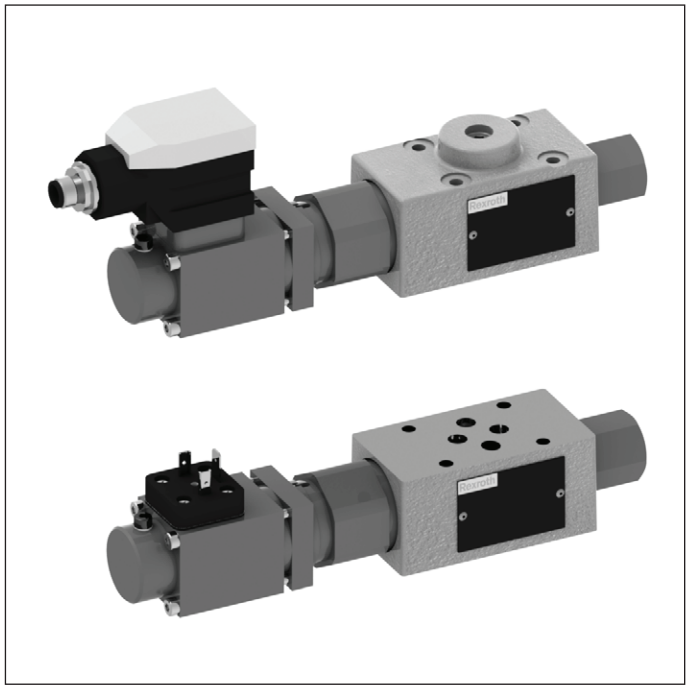
Proportional pressure reducing valve, pilot operated

Type DRE(E) and ZDRE(E)

RE 29175
Edition: 2013-06
Replaces: 01.12



- Size 6
- Component series 1X
- Maximum operating pressure: 210 bar (DRE)
  315 bar (ZDRE)
- Maximum flow: 30 l/min

CE

Features

- Pilot operated pressure reducing valve in ports A and P1 with pressure limitation
- Operation by means of proportional solenoids
- For subplate mounting or sandwich plate design: Porting pattern according to ISO 4401-03-02-0-05
- Low manufacturing tolerance of the command value pressure characteristic curve due to electrical adjustment for the operation with external control electronics
- Minimum set pressure in ports A or P1, see page 12
- Types DREE and ZDREE with integrated electronics (OBE)
- CE conformity according to EMC Directive 2004/108/EC

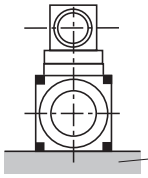
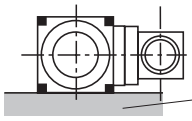
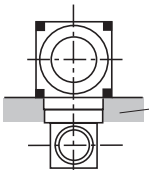
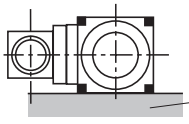
Contents

Ordering code

01	02	03	04	05	06		07		08	09	10	11	12	13	14	15
	DRE		**6**			**–**	**1X**	**/**		**M**	**G24**					*****

01	Subplate mounting	**no code**
	Sandwich plate	**Z**
02	Proportional pressure reducing valve	**DRE**
03	For external control electronics	**no code**
	With integrated electronics (OBE)	**E**
04	Size 6	**6**
05	Pressure reduction in channel A (subplate mounting)	**no code**
	Pressure reduction in channel P1 (sandwich plate)	**VP**

Position of the mating connector (omitted in case of subplate mounting)

06	 Valve contact surface (seal ring recesses in the housing)	**1**
	 Valve contact surface (seal ring recesses in the housing)	**2**
	 Valve contact surface (seal ring recesses in the housing)	**3**
	 Valve contact surface (seal ring recesses in the housing)	**4**
07	Component series 10 ... 19 (10 ... 19: Unchanged installation and connection dimensions)	**1X**

Pressure rating

08	50 bar	**50**
	100 bar	**100**
	210 bar	**210**
	315 bar	**315** [1]
09	**Without** check valve	**M**

Supply voltage

10	Direct voltage 24 V	**G24**
11	**With** manual override	**N9**
	Without manual override	**no code**

[1] Only available for "Z" version

Ordering code

01	02	03	04	05	06		07		08	09	10	11	12	13	14	15
	DRE		**6**			**–**	**1X**	**/**		**M**	**G24**					*****

Electrical connection

12	**Type DRE; ZDRE:**	
	Without mating connector; connector DIN EN 175301-803 Mating connector, separate order, see page 18	**K4**
	Type DREE; ZDREE:	
	Without mating connector; connector M12 Cable set, separate order, see page 18	**K24**

Interface electronics

13	Command value 0 to 10 V	**A1**
	Command value 4 to 20 mA	**F1**
	Type (Z)DRE	**no code**

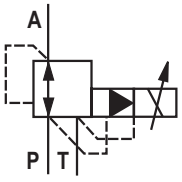
Seal material

14	NBR seals	**M**
	FKM seals	**V**

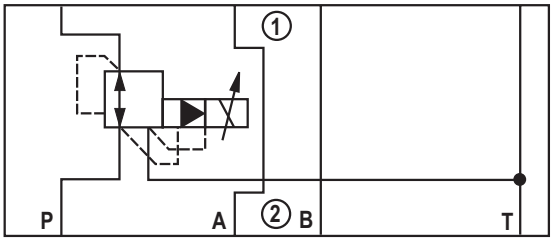
09	Further details in the plain text	

Symbols (① = component side, ② = plate side)

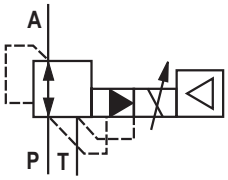
Type DRE 6...



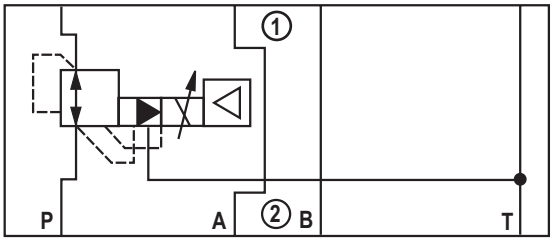
Type ZDRE 6 VP...



Type DREE 6...



Type ZDREE 6 VP...



Function, section

The valve types DRE and ZDRE are electrically pilot operated 3-way pressure reducing valves with pressure limitation of the actuator.
They are used for reducing a system pressure.

Technical set-up:

The valve consists of three main assemblies:

- Pilot control valve (1)
- Proportional solenoid (2)
- Main valve (3) with main control spool (4)

Function:

Type DRE

General function:

- Command value-dependent setting of the pressure to be reduced in channel A via the proportional solenoid (2).
- In the depressurized port P, the spring (17) holds the main control spool (4) in the initial position.
- Thus, opening the connection from A to T and blocking of the connection from P to A.
- Pressure connection from port P to the ring channel (5).
- Pilot oil flows from the bore (6) to port T, via the flow controller (7), the nozzle (8) to the pilot control valve (1), the throttle gap (9) to the longitudinal groove (10) and the bores (11, 12).

Pressure reduction:

- Build-up of the pilot pressure in the control chamber (16) as function of the command value.
- Movement of the main control spool (4) to the right, hydraulic fluid flows from P to A.
- Actuator pressure pending in port A to the spring chamber (15) via channel (13) and nozzle (14).
- Increase in the pressure in port A to the set pressure of the pilot control valve (1) leads to the movement of the main control spool (4) to the left. The pressure in port A is almost equal to the pressure set at the pilot control valve (1).

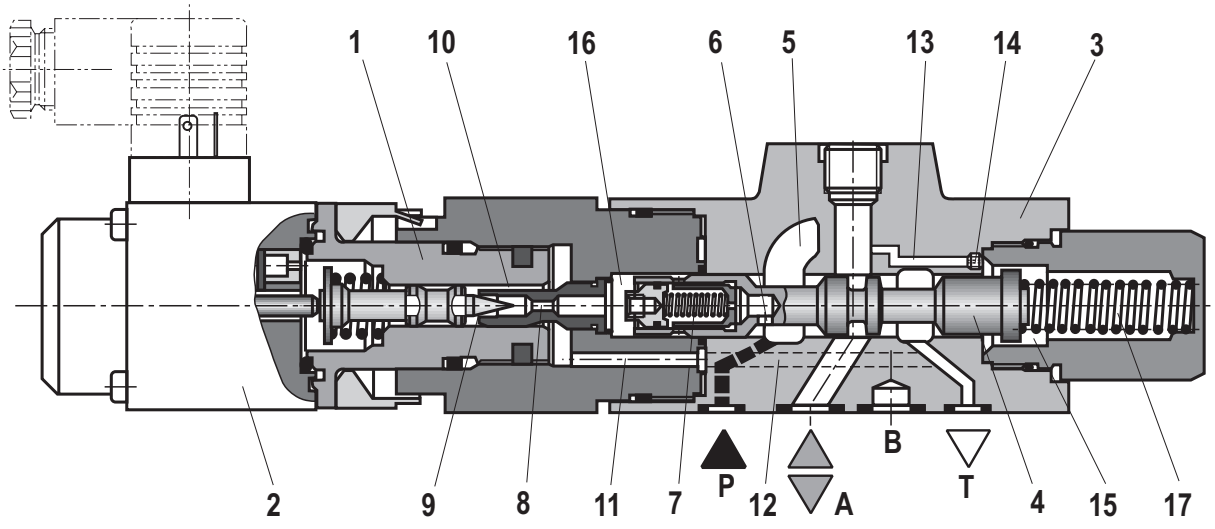
Pressure limitation:

- If the pressure in port A exceeds the set pressure of the pilot control valve (1), the main control spool (4) is moved further to the left.
- Thus, opening of the connection from A to T and limitation of the pressure pending in port A to the set command value.

Type ZDRE

In principle, the function of this valve corresponds to the function of type DRE 6.
The pressure is, however, reduced in channel P1.

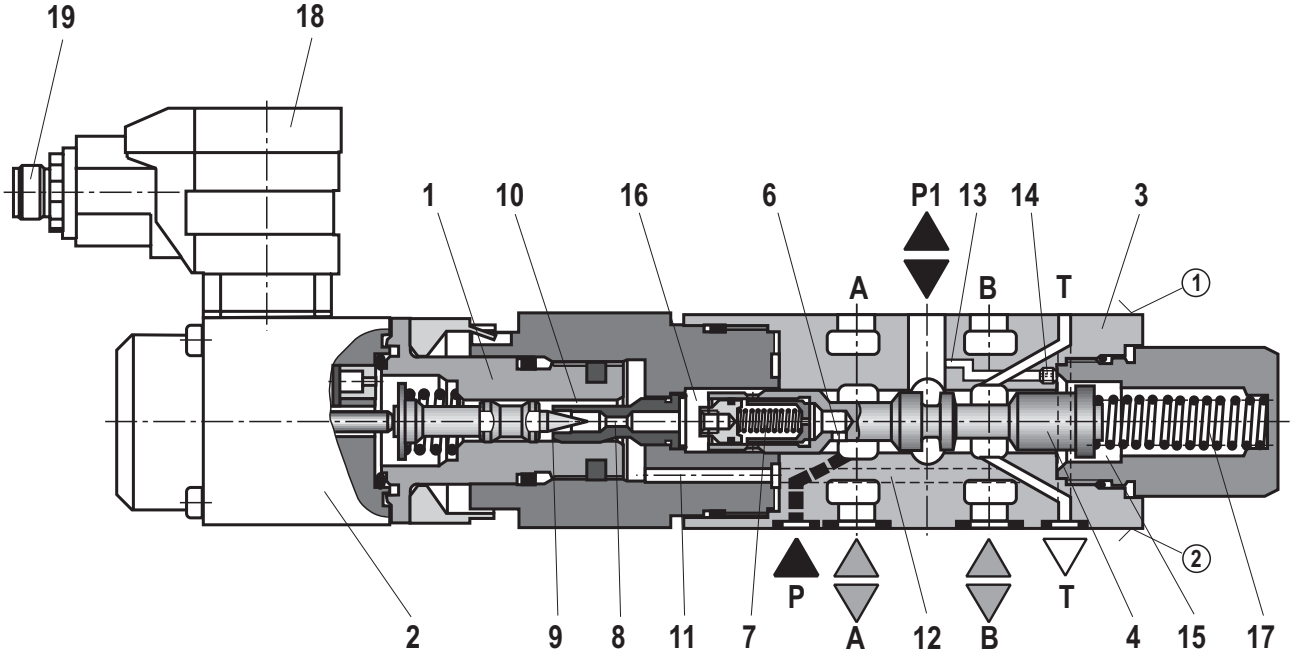
Type DRE 6-1X/...K4...



Function, section

Type (Z)DREE – with integrated electronics (OBE)
With regard to function and structure, these valves correspond to type (Z)DRE. On the proportional solenoid (2), there is moreover a housing (18) with the control electronics. Supply and command value voltage or command value current are applied to the connector (19).
In the factory, the command value pressure characteristic curve is adjusted with little manufacturing tolerance.

Type ZDREE 6 VP1-1X/...K24...
(① = component side, ② = plate side)



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

general				
Weight	–Type (Z)DRE 6	kg	2.0	
	–Type (Z)DREE 6	kg	2.1	
Installation position			Any	
Storage temperature range		°C	–20 ... +80	
Ambient temperature range		°C	–20 ... +70	

hydraulic (measured with HLP46, ϑ_{oil} = 40 ±5 °C)				
Maximum operating pressure	– Port P or P2	bar	315	
	– Port P1, A, and B	bar	210	
	– Port T	bar	Separately and to the tank at zero pressure	
Maximum set pressure in channels P1 and A	– Pressure rating 50 bar	bar	50	
	– Pressure rating 100 bar	bar	100	
	– Pressure rating 210 bar	bar	210	
	– Pressure rating 315 bar	bar	315 [1]	
Minimum set pressure with command value 0 in channels P1 and A		bar	See characteristic curves page 12	
Pilot flow		l/min	0.65	
Maximum flow		l/min	30	
Hydraulic fluid			See table page 7	
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)			Class 20/18/15 [2]	
Hysteresis		%	±2.5 of the maximum set pressure	
Repetition accuracy		%	< ±2 of the maximum set pressure	
Linearity	– Type (Z)DRE 6	%	±3.5 of the maximum set pressure	
Manufacturing tolerance of the command value pressure characteristic curve, related to the hysteresis characteristic curve, pressure increasing	– Type (Z)DRE 6	%	±2 of the maximum set pressure	
	– Type (Z)DREE 6	%	±3 of the maximum set pressure	
Step response T_u + T_g	10% → 90%	ms	~150	Measured with 1 liter standing hydraulic fluid column
	90% → 10%	ms	~150	

1) Only available for "Z" version.

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

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

Hydraulic fluid		Classification	Suitable sealing materials	Standards
Mineral oils and related hydrocarbons		HL, HLP	NBR, FKM	DIN 51524
Environmentally compatible	– insoluble in water	HETG	NBR, FKM	ISO 15380
		HEES	FKM	
	– soluble in water	HEPG	FKM	ISO 15380
Flame-resistant	– sater-free	HFDU, HFDR	FKM	ISO 12922
	– containing water	HFC (Fuchs Hydrotherm 464 Petrofer Ultra Safe 620)	NBR	ISO 12922

☞ **Important information on hydraulic fluids!**
- For more information and data on the use of other hydraulic fluids refer to data sheet 90220 or contact us!
- There may be limitations regarding the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.)!
- The flash point of the process and operating medium used must be at least 40 K higher than the maximum solenoid surface temperature.
- **Flame-resistant – containing water**:
  - Maximum operating pressure 210 bar
  - Maximum hydraulic fluid temperature 60 °C
  - Expected life cycle as compared to HLP hydraulic oil 30% to 100%

electrical			
Supply voltage		V	24 direct voltage
Minimum control current		mA	100
Maximum control current		mA	1600
Solenoid coil resistance	– Cold value at 20 °C	Ω	5
	– Maximum hot value	Ω	7.5
Switch-on duration		%	100
Protection class of the valve according to EN 60529			IP 65 with mating connector mounted and locked

electrical, integrated electronics (OBE)			
Supply voltage	– Nominal voltage	VDC	24
	– Lower limit value	VDC	18
	– Upper limit value	VDC	35
Current consumption		A	≤ 1.5
Required fuse protection		A	2.0 time-lag
Inputs	– Voltage	V	0 to 10
	– Current	mA	4 to 20
Protection class of the valve according to EN 60529			IP 65 with mating connector mounted and locked
Conformity			CE according to EMC Directive 2004/108/EC Tested according to EN 61000-6-2 and EN 61000-6-3

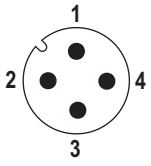
Electrical connection (dimensions in mm)

Type (Z)DREE

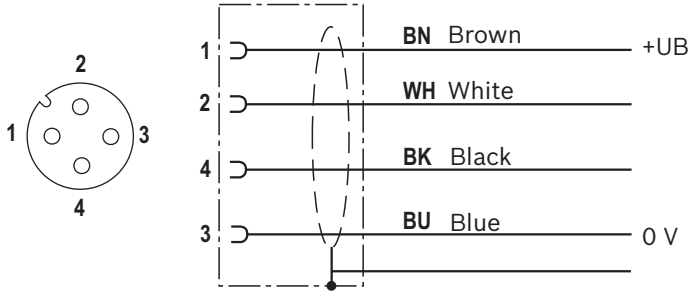
Connector pin assignment	Contact	Allocation interface "A1"	Allocation interface "F1"
Supply voltage	1	24 VDC (u(t) = 21 V to 35 V); $I_{max} \leq 1.5$ A	
Command value input	2	0 to 10 V; R_E = 20 kΩ	4 to 20 mA; R_E = 100 Ω
Weight	3	0 V	
	4	Reference potential command value	

M12 plug-in connector port

Connector on amplifier

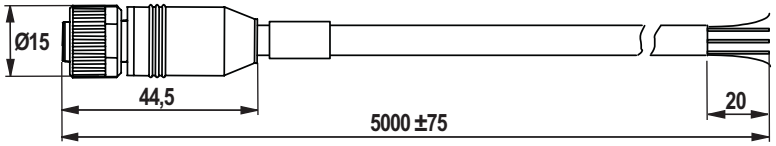


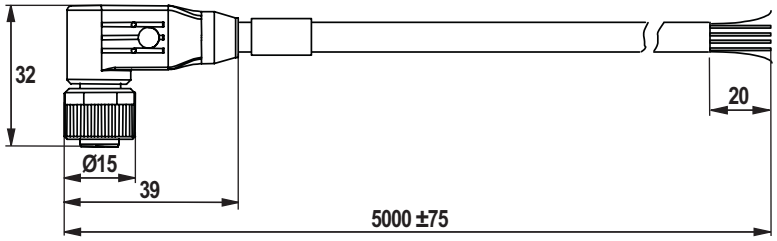
Mating connector and wire colors with pre-assembled cable set
Please order the cable set separately, see page 18



The connection for the protective earthing conductor is not provided

Connection cross-section:
4 x 0.75 mm² shielded
(connect shield in control cabinet)

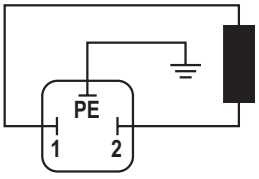




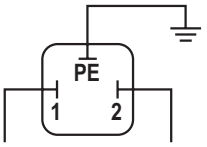
Electrical connection

Type (Z)DRE

Connection to connector



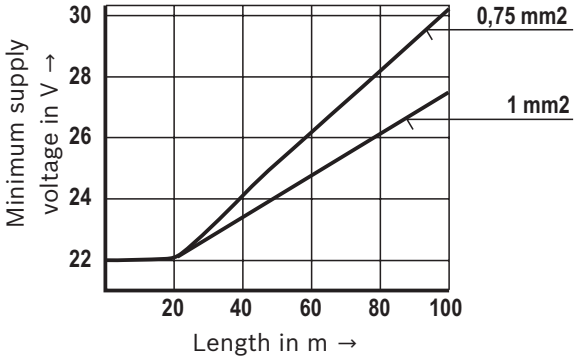
Connection to mating connector



Connection cable for type (Z)DRE

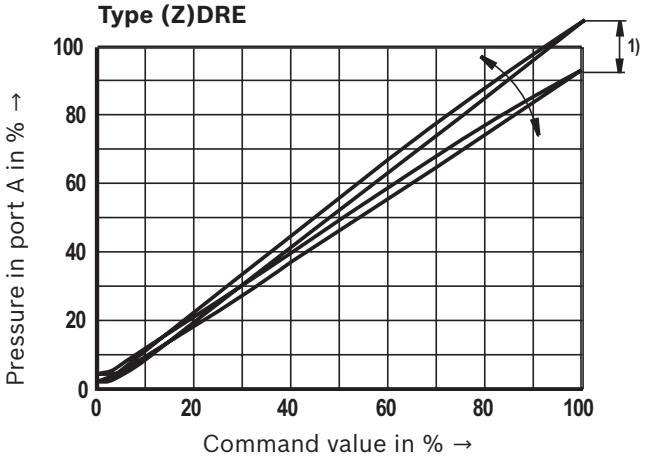
- Recommendation 6-wire, 0.75 or 1 mm² plus protective earthing conductor and screening
- Only connect the screening to PE on the supply side
- Maximum admissible length = 100 m

The minimum supply voltage at the power supply unit depends on the length of the supply line (see diagram).



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

Pressure in port A depending on the command value (manufacturing tolerance)
without flow

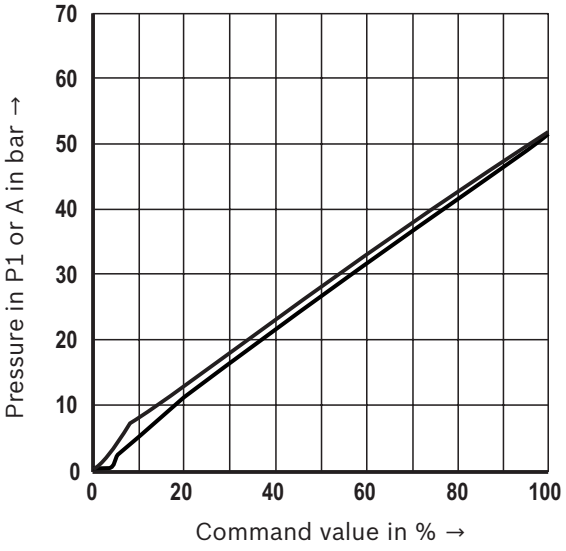


1) With type (Z)DRE, the manufacturing tolerance at the **external amplifier** (type and data sheet see page 7) can be adjusted using the command value attenuator potentiometer "**Gw**". Digital amplifiers are adjusted using the parameter "**Limit**".
The control current indicated in the technical data must not be exceeded!
In order to be able to adjust several valves to the same characteristic curve, the pressure must - with a command value of 100 % - not exceed the maximum set pressure of the relevant pressure rating at any valve.

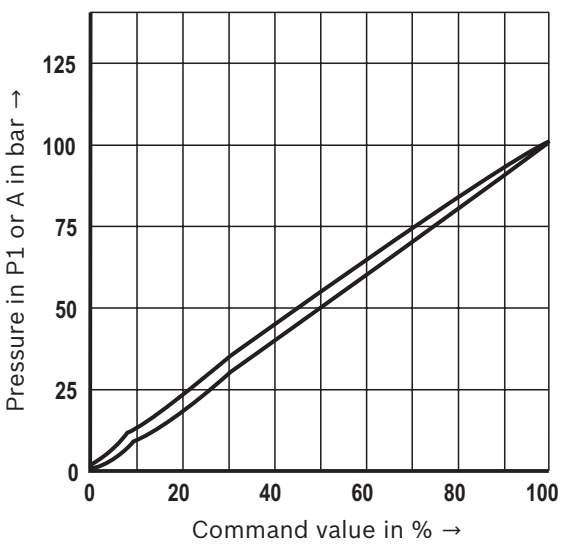
Characteristic curves: Type (Z)DRE (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C)

Type (Z)DRE: Pressure in port P1 or A depending on the command value

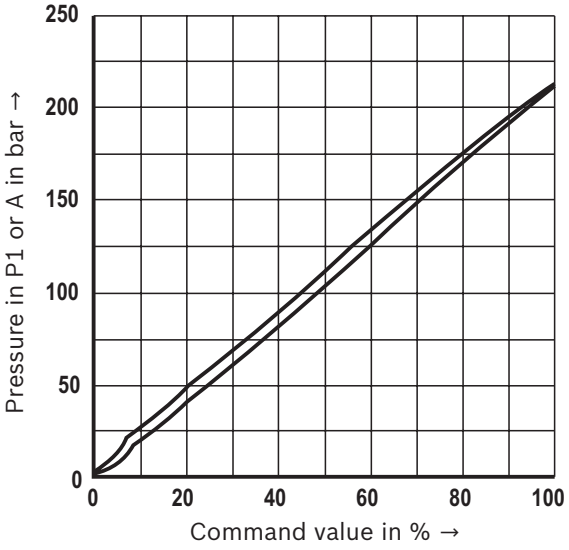
Pressure rating 50 bar Type (Z)DRE



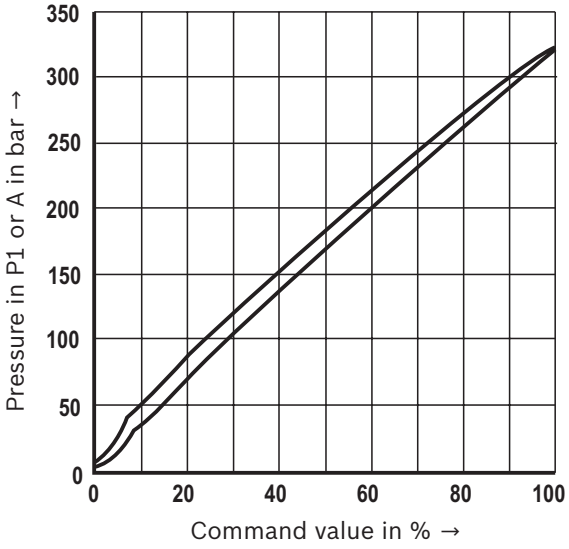
Pressure rating 100 bar Type (Z)DRE



Pressure rating 210 bar Type (Z)DRE



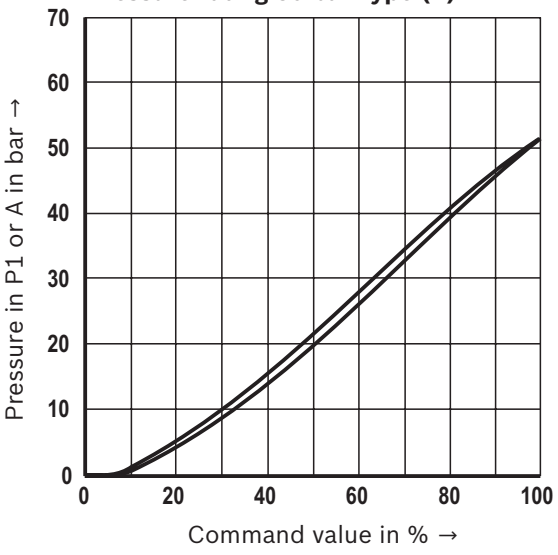
Pressure rating 315 bar Type ZDRE



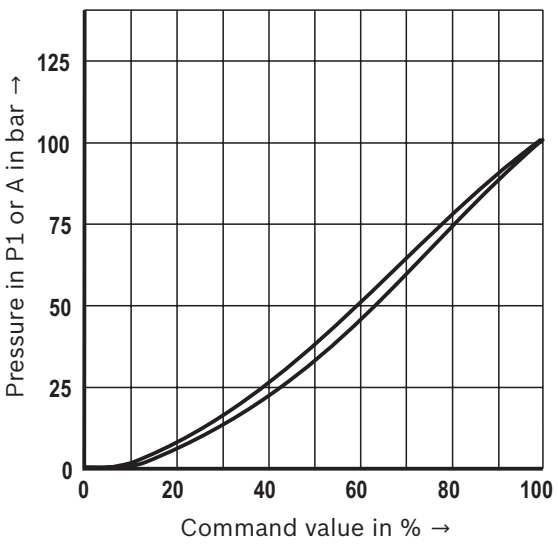
Characteristic curves: Type (Z)DREE (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C)

Type (Z)DRE(E): Pressure in port P1 or A depending on the command value

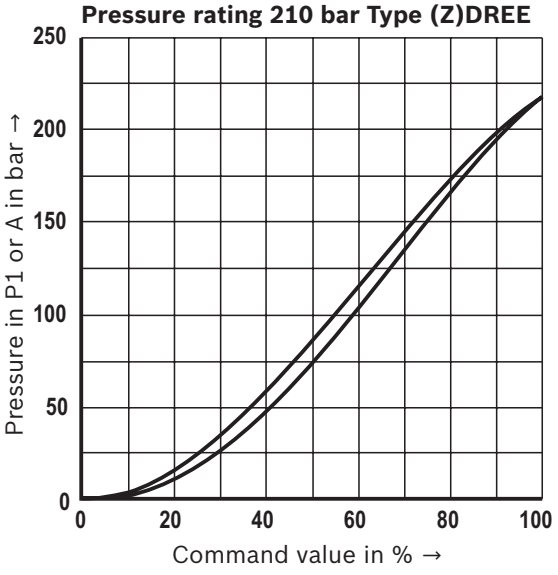
Pressure rating 50 bar Type (Z)DREE



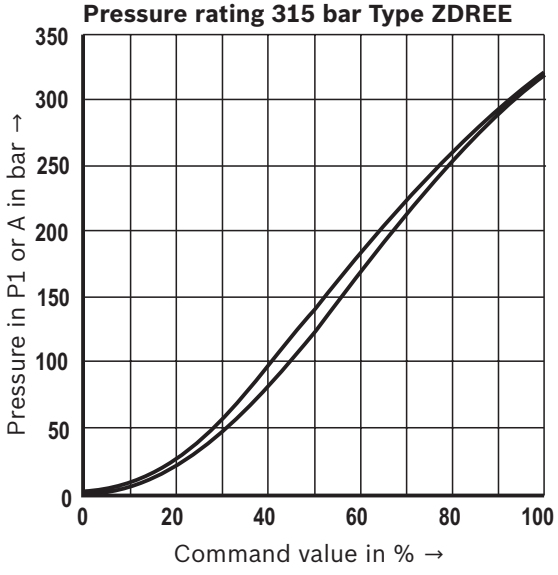
Pressure rating 100 bar Type (Z)DREE



Pressure rating 210 bar Type (Z)DREE



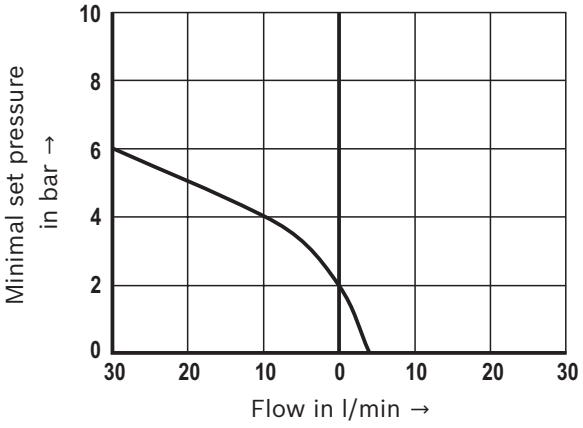
Pressure rating 315 bar Type ZDREE



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

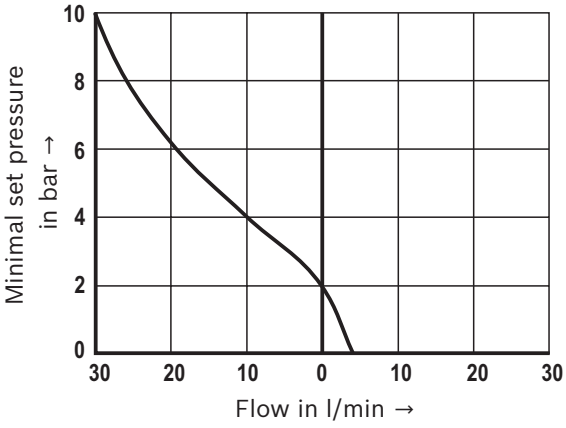
Minimum set pressure in port P1 or A with command value 0 V (without counter pressure in channel T)

Pressure rating 50 bar



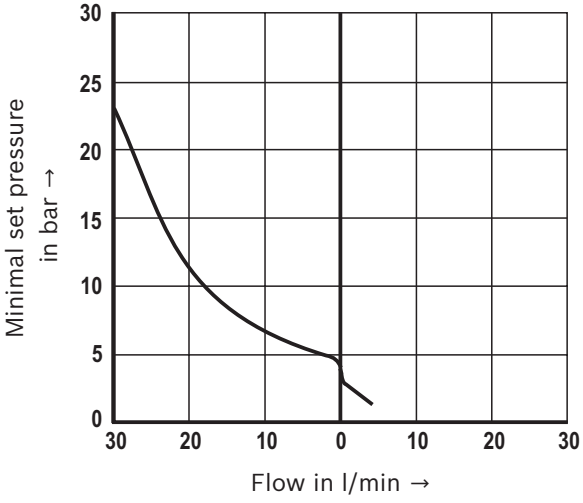
Type DRE A → T Type DRE P → A
Type ZDRE P1 → T Type ZDRE P → P1

Pressure rating 100 bar/210 bar



Type DRE A → T Type DRE P → A
Type ZDRE P1 → T Type ZDRE P → P1

Pressure rating 315 bar

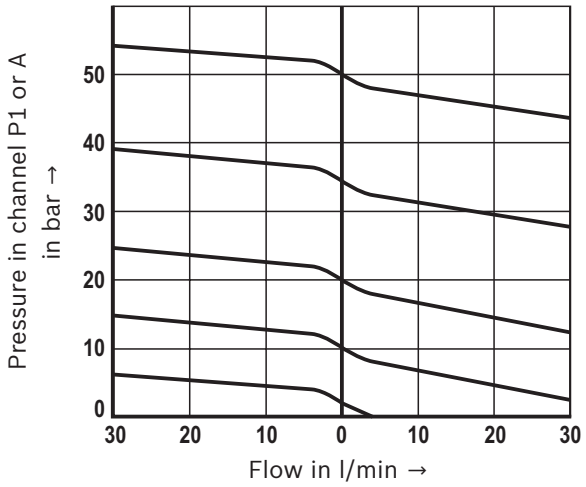


Type ZDRE P1 → T Type ZDRE P → P1

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

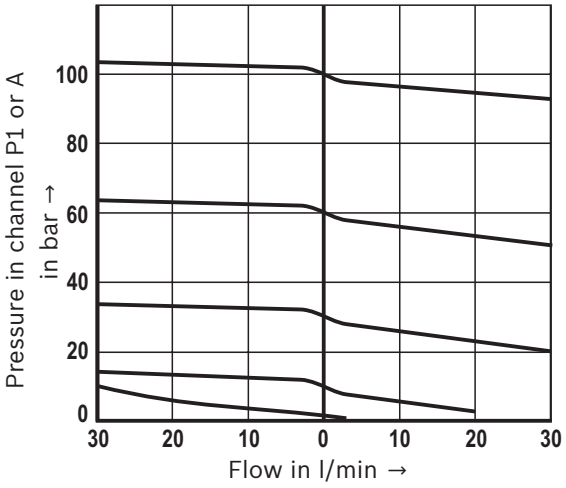
Pressure in channel P1 or A – flow

Pressure rating 50 bar



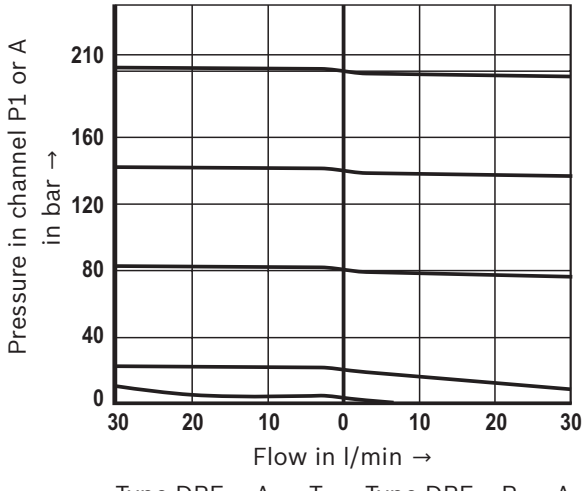
Type DRE A → T Type DRE P → A
Type ZDRE P1 → T Type ZDRE P → P1

Pressure rating 100 bar



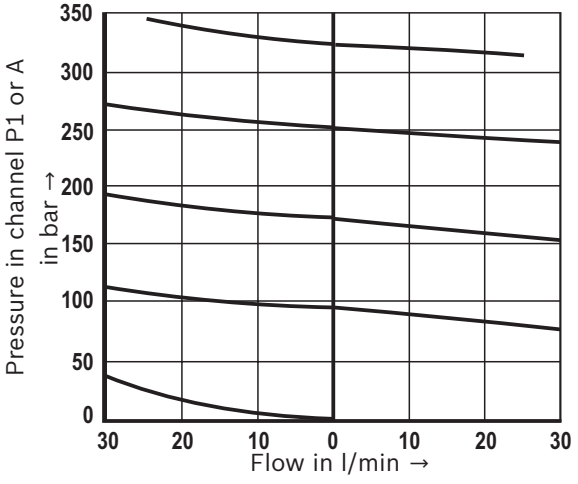
Type DRE A → T Type DRE P → A
Type ZDRE P1 → T Type ZDRE P → P1

Pressure rating 210 bar



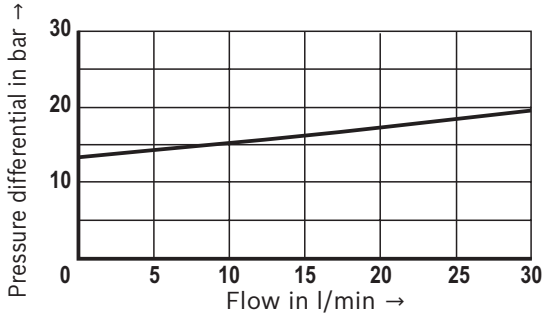
Type DRE A → T Type DRE P → A
Type ZDRE P1 → T Type ZDRE P → P1

Pressure rating 315 bar

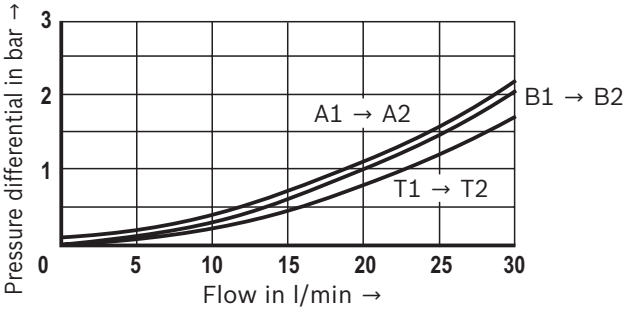


Type ZDRE P1 → T Type ZDRE P → P1

Δp-q_V characteristic curves

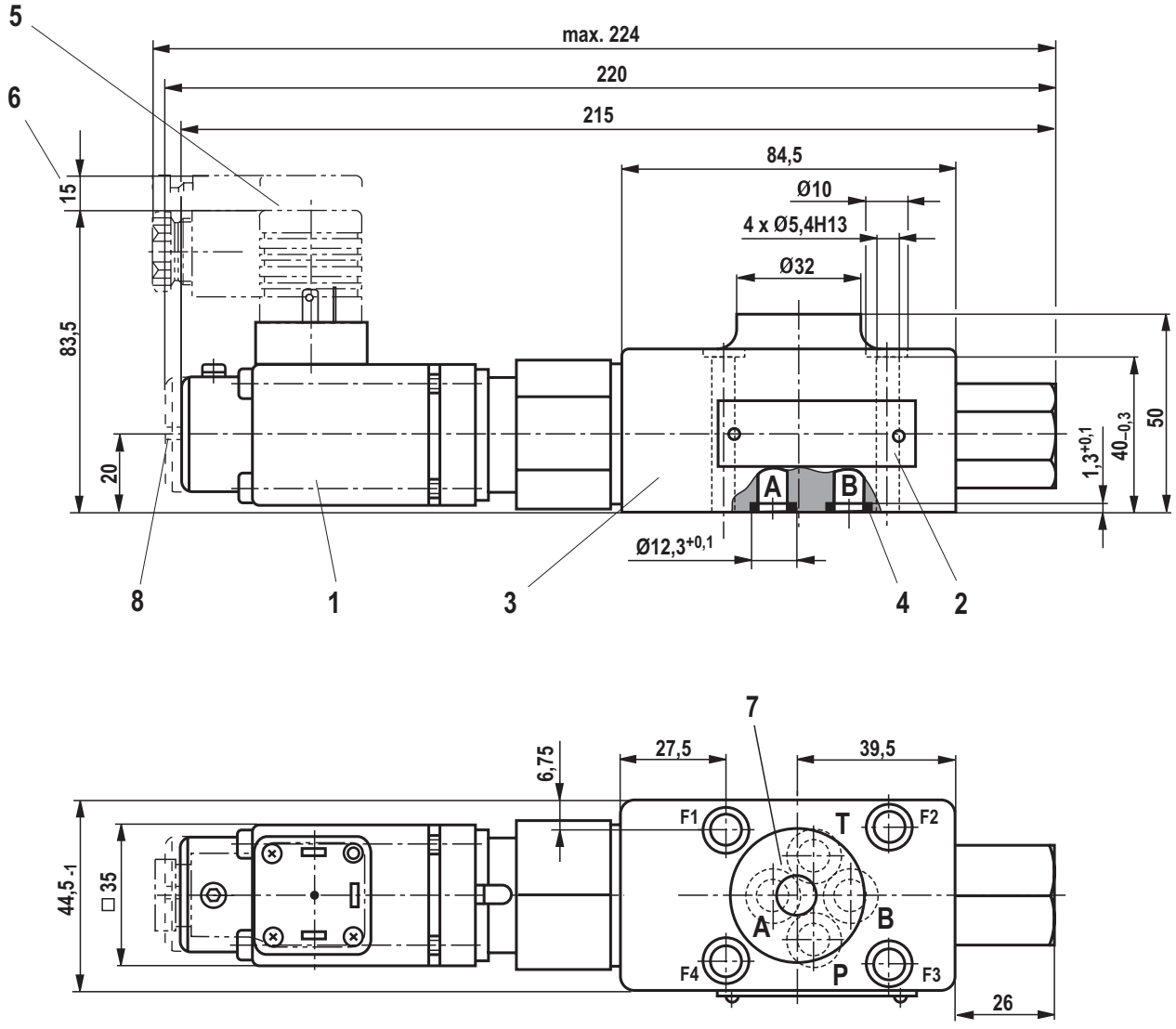


Type DRE(E) P → A
Type ZDRE(E) P2 → P1

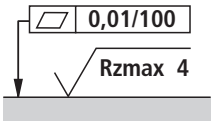


Notice!
The shown ***Δp*** value corresponds to the minimum pressure available in port P (P2) minus the maximum pressure to be controlled in port A (P1).

Dimensions: Type DRE
(dimensions in mm)



1 Proportional solenoid **without** manual override
2 Name plate
3 Valve housing
4 Identical seal rings for ports A, B, P and T
5 Mating connector, separate order, see page 18
6 Space required for removing the mating connector
7 Porting pattern according to ISO 4401-03-02-0-05
8 Proportional solenoid **with** manual override

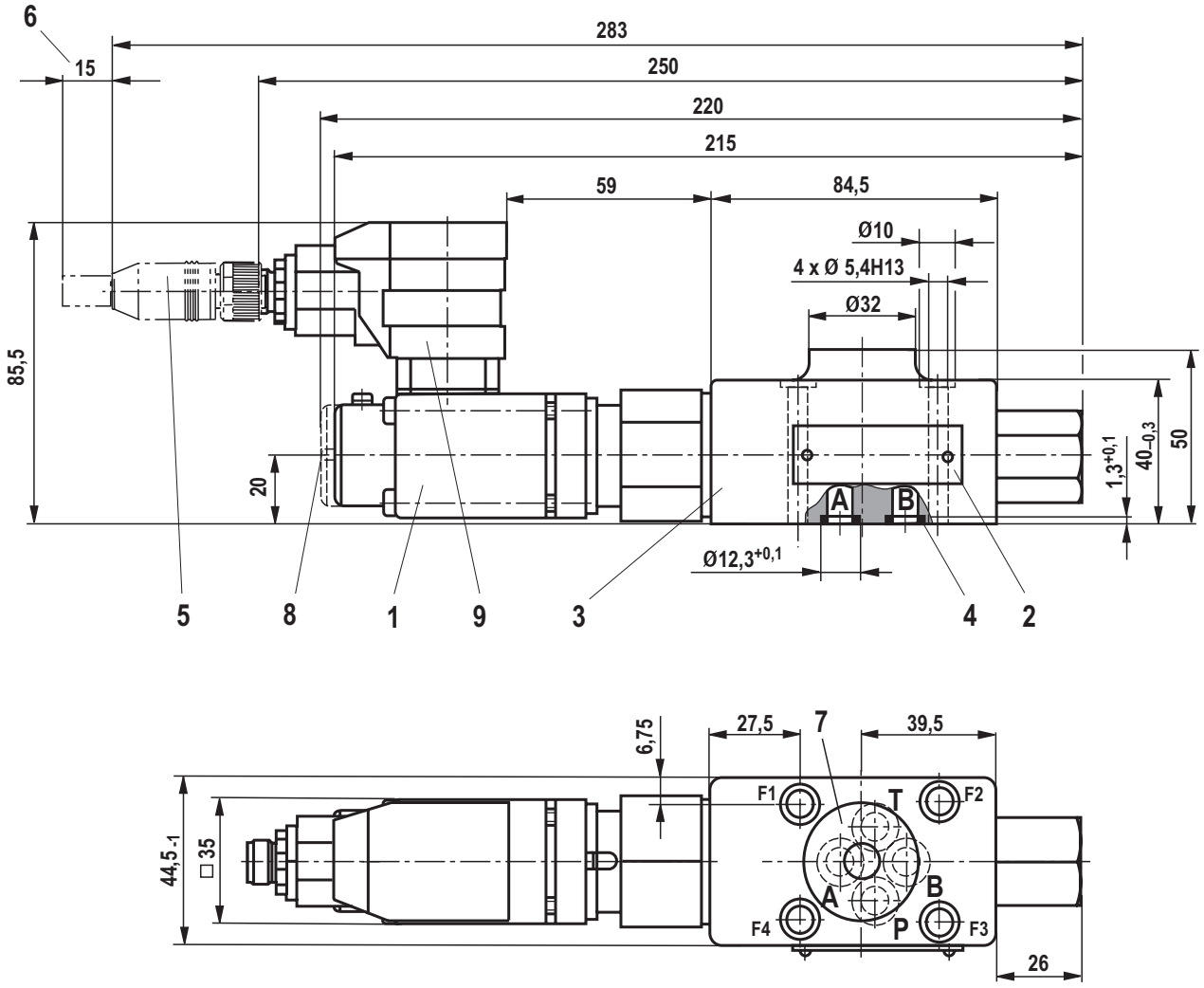


Required surface quality of the valve contact surface

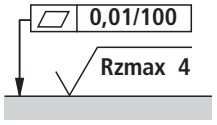
Notice!
The dimensions are nominal dimensions which are subject to tolerances.

Valve mounting screws and **subplates** see page 18.

Dimensions: Type DREE
(dimensions in mm)



1 Proportional solenoid **without** manual override
2 Name plate
3 Valve housing
4 Identical seal rings for ports A, B, P and T
5 Mating connector, separate order, see page 18
6 Space required for removing the mating connector
7 Porting pattern according to ISO 4401-03-02-0-05
8 Proportional solenoid **with** manual override
9 Integrated electronics (OBE)

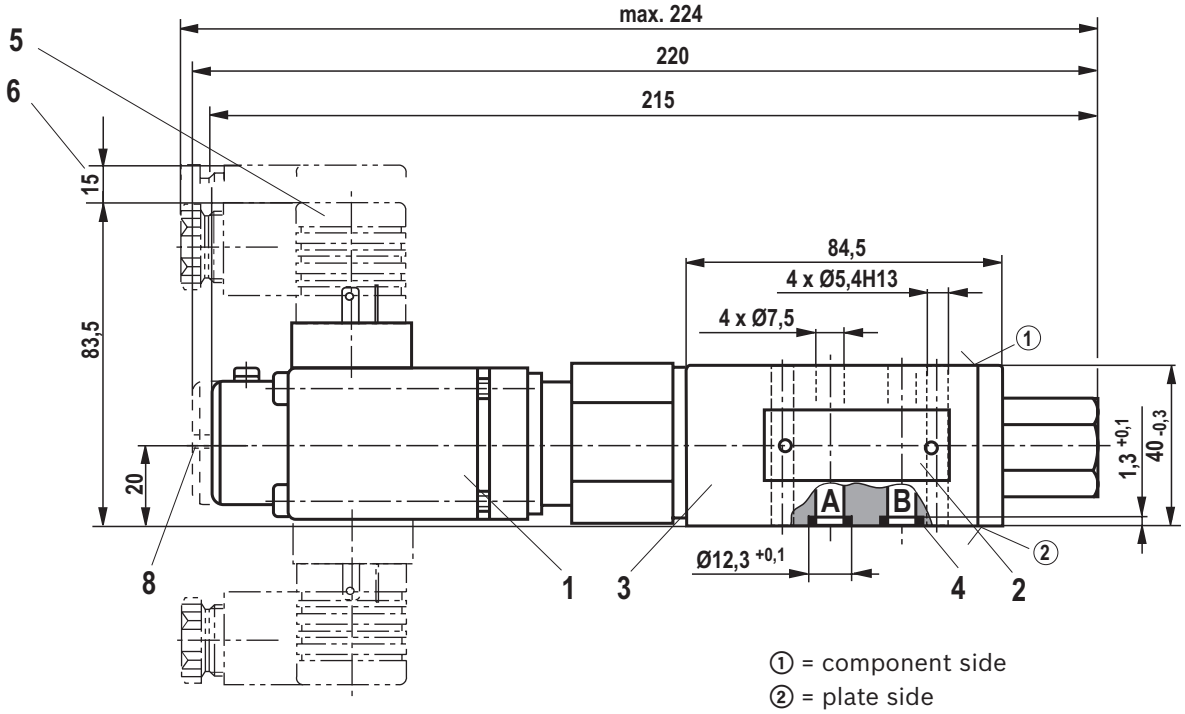


Required surface quality of the valve contact surface

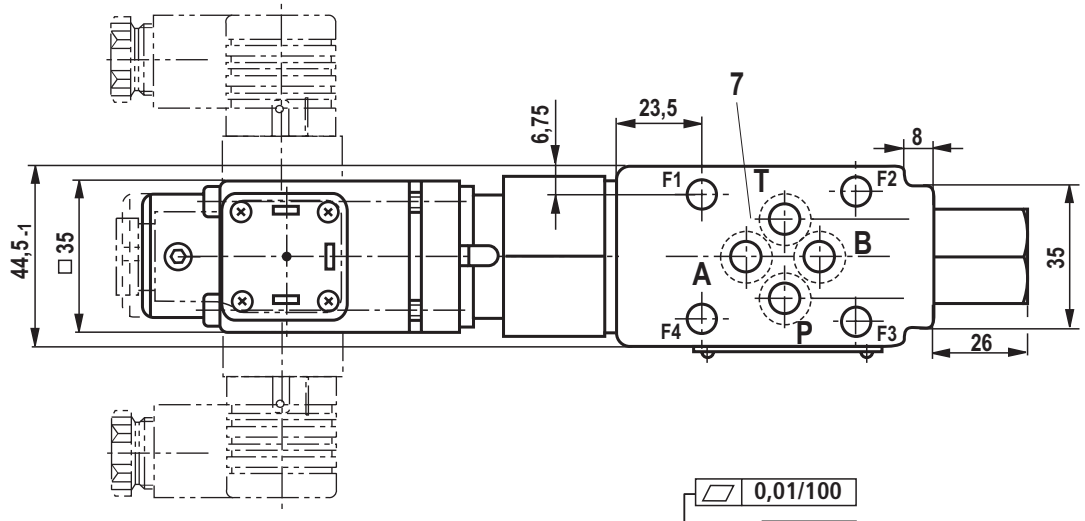
Notice!
The dimensions are nominal dimensions which are subject to tolerances.

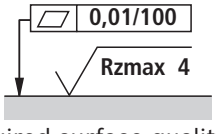
Valve mounting screws and **subplates** see page 18.

Dimensions: Type ZDRE
(dimensions in mm)



① = component side
② = plate side



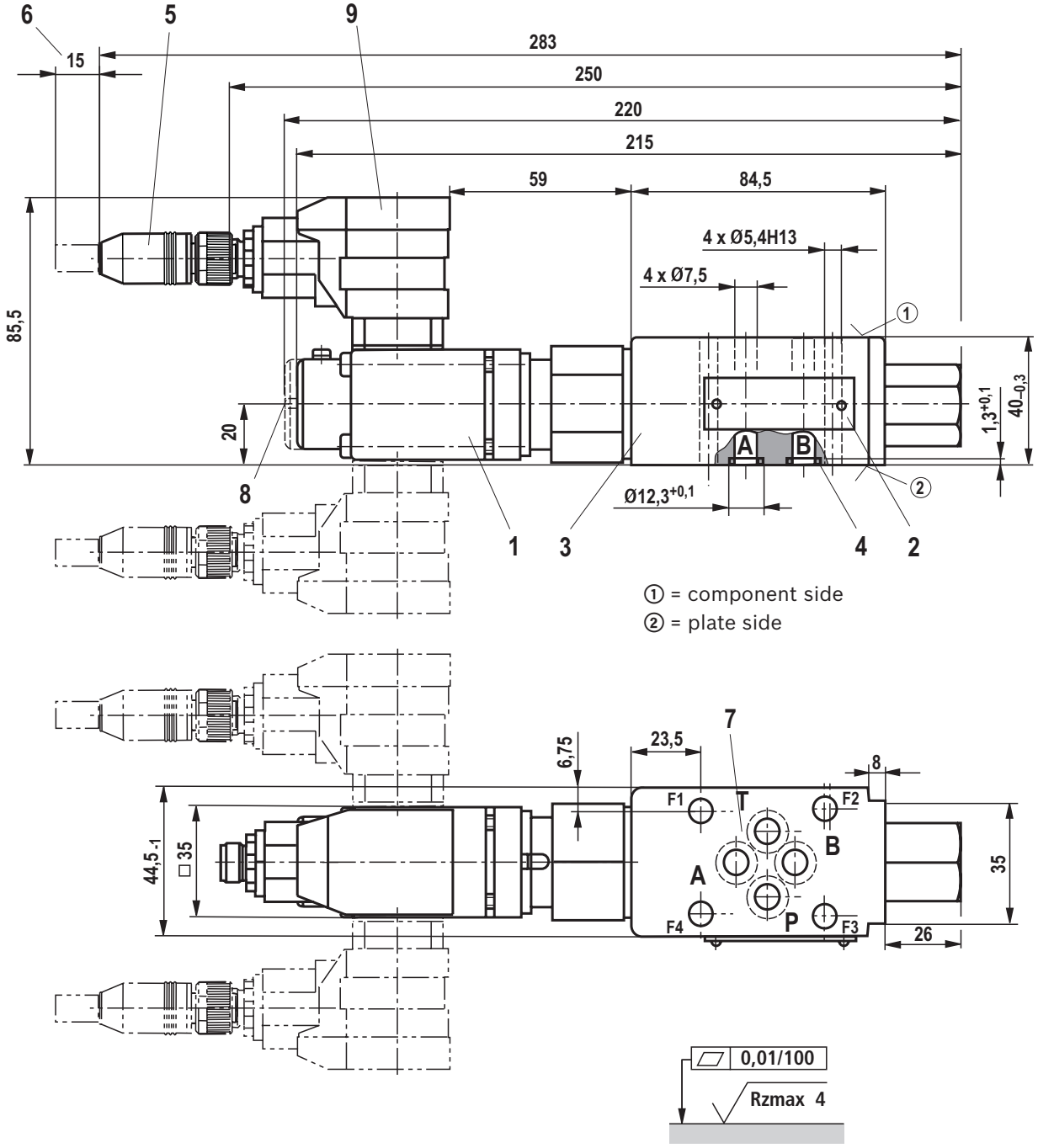


Required surface quality of the valve contact surface

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

Item explanations see type DRE on page 14,
valve mounting screws and **subplates** see page 18.

Dimensions: Type ZDREE
(dimensions in mm)



Required surface quality of the valve contact surface

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

Item explanations see type DREE on page 15,
valve mounting screws and **subplates** see page 18.

Dimensions

Hexagon socket head cap screws		Material number
Type DRE(E)	4x ISO 4762 - M5 x 50 - 10.9-flZn-240h-L (friction coefficient μ_{total} = 0.09 to 0.14) tightening torque M_A = 7 Nm ±10%	
Type ZDRE(E)	4x ISO 4762 - M5 - 10.9-flZn-240h-L (friction coefficient μ_{total} = 0.09 to 0.14) tightening torque M_A = 7 Nm ±10%	

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

Subplates	Data sheet
Size 6	45052

Accessories (not included in the scope of delivery)

Proportional amplifier for type (Z)DRE	Data sheet	Material number
VT-MSPA1-10 in modular design	30223	R901142355
VT-VSPD-1 in Euro-card format	30523	R901077287
VT-VSPA1-10 in Euro-card format	30100	R901152628

Mating connector for type (Z)DRE	Data sheet	Material number
Mating connector (black) DIN EN 175301-803	08006	R901017011

Cable sets for type (Z)DREE		Material number
Cable set VT-SSPA1-1X/M12/1/V00	Assembled cable with straight mating connector	R901241656
Cable set VT-SSPA1-1X/M12/2/V00	Assembled cable with angular mating connector	R901241651

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