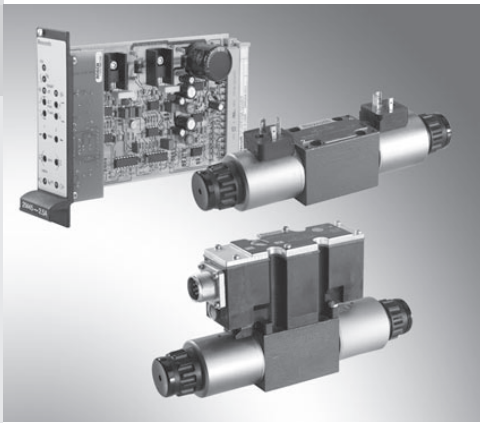
Proportional pressure reducing valve, in 3-way version

RE 29184/06.11 1/12
Replaces: 12.02

Type 3DREP and 3DREPE



Size 6
Component series 2X
Maximum operating pressure 100 bar
Maximum flow 15 l/min

Table of contents

Features

- Direct operated proportional valves for controlling a pressure and the direction of a flow
- Operation by means of proportional solenoids with central thread and detachable coil
- Subplate mounting:
  Porting pattern according to ISO 4401
- Manual override, optional
- Spring-centered control spool
- Type 3DREPE with integrated control electronics
- External control electronics for type 3DREP:
  - Analog amplifiers type VT-VSPA2-1-2X/… in Eurocard format (separate order), see page 5
  - Digital amplifier type VT-VSPD-1-1X/… in Eurocard format (separate order), see page 5
  - Electric amplifier type VT 11118 in modular design (separate order), see page 5

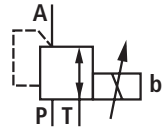
Ordering code

3DREP		6	–2X/		E	G24			/		*

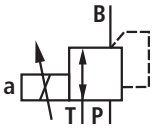
For **external** control electronics **= No code**
With **integrated** control electronics **= E**

Size
Size 6 **= 6**

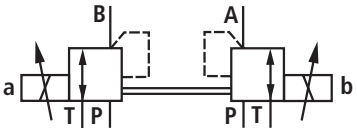
Symbols (simplified)



= A



= B



= C

Component series 20 to 29 **= 2X**
(20 to 29: Unchanged installation and connection dimensions)

Pressure rating
16 bar **= 16**
25 bar **= 25**
45 bar **= 45**

Seal material
M = NBR seals
V = FKM seals

No code = For DREP

For DREPE
A1 = Command value/ actual value ±10 V
F1 = Command value/ actual value 4 to 20 mA

Electrical connection for DREP
K4 = [1] **Without** mating connectors, with connector according to DIN EN 175 301-803
Mating connectors - separate order see page 7

For DREPE
K31 = [1] **Without** mating connectors, with connector according to DIN EN 175 301-804
Mating connectors - separate order see page 7

No code = Without special type of protection
J = [2] Sea water-resistant

No code = Without manual override
N9 = [3] With concealed manual override

Supply voltage
G24 = +24 V direct voltage

E = Proportional solenoid with detachable coil

Further details in the plain text

[1] With version "J" = sea water-resistant only specify "K31"

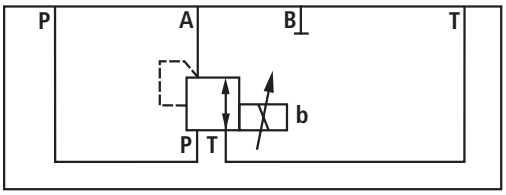
[2] Only with version 3DREP6

[3] With version "J" = "N" instead of "N9"

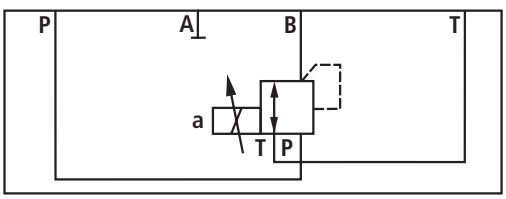
Electric special types of protection on request!

Symbols

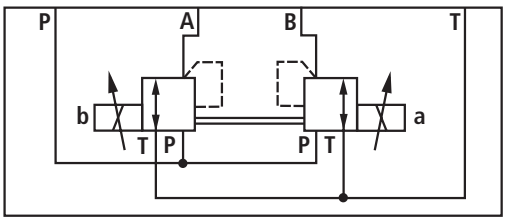
Type 3DREP..6 **A** 2X/..E (detailed)



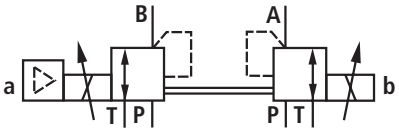
Type 3DREP..6 **B** 2X/..E (detailed)



Type 3DREP..6 **C** 2X/..E (detailed)



Example of valve with integrated control electronics
Type 3DREP**E**..6 **C** 2X/..E (simplified)



Function, section

The 3-way pressure reducing valve type 3 DREP 6.. is direct operated by proportional solenoids. It is used to convert an electric input signal into a proportional pressure output signal. The proportional solenoids are controllable wet-pin DC solenoids with central thread and detachable coil. The solenoids are optionally actuated by external control electronics (type 3DREP) or by the internal control electronics (type 3DREPE).

Set-up:

The valve basically consists of:

- Housing (1) with connection surface
- Control spool (2) with pressure measuring spool (3, 4)
- Solenoids (5, 6) with central thread
- Optionally integrated control electronics (7)

Function:

The pressure in A or B is set by means of the proportional solenoids. The amount of the pressure depends on the current. With de-energized solenoids (5, 6), the control spool (2) is held in the central position by means of the pressure springs (8). Ports A and B are connected with T so that the hydraulic fluid can flow off to the tank without obstructions.

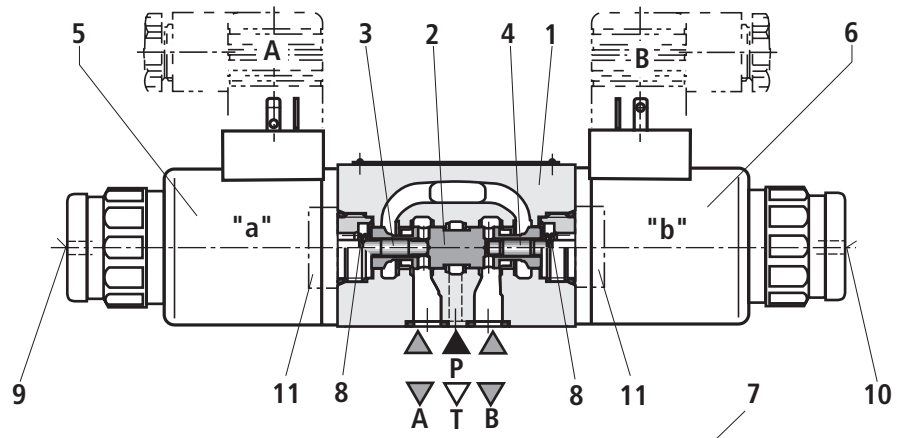
By energizing a proportional solenoid e.g. solenoid "a" (5), the pressure measuring spool (3) and with it the control spool (2) are moved to the right. This opens the connection from P to B and A to T via orifice-type cross-sections with progressive flow characteristic. The pressure that builds up in channel B acts with the surface of the pressure measuring spool (4) on the control spool and against the solenoid force. The pressure measuring spool (4) is supported by the solenoid "b". If the pressure exceeds the value set at solenoid "a", the control spool (2) is pushed back against the solenoid force and connects B with T until the set pressure is achieved again. The pressure is proportional to the solenoid current.

After shut-down of the solenoid, the control spool (2) is returned into the central position by the compression springs (8). An optional hand override (9, 10) allows for the displacement of the control spool (2) without solenoid energization.

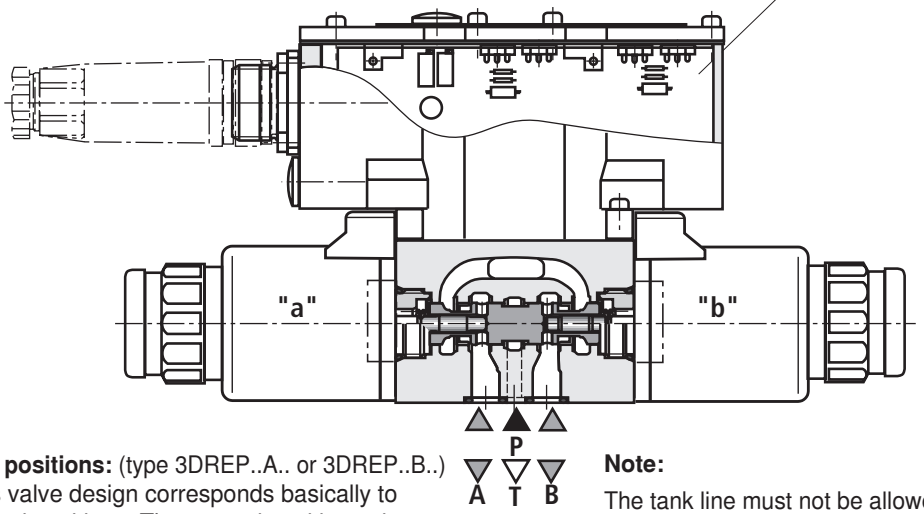
☞ **Note:**

The unwanted activation of the hand override may lead to uncontrolled machine movements!

Type 3DREP 6..



Type 3DREPE 6..



Valve with 2 spool positions: (type 3DREP..A.. or 3DREP..B..)
The function of this valve design corresponds basically to the valve with 3 spool positions. The 2 spool position valves are, however, only equipped with solenoid "a" (5) or solenoid "b" (6). Instead of the 2nd proportional solenoid, there is a plug screw (11).

Note:

The tank line must not be allowed to run empty. With corresponding installation conditions, a precharge valve (pre-charging pressure approx. 2 bar) must be installed.

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

general

Valve type		3DREP	3DREPE
Weight	kg	2.0	2.2
Installation position		Any, preferably horizontal	
Storage temperature range	°C	–20 to +80	
Ambient temperature range	°C	–20 to +70	–20 to +50

hydraulic (measured with HLP 32, ϑ_{oil} = 40 °C ± 5 °C)

Operating pressure range	Port P	bar	20 to 100 for pressure rating 16
		bar	30 to 100 for pressure rating 25
		bar	50 to 100 for pressure rating 45
	Port T	bar	0 to 30
Maximum flow		l/min	15 (Δp = 50 bar)
Hydraulic fluid			See table below
Hydraulic fluid temperature range (at the valve working ports)		°C	–20 to +80, preferably +40 to +50
Viscosity range		mm^2/s	20 to 380, preferably 30 to 46
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)			Class 17/15/12 [1)]
Hysteresis		%	≤ 5
Repeatability		%	≤ 1
Response sensitivity		%	≤ 0.5
Range of inversion		%	≤ 1

[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.

For the selection of the filters see www.boschrexroth.com/filter

Hydraulic fluid		**Classification**	**Suitable sealing materials**	**Standards**
Mineral oils and related hydrocarbons		HL, HLP	NBR, FKM	DIN 51524
Flame-resistant	– Water-containing	HFC	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 40 K higher than the maximum solenoid surface temperature.
- **Flame-resistant – water-containing**: Maximum pressure differential per control edge 175 bar, otherwise, increased cavitation erosion!
  Tank pre-loading < 1 bar or > 20 % of the pressure differential. The pressure peaks should not exceed the maximum operating pressures!

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

electric

Valve type			3DREP	3DREPE
Voltage type			Direct voltage	
Type of signal			Analog	
Command value signal	Voltage input "A1" Current input "F1"	V mA	-	±10 4 to 20
Maximum current per solenoid		A	1.5	2.5
Solenoid coil resistance	Cold value at 20 °C	Ω	5.2	2.15
	Maximum hot value	Ω	7.6	3.3
Duty cycle		%	100	
Maximum coil temperature [1]		°C	up to 150	
Protection class according DIN EN 60529/VDE 0470 part 1			IP 65 with mating connector mounted and locked	

[1] Due to the temperatures occurring at the surfaces of the solenoid coils, the European standards ISO 13732-1 and EN 982 need to be adhered to!

Control electronics

For 3DREP	Digital amplifier in Eurocard format [1]		VT-VSPD-1-2X/... according to data sheet 30523
	Analog amplifier in Eurocard format [1]		VT-VSPA2-1-2X/… according to data sheet 30110
	Analog module amplifier [1]		VT11118-1X/... according to data sheet 30218
For 3DREPE			Integrated in the valve, see page 8
	Analog command value module		VT- SWMA-1-1X/... according to data sheet 29902
	Analog command value module		VT-SWMKA-1-1X/... according to data sheet 29903
	Digital command value card		VT-HACD-1-1X/… according to data sheet 30143
	Analog command value card		VT-SWKA-1-1X/... according to data sheet 30255
Supply voltage	Nominal voltage	VDC	24
3DREPE, 3DREP [2]	Lower limit value	V	19
	Upper limit value	V	35
Current consumption	I_{max}	A	1.8
of the amplifier	Maximum impulse current	A	3

[1] Separate order

[2] With Bosch Rexroth AG control electronics

☞ **Note:** Information on the **environment simulation testing** for the areas EMC (electromagnetic compatibility), climate and mechanical load see RE 29055-U (declaration on environmental compatibility).

Block diagram of the integrated electronics (OBE) for type 3DREPE

Device connector allocation	Contact	Signal with A1	Signal with F1
Supply voltage	A	24 VDC (u(t) = 19.4 to 35 V); I_{max} = 2 A	
	B	0 V	
Reference (actual value)	C	Cannot be used [1]	
Differential amplifier input	D	±10 V; R_e > 50 kΩ	4 to 20 mA; R_e > 100 Ω
(command value)	E	Reference potential command value	
	F	Cannot be used [1]	
	PE	Connected to cooling element and valve housing	

[1] Slots C and F must not be connected!

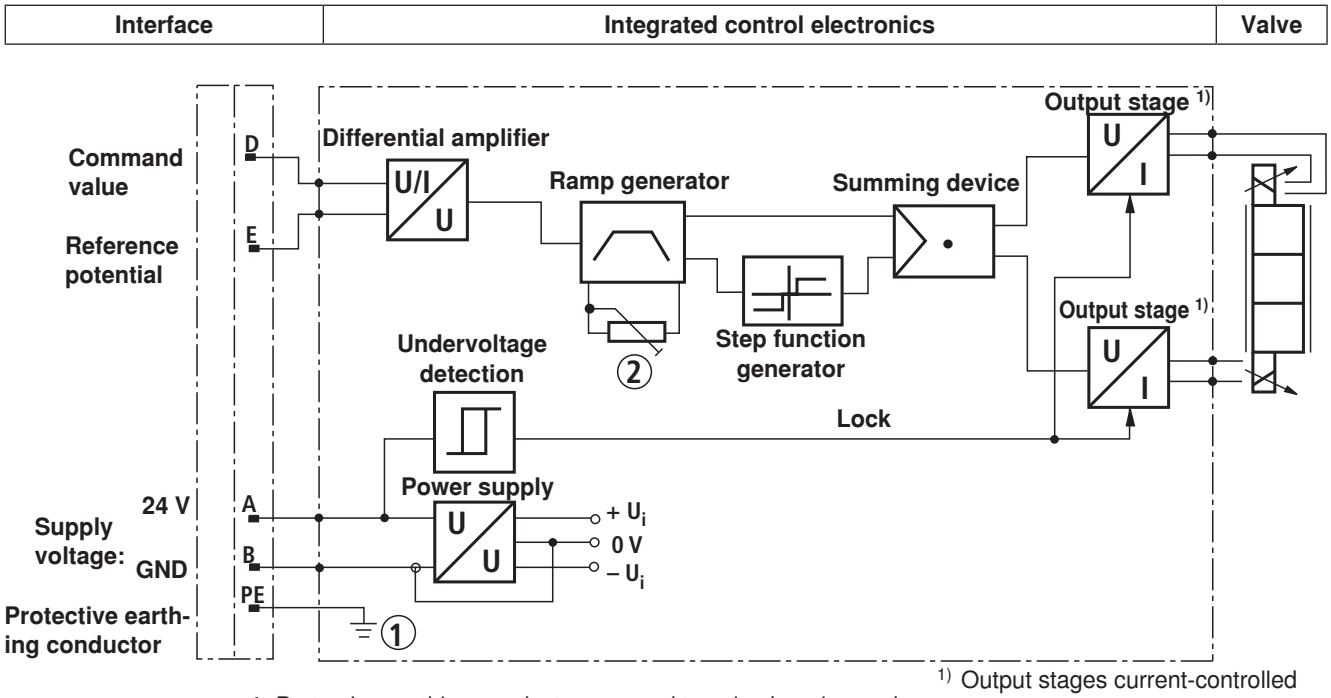
Command value: Reference potential at E and positive command value (or 12 to 20 mA) at D result in pressure in A.
Reference potential at E and negative command value (or 12 to 4 mA) at D result in pressure in B.

With valves with 1 solenoid on side b (design A):
Reference potential at E and positive command value at D (4 to 20 mA) result in pressure in A.

With valves with 1 solenoid on side a (design B):
Reference potential at E and positive command value at D (4 to 20 mA) result in pressure in B.

Connection cable: Recommendation:
- Up to 25 m line length: Type LiYCY 5 x 0.75 mm²
- Up to 50 m line length: Type LiYCY 5 x 1.0 mm²

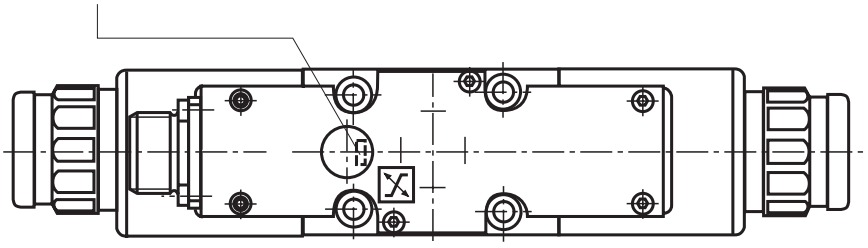
External diameter 6.5 to 11 mm
Connect shield on PE only on the supply side.



[1] Output stages current-controlled

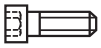
1 Protective earthing conductor screwed to valve housing and cover

2 Ramp can be set from 0 to 5 s from the outside ($T_{up} \triangleq T_{down}$)



Accessories (not included in scope of delivery)

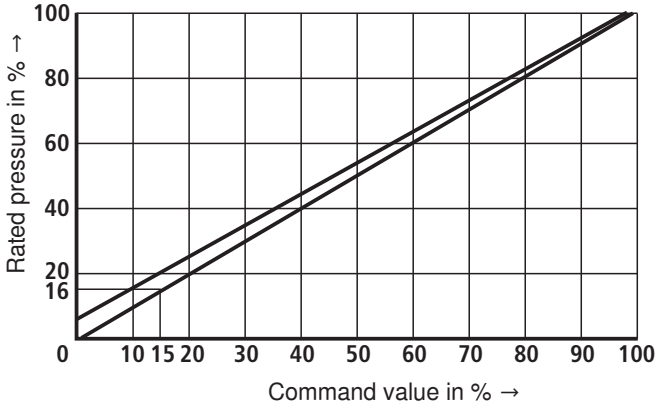
Mating connectors 			**Material number**
Mating connector for		Solenoid **a**, color gray	R900074683
3DREP	DIN EN 175301-803	Solenoid **b**, color black	R900074684
Mating connector for			e.g. R900021267 (plastic)
3DREPE and **3DREPE...J...**	DIN EN 175201-804		e.g. R900223890 (metal)
			e.g. R900217845 (plastic 90°)
Mating connector for			
3DREP...J...	DIN EN 175201-804		R900021267 (plastic)

Hexagon socket head cap screws 		**Material number**
Size 6	4 x ISO 4762 - M5 x 50 - 10.9 Tightening torque M_A = 8.9 Nm ±10 %	

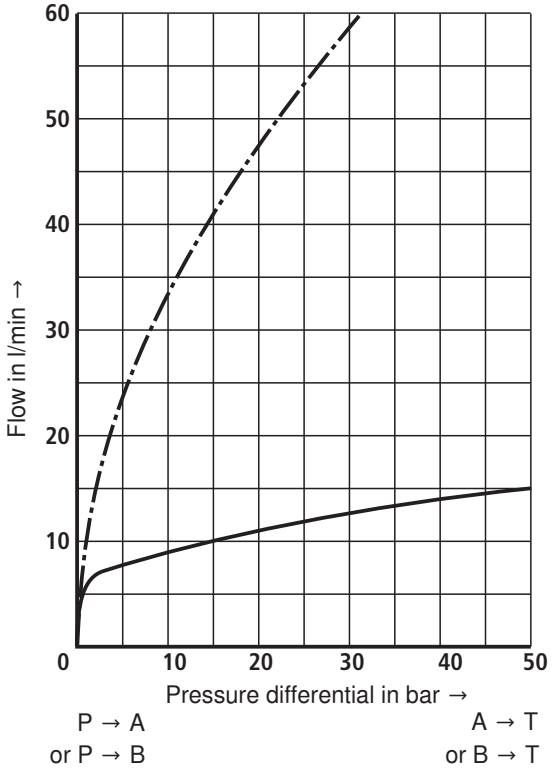
Subplates	**Data sheet**
Size 6	45052

Characteristic curves (measured with HLP 46, ϑ_{oil} = 40 °C ± 5 °C and p = 100 bar)

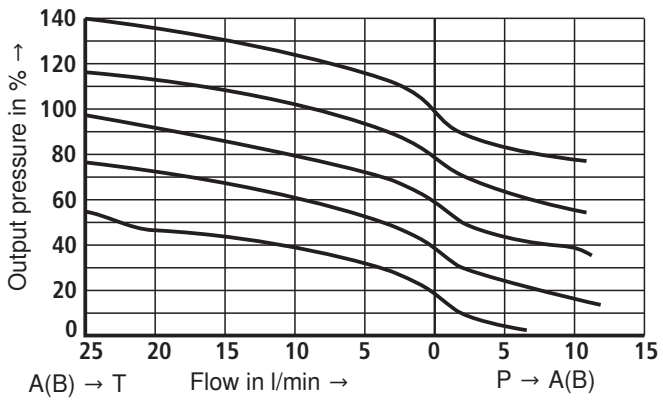
Pressure rating 16, 25 and 45 bar



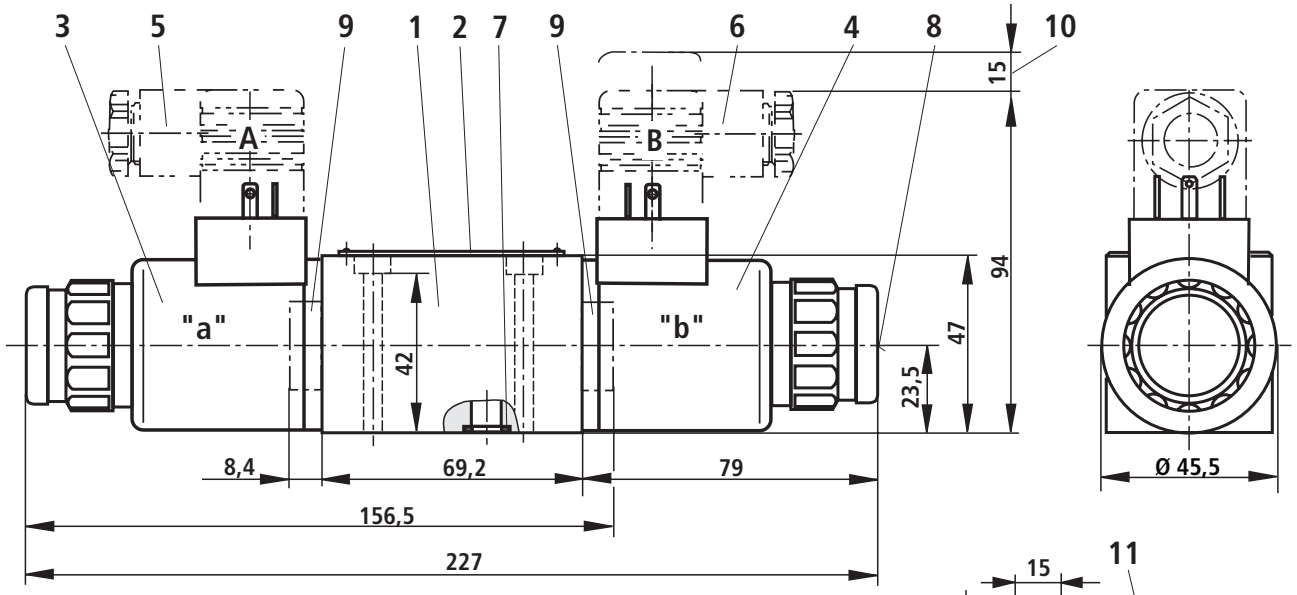
Pressure rating 16, 25 and 45 bar

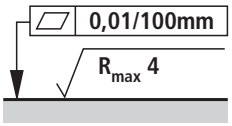


Pressure/flow dependency



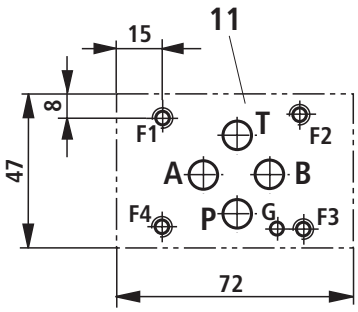
Unit dimensions: Type 3DREP (dimensions in mm)





Required surface quality of the valve mounting face

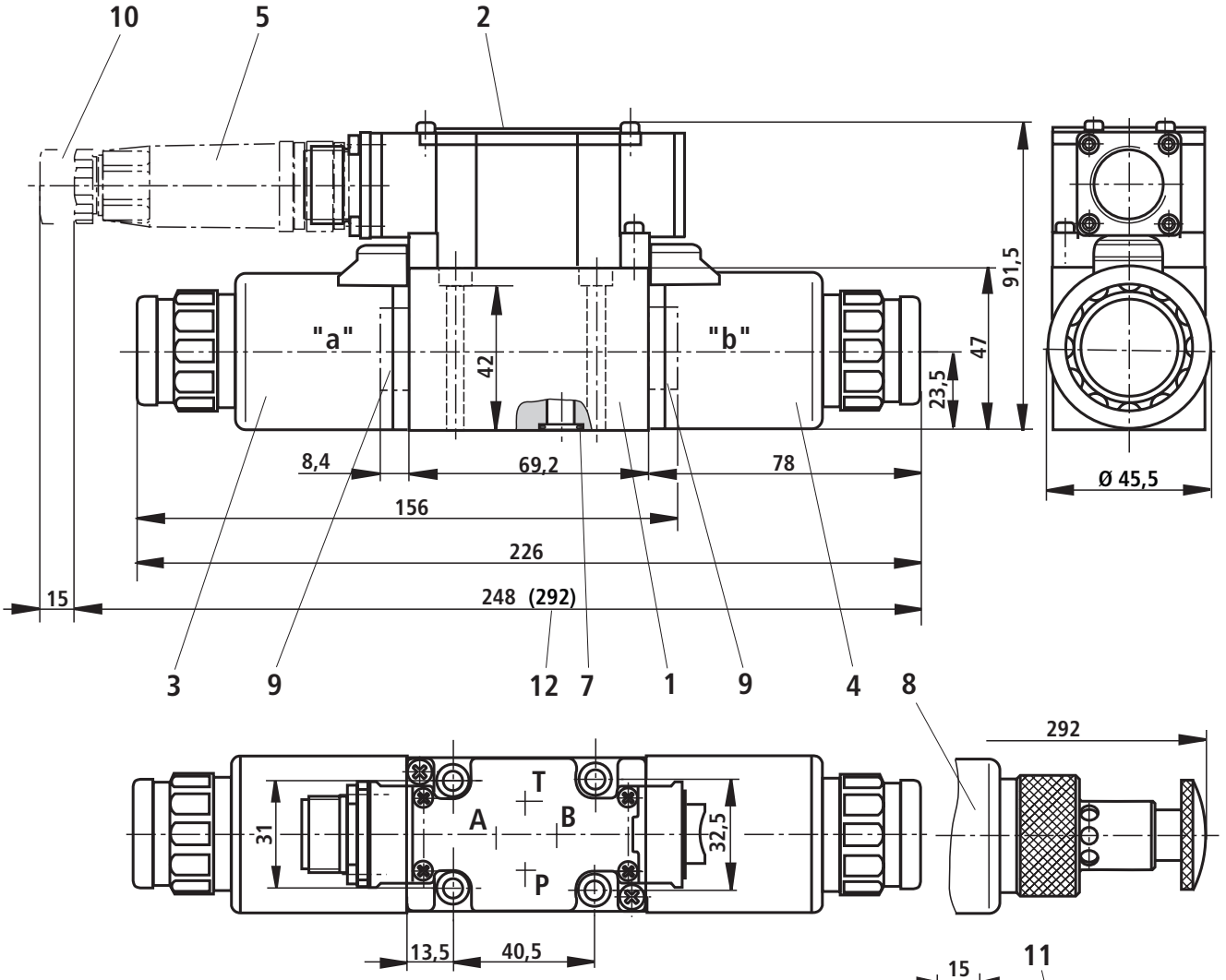
General tolerances according to ISO 2768-mK

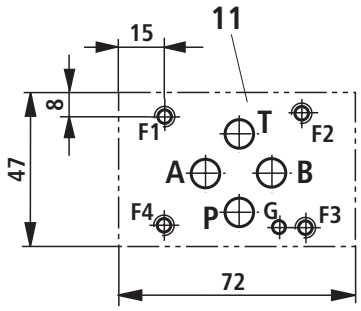


1 Valve housing
2 Name plate
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Mating connector "A", color gray (order separately, see page 5)
6 Mating connector "B", color black (order separately, see page 5)
7 Identical seal rings for ports A, B, P, and T
8 Concealed manual override "N9"
9 Plug screw for valves with 1 solenoid (version "A" or "B")
10 Space required for removing the mating connector
11 Machined valve mounting face, porting pattern according to ISO 4401-03-02-0-05

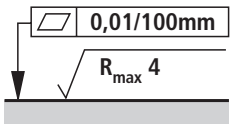
Subplates and valve mounting screws see page 7.

Unit dimensions: Type 3DREP...J - sea water-resistant (dimensions in mm)





1 Valve housing
2 Name plate
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Mating connector
(order separately, see page 5)
7 Identical seal rings for ports A, B, P, and T
8 Concealed manual override "N"
9 Plug screw for valves with 1 solenoid (version "A" or "B")
10 Space required for removing the mating connector
11 Machined valve mounting face, porting pattern according to ISO 4401-03-02-0-05
12 Dimension for version "N"

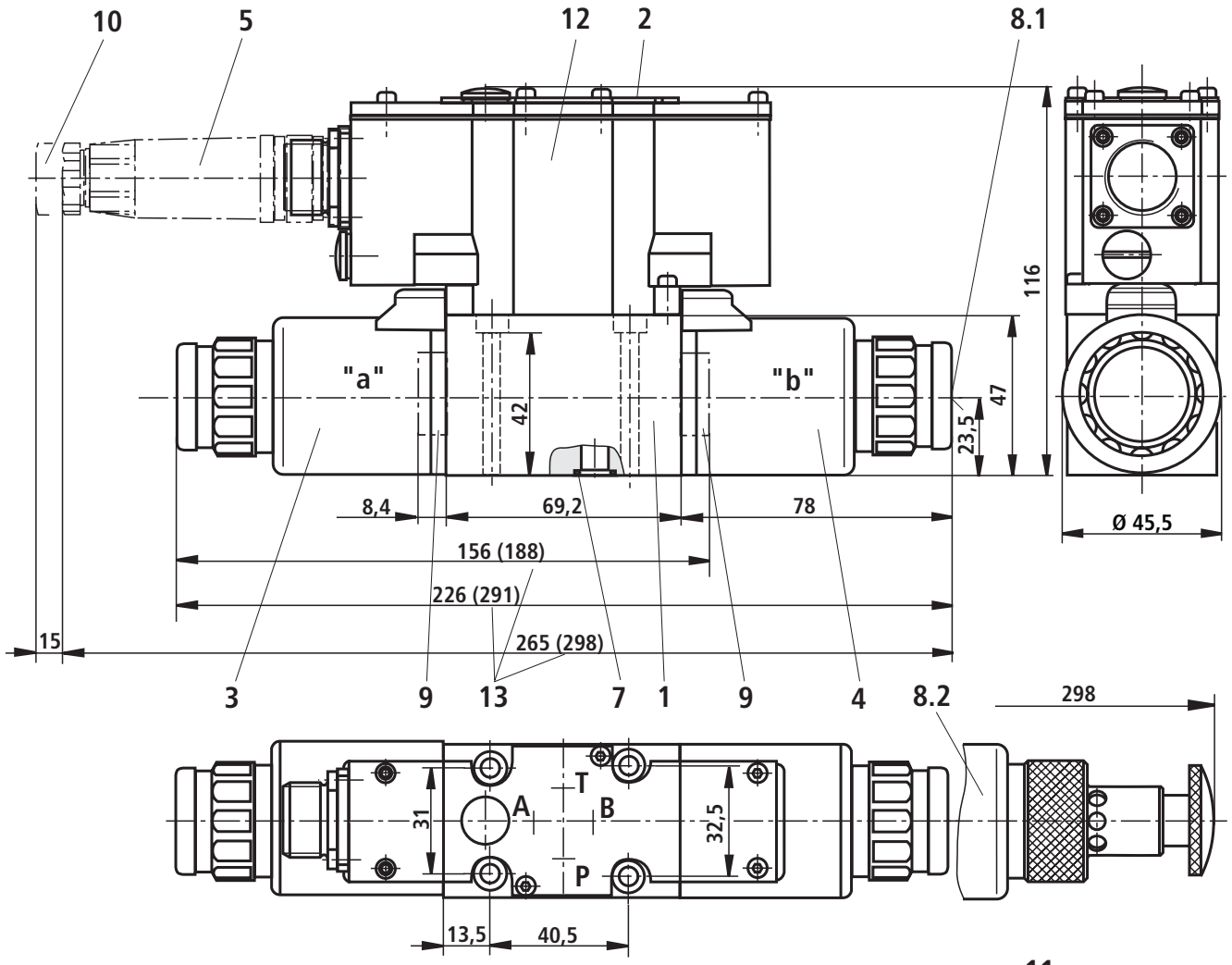


Required surface quality of the valve mounting face

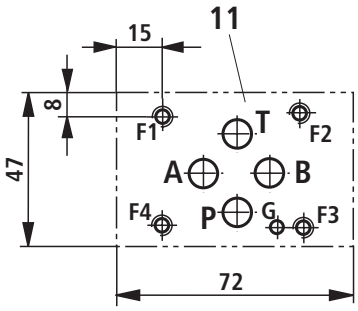
General tolerances according to ISO 2768-mK

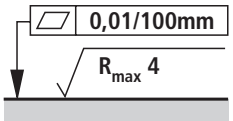
Subplates and valve mounting screws see page 7

Unit dimensions: Type 3DREPE and 3DREPE...J - sea water-resistant (dimensions in mm)



1 Valve housing
2 Name plate
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Mating connector (order separately, see page 5)
7 Identical seal rings for ports A, B, P, and T
8.1 Concealed manual override "N9"
8.2 Manual override "N" for sea water-resistant version "J"
9 Plug screw for valves with 1 solenoid (version "A" or "B")
10 Space required for removing the mating connector
11 Machined valve mounting face, porting pattern according to ISO 4401-03-02-0-05
12 Integrated control electronics
13 Dimension ( ) for sea water-resistant version "J"





Required surface quality of the valve mounting face

General tolerances according to ISO 2768-mK

Subplates and valve mounting screws see page 7

Throttle insert

When using a proportional directional valve type 4WRZ..., the following throttle inserts are to be used in channel A and B:

Size	**10**	**16**	**25**	**32**	**52**
Ø in mm	1.8	2.0	2.8	–	–
Material no.	R900158510	R900158547	R900158548	–	–

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