

Proportional pressure reducing valve, pilot operated

1/18

Type DRE(E) and ZDRE(E)

Size 6
Component series 1X
Maximum operating pressure 315 bar
Maximum flow 30 l/min

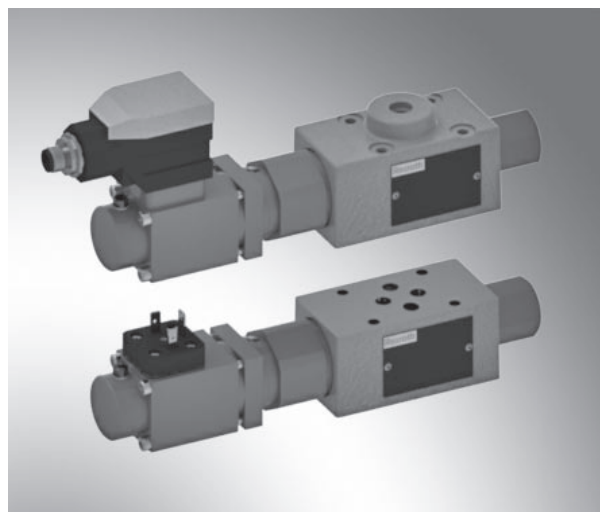


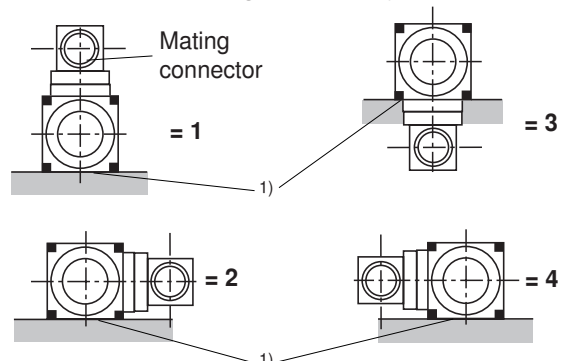
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Features

- Pilot-operated valve for reducing the pressure 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
- Little manufacturing tolerance of the command value pressure characteristic curve due to electrical adjustment in case of operation with external control electronics
- Minimum set pressure in ports A or P1, see page 12
- Types DREE and ZDREE with integrated electronics (OBE)

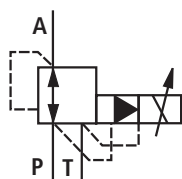
Ordering code

	DRE	6	1X	M	G24
Subplate mounting	= no code				
Sandwich plate	= Z				
Proportional pressure reducing valve	= DRE				
For external control electronics	= no code				
With integrated electronics (OBE)	= E				
Size 6		= 6			
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)					
 1) Valve mounting face (seal ring recesses in the housing)					
Component series 10 to 19 (10 to 19: Unchanged installation and connection dimensions)			= 1X		
Pressure rating					
50 bar			= 50		
100 bar			= 100		
210 bar			= 210		
Without check valve				= M	
Supply voltage					
Direct voltage 24 V				= G24	
With manual override					= N9
Without manual override					= no code

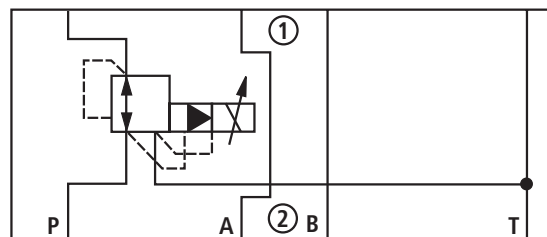
				*	Further details in the plain text
				M =	
				V =	
				A1 =	Seal material NBR seals FKM seals
				F1 =	
				no code =	Interface electronics Command value 0 to 10 V Command value 4 to 20 mA Type (Z)DRE
				K4 =	Electrical connection type DRE; ZDRE: Without mating connector, with connector according to DIN EN 175301-803
				K24 =	Type DREE; ZDREE: Without mating connector, with connector M12 Cable set, see page 18

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

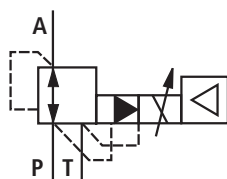
Type DRE 6...



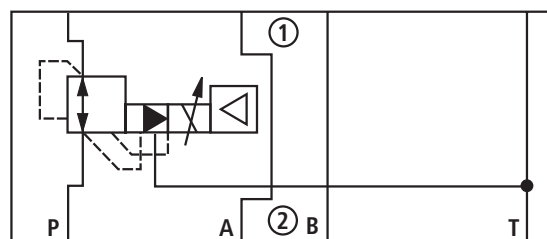
Type ZDRE 6 VP...



Type DREE 6...



Type ZDREE 6 VP...



Function, section

Valves of type 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 structure:

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 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 control 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. Pressure in port A is almost identical with the set pressure at the pilot control valve (1).

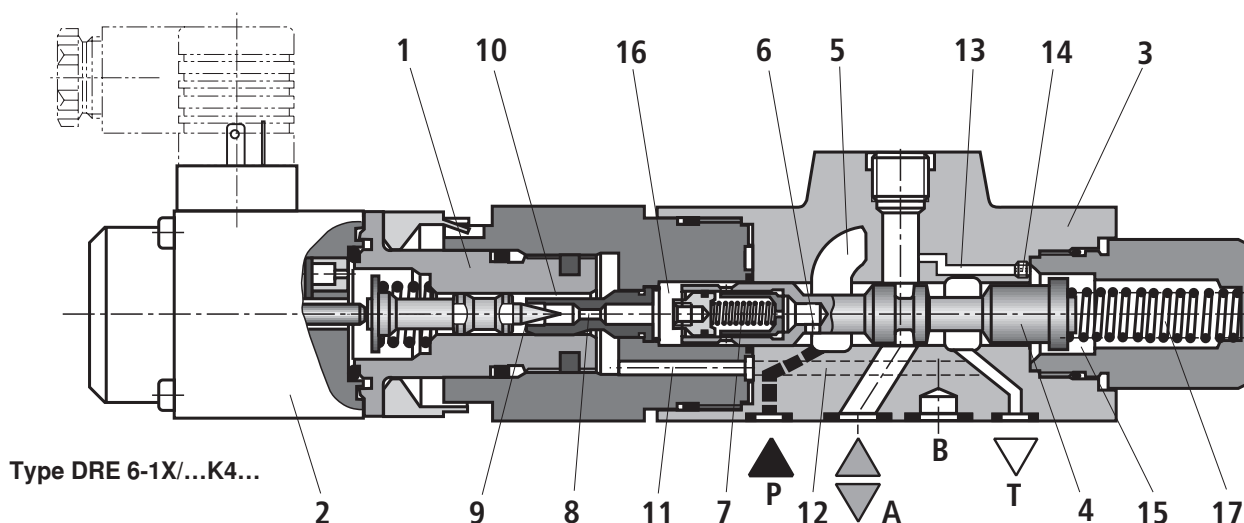
Pressure limitation:

- 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.



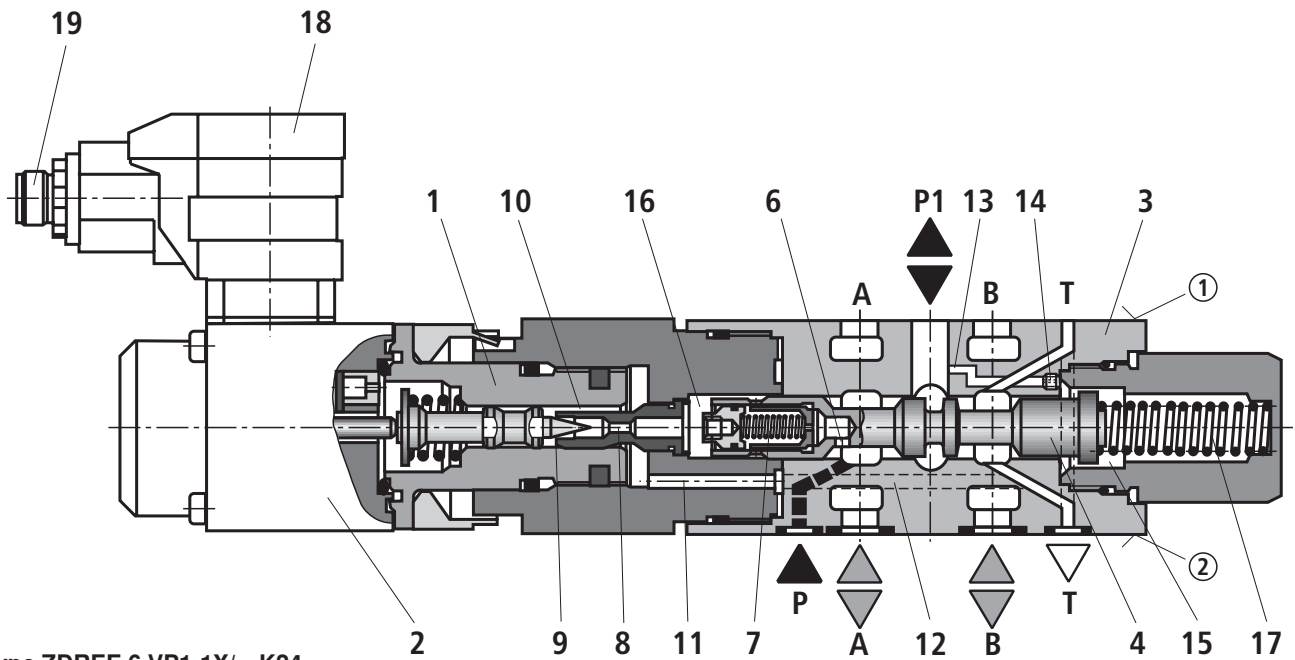
Function, section

Type (Z)DREE – with integrated electronics (OBE)

With regard to function and structure, these types 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 and/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 to +80
Ambient temperature range		°C	–20 to +70

hydraulic (measured with HLP 46; $t_{Oil} = 40\text{ °C} \pm 5\text{ °C}$)

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
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
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)			Class 20/18/15 ¹⁾
Hydraulic fluid temperature range		°C	–20 to +80
Viscosity range		mm ² /s	15 to 380
Hysteresis		%	±2.5 of the maximum set pressure
Repeatability		%	< ±2 of the maximum set pressure
Linearity		%	±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
	90 % → 10 %	ms	~150

¹⁾ 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 service life of the components.

Technical data (For applications outside these parameters, please consult us!)**hydraulic**

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
	– Soluble in water HEES	FKM	
Flame-resistant	– Water-free HEPG	FKM	ISO 15380
	– Water-containing HFDR, HFDR	FKM	ISO 12922
	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!
- The flash point of the process and operating medium used must be at least 40 K higher than the maximum solenoid surface temperature.
- There may be limitations regarding the technical valve data (temperature, pressure range, service life, maintenance intervals, etc.)!

– Flame-resistant - containing water:

- Maximum operating pressure 210 bar
- Maximum hydraulic fluid temperature 60 °C
- Expected service life as compared to HLP hydraulic oil 30 % to 100 %

electric

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	21
	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
Output	Actual current value	mV	1 mV ± 1 mA
Protection class of the valve according to EN 60529			IP 65 with mating connector mounted and locked
Electromagnetic compatibility			EN 61000-6-2: 2011-06; EN 61000-6-3: 2011-09

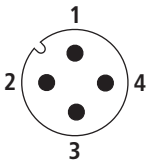
Electrical connection (dimensions in mm)

Type (Z)DREE

Device connector allocation	Contact	Assignment interface "A1"	Assignment interface "F1"
Supply voltage	1	24 VDC ($u(t) = 21\text{ V to }35\text{ V}$); $I_{\text{max}} \leq 1.5\text{ A}$	
Command value input	2	0 to 10 V; $R_E = 20\text{ k}\Omega$	4 to 20 mA; $R_E = 100\text{ }\Omega$
Ground	3	0 V	
	4	Reference potential command value	

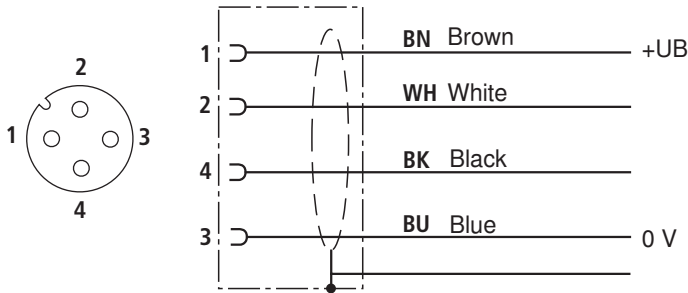
M12 plug-in connector port

Connector at the amplifier



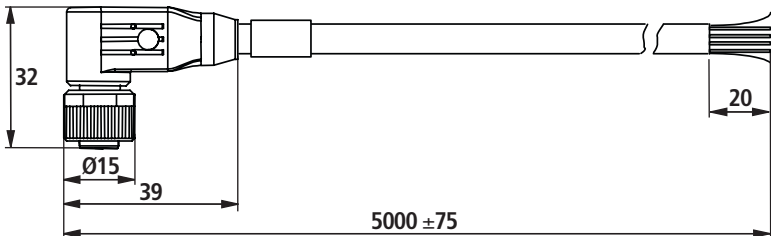
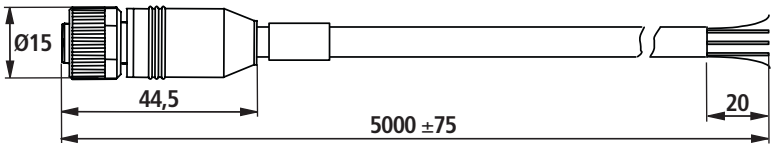
Mating connector and wire colors with pre-assembled cable set

Please order the cable set separately, see page 18



The connection for protective earthing conductor is omitted

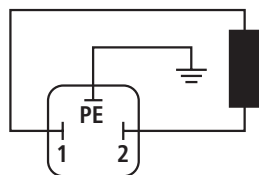
Connection cross-section:
4 x 0.75 mm² shielded
(connect shield in the control cabinet)



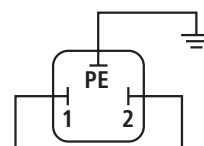
Electrical connection (dimensions in mm)

Type (Z)DRE

Connection at connector



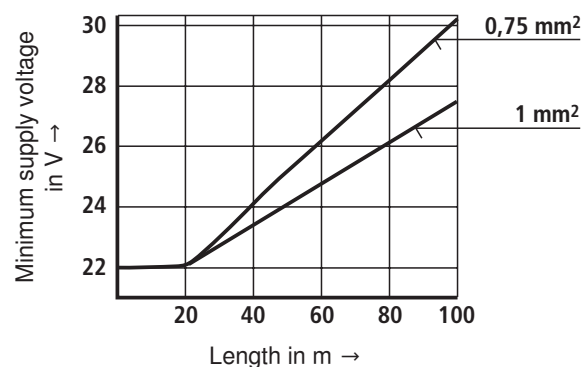
Connection at mating connector



Connection cable for type (Z)DRE

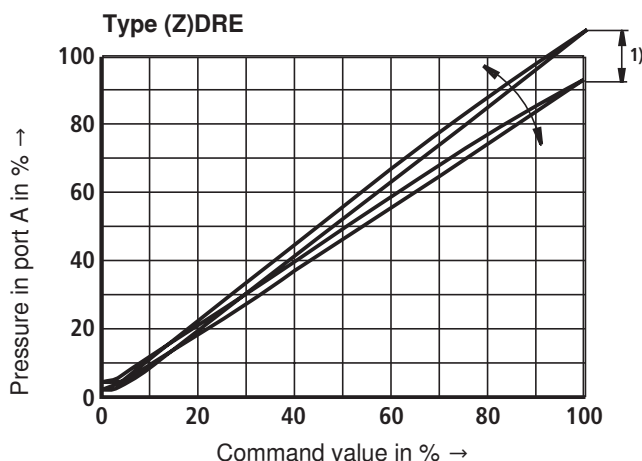
- Recommendation 6-wire, 0.75 or 1 mm² plus protective earthing conductor and shielding
- Only connect the screening to PE on the supply side
- Maximum admissible length 100 m

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



Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$)

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



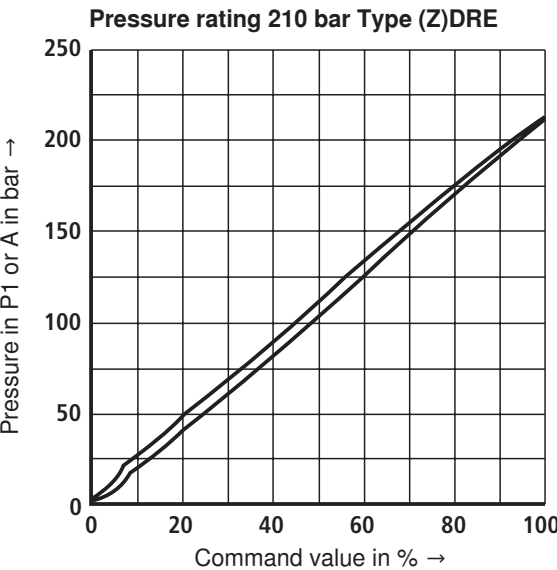
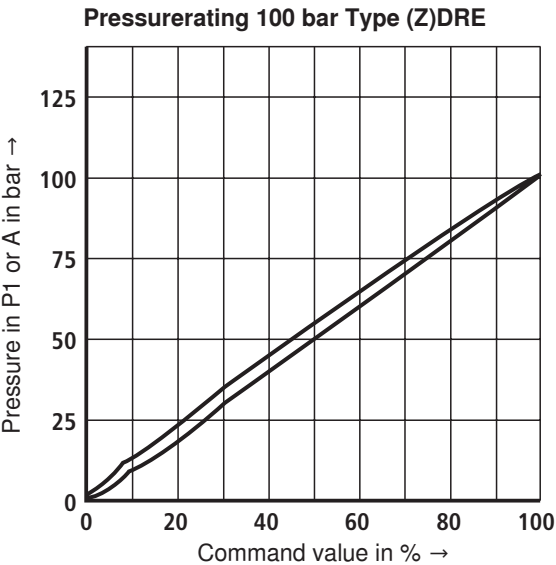
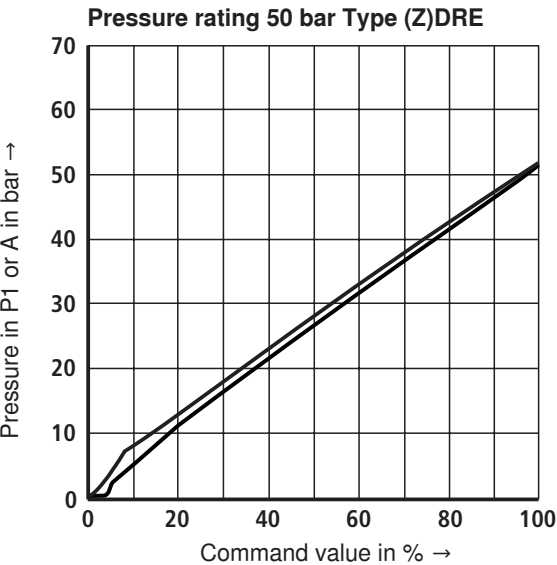
¹⁾ With type (Z)DRE, the manufacturing tolerance at the **external amplifier** (type and data sheet see page 7) can be adjusted using the command value attenuator potentiometer "Gw". With the digital amplifier, the setting is made using the "Limit" parameter.

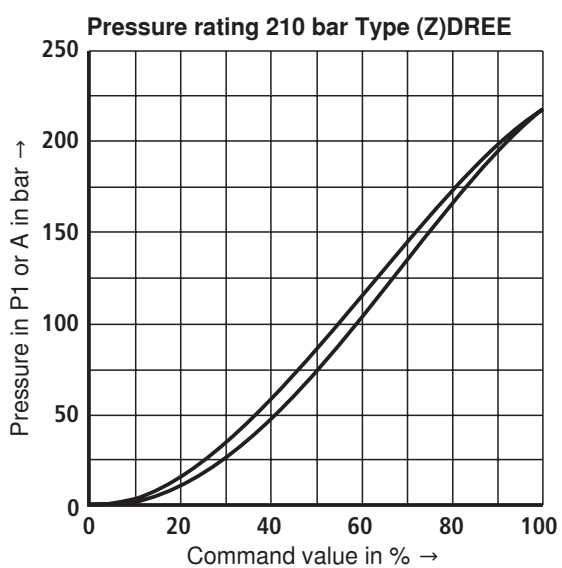
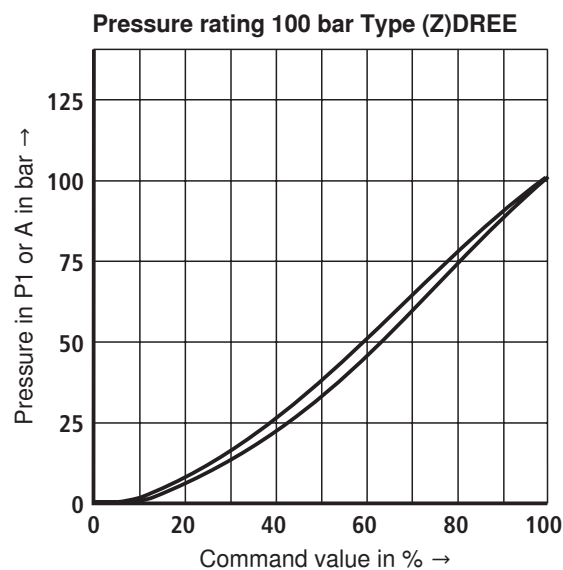
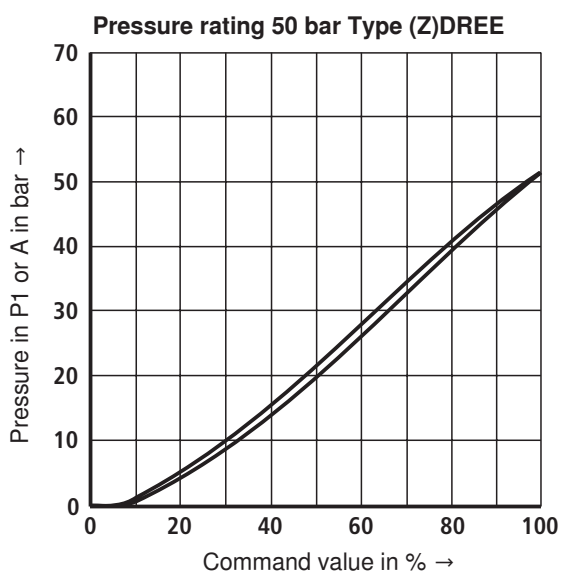
In this connection, the control current according to the technical data must not be exceeded!

In order to be able to adjust several valves to the same characteristic curve, the pressure must - with a command value of 100 % - at no valve exceed the maximum set pressure of the relevant pressure rating.

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

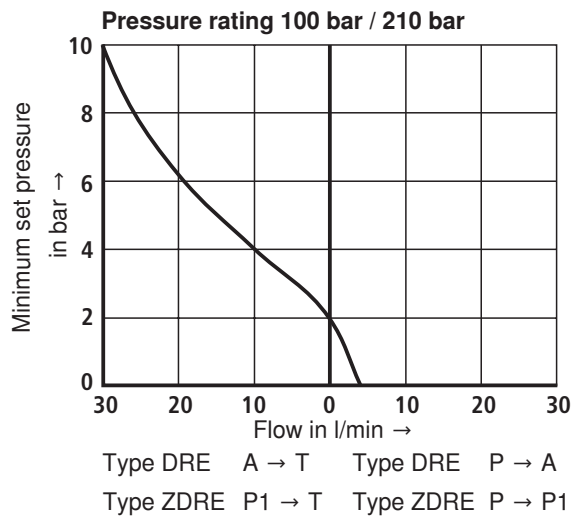
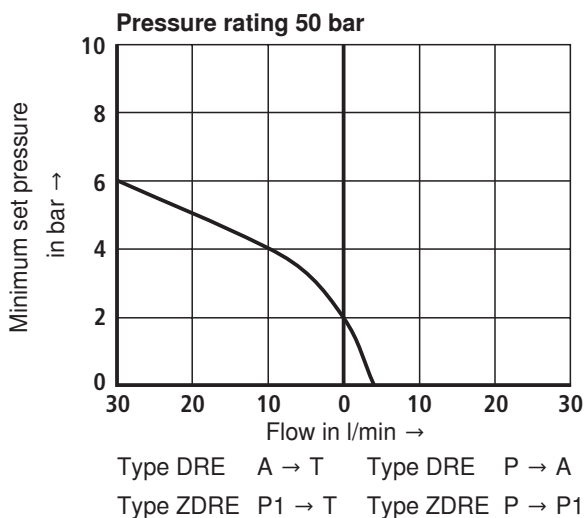
Type (Z)DRE: Pressure in port P1 or A depending on the command value



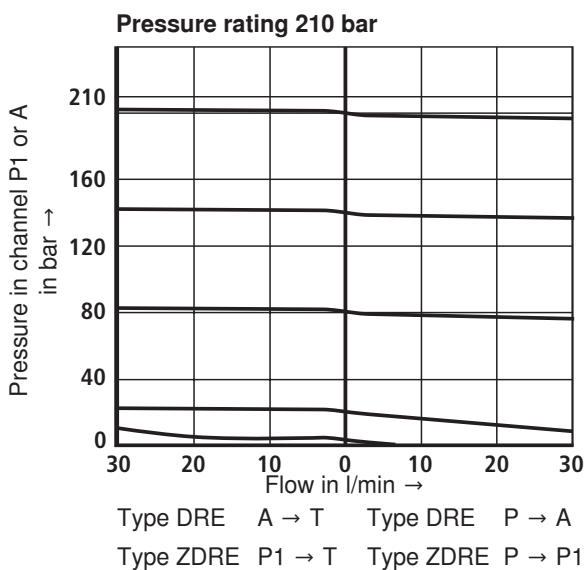
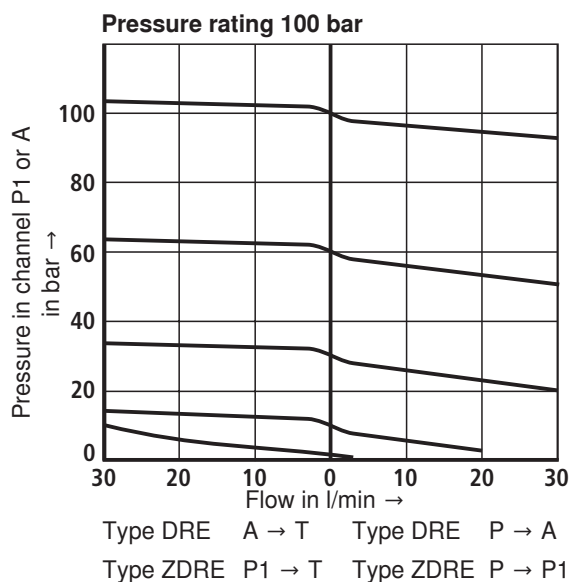
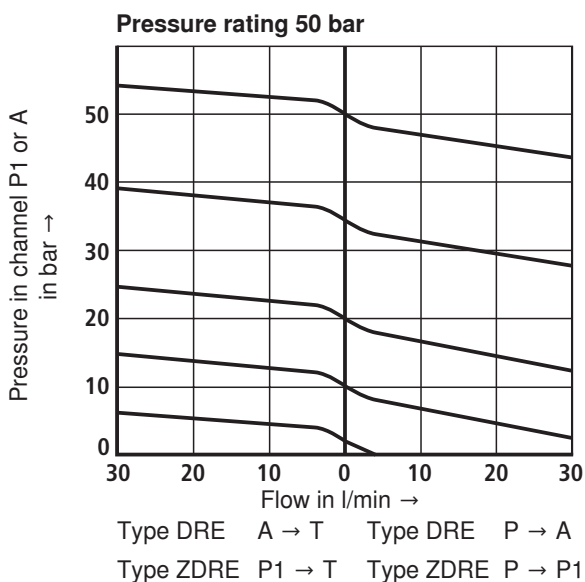
Characteristic curves: Type (Z)DREE (measured with HLP46, $\vartheta_{oil} = 40\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$)**Type (Z)DRE(E): Pressure in port P1 or A depending on the command value**

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

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

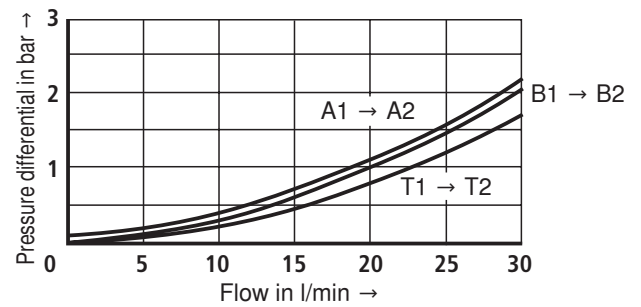
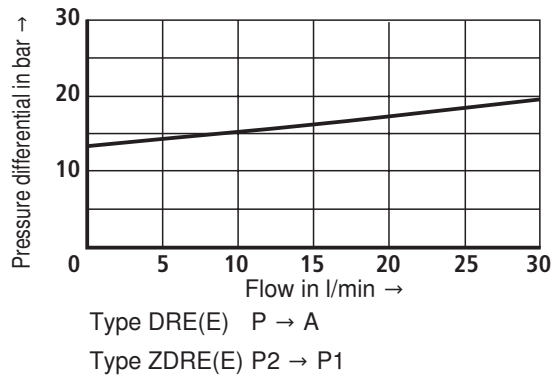


Pressure in channel P1 or A – flow



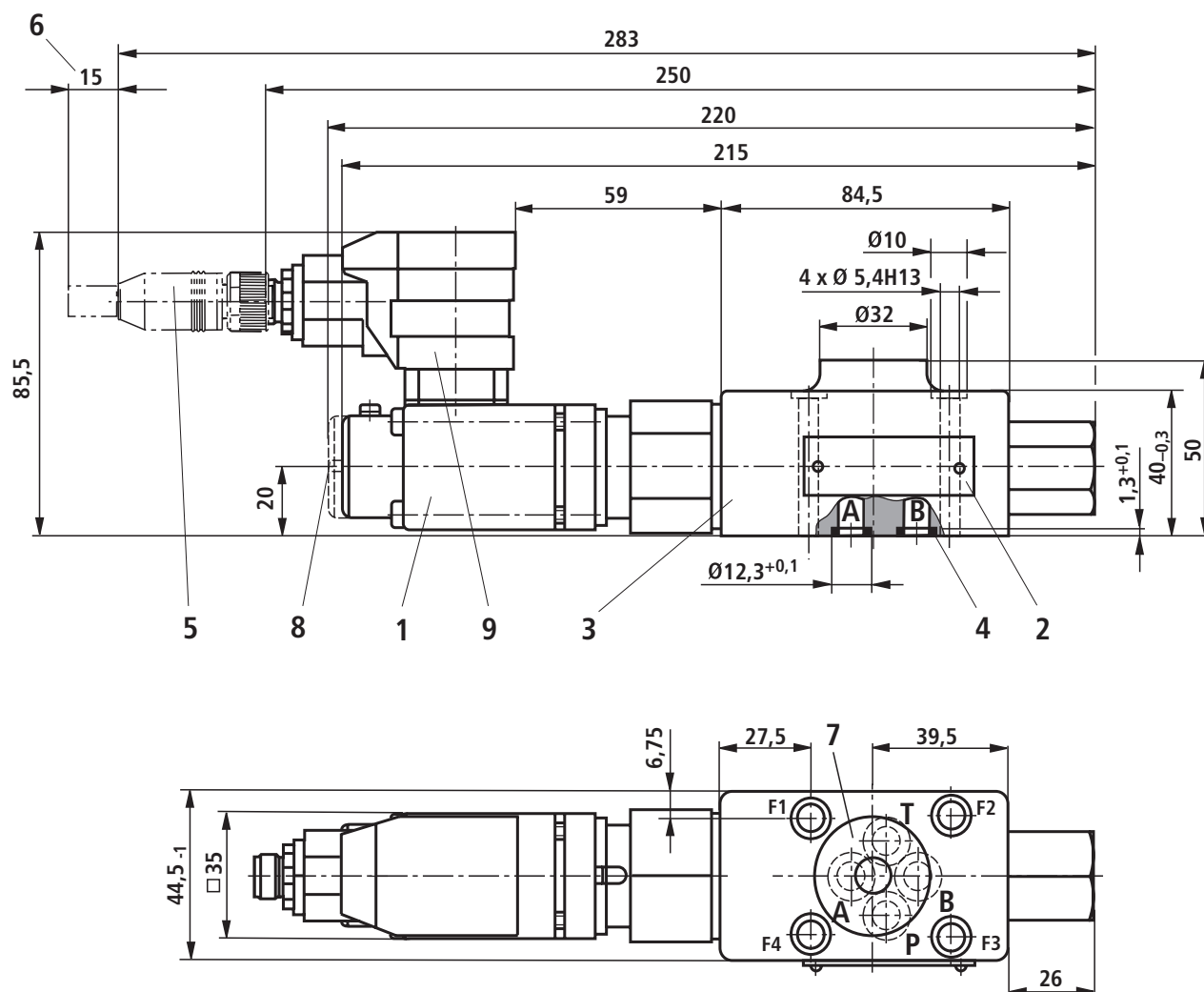
Characteristic curves (measured with HLP46, $\vartheta_{Oil} = 40\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$)

Δp - q_v characteristic curves

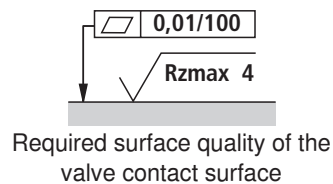


Notice!

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).

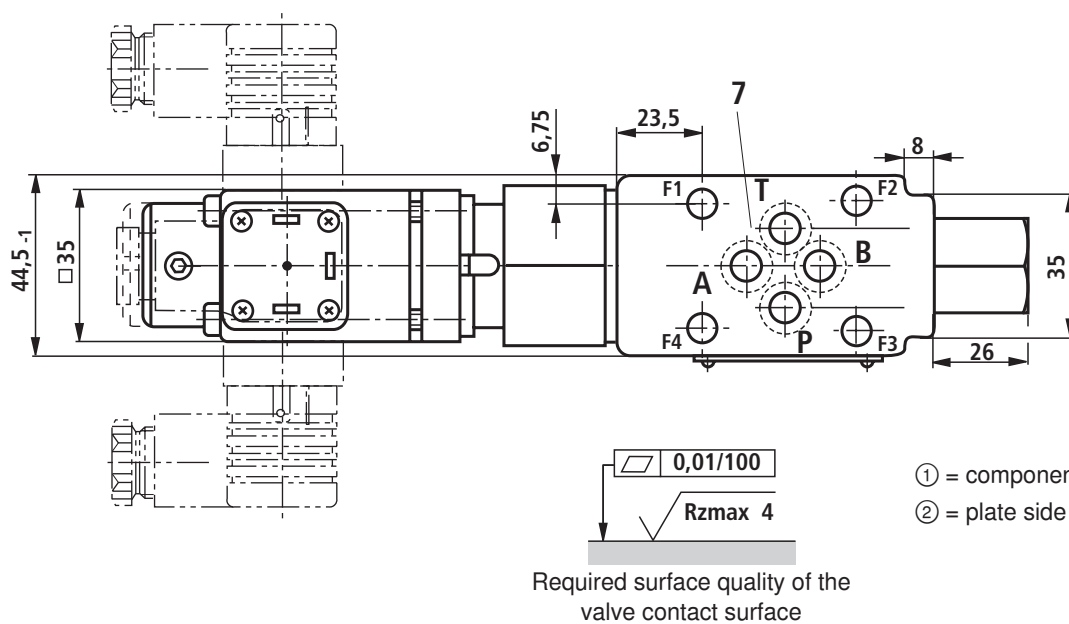
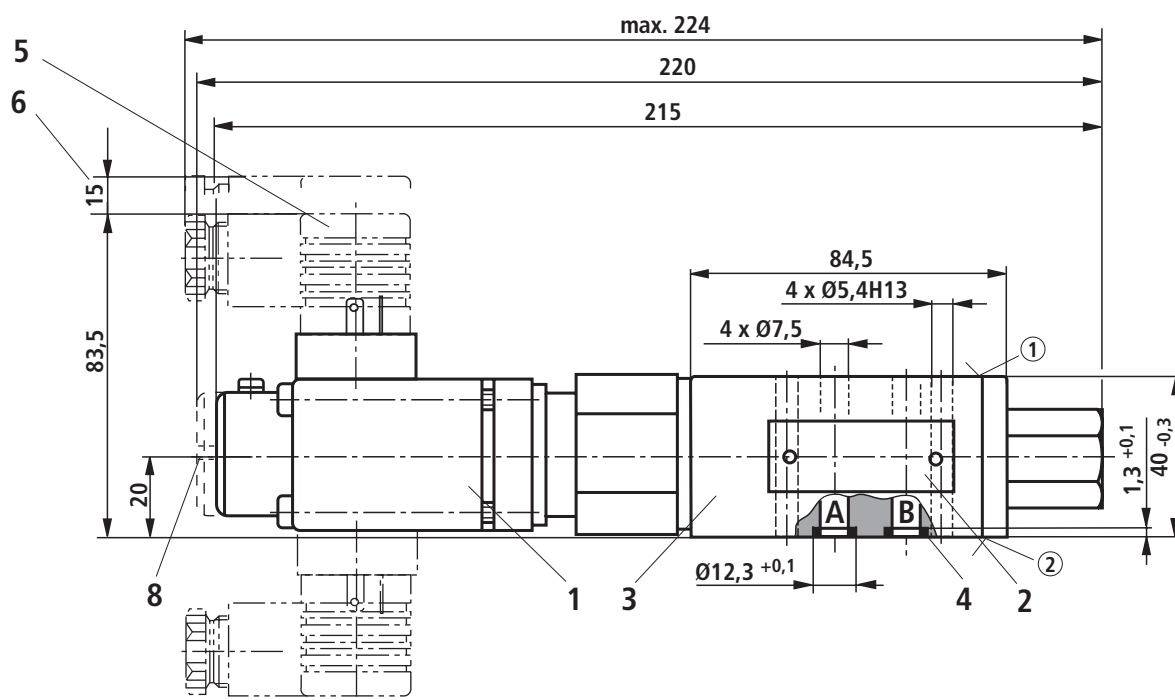
Unit dimensions: Type DREE (dimensions in mm)

- 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 to remove the mating connector
- 7 Porting pattern according to ISO 4401-03-02-0-05
- 8 Proportional solenoid **with** manual override
- 9 Integrated electronics (OBE)



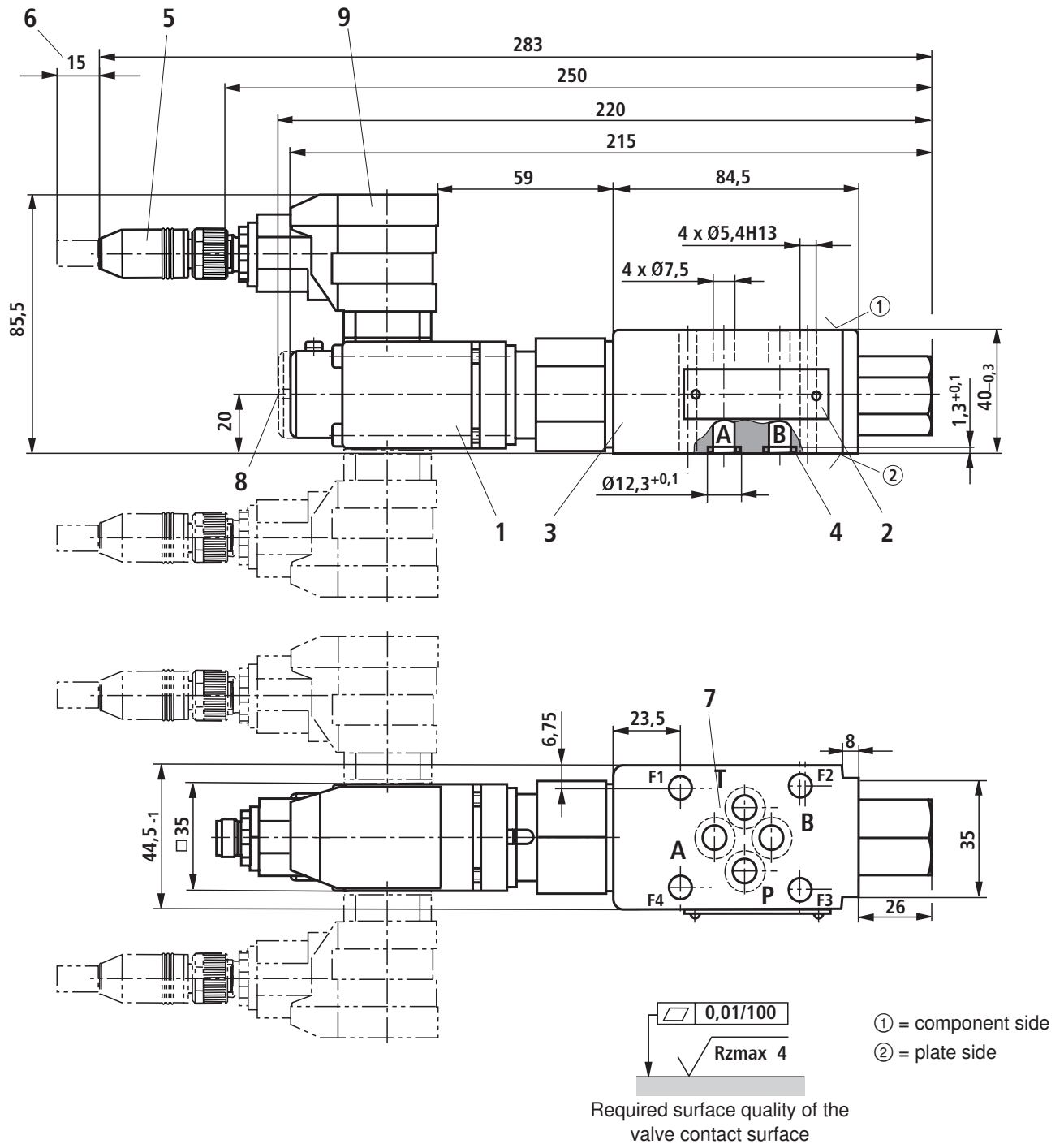
Subplates and valve mounting screws see page 18

Unit dimensions: Type ZDRE (dimensions in mm)



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

Unit dimensions: Type ZDREE (dimensions in mm)



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

Unit dimensions

Hexagon socket head cap screws		
Type DRE(E)	4x ISO 4762 - M5 x 50 - 10.9-fZn-240h-L (Friction coefficient $\mu_{total} = 0.09$ to 0.14) Tightening torque $M_A = 7\text{ Nm} \pm 10\%$	
Type ZDRE(E)	4x ISO 4762 - M5 - 10.9-fZn-240h-L (Friction coefficient $\mu_{total} = 0.09$ to 0.14) Tightening torque $M_A = 7\text{ Nm} \pm 10\%$	

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

Subplates
Size 6