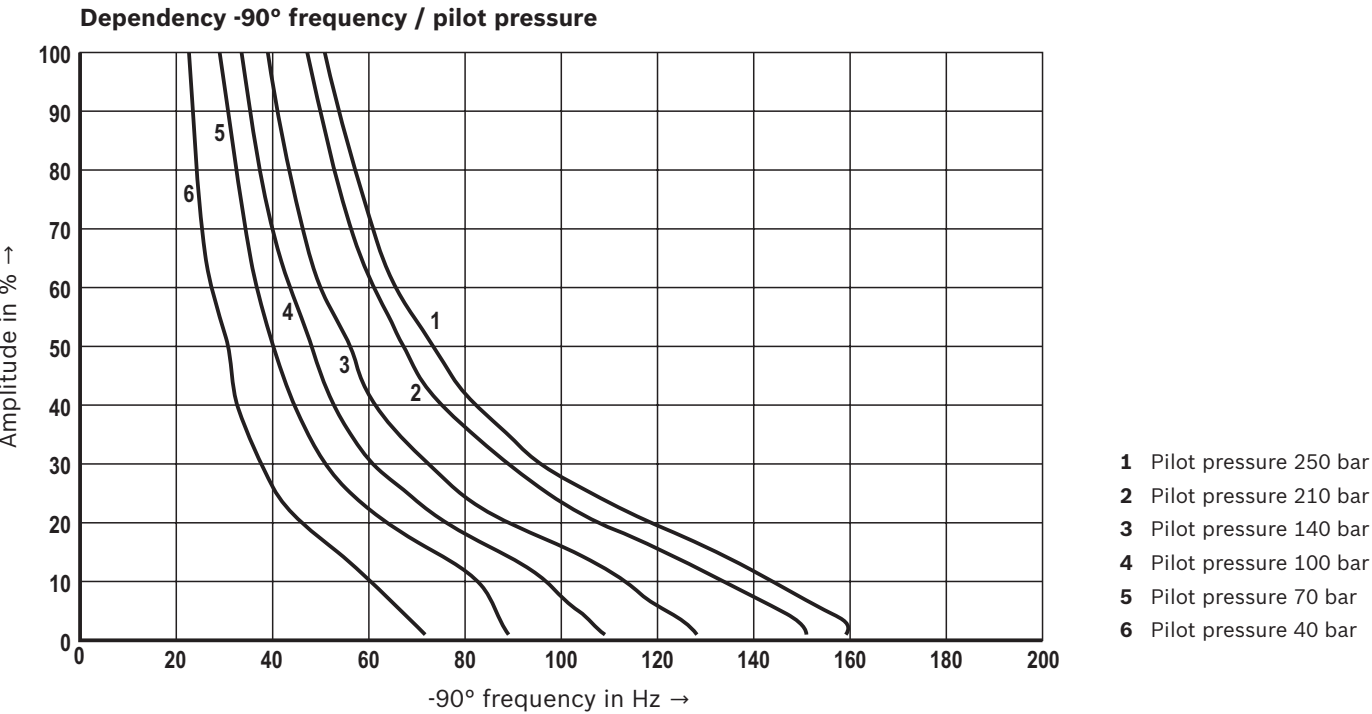
**Transition function with stepped electric input signals**



**Frequency response characteristic curves**



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

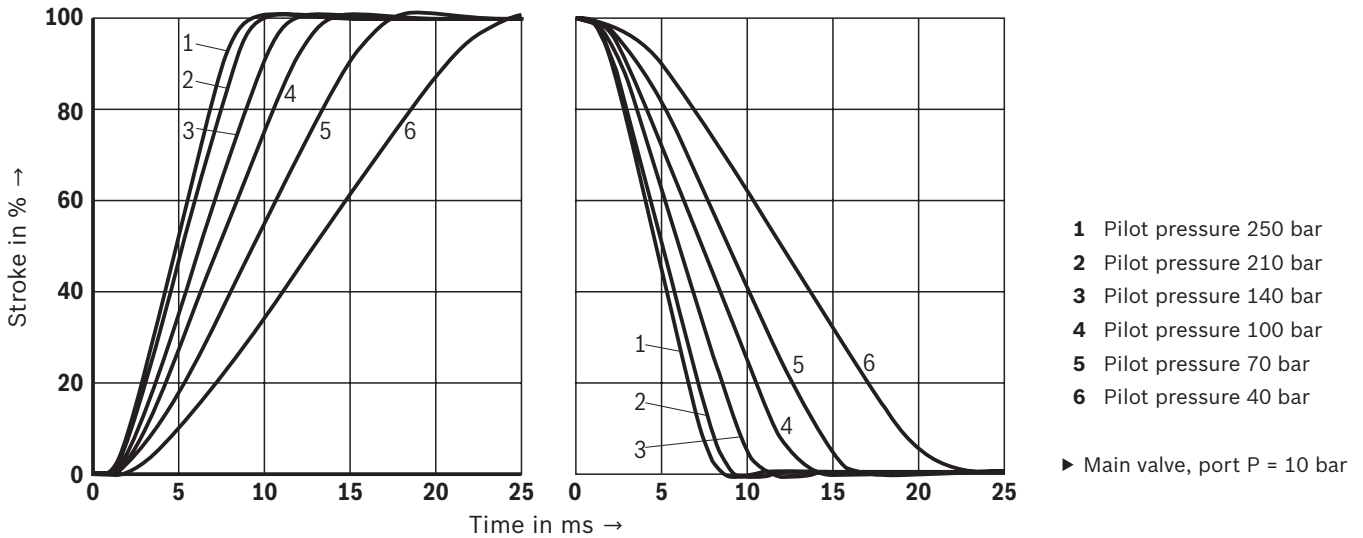


$$\Delta p = p_P - p_L - p_T$$

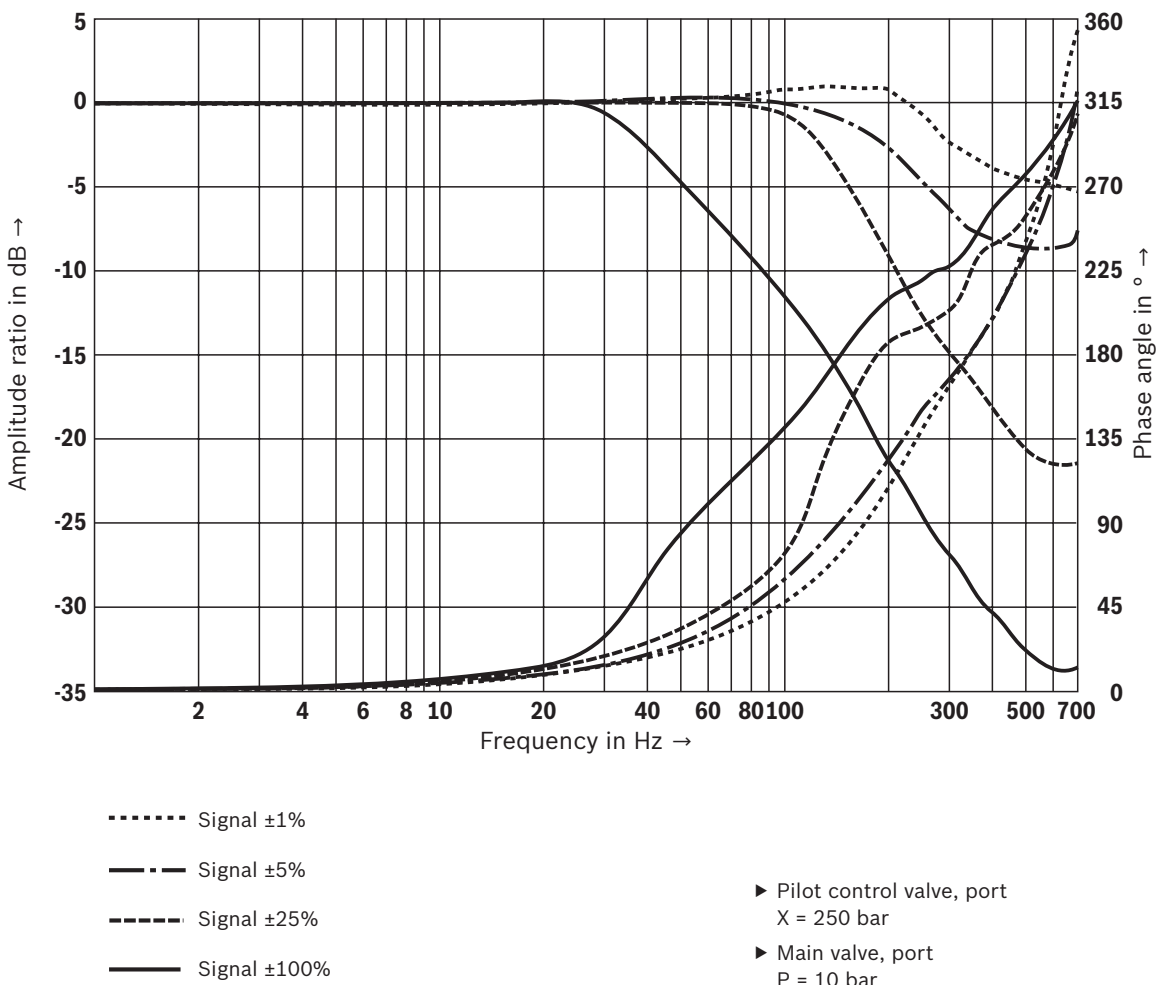
$\Delta p$  Pressure differential  
 $p_P$  Inlet pressure  
 $p_L$  Load pressure  
 $p_T$  Return flow pressure

**Characteristic curves:** Size 25 and 27  
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

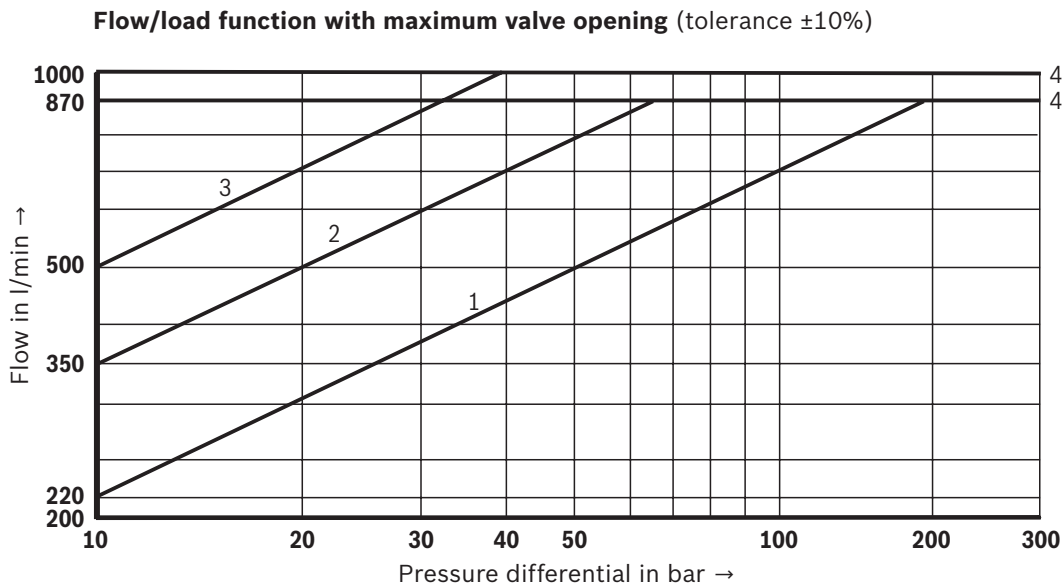
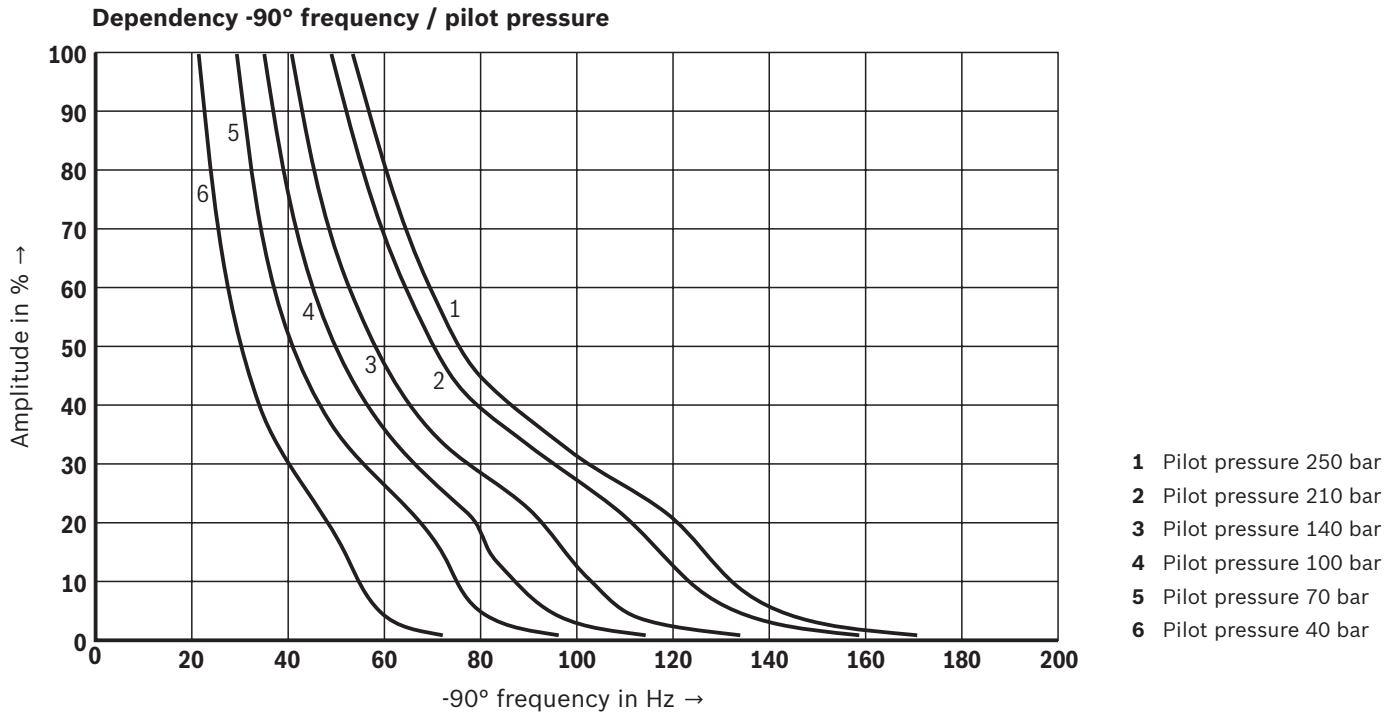
**Transition function with stepped electric input signals**



**Frequency response characteristic curves**



**Characteristic curves:** Size 25 and 27  
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

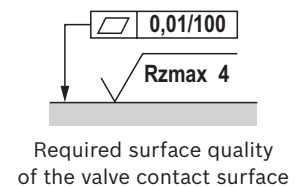
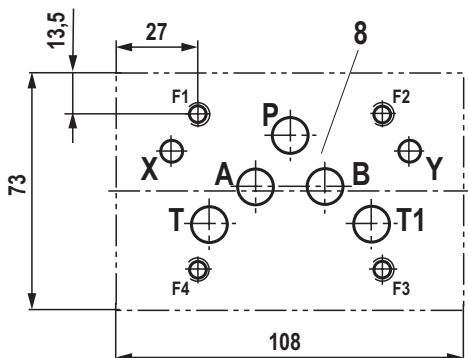
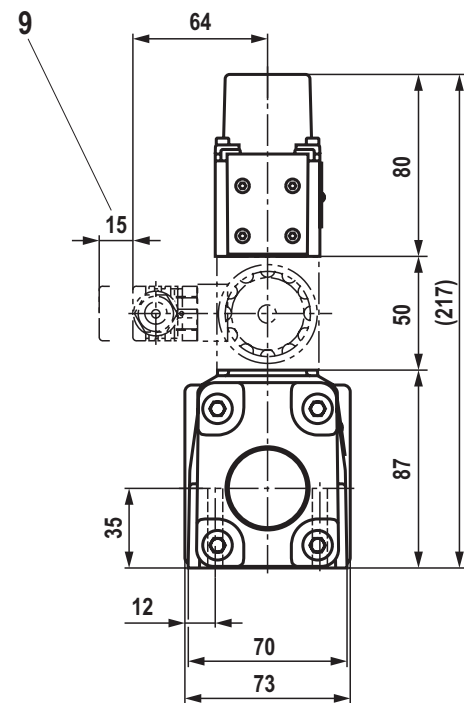
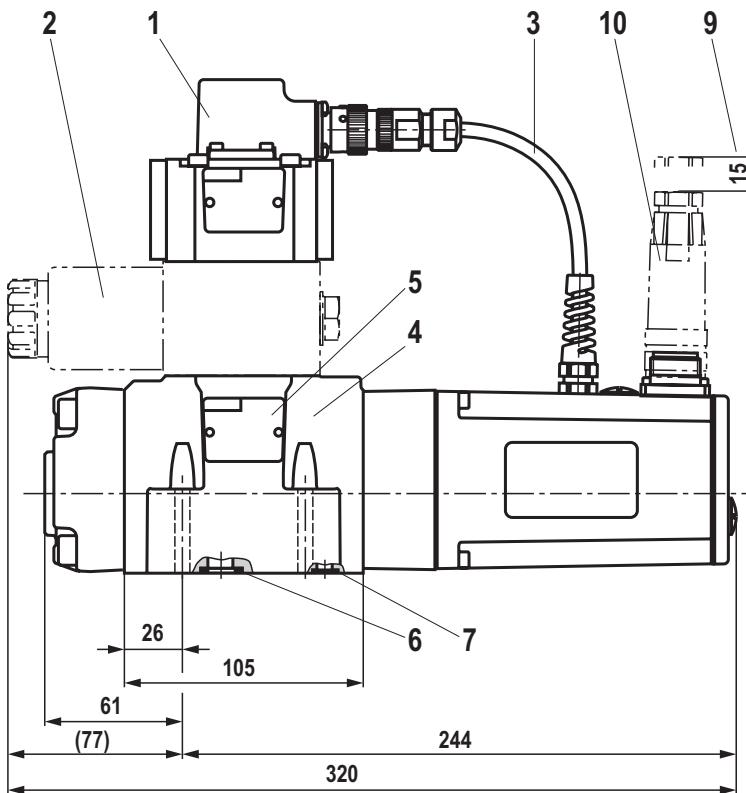


- 1 Rated flow 220 l/min
- 2 Rated flow 350 l/min
- 3 Rated flow 500 l/min
- 4 Recommended flow limitation (flow velocity 30 m/s)

$$\Delta p = p_P - p_L - p_T$$

$\Delta p$  Pressure differential  
 $p_P$  Inlet pressure  
 $p_L$  Load pressure  
 $p_T$  Return flow pressure

**Dimensions:** Size 10  
(dimensions in mm)



- 1 Pilot control valve
- 2 Directional sandwich plate valve (only included with version "WG")
- 3 Cabling
- 4 Main stage
- 5 Name plate
- 6 Identical seal rings for ports A, B, P, T and T1
- 7 Identical seal rings for ports X and Y
- 8 Machined valve contact surface; porting pattern according to ISO 4401-05-05-0-05 (ports X and Y as required)
- 9 Space required to remove the mating connectors
- 10 Mating connector, separate order, see page 26

**Subplates** (separate order) with porting pattern according to ISO 4401-05-05-0-05 see data sheet 45100.

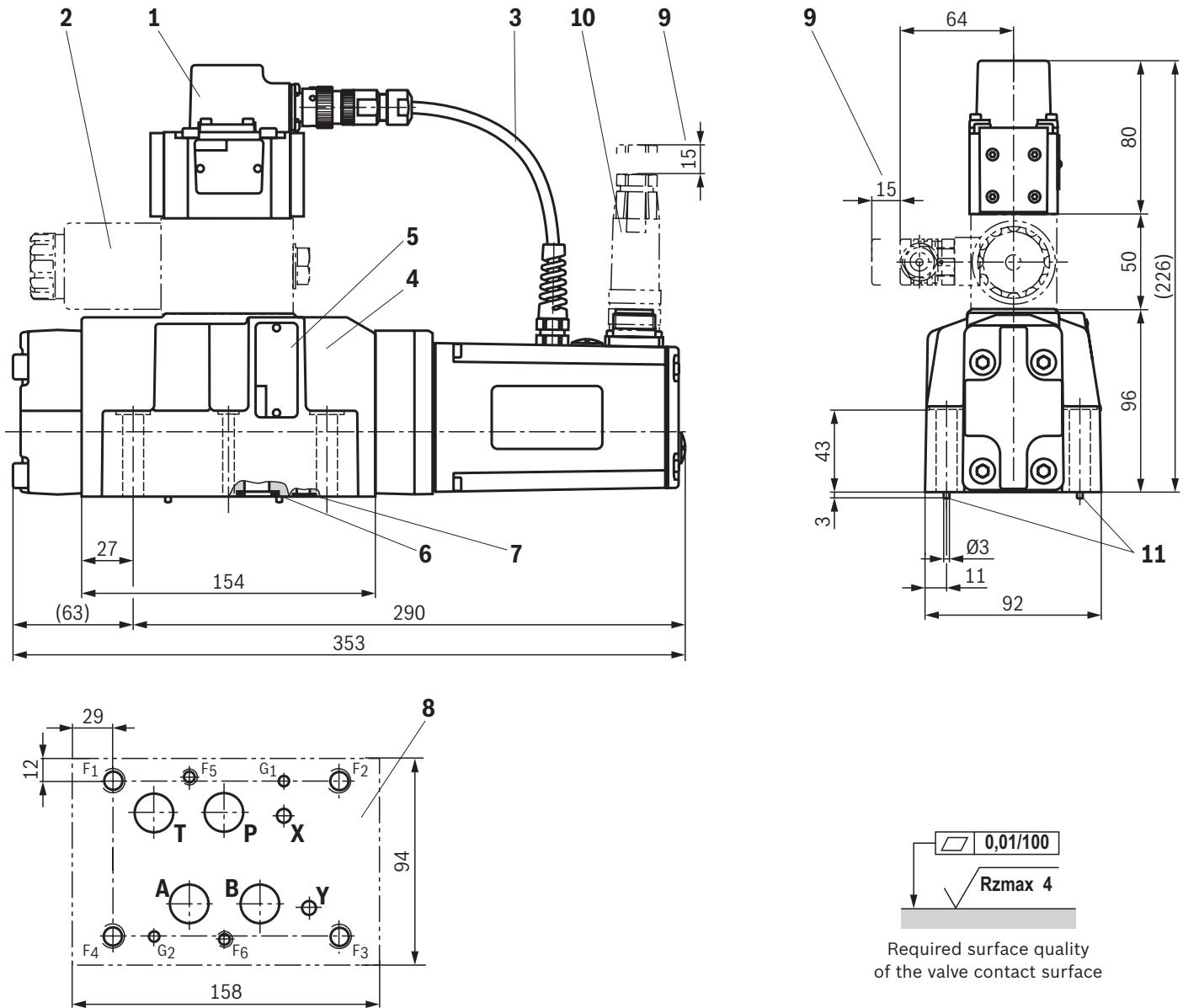


**Notice:**

The dimensions are nominal dimensions which are subject to tolerances.

**Valve mounting screws** see page 25.

# **Dimensions:** Size 16 (dimensions in mm)



- 1 Pilot control valve
- 2 Directional sandwich plate valve (only included with version "WG")
- 3 Cabling
- 4 Main stage
- 5 Name plate
- 6 Identical seal rings for ports A, B, P, T
- 7 Identical seal rings for ports X, Y
- 8 Machined valve contact surface; porting pattern according to ISO 4401-07-07-0-05 (ports X and Y as required)  
Deviating from the standard: ports A, B, P, T – Ø20 mm
- 9 Space required to remove the mating connectors
- 10 Mating connector, separate order, see page 26
- 11 Locking pin

**Subplates** (separate order) with porting pattern according to ISO 4401-07-07-0-05 see data sheet 45100.

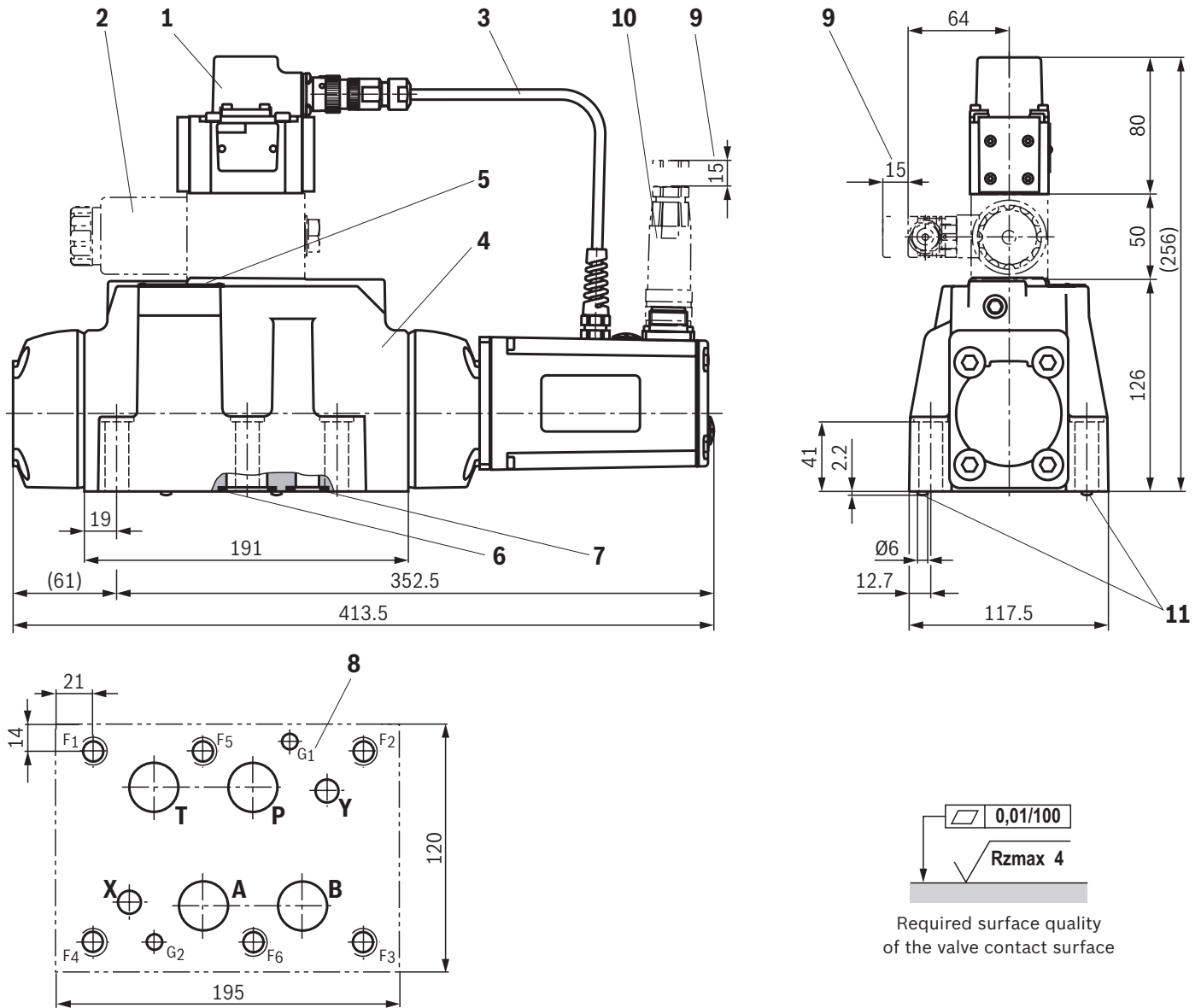


## **Notice:**

The dimensions are nominal dimensions which are subject to tolerances.

**Valve mounting screws** see page 25.

**Dimensions:** Size 25  
(dimensions in mm)



- 1 Pilot control valve
- 2 Directional sandwich plate valve (only included with version "WG")
- 3 Cabling
- 4 Main stage
- 5 Name plate
- 6 Identical seal rings for ports A, B, P, T
- 7 Identical seal rings for ports X, Y
- 8 Machined valve contact surface; porting pattern according to ISO 4401-08-08-0-05 (ports X, Y as required)
- 9 Space required to remove the mating connectors
- 10 Mating connector, separate order, see page 26
- 11 Locking pin

**Subplates** (separate order) with porting pattern according to ISO 4401-08-08-0-05 see data sheet 45100.

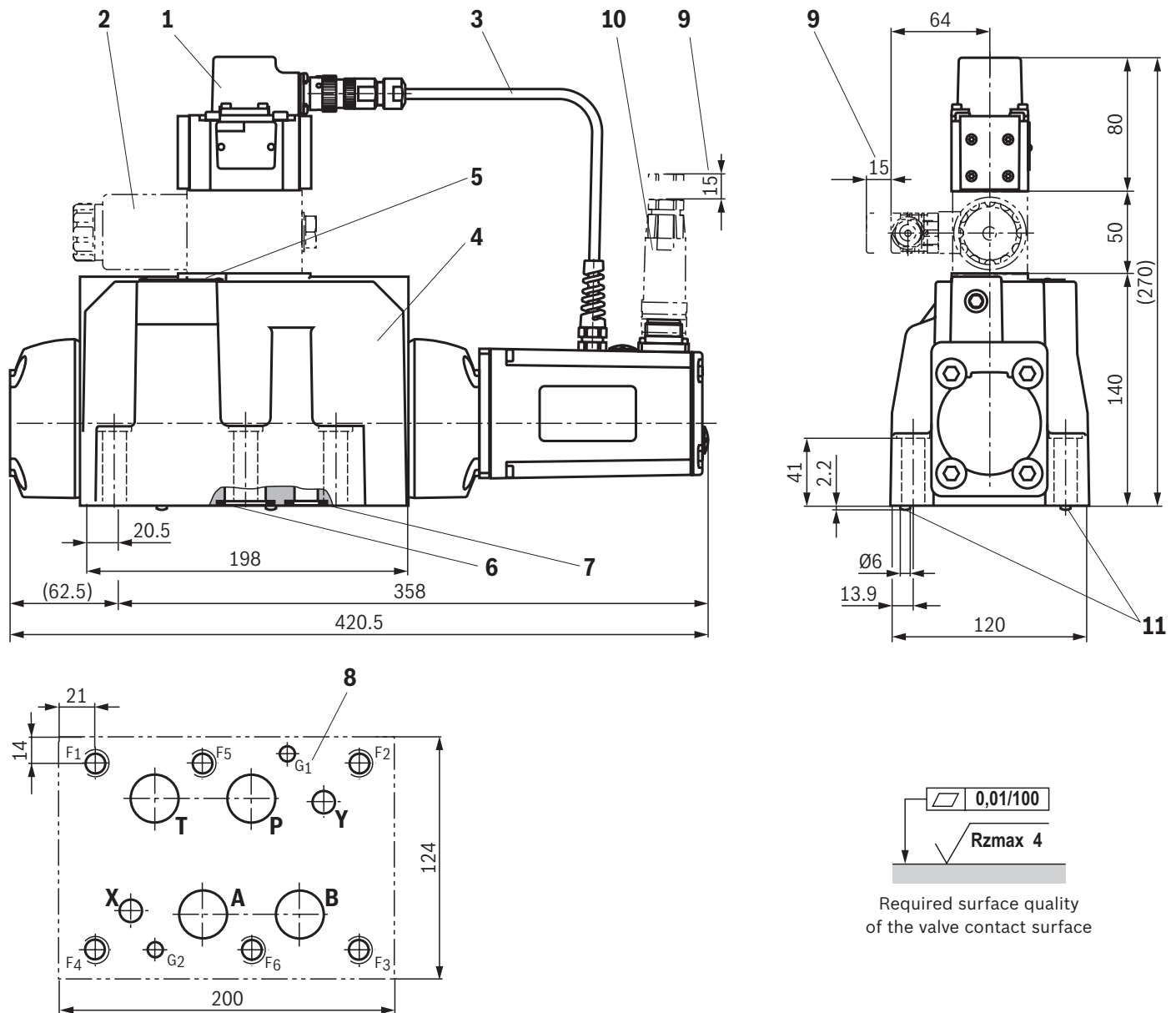


**Notice:**

The dimensions are nominal dimensions which are subject to tolerances.

**Valve mounting screws** see page 25.

# **Dimensions:** Size 27 (dimensions in mm)



- 1 Pilot control valve
- 2 Directional sandwich plate valve (only included with version "WG")
- 3 Cabling
- 4 Main stage
- 5 Name plate
- 6 Identical seal rings for ports A, B, P, T
- 7 Identical seal rings for ports X, Y
- 8 Machined valve contact surface; porting pattern according to ISO 4401-08-08-0-05 (ports X, Y as required)  
Deviating from the standard: ports A, B, P, T –  $\varnothing 32$  mm
- 9 Space required to remove the mating connectors
- 10 Mating connector, separate order, see page 26
- 11 Locking pin

**Subplates** (separate order) with porting pattern according to ISO 4401-08-08-0-05 see data sheet 45100.



## **Notice:**

The dimensions are nominal dimensions which are subject to tolerances.

**Valve mounting screws** see page 25.



## Dimensions

### Valve mounting screws (separate order)

Size	Quantity	Hexagon socket head cap screws	Material number
10	4	ISO 4762 - M6 x 45 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Tightening torque $M_A$ = 13.5 Nm ±10%	R913043777
	or		
	4	ISO 4762 - M6 x 45 - 10.9 Tightening torque $M_A$ = 15.5 Nm ±10%	Not included in the Rexroth delivery range
	or		
16	4	ASME B18.3 - 1/4-20 UNC x 1 3/4" - ASTM-A574 Tightening torque $M_A$ = 15 Nm [11 ft-lbs] ±10%	Not included in the Rexroth delivery range
	2	ISO 4762 - M6 x 60 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Tightening torque $M_A$ = 12.2 Nm ±10%	R913043410
	4	ISO 4762 - M10 x 60 - 10.9-flZn/nc/480h/C Tightening torque $M_A$ = 58 Nm ±20%	R913014770
	or		
	2	ISO 4762 - M6 x 60 - 10.9 Tightening torque $M_A$ = 15.5 Nm ±10%	Not included in the Rexroth delivery range
	4	ISO 4762 - M10 x 60 - 10.9 Tightening torque $M_A$ = 75 Nm ±20%	
	or		
	2	ASME B18.3 - 1/4-20 UNC x 2 1/4" - ASTM-A574 Tightening torque $M_A$ = 15 Nm [11 ft-lbs] ±10%	Not included in the Rexroth delivery range
4	ASME B18.3 - 3/8-16 UNC x 2 1/4" - ASTM-A574 Tightening torque $M_A$ = 60 Nm [44 ft-lbs] ±10%		
25, 27	6	ISO 4762 - M12 x 60 - 10.9-flZn/nc/480h/C Tightening torque $M_A$ = 100 Nm ±20%	R913015613
	or		
	6	ISO 4762 - M12 x 60 Tightening torque $M_A$ = 130 Nm ±20%	Not included in the Rexroth delivery range
	or		
	6	ASME B18.3 - 1/2-13 UNC x 2 1/4" - ASTM-A574 Tightening torque $M_A$ = 110 Nm [81 ft-lbs] ±10%	Not included in the Rexroth delivery range



#### Notice:

For reasons of stability, exclusively these valve mounting screws may be used. The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure.

**Accessories** (separate order)**Directional control valve**

<b>Mating connectors 6-pole + PE</b>	<b>Design</b>	<b>Design</b>	<b>Material number</b>	<b>Data sheet</b>
For the connection of valves with integrated electronics, round connector 6+PE, line cross-section 0.5 ... 1.5 mm <sup>2</sup>	straight	Metal	<b>R900223890</b>	08006
	straight	Plastic	<b>R900021267</b>	

<b>Cable sets 6-pole + PE</b>	<b>Length in m</b>	<b>Material number</b>	<b>Data sheet</b>
For the connection of valves with integrated electronics, round connector 6+PE, straight connector, shielded, potted-in mating connector, line cross-section 0.75 mm <sup>2</sup>	3.0	<b>R901420483</b>	08006
	5.0	<b>R901420491</b>	
	10.0	<b>R901420496</b>	
	20.0	<b>R901448068</b>	–

**Sandwich plate valve**

<b>Mating connectors</b>	<b>Material number</b>	<b>Data sheet</b>
Mating connector according to DIN EN 175301-803, ISO 4400	e.g. <b>R901017011</b> (plastic)	08006

**Miscellaneous**

	<b>Material number</b>
Filter element and seal	<b>R961001949</b>

**Further information**

► Hydraulic valves for industrial applications	Data sheet 07600-B
► Directional servo valve with mechanical position feedback	Data sheet 29564
► Subplates	Data sheet 45100
► Hydraulic fluids on mineral oil basis	Data sheet 90220
► Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)	Data sheet 90223
► Reliability characteristics according to EN ISO 13849	Data sheet 08012
► Hexagon socket head cap screw, metric/UNC	Data sheet 08936
► General product information on hydraulic products	Data sheet 07008
► Installation, commissioning and maintenance of servo valves and high-response valves	Data sheet 07700
► Assembly, commissioning and maintenance of hydraulic systems	Data sheet 07900
► Selection of filters	
► Information on available spare parts	