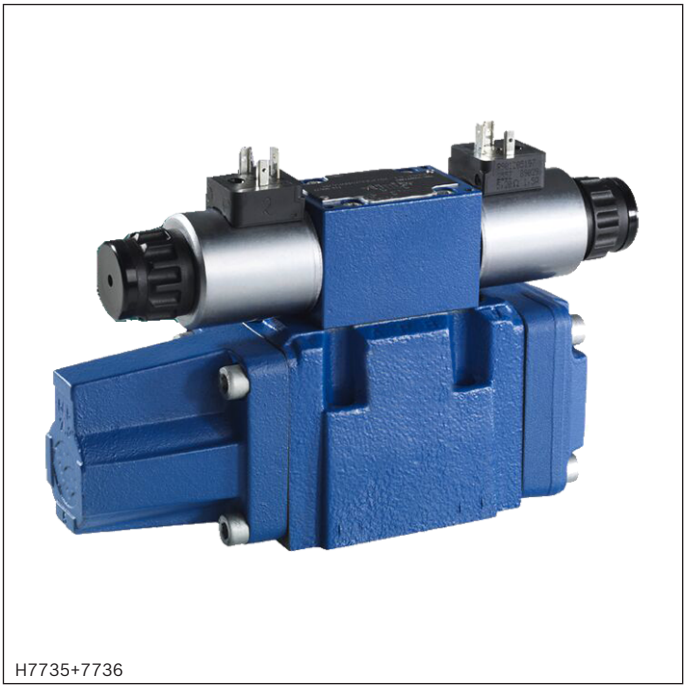
Proportional directional valve, pilot-operated, without electrical position feedback, with or without on-board electronics (OBE)

Type 4WRZ and 4WRZE



H7735+7736

- Size 10 ... 32
- Component series 7X
- Maximum operating pressure 350 bar
- Maximum flow 1600 l/min

CE

Features

- 4/2 and 4/3-way version
- For subplate mounting
- Porting pattern according to ISO 4401
- Control of flow direction and size
- Operation by means of proportional solenoids with central thread and detachable coil
- Spring-centered control spool
- External control electronics
- On-board electronics (OBE) with voltage or current input (‘A1’ or ‘F1’)
- Manual override, optional
- CE conformity according to EMC Directive 2014/30/EU

Contents

Features	1
Ordering code	2, 3
Symbols	4, 5
Function, section	6
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Electrical connections and assignment	12
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Dimensions	21 ... 26
Accessories	27
EMC directive requirements	27
Further information	28

Ordering code

01	02	03	04	05	06	07	08		09	10	11	12	13	14	15	16	17	15	16	17	18	19
4	**WR**	**Z**					**7X**	**/**		**6E**	**G24**											*****

01	4 main ports	**4**
02	Proportional directional valve, pilot-operated	**WR**
03	Electro-hydraulic actuation	**Z**
04	External control electronics	**no code**
	On-board electronics (OBE)	**E** ◇
05	Size 10	**10**
	Size 16	**16**
	Size 25	**25**
	Size 32	**32**
06	Symbols; possible version see page 4 ... 5	

Nominal flow (***Δp*** = 5 bar per control edge)

07	**Size 10**	
	25 l/min	**25**
	50 l/min	**50**
	85 l/min	**85**
	Size 16	
	125 l/min	**125**
	180 l/min	**180** ◇
	Size 25	
	220 l/min	**220**
	325 l/min	**325** ◇
	Size 32	
	360 l/min	**360**
	520 l/min	**520** ◇
08	Component series 70 ... 79 (70 ... 79: unchanged installation and mounting dimensions)	**7X**
09	Subplate mounting	**no code**
10	Proportional solenoid with detachable coil	**6E**
11	Direct voltage 24 V	**G24**
12	With concealed manual override	**N9** [1] ◇
	Without manual override	**no code**

Corrosion resistance (outside)

13	None (valve housing with standard paint coating)	**no code**
	Seawater-resistant	**J** [2]

Pilot oil flow

14	External pilot oil supply, external pilot oil return	**no code**
	Internal pilot oil supply, external pilot oil return	**E**
	Internal pilot oil supply, internal pilot oil return	**ET** ◇
	External pilot oil supply, internal pilot oil return	**T**

Ordering code

01	02	03	04	05	06	07	08		09	10	11	12	13	14	15	16	17	15	16	17	18	19
4	**WR**	**Z**					**7X**	**/**		**6E**	**G24**											*****

Electrical connection

15	Connector 3-pole (2 + PE) according to EN 175301-803	**K4**	
	Connector, 7-pole (6 + PE) according to EN 175201-804	**K31** [3]	◇

Electrical interface

16	External control electronics	**no code**	
	Command value input ±10 V	**A1** [3]	◇
	Command value input 4 ... 20 mA	**F1** [3]	

17	Without pressure reducing valve	**no code**	
	With pressure reducing valve type ZDR 6 DP0-4X/40YM-W80 (permanently set)	**D3**	◇

Seal material (observe compatibility of seals with hydraulic fluid used, see page 9)

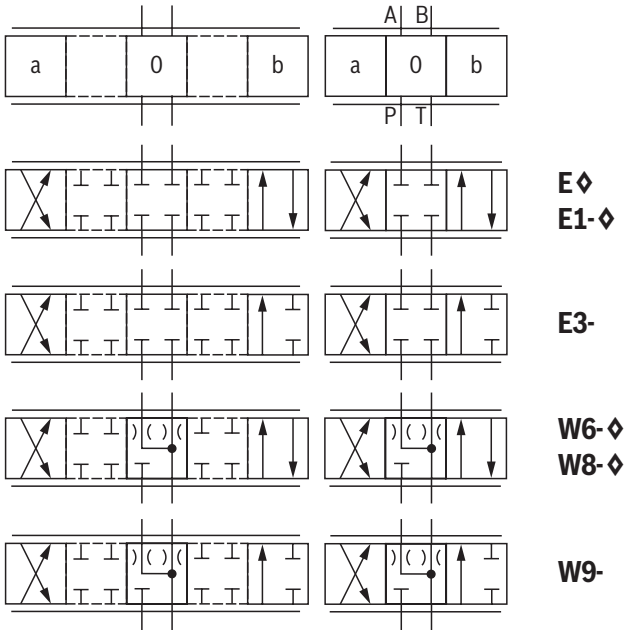
18	NBR seals	**M**	◇
	FKM seals	**V**	

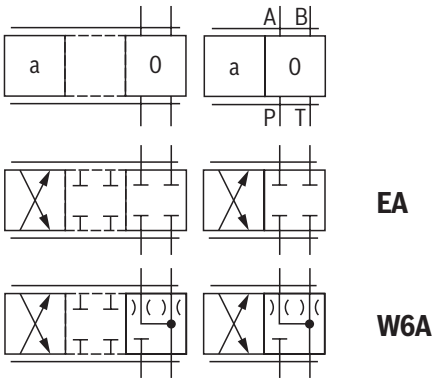
19	Further details in the plain text	

[1] Not version "J"
[2] Only version "K31"
[3] Only version "ZE"

☞ **Notice:** ◇ = Preferred type

Symbols





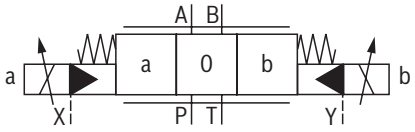
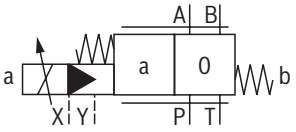
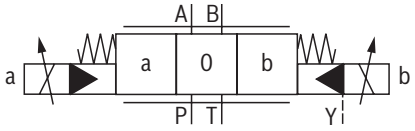
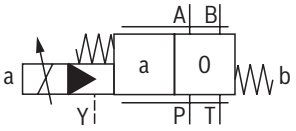
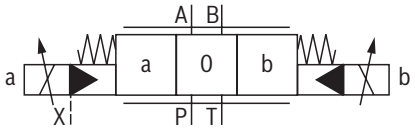
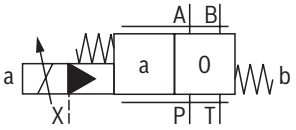
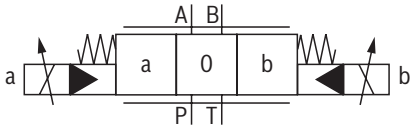
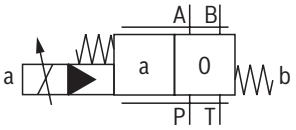
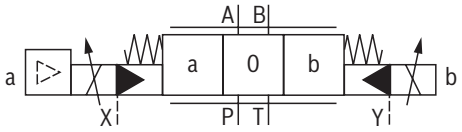
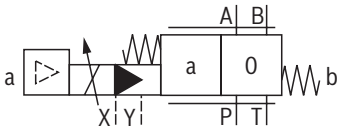
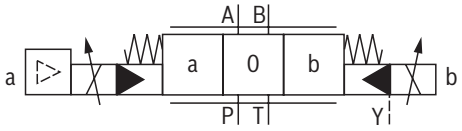
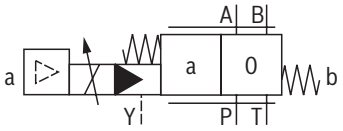
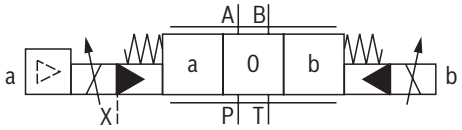
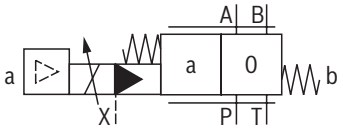
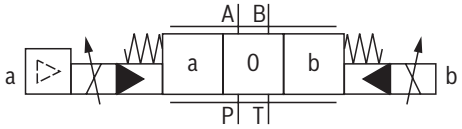
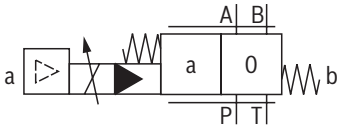
Notice:
- Representation according to ISO 1219-1. Hydraulic interim positions are shown by dashes.
- With symbols W6-, W8-, W9- and W6A, there is a connection in the "0" spool position from A →T and B → T with less than 2% of the relevant nominal cross-section.
- Differential circuit, cylinder piston base at port A.

Notice: ◊ = Preferred type

With symbols E1- and W8-:
P→A: $q_{V\,max}$ B→T: $q_V/2$
P→B: $q_V/2$ A→T: $q_{V\,max}$

With symbols E3- and W9-:
P→A: $q_{V\,max}$ B→T: blocked
P→B: $q_V/2$ A→T: $q_{V\,max}$

Symbols

Type	3 spool positions	2 spool positions	Pilot oil flow
WRZ			"no code"
			"E"
			"T"
			"ET"
WRZE			"no code"
			"E"
			"T"
			"ET"

Function, section

Valves type WRZ(E) are pilot-operated directional valves with operation by proportional solenoid. Their function is to control the flow direction and size.

Design

The valves basically comprise:

- Pilot control valve (4) with proportional solenoids (2 and 3)
- Main valve (5) with main control spool (6) and compression spring (7)

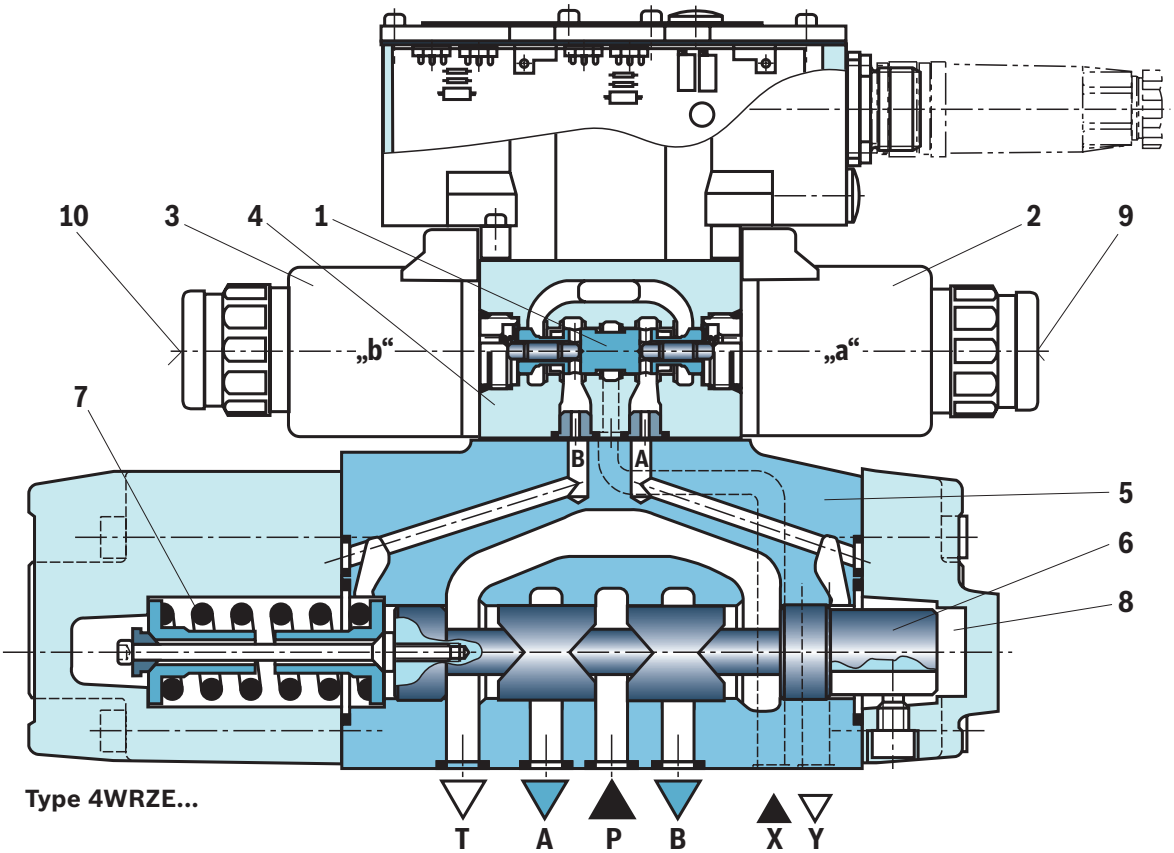
Function

- With de-energized solenoids (2 and 3), central position of the main control spool (6) by compression spring (7)
- The main control spool (6) is controlled by the pilot control valve (4); the main control spool is moved proportionally, e.g. by actuating solenoid "b" (3)
  - The control spool (1) is moved to the right, pilot oil enters the pressure chamber (8) via the pilot control valve (4) and deflects the main control spool (6) proportionally to the electric input signal
  - Connection from P→A and B→T via orifice-type cross-sections with progressive flow characteristic
- Pilot oil supply to the pilot control valve internally via port P or externally via port X
- Switching off the solenoid (3)
  - The control spool (1) and main control spool (6) are moved back into the central position
- Flow depending on spool position from P→A and B→T or P→B and A→T(R).

An optional manual override (9 and 10) can be used to move the control spool (1) without solenoid energization.

☞ **Notice:**

- Accidental activation of the manual override may lead to uncontrolled machine movements.
- Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.
- For information on the pilot control valve (4) see data sheet 29184.



Type 4WRZE...

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

General						
Size		NG	10	16	25	32
Type of connection			Subplate mounting			
Porting pattern			ISO 4401-05-05-0-05	ISO 4401-07-07-0-05	ISO 4401-08-08-0-05	ISO 4401-10-09-0-05
Mass	▶ Type WRZ	kg	7.8	11.9	18.2	42.2
	▶ Type WRZE	kg	8.0	14.0	19.0	43.0
	▶ Pressure reducing valve "D3"	kg	0.5			
Installation position			Any, preferably horizontal			
Ambient temperature range	▶ Type WRZ	°C	–20 ... +80			
	▶ Type WRZE		–20 ... +50			
Storage temperature range (with UV protection)		°C	+5 ... +40			
Maximum storage time		Years	1 (if the storage conditions are observed, refer to the operating instructions 07600-B)			
Maximum relative humidity (no condensation)		%	95			
Protection class according to EN 60529			IP65 (if suitable and correctly mounted mating connectors are used)			
Maximum surface temperature [1]		°C	150			
Sine test according to EN 60068-2-6			10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes			
Noise test according to EN 60068-2-64			20 ... 2000 Hz / 10 g_{RMS} / 30 g peak / 30 min / 3 axes			
Transport shock according to EN 60068-2-27			15 g / 11 ms / 3 shocks / 3 axes			
Conformity	▶ CE according to EMC Directive 2014/30/EU, tested according to		EN 61000-6-2 and EN 61000-6-3			
	▶ RoHS Directive		2011/65/EU [2]			

[1] Due to the rising surface temperatures of the solenoid coils, the standards ISO 13732-1 and ISO 4413 are to be observed.

[2] The product fulfills the substance requirements of the RoHS Directive 2011/65/EU.

Notice:
EMC directive conditions see page 27.

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

Hydraulics							
Size			NG	10	16	25	32
Maximum operating pressure	▶ Ports A, B, P						
	– Pilot control valve	External pilot oil supply	bar	100			
		Internal pilot oil supply	bar	100			
		Pressure reducing valve "D3"		350			
	– Main valve		bar	350			
	▶ Ports T, R	External pilot oil supply	bar	315	250	250	150
	▶ Port T	Internal pilot oil supply	bar	30			
	▶ Port Y		bar	30			
Minimum operating pressure	▶ Ports A, B, P						
	– Pilot control valve	External pilot oil supply	bar	30			
		Internal pilot oil supply	bar	30			
		Pressure reducing valve "D3"	bar	100			
Hydraulic fluid				See table page 9			
Hydraulic fluid temperature range (at the valve working ports)			°C	–20 ... +80			
Viscosity range		▶ Recommended	mm^2/s	30 ... 46			
		▶ Maximum admissible	mm^2/s	20 ... 380			
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)		▶ Pilot control valve		Class 18/16/13 [3]			
		▶ Main valve		Class 20/18/15 [3]			
Maximum flow		▶ Main valve	l/min	170	460	870	1600
Pilot flow			l/min	3.5	5.5	7	15.9

[3] 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.

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

Hydraulic fluid		Classification	Suitable sealing materials	Standards
Mineral oils		HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524
Bio-degradable	▶ Insoluble in water	HETG	FKM	ISO 15380
		HEES	FKM	
	▶ Soluble in water	HEPG	FKM	ISO 15380
Flame-resistant	▶ Water-free	HFDU (glycol base)	FKM	ISO 12922
		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

☞ **Important information on hydraulic fluids:**

- ▶ For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ **Bio-degradable and flame-resistant – containing water:**
  If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.
- ▶ **Flame-resistant – containing water:**
  - – Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – backing up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
  - – Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, the command value profile is to be adjusted for proportional and high-response valves.

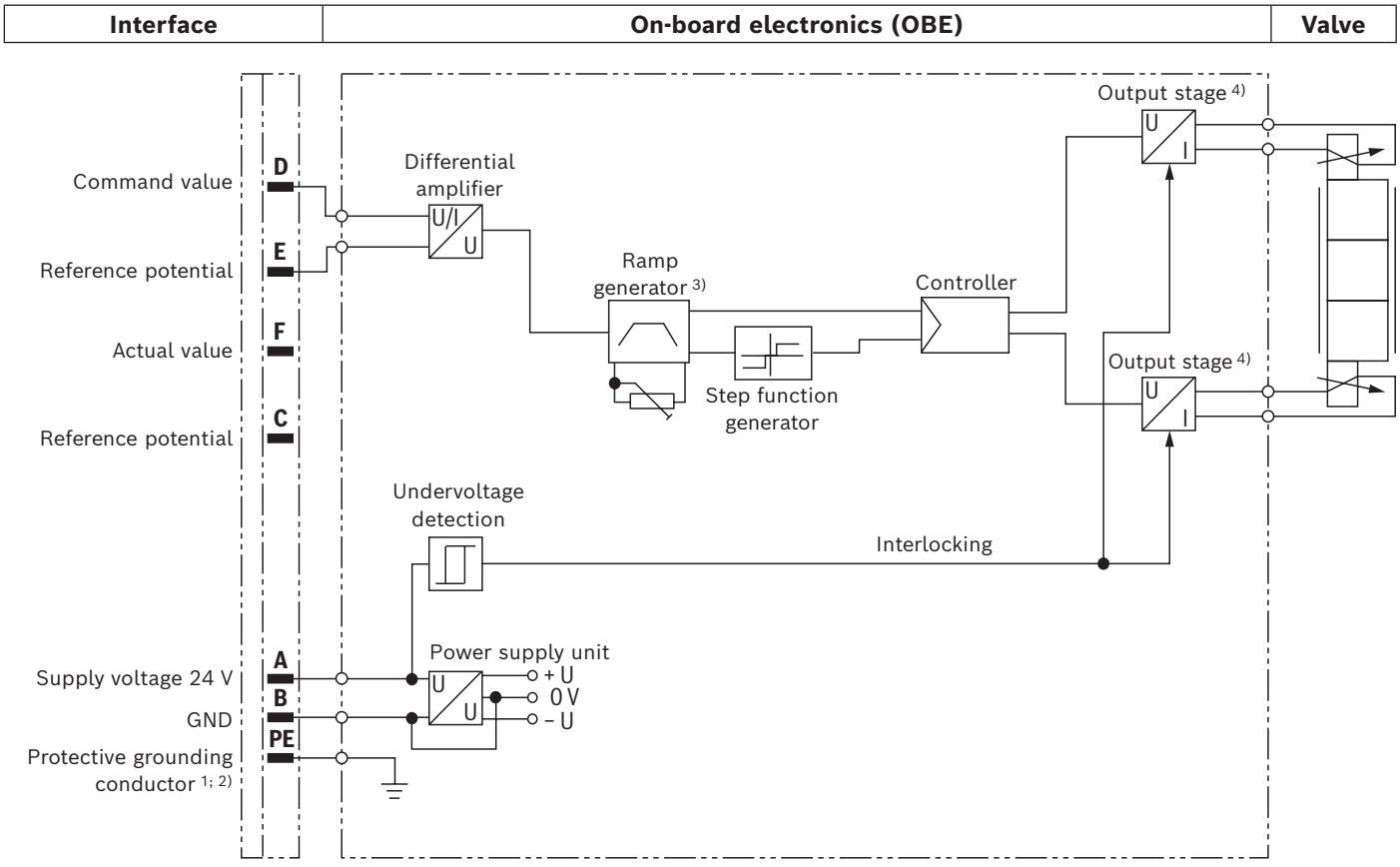
Static / dynamic		
Hysteresis	%	<6

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

Electrical, on-board electronics (OBE) – interface "A1"				
Supply voltage	▶ Nominal value		VDC	24
	▶ Minimum		VDC	19
	▶ Maximum		VDC	36
	▶ Maximum residual ripple		Vpp	2.5
	▶ Maximum power consumption		VA	40
	▶ Current consumption	Maximum	A	<2
		Impulse current	A	3
	▶ Fuse protection, external		A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580			%	S1 (continuous operation)
Functional ground and screening				See pin assignment, page 12
Maximum voltage of the differential inputs against 0 V				D→B; E→B (max. 18 V)
Command value (differential amplifier)	▶ Measurement range		V	±10
	▶ Input resistance		kΩ	>100

Electrical, on-board electronics (OBE) – interface "F1"				
Supply voltage	▶ Nominal value		VDC	24
	▶ Minimum		VDC	19
	▶ Maximum		VDC	36
	▶ Maximum residual ripple		Vpp	2.5
	▶ Maximum power consumption		VA	40
	▶ Current consumption	Maximum	A	<2
		Impulse current	A	3
	▶ Fuse protection, external		A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580			%	S1 (continuous operation)
Functional ground and screening				See pin assignment, page 12
Maximum voltage of the differential inputs against 0 V				D→B; E→B (max. 18 V)
Command value	▶ Input current range		mA	4 ... 20
	▶ Input resistance		Ω	100

Block diagram/controller function block



1) The protective grounding conductor (PE) is connected to the valve housing.

2) Port PE is connected to the cooling element and the valve housing

3) Ramp adjustable from 0 ... 2.5 s from the outside, both for t_{up} and t_{down}

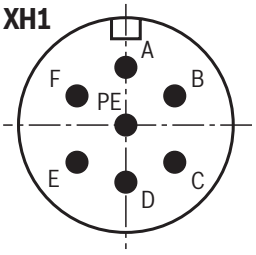
4) Output stages flow-controlled

Electrical connections and assignment

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

Pin	Interface assignment	
	"A1"	"F1"
A	Supply voltage	Supply voltage
B	GND	GND
C	Cannot be used	Cannot be used
D	Command value	Command value
E	Reference potential command value	Reference potential command value
F	Cannot be used	Cannot be used
PE	Functional ground (directly connected to the valve housing)	

XH1

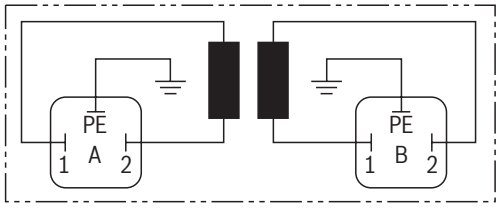
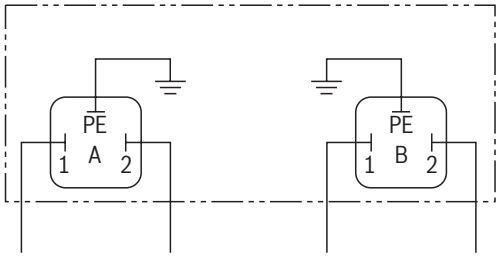


☞ **Notice:**
Mating connectors, separate order, see page 27 and data sheet 08006.

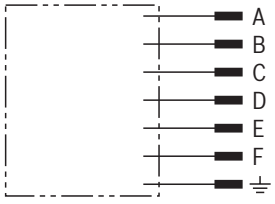
		Command value	Actual value	Switching positions	
				3 ("a"; "b")	**2** ("a")
Positive	"A1"	0 ... +10 V	–	P→A; B→T	P→B; A→T
	"F1"	12 ... 20 mA	–		
Negative	"A1"	0 ... −10 V	–	P→B; A→T	–
	"F1"	12 ... 4 mA	–		
Connection cable	▶ Up to 20 m cable length type LiYCY 7 x 0.75 mm²				
	▶ Up to 40 m cable length type LiYCY 7 x 1.0 mm²				
	▶ EMC-compliant installation: – Apply screening to both line ends – Use metal mating connector (see page 27) ▶ Alternatively up to 30 m cable length admissible – Apply screening on supply side – Plastic mating connector (see page 27) can be used				

External control electronics

Without corrosion resistance

Connection at device connector	Connection at mating connector
	

With corrosion resistance "J"

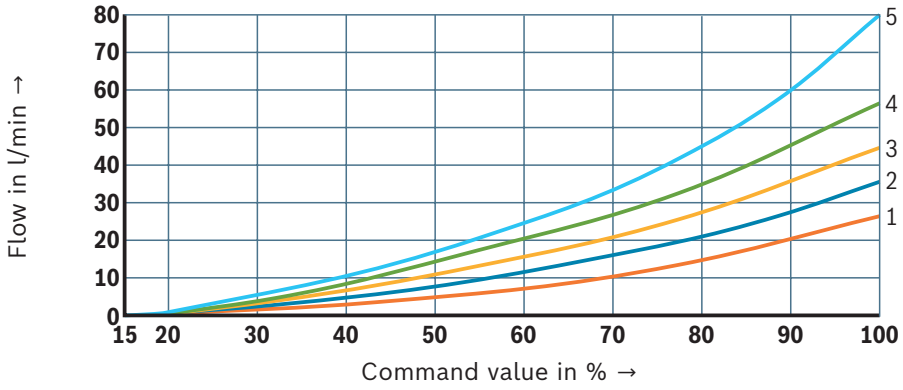


Pin	Connection with
A	Solenoid A
B	Solenoid B
C	Solenoid A
D	Solenoid B
E	n.c.
F	n.c.
PE	Valve housing

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

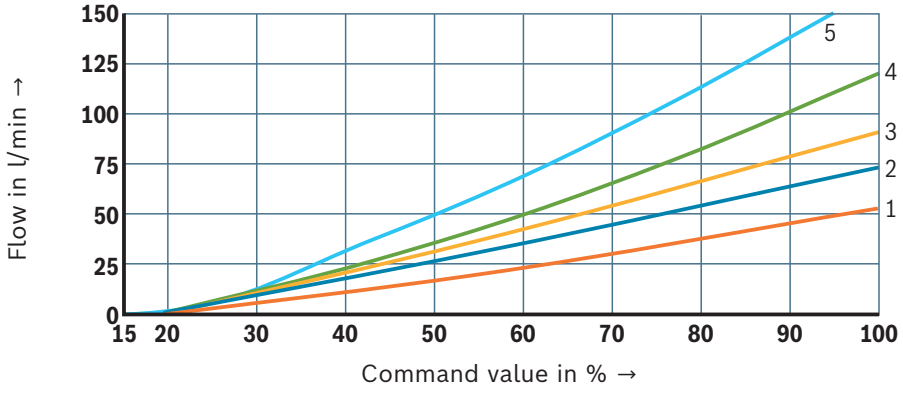
Characteristic curves: Size 10
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Flow/signal function (rated flow 25 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



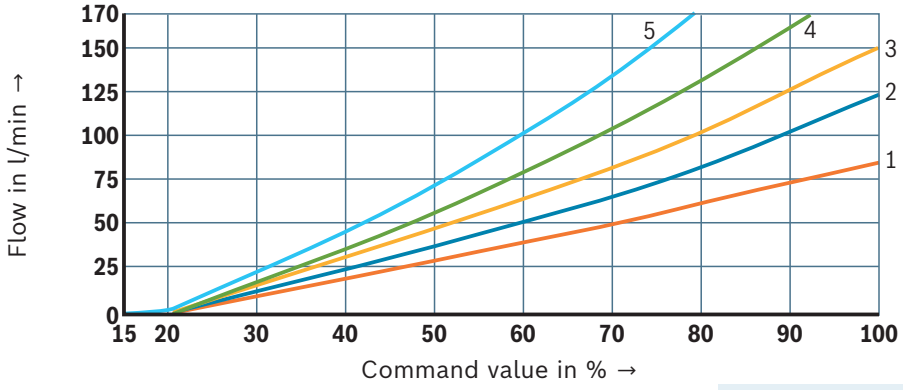
1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

Flow/signal function (rated flow 50 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



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

Flow/signal function (rated flow 85 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



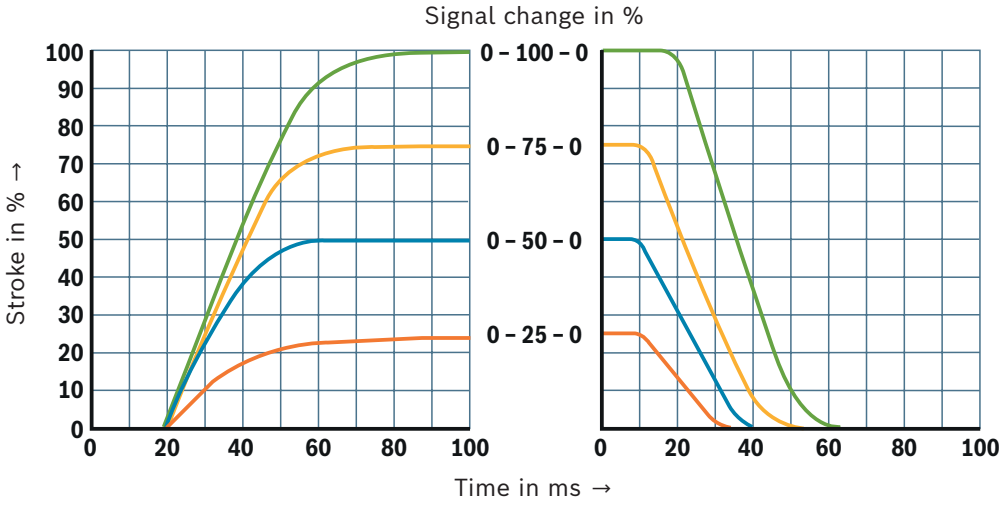
1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

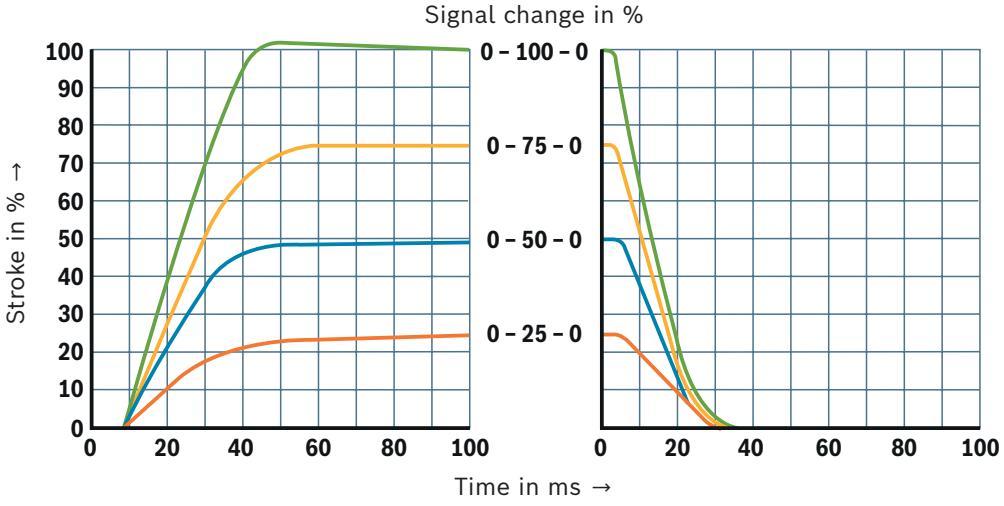
Characteristic curves: Size 10
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Transition function with stepped electric input signals (p_{St} = 50 bar)
Symbol E, W6-, EA, W6A

Type WRZ



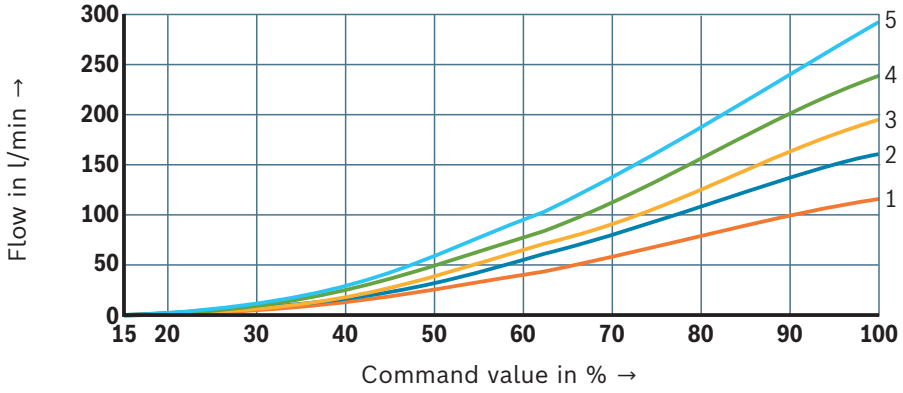
Type WRZE



☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

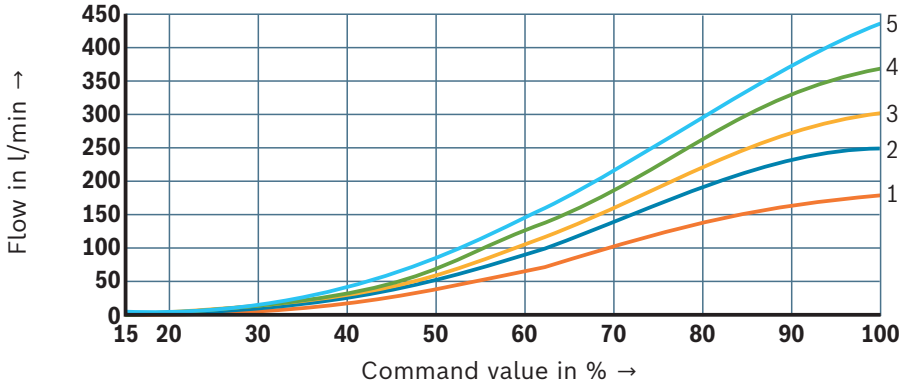
Characteristic curves: Size 16
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Flow/signal function (rated flow 125 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



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

Flow/signal function (rated flow 180 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



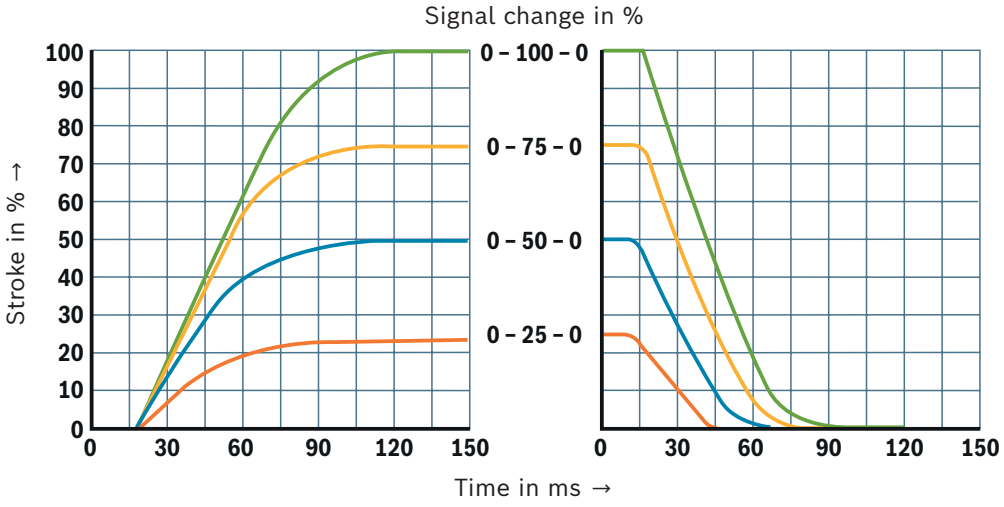
1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

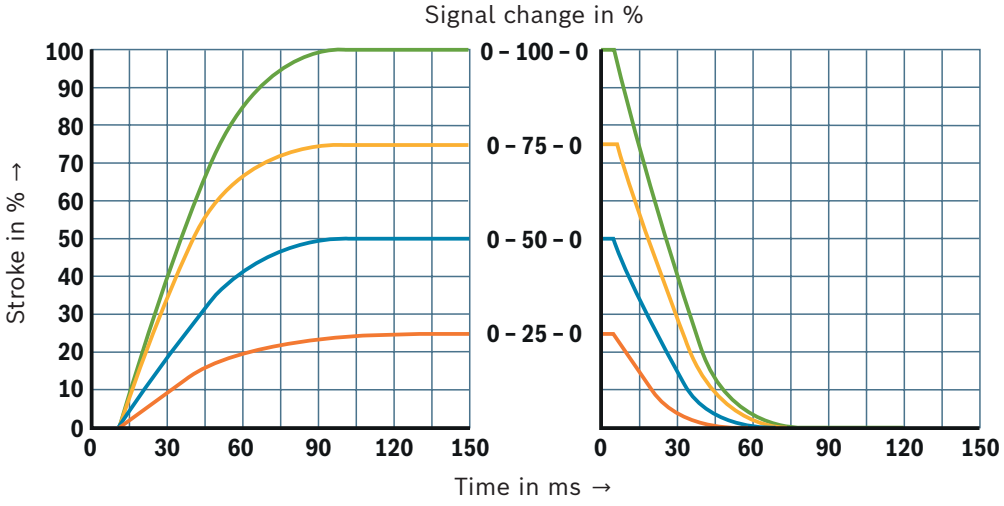
Characteristic curves: Size 16
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Transition function with stepped electric input signals (p_{St} = 50 bar)
Symbol E, W6-, EA, W6A

Type WRZ



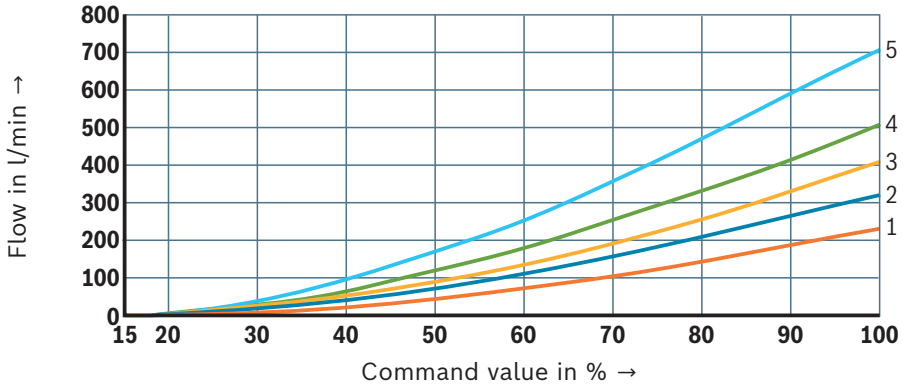
Type WRZE



☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

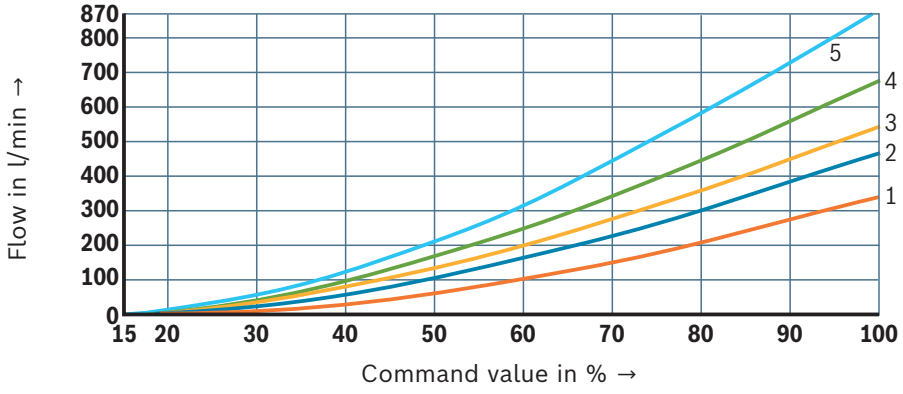
Characteristic curves: Size 25
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Flow/signal function (rated flow 220 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



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

Flow/signal function (rated flow 325 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



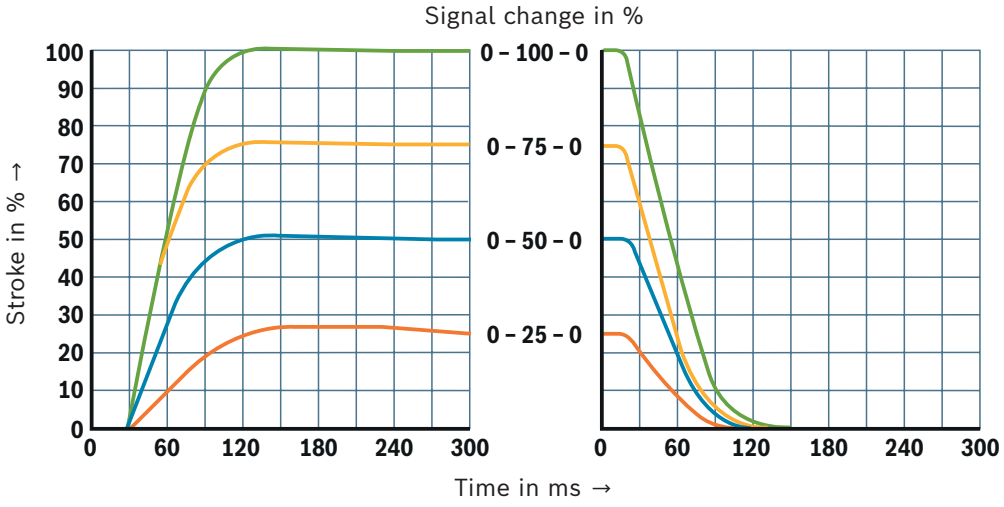
1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

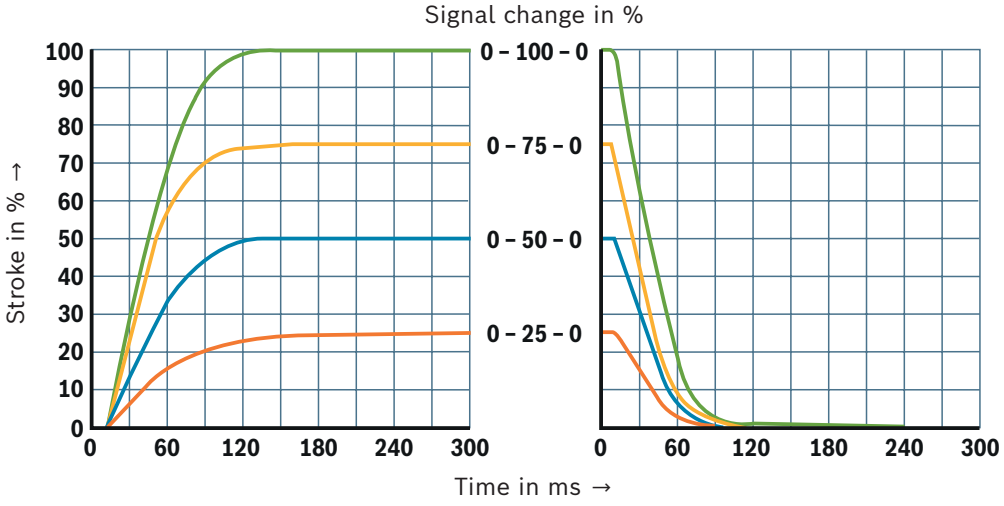
Characteristic curves: Size 25
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Transition function with stepped electric input signals (p_{St} = 50 bar)
Symbol E, W6-, EA, W6A

Type WRZ



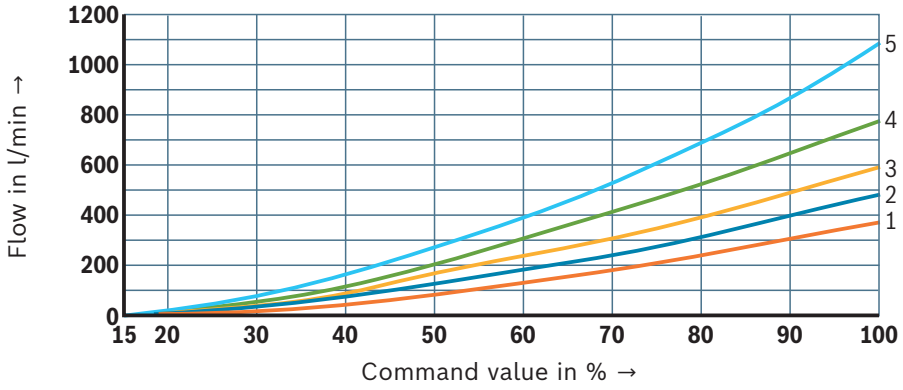
Type WRZE



☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

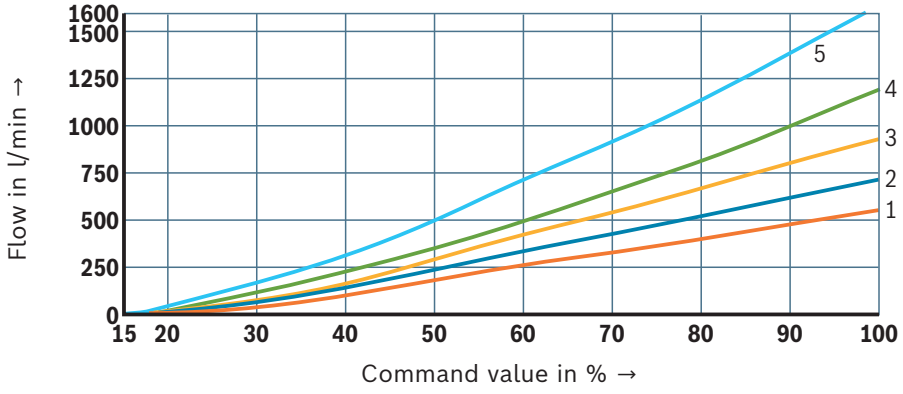
Characteristic curves: Size 32
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Flow/signal function (rated flow 360 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



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

Flow/signal function (rated flow 520 l/min at ***Δp*** = 10 bar)
Symbol E, W6-, EA, W6A; P→A; B→T or P→B; A→T



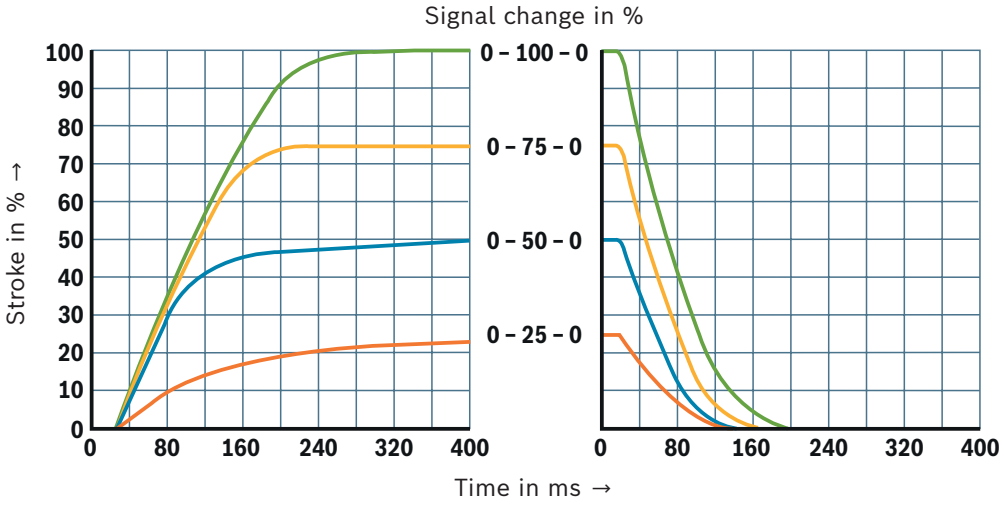
1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

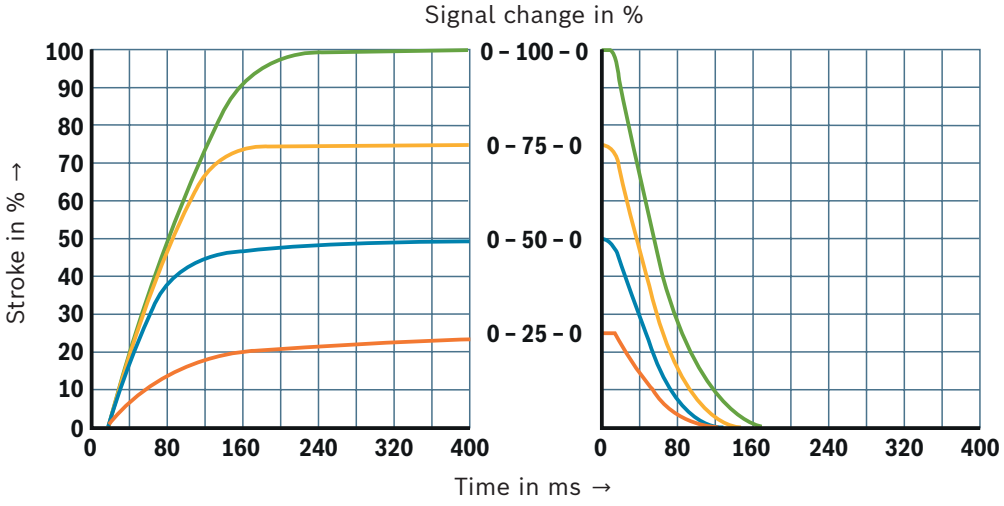
Characteristic curves: Size 32
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Transition function with stepped electric input signals (p_{St} = 50 bar)
Symbol E, W6-, EA, W6A

Type WRZ

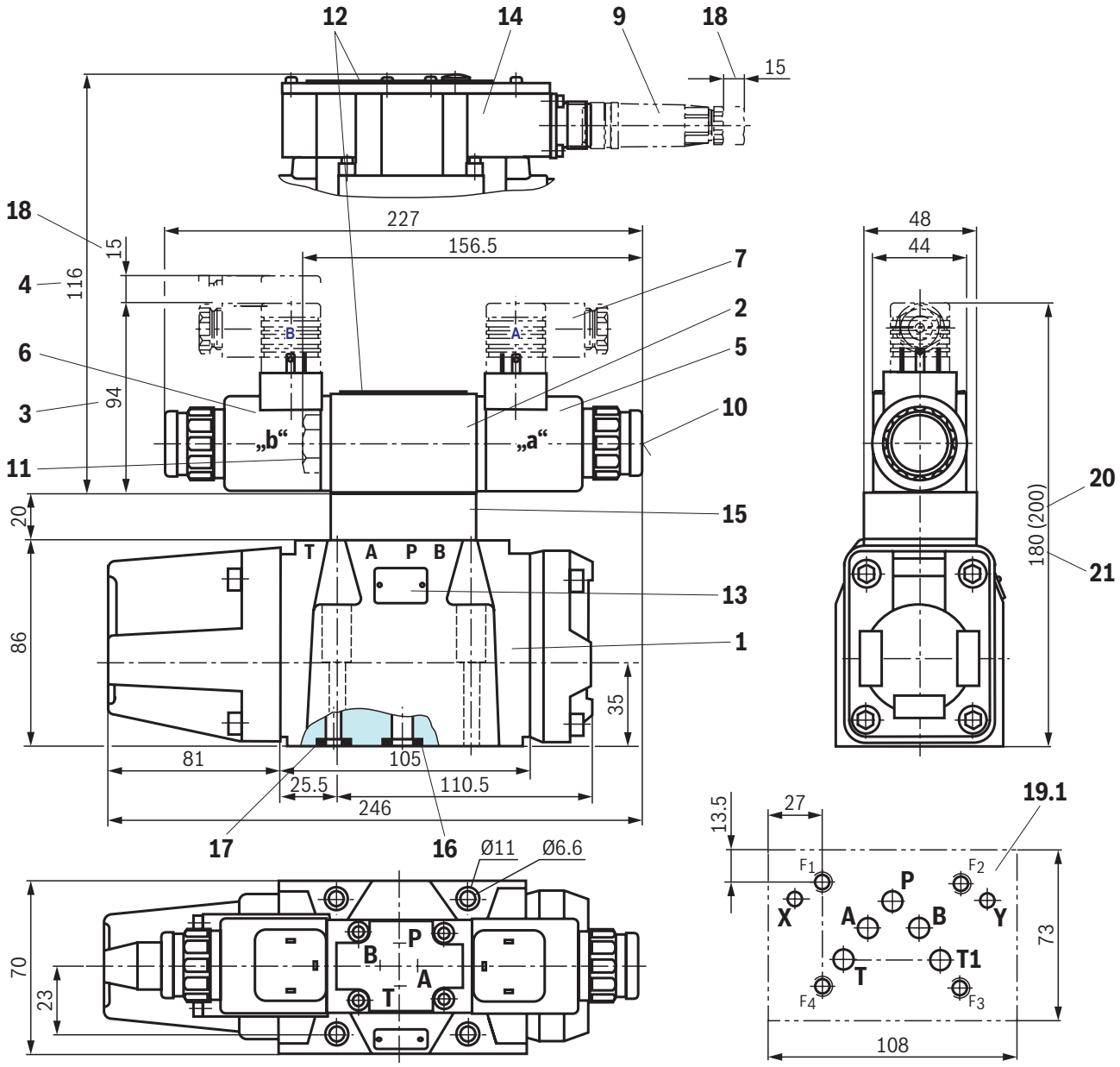


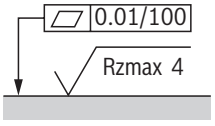
Type WRZE



☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

Dimensions: Size 10
(dimensions in mm)



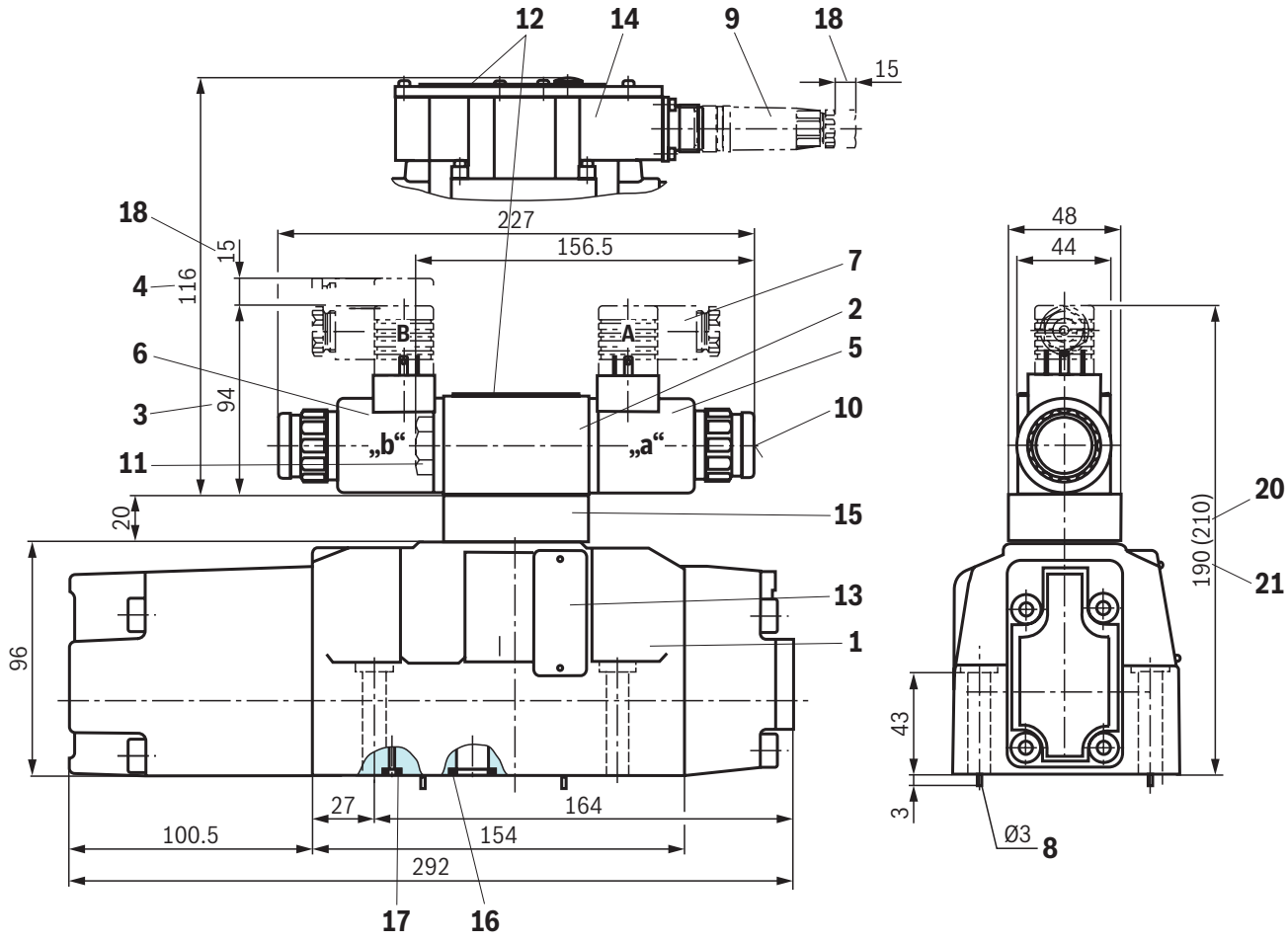


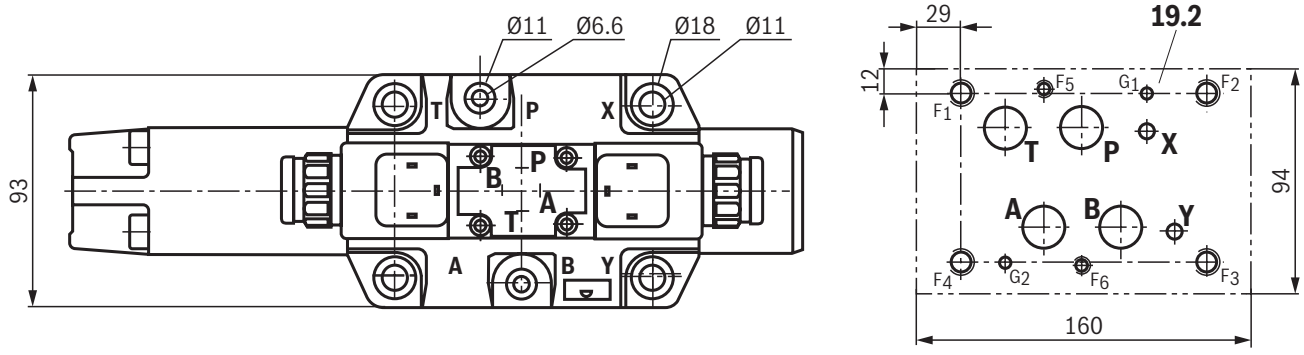
Required surface quality of the valve contact surface

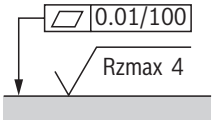
For **item explanations, valve mounting screws** and **subplates** see page 25 and 26.

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

Dimensions: Size 16
(dimensions in mm)





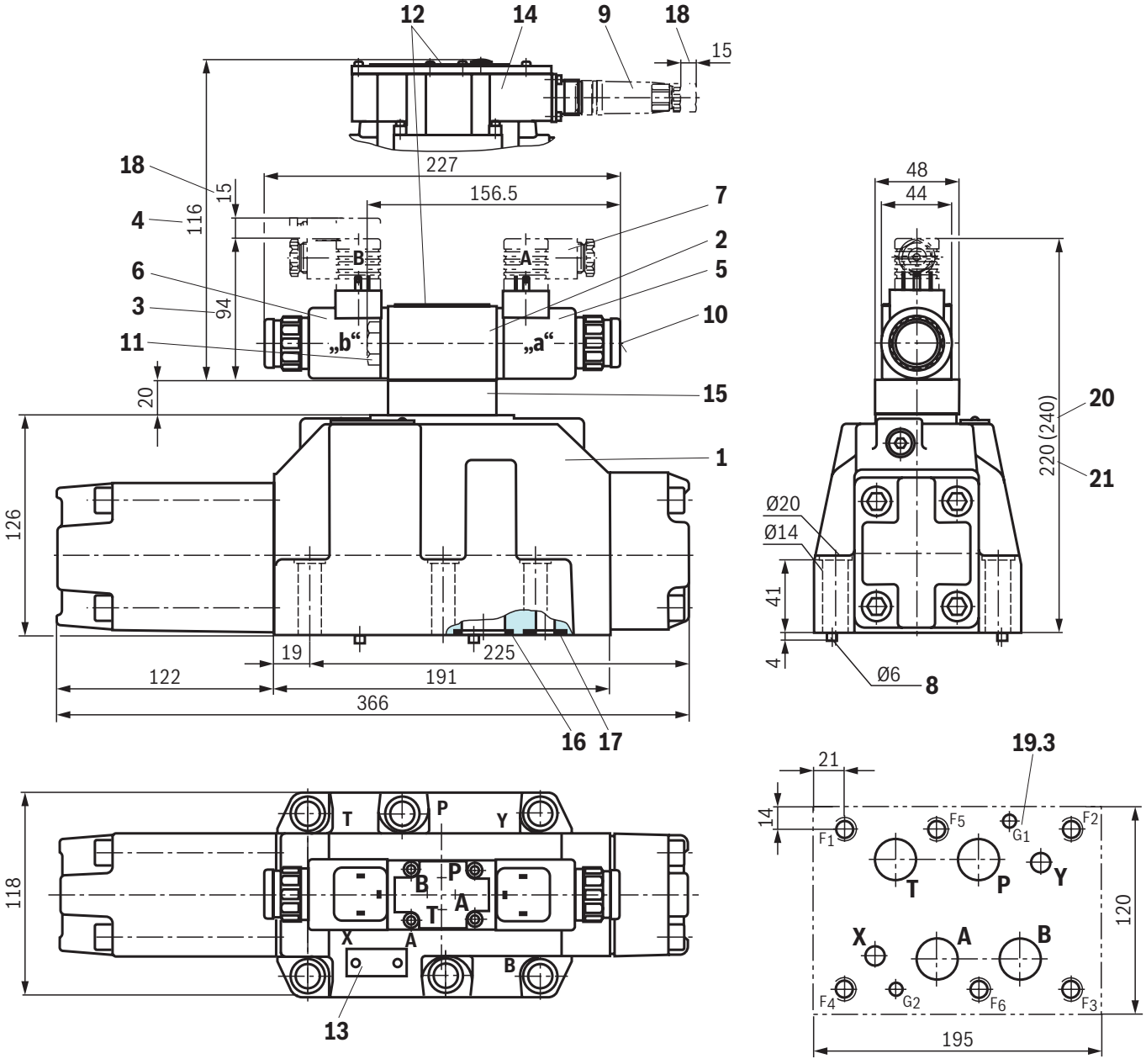


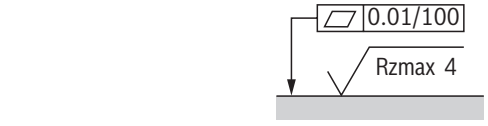
Required surface quality of the valve contact surface

For **item explanations, valve mounting screws** and **subplates** see page 25 and 26.

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

Dimensions: Size 25
(dimensions in mm)



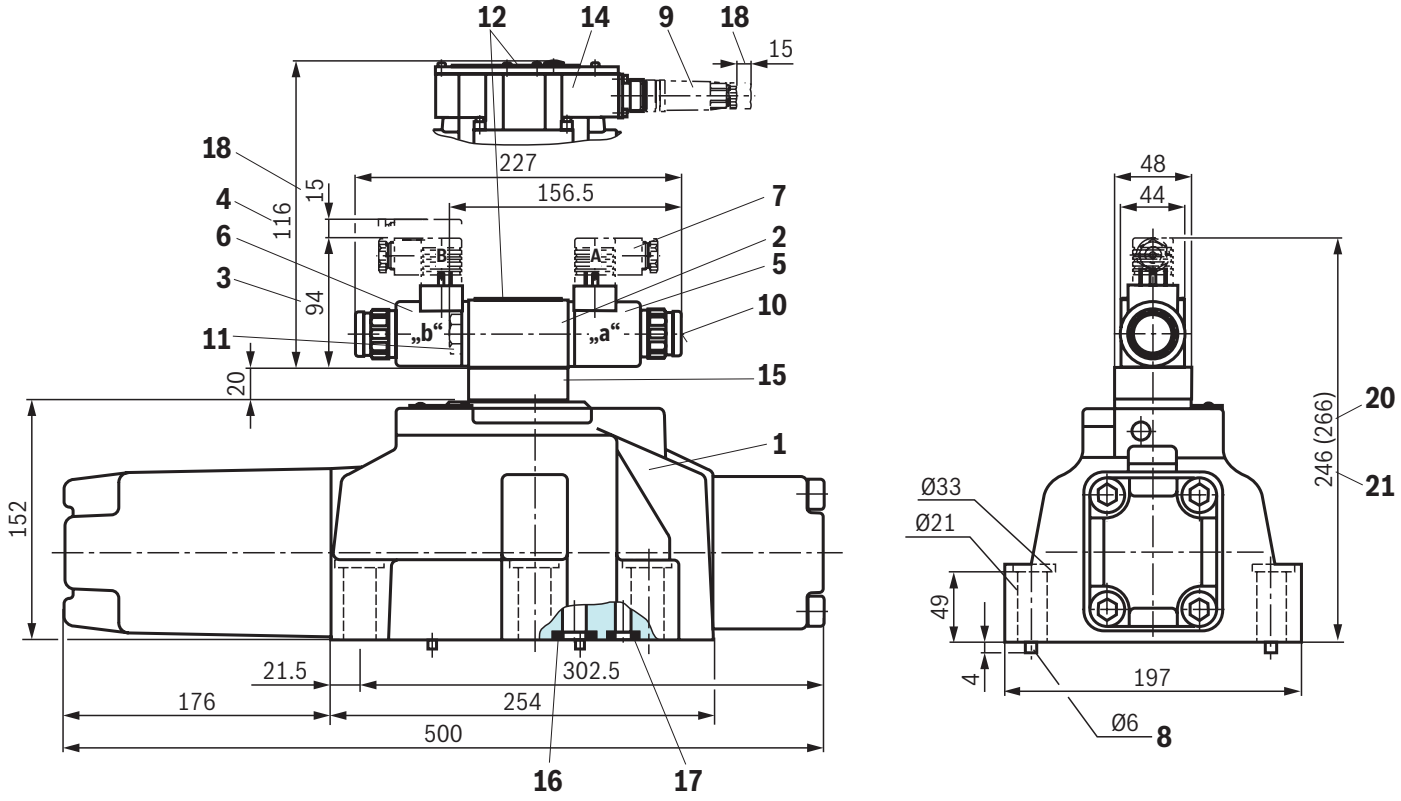


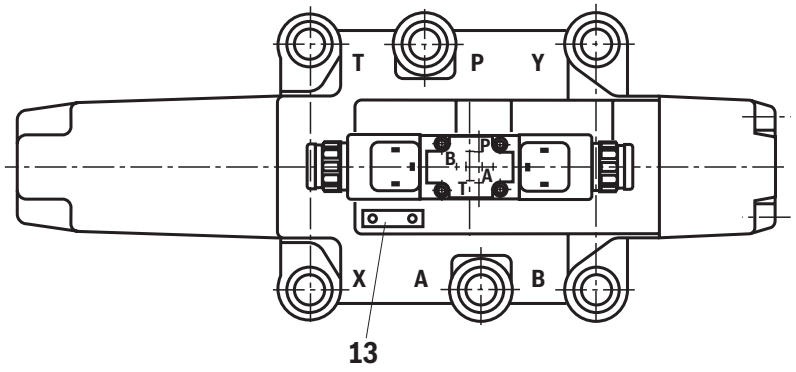
Required surface quality of the valve contact surface

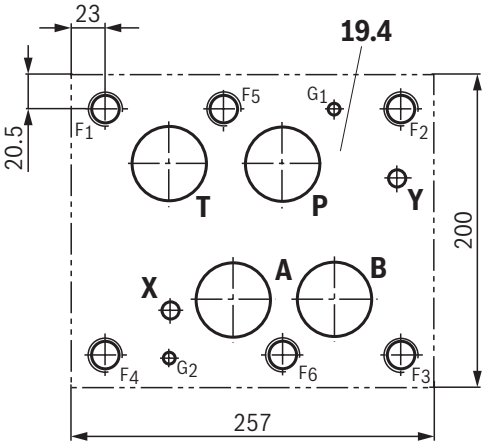
For **item explanations, valve mounting screws** and **subplates** see page 25 and 26.

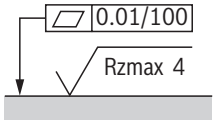
Notice:
The dimensions are nominal dimensions which are subject to tolerances.

Dimensions: Size 32
(dimensions in mm)









Required surface quality of the valve contact surface

For **item explanations, valve mounting screws** and **subplates** see page 25 and 26.

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

Dimensions

1 Main valve
2 Pilot control valve
3 Dimension for type 4WRZ (no corrosion resistance)
4 Dimension for type 4WRZE
5 Proportional solenoid "a"
6 Proportional solenoid "b"
7 Mating connector without circuitry for connector "K4" (separate order, see page 27 and data sheet 08006)
8 Locking pin
9 Mating connector for connector "K31" (separate order, see page 27 and data sheet 08006)
10 Concealed manual override "N9"
11 Plug screw for valves with one solenoid
12 Name plate for pilot control valve
13 Name plate for main valve
14 On-board electronics (OBE)
15 Pressure reducing valve "D3"
16 Identical seal rings for ports A, B, P, T, and T1
17 Identical seal rings for ports X, Y, and L
18 Space required to remove the mating connector
19.1 Machined valve contact surface; porting pattern according to ISO 4401-05-05-0-05; ports X and Y as required
19.2 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.
19.3 Machined valve contact surface; porting pattern according to ISO 4401-08-08-0-05; ports X and Y as required
19.4 Machined valve contact surface; porting pattern according to ISO 4401-10-09-0-05, ports X and Y as required; deviating from the standard: Ports A, B, P, T Ø38 mm.
20 Dimension for version without pressure reducing valve
21 Dimension for version with pressure reducing valve "D3"

☞ **Notice:**
For type 4WRZ..., use the following throttle inserts in channel A and B of the pilot control valve:

NG	**Throttle insert Ø** in mm	
10	1.8	
16	2.0	
25	2.8	
32	–	

Dimensions

Valve mounting screws (separate order)

Size	Quantity	Hexagon socket head cap screws
10	4	**ISO 4762 - M6 x 45 - 10.9-flZn-240h-L** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 13.5 Nm ±10%
	or	
	4	**ISO 4762 - M6 x 45 - 10.9** Friction coefficient μ_{total} = 0.12 ... 0.17; tightening torque M_A = 15.5 Nm ±10%
16	2	**ISO 4762 - M6 x 60 - 10.9-flZn-240h-L** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 12.2 Nm ±10%
	4	**ISO 4762 - M10 x 60 - 10.9-flZn-240h-L** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 58 Nm ±20%
	or	
	2	**ISO 4762 - M6 x 60 - 10.9** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 15.5 Nm ±10%
	4	**ISO 4762 - M10 x 60 - 10.9** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 75 Nm ±20%
25	6	**ISO 4762 - M12 x 60 - 10.9-flZn-240h-L** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 100 Nm ±20%
	or	
	6	**ISO 4762 - M12 x 60 - 10.9** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 130 Nm ±20%
32	6	**ISO 4762 - M20 x 80 - 10.9-flZn-240h-L** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 340 Nm ±20%
	or	
	6	**ISO 4762 - M20 x 80 - 10.9** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 430 Nm ±20%

☞ **Notice:**
For reasons of stability, only the specified valve mounting screws may be used.

Subplates (separate order) with porting pattern according to ISO 4401, see data sheet 45100.

Accessories (separate order)

Mating connectors and cable sets

Pos. [1]	Designation	Version	Short designation
9	Mating connector; for valves with round connector, 6-pole + PE	Straight, metal, PG11	7PZ31...M
		Straight, plastic, PG11	7PZ31...K
7	Mating connector; for valves with "K4" connector, 2-pole + PE, design A	Without circuitry, M16 x 1.5, 0 ... 250 V, "a"	Z4
		Without circuitry, M16 x 1.5, 0 ... 250 V, "b"	

[1] See dimensions page 21 ... 24.

External control electronics

	Type
Modular design	VT-MSPA1-2X

EMC directive requirements

- Shielded connection cables must be used for the electrical connection. The shielding must be placed on both sides.
- A metal mating connector must be used to make contact between the cable shielding and the valve.
- A separate EMC-approved power supply unit must be provided for each valve, e.g. one that is CE-compliant.
- The production of a low impedance connection is established via the professional installation of the valve on a grounded metal manifold block in the system.
- In a strong electro-magnetic environment, further EMC measures may be required, such as shielding of the complete device via metal housings or the use of ferrites on supply and signal lines.