RE 25818
Edition: 2021-10
Replaces: 2017-06

rexroth
A Bosch Company

Pressure relief valve, pilot-operated

Type DB...W65; DBW...W65; DB 20 K



- Sizes 10 and 25
- Component series 1X; 4X
- Maximum operating pressure 350 bar
- Maximum flow 400 l/min

CE

Features

- For subplate mounting
  Porting pattern according to ISO 6264-06-09-*-97 (NG10) and ISO 6264-08-13-*-97 (NG25)
- For threaded connection
- As screw-in cartridge valve
- 4 adjustment types for pressure adjustment, optionally:
  - Rotary knob
  - Sleeve with hexagon and protective cap
  - Lockable rotary knob with scale
  - Rotary knob with scale
- 5 pressure ratings
- Solenoid-actuated unloading via a built-on directional spool valve
- CE conformity according to the Low-Voltage Directive 2014/35/EU for electrical voltages > 50 VAC or > 75 VDC

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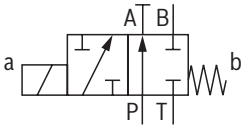
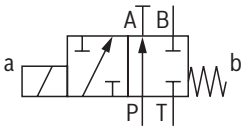
Ordering code

01	02	03	04	05	06		07		08	09	10	11	12	13	14	15	16	17	18	19
DB						**–**		**/**												*****

01	Pressure relief valve	**DB**

02	**Without** directional valve	**no code**
	With attached directional valve	**W** [1]

03	**– Size 10**	
	Subplate mounting "–"	**10**
	Threaded connection "G" (G1 1/2)	**10**
	– Size 25	
	Subplate mounting "–"	**20**
	Threaded connection "G" (G3/4)	**15**
	Threaded connection "G" (G1)	**20**
	Screw-in cartridge valve "K"	**20**

04		normally closed	**A** [2]
		normally open	**B** [2]

Type of connection

05	Subplate mounting	**–**
	Threaded connection	**G**
	Screw-in cartridge valve	**K**

Adjustment type

06	Rotary knob	**1**
	Sleeve with hexagon and protective cap	**2**
	Lockable rotary knob with scale	**3** [3]
	Rotary knob with scale	**7**

07	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions); (version "K" only)	**1X**
	Component series 40 ... 49 (40 ... 49: unchanged installation and connection dimensions); (version "–" and "G" only)	**4X**

1) Only with version "G".
2) Ordering code only necessary with version "W".
3) H-key with material no. **R900008158** is included in the scope of delivery.
4) Dash "–" only necessary with version "W" and without specification of "U".
5) Mating connectors, separate order, see page 20.

☞ **Notice:**
- In case spare parts of the screw-in cartridge valve for standard subplate mounting or threaded connection housing NG10 and 25 are required, **always** order type DB 20 K.-1X/.XY.
- Type-examination tested safety valves are **only** available as type DB 20 K.-1X/.Y...E.

Ordering code

01	02	03	04	05	06		07		08	09	10	11	12	13	14	15	16	17	18	19
DB						**–**		**/**												*****

Pressure rating

08	Set pressure up to 50 bar	**50**
	Set pressure up to 100 bar	**100**
	Set pressure up to 200 bar	**200**
	Set pressure up to 315 bar	**315**
	Set pressure up to 350 bar (only version "DB")	**350**

Pilot oil supply and pilot oil return (see also Symbols on page 4)

09	Internal pilot oil supply and pilot oil return	**–** [4]
	External pilot oil supply, internal pilot oil return	**X**
	Internal pilot oil supply, external pilot oil return	**Y**
	External pilot oil supply and pilot oil return	**XY**

10	Standard version	**no code**
	Valve for minimum cracking pressure (not suitable for mutual relief!)	**U**

11	**Without** directional valve	**no code**
	With directional spool valve (data sheet 23178)	**6E** [2]

12	Direct voltage 24 V	**G24** [2]
	Alternating voltage 230 V 50/60 Hz	**W230** [2]

13	**With** concealed manual override (standard)	**N9** [2]
	With manual override	**N** [2]
	Without manual override	**no code**

Corrosion resistance

14	None	**no code**
	High corrosion protection (720 h salt spray test according to EN ISO 9227); (only version "K" and "2")	**J5**

Electrical connection

15	**Individual connection**	
	Without mating connector; connector DIN EN 175301-803	**K4** [2]

Seal material (observe compatibility of seals with hydraulic fluid used, see page 7)

16	NBR seals	**no code**
	FKM seals	**V**

17	Vertical installation position of the screw-in cartridge valve (cartridge) (only version "–" and "G")	**W65**
	Any installation position of the screw-in cartridge valve (only version "K")	**no code**

Type-examination procedure

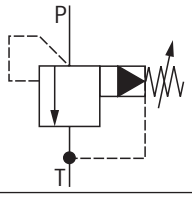
18	**Without** type-examination procedure	**no code**
	Safety valve according to Pressure Equipment Directive 2014/68/EU (version "K" only)	**E**

19	Further details in the plain text	

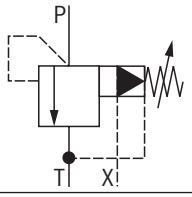
☞ **Notice:** Preferred types and standard units are contained in the EPS (standard price list).

Symbols

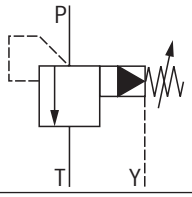
Type DB...**–**...



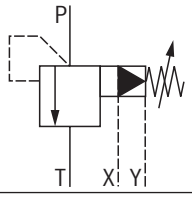
Type DB...**X**...



Type DB...**Y**...



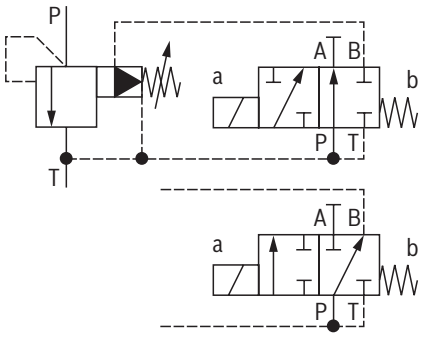
Type DB...**XY**...



Type DBW...**–**...

normally closed

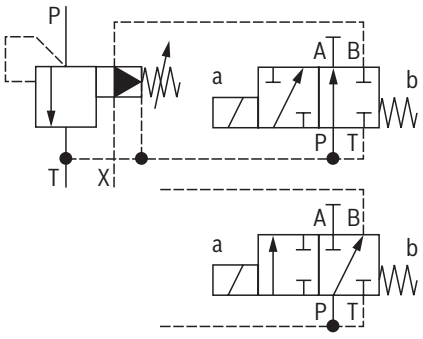
normally open



Type DBW...**X**...

normally closed

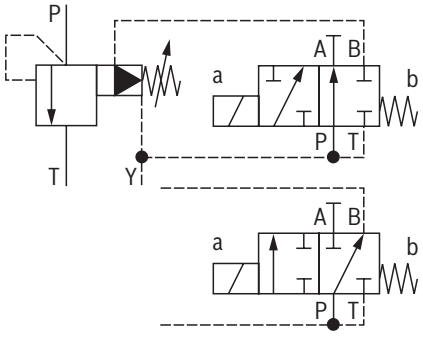
normally open



Type DBW...**Y**...

normally closed

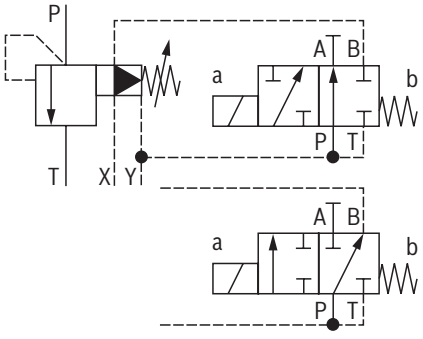
normally open



Type DBW...**XY**...

normally closed

normally open

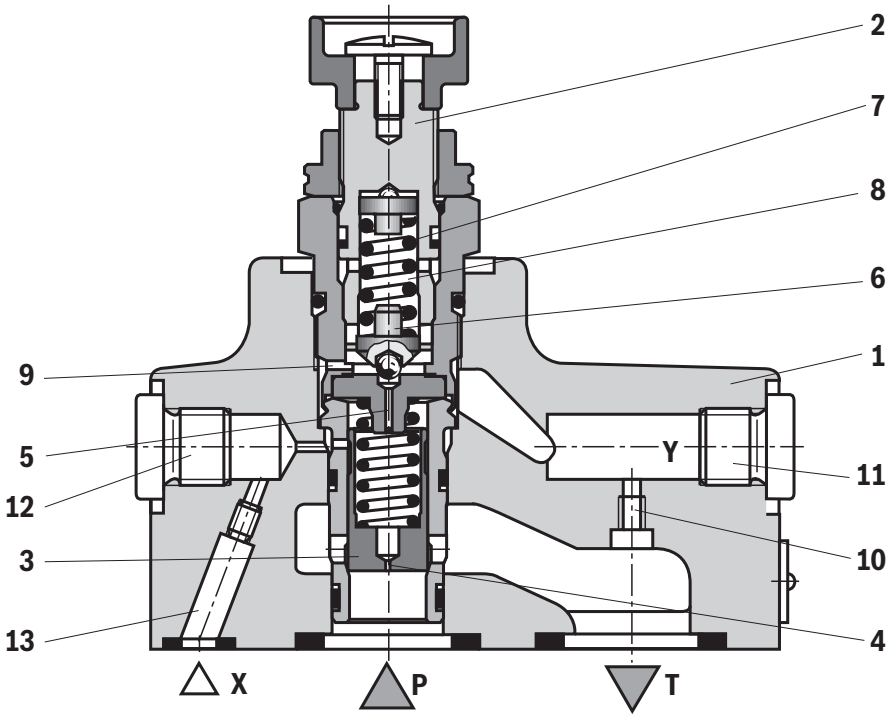


Function, section

Valves of type DB and DBW are pilot-operated pressure relief valves. They are used for limitation (DB) or limitation and solenoid-actuated unloading (DBW) of the operating pressure.
The valves basically consist of housing (1) and pilot control valve (2) with adjustment type.

Pressure relief valve type DB
The pressure applied to channel P acts on the main spool (3). Via the nozzle bores (4 and 5), the pressure is at the same time applied to poppet (6). If the pressure in channel P exceeds the value set at spring (7), poppet (6) opens against spring (7). Via the nozzle bores (4 and 5), the hydraulic fluid from channel P now flows into the spring chamber (8). From here, it is led into the tank internally (version "–"), via the control line (9 and 10), or externally (version "Y") via the control line (9 and 11).

Due to the state of equilibrium at the main spool (3), hydraulic fluid flows from channel P to channel T, maintaining the set operating pressure.
A pressure gauge connection (12) allows for the control of the operating pressure.
The pressure relief valve can be unloaded or switched to another pressure (second pressure rating) via port X (13).
Pressure relief valve type DBW (only threaded connection)
The function of this valve is basically the same as that of valve type DB.
The main spool (3) is unloaded by controlling a built-on directional valve.



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

General					
Size			NG	10	25
Weight	▶ Subplate mounting "–"		kg	1.6	2.3
	▶ Threaded connection "G"	– Type DB	kg	2.95	2.95
		– Type DBW	kg	4.25	4.25
	▶ Screw-in cartridge valve "K"		kg	–	0.35
Installation position				any	
Ambient temperature range		▶ Type DB	°C	–20 ... +80 (NBR seals) –15 ... +80 (FKM seals)	
		▶ Type DBW		–20 ... +50 (NBR seals) –15 ... +50 (FKM seals)	
Conformity	▶ CE according to Low-Voltage Directive 2014/35/EU tested according to			EN 60204-1:2006-01 and DIN VDE 0580, classified as component	

Hydraulic					
Maximum operating pressure	▶ Port P, X		bar	350	
	▶ Port T		bar	315	
Maximum counter pressure	▶ Port Y	– Type DB	bar	250	
	▶ Port Y, T	– Type DBW	bar	210 (DC solenoid) 160 (AC solenoid)	
Minimum set pressure			bar	flow-dependent, see characteristic curves page 9 ... 10	
Maximum set pressure			bar	50; 100; 200; 315; 350 (only type DB)	
Maximum flow	▶ Subplate mounting "–"		l/min	200	400
	▶ Threaded connection "G"			150	200 (G3/4); 300 (G1)
Hydraulic fluid				see table page 7	
Hydraulic fluid temperature range (at the valve working ports)			°C	–20 ... +80 (NBR seals) –15 ... +80 (FKM seals)	
Viscosity range			mm^2/s	10 ... 800	
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)				Class 20/18/15 [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 life cycle of the components.

☞ **Notice:**
Technical data for directional spool valve see data sheet 23178.

Technical data

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

Hydraulic fluid		Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils		HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	FKM	ISO 15380	90221
		HEES	FKM		
	▶ Soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	FKM	ISO 12922	90222
		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	90223

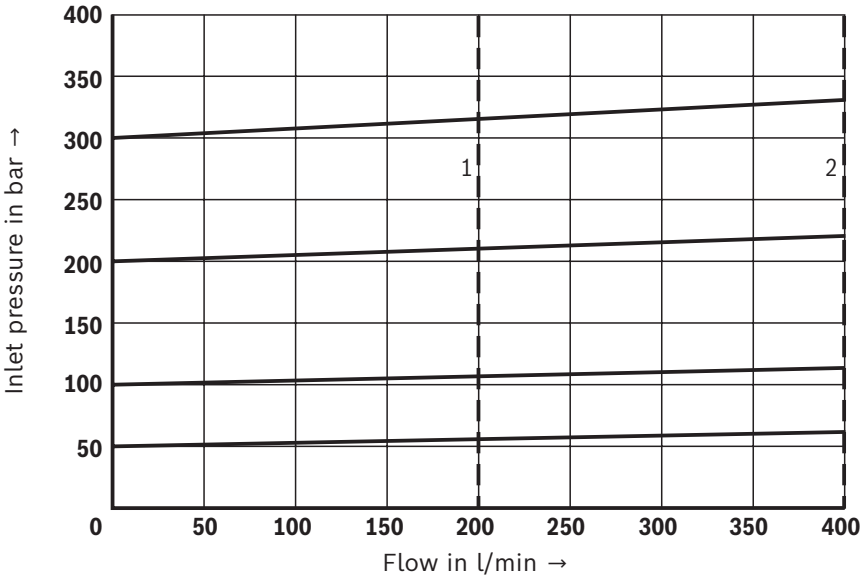
☞ **Important information on hydraulic fluids:**

- ▶ For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ **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, a maximum duty cycle of 50% in continuous operation has to be set for on/off valves (measuring time 300 s). If this is not possible due to the function, an energy-reducing control of these components is recommended, e.g. via a PWM plug-in amplifier.

Characteristic curves

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

Inlet pressure dependent on the flow



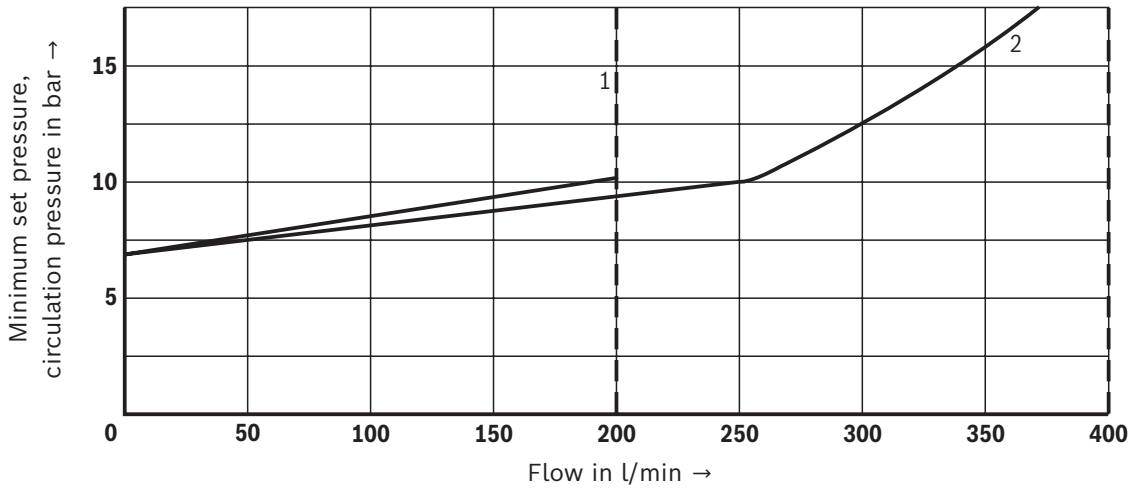
1 Size 10
2 Size 25

☞ **Notice:**

- The characteristic curves were measured with **external, depressurized pilot oil return**.
- With internal pilot oil return, the inlet pressure increases by the output pressure present in port T.

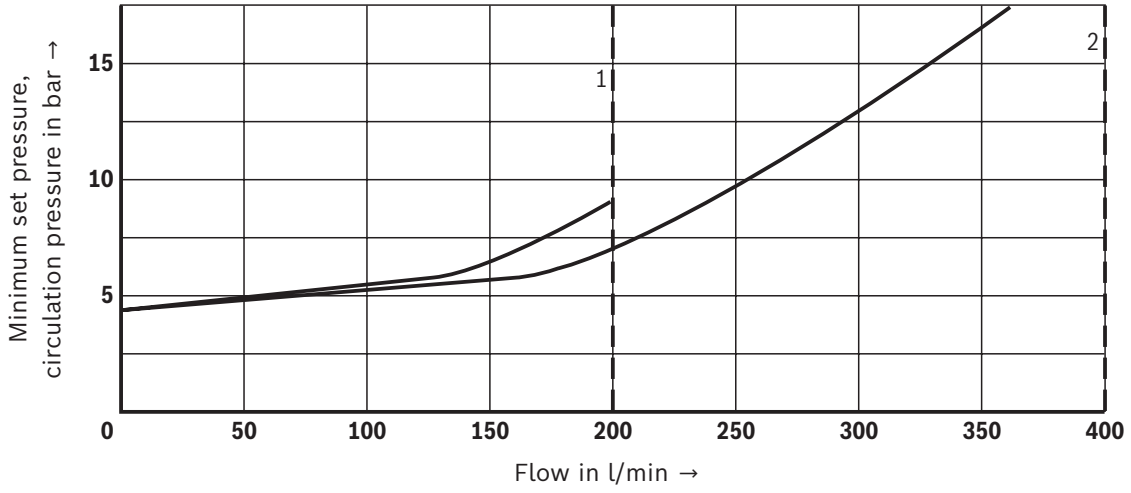
Characteristic curves: Subplate mounting (measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Minimum set pressure and circulation pressure dependent on the flow [1)]
Standard version



1 Size 10
2 Size 25

Minimum set pressure and circulation pressure dependent on the flow [1)]
Version "U"



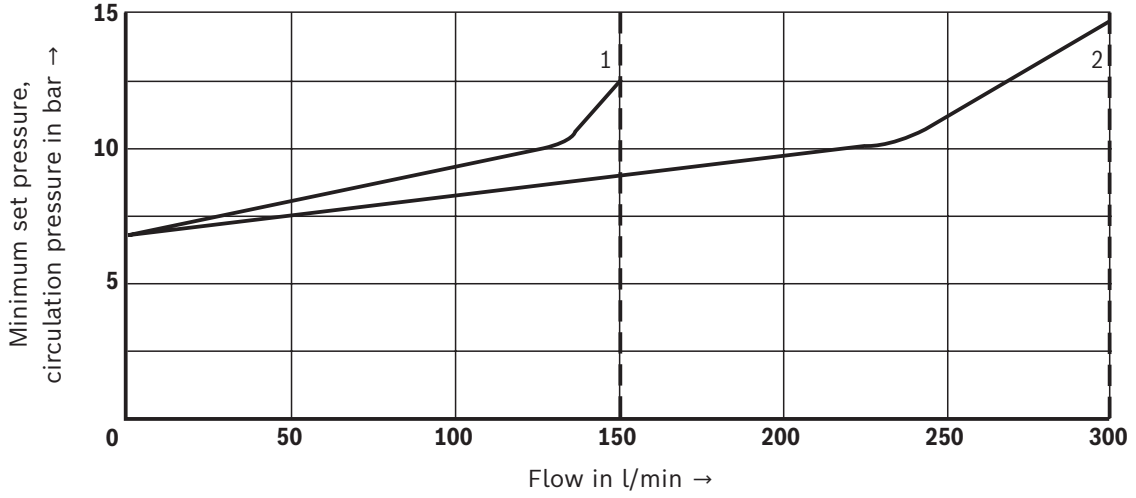
1 Size 10
2 Size 25

☞ **Notice:**
- The characteristic curves were measured with **external, depressurized pilot oil return.**
- With internal pilot oil return, the inlet pressure increases by the output pressure present in port T.

[1)] The characteristic curves apply to the pressure at the valve output p_T = 0 bar across the entire flow range.

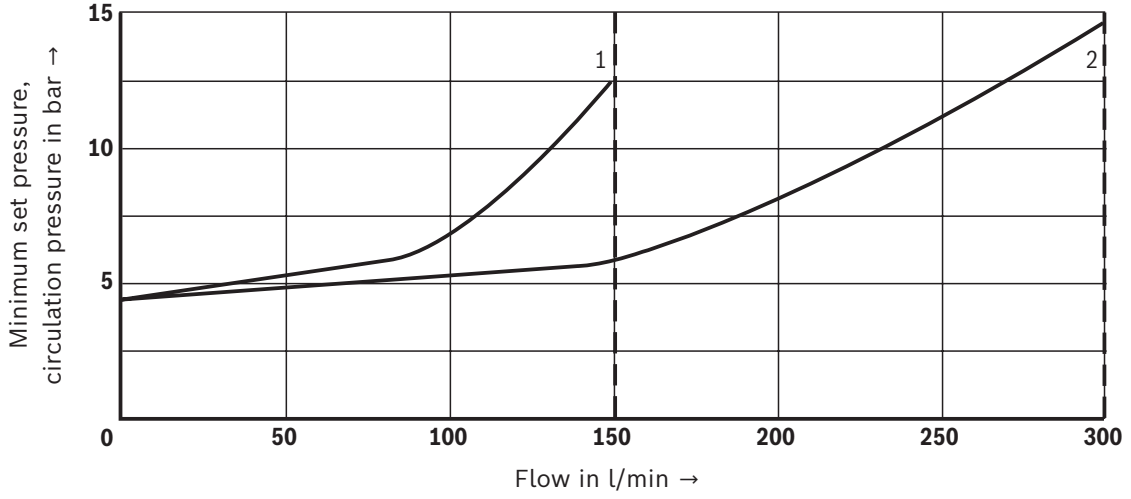
Characteristic curves: Threaded connection (measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Minimum set pressure and circulation pressure dependent on the flow [1)]
Standard version



1 Size 10
2 Size 25

Minimum set pressure and circulation pressure dependent on the flow [1)]
Version "U"

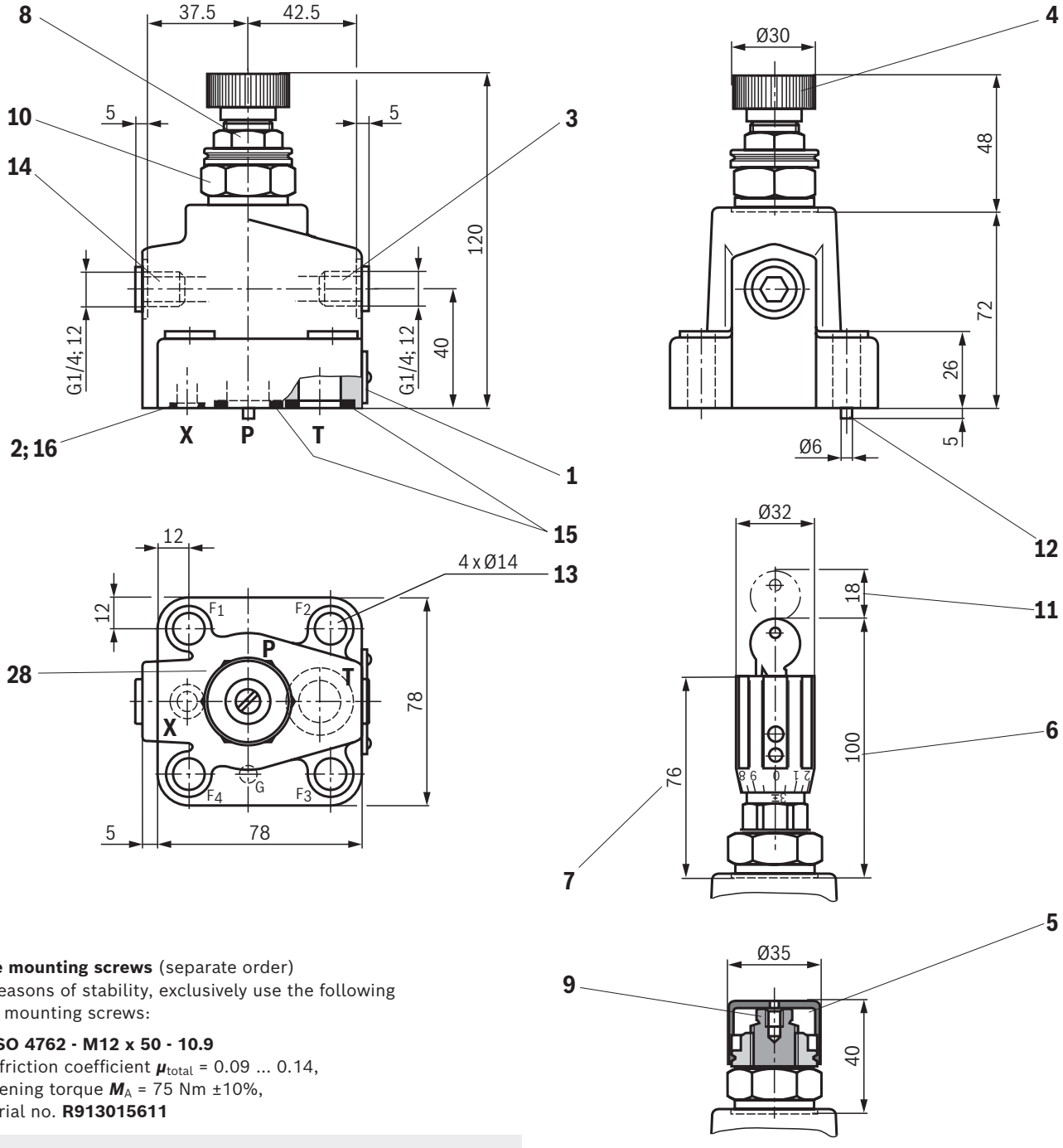


1 Size 10
2 Size 25

☞ **Notice:**
- The characteristic curves were measured with **external, depressurized pilot oil return.**
- With internal pilot oil return, the inlet pressure increases by the output pressure present in port T.

[1)] The characteristic curves apply to the pressure at the valve output p_T = 0 bar across the entire flow range.

Dimensions: Subplate mounting – size 10 (dimensions in mm)

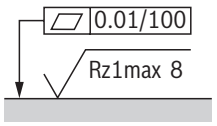


Valve mounting screws (separate order)
For reasons of stability, exclusively use the following valve mounting screws:

4 x ISO 4762 - M12 x 50 - 10.9
with friction coefficient μ_{total} = 0.09 ... 0.14,
Tightening torque M_A = 75 Nm ±10%,
Material no. **R913015611**

☞ **Notice:**
The tightening torques are guidelines when using screws with the specified friction coefficients and when using a manual torque wrench (tolerance ± 10%).

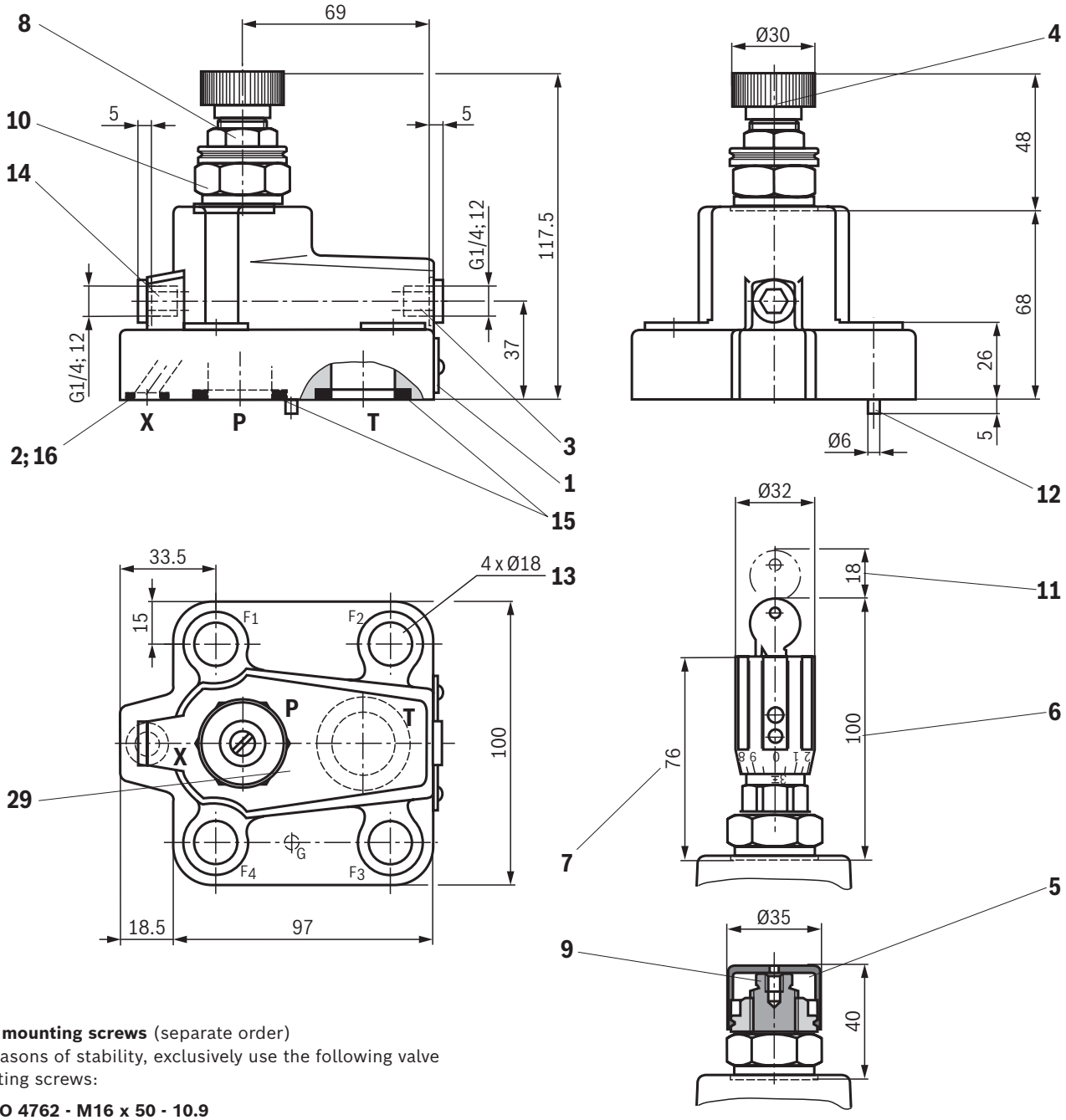
Subplates (separate order) with porting pattern according to ISO 6264-06-09-*-97 see data sheet 45100.



Required surface quality of the valve contact surface

Item explanations see page 17.

Dimensions: Subplate mounting – size 25 (dimensions in mm)

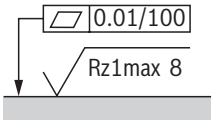


Valve mounting screws (separate order)
For reasons of stability, exclusively use the following valve mounting screws:

4 x ISO 4762 - M16 x 50 - 10.9
with friction coefficient μ_{total} = 0.09 ... 0.14,
Tightening torque M_A = 185 Nm ±10 %,
Material no. **R913015664**

☞ **Notice:**
The tightening torques are guidelines when using screws with the specified friction coefficients and when using a manual torque wrench (tolerance ± 10%).

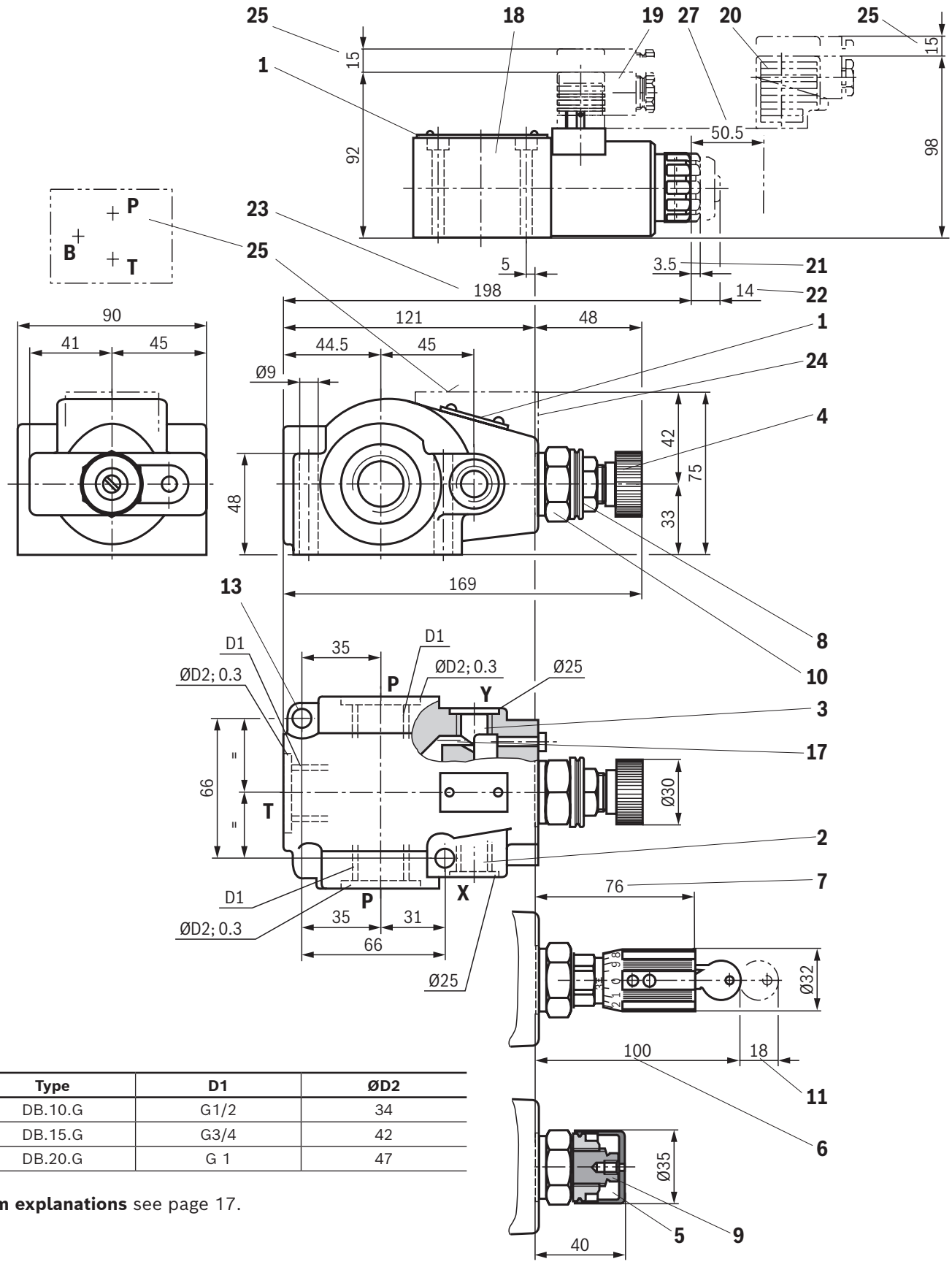
Subplates (separate order) with porting pattern according to ISO 6264-08-13-*-97, see data sheet 45100.



Required surface quality of the valve contact surface

Item explanations see page 17.

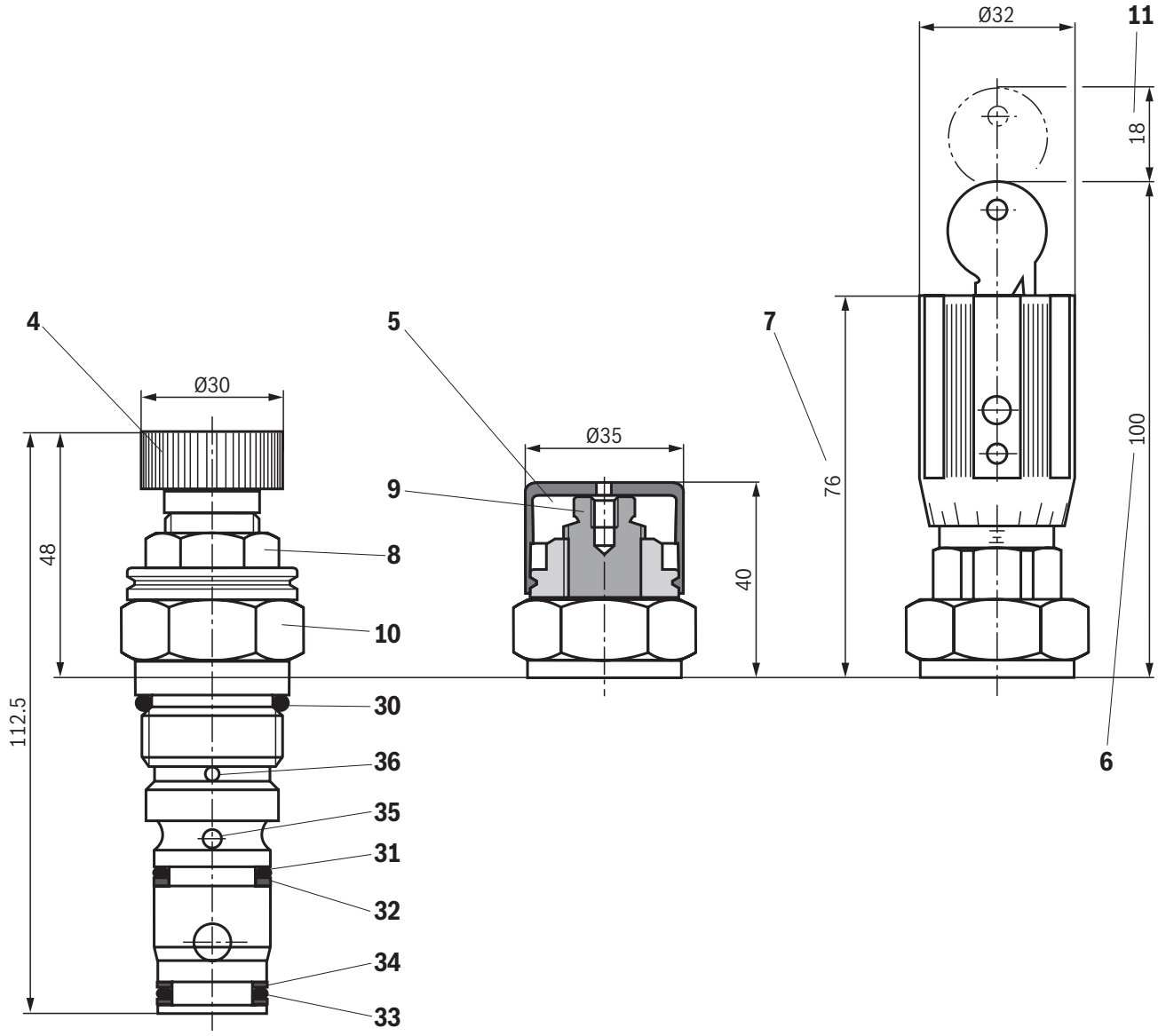
Dimensions: Threaded connection
(dimensions in mm)



Type	D1	ØD2
DB.10.G	G1/2	34
DB.15.G	G3/4	42
DB.20.G	G 1	47

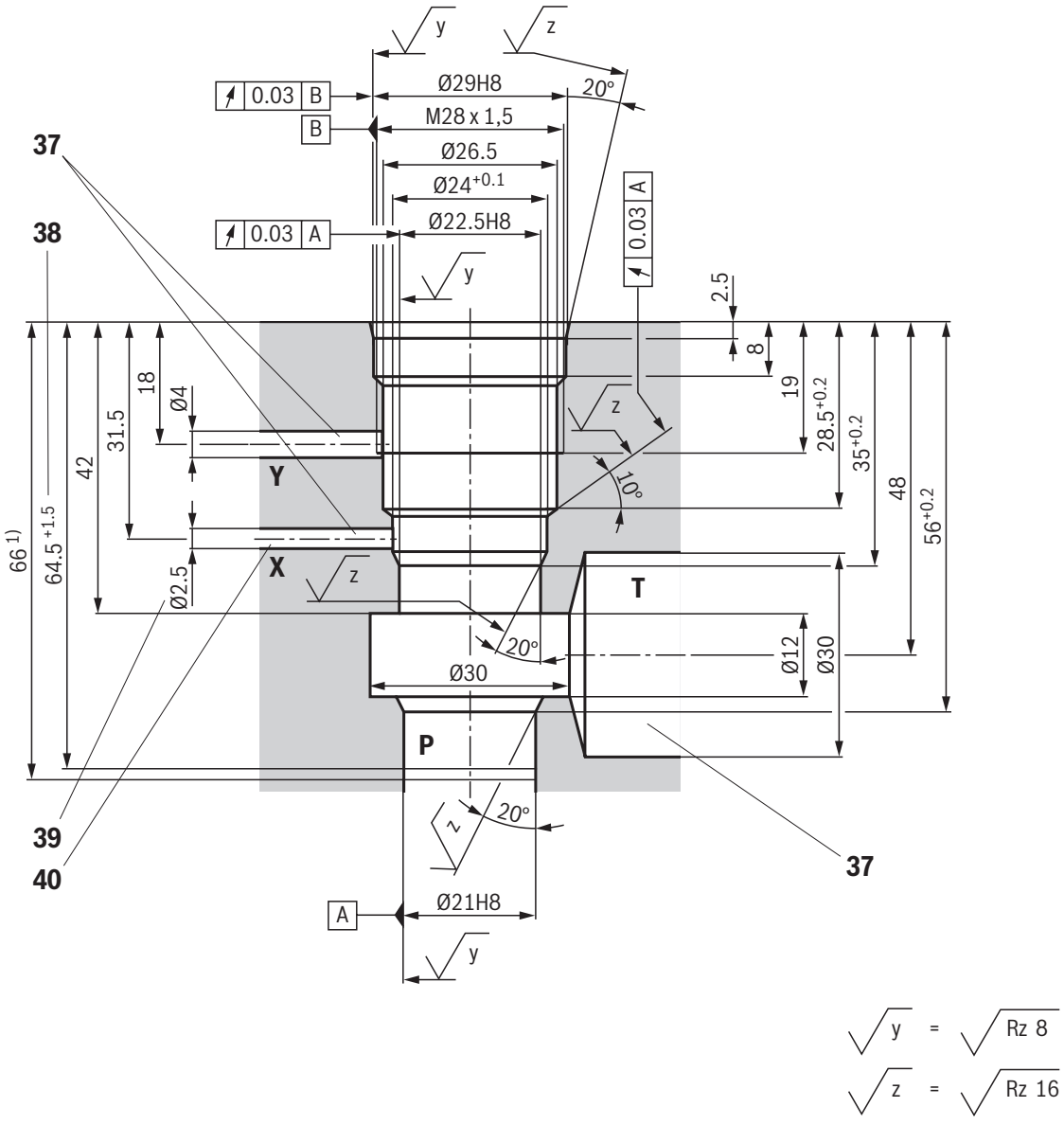
Item explanations see page 17.

Dimensions: Screw-in cartridge valve
(dimensions in mm)



Item explanations see page 17.

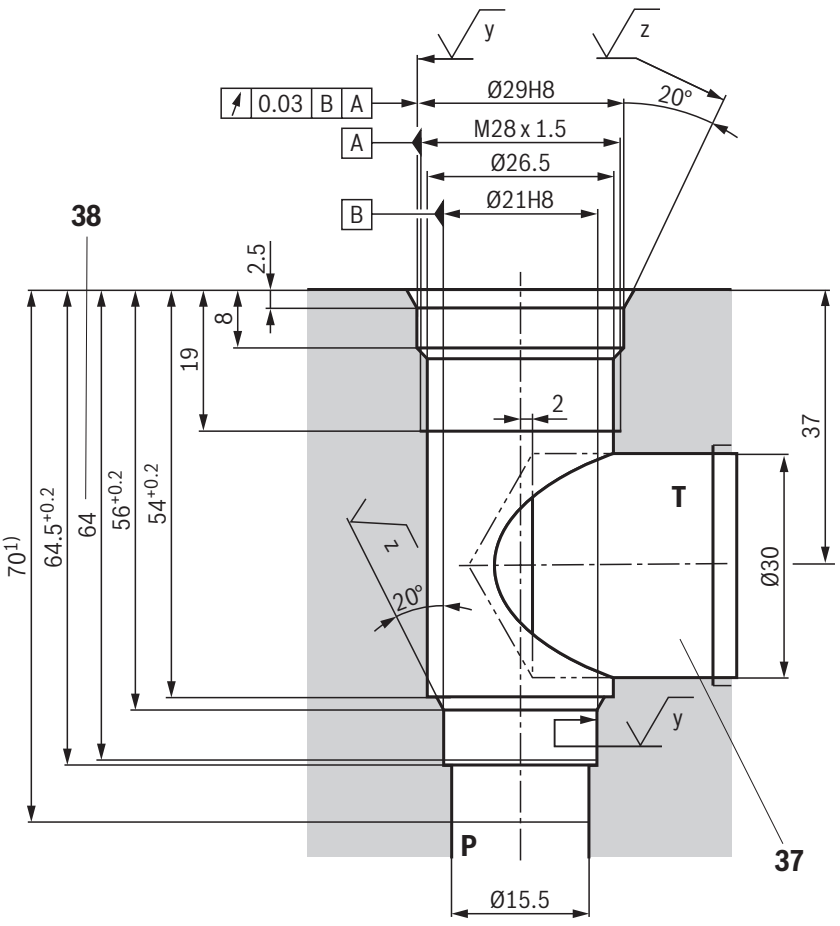
Mounting cavity: Version "XY" and
type-examination tested safety valves version "Y...E" (dimensions in mm)



1) Installation depth

Item explanations see page 17.

Mounting cavity: Version "Y"
(dimensions in mm)



1) Installation depth

Item explanations see page 17.

Dimensions

1 Name plate
2 Port X for remote control, optional
3 Port Y for external pilot oil return
4 Adjustment type "1"
5 Adjustment type "2"
6 Adjustment type "3"
7 Adjustment type "7"
8 Lock nut wrench size 22, tightening torque $M_A = 10^{+5}$ Nm
9 Hexagon, wrench size 10
10 Hexagon, wrench size 30, tightening torque M_A = 50 Nm
11 Space required to remove the key
12 Locating pin
13 Valve mounting bores
14 Pressure gauge connection
15 Identical seal rings for ports P and T
16 Seal ring for port X
17 Grub screw is omitted with internal pilot oil return
18 Directional spool valve NG6, see data sheet 23178
19 Mating connector **without** circuitry
(separate order, see page 20)
20 Mating connector **with** circuitry
(separate order, see page 20)
21 Dimension for valve without manual override
22 Dimension for valve with manual override "N"
23 Dimension for valve with concealed manual override "N9"
24 Housing for version "W"
25 Space required to remove the mating connector
26 Valve contact surface; port A is not bored
27 Space required to remove the solenoid coil
28 Porting pattern according to ISO 6264-06-09-*-97
29 Porting pattern according to ISO 6264-08-13-*-97
30 Seal ring
31 Seal ring (omitted with version "Y")
32 Support ring (omitted with version "Y")
33 Seal ring
34 2 support rings
35 Bore for port X not available with version "Y"
36 Bore for port Y available with version "XY" and "Y"
37 Bore X, Y and T optionally at the circumference for version "XY"
Bore T optionally at the circumference for version "Y"
(no separate bore Y required; pilot oil return via bore T)
38 Depth of fit
39 Bore Ø 2.5 is only to be bored if necessary
40 Port X does not have to be bored for type-examination tested safety valves version "Y...E" as it does not have any function.

Ordering code: Type-examination tested safety valves type DB 20 K...E, component series 1X according to Pressure Equipment Directive 2014/68/EU

NG	Type designation	Component marking	Maximum flow q_{Vmax} in l/min	Set response overpressure p in bar
25	DB 20 K [1] –1X/ [2] Y [3] E	TÜV.SV.[ ]–1001.14,4.F.G.p	70	30 ... 60
			100	61 ... 110
			150	111 ... 210
			200	211 ... 315
			300	316 ... 350

Adjustment type

1	Hand wheel (pressure adjustment sealed, unloading or setting of a lower response pressure possible)	**1**
	With sealed protective cap (no adjustment/unloading possible)	**2**
2	Pressure in the designation is to be entered by the customer, pressure adjustment ≥30 bar and possible in 5-bar steps.	**e.g. 150**

Seal material

3	NBR seals	**no code**
	FKM seals	**V**
[ ]	Value entered at the factory	

Deviating technical data: Type-examination tested safety valves type DB 20 K...E, Component series 1X, according to the Pressure Equipment Directive 2014/68/EU [1)]

General				
Conformity				CE according to Pressure Equipment Directive 2014/68/EU

Hydraulic				
Maximum counter pressure	▶ Port Y		bar	0
	▶ Port T	"No code" version	bar	0
		Version "Y"		10
Maximum flow				see preceding table
Hydraulic fluid				Mineral oil (HL, HLP) according to DIN 51524
Hydraulic fluid temperature range (= TS)			°C	–10 ... +60
Viscosity range			mm^2/s	12 ... 230

[1)] For applications outside these parameters, please consult us!

Safety instructions: Type-examination tested safety valves type DB 20 K...E, component series 1X according to Pressure Equipment Directive 2014/68/EU

- Before ordering a type-examination tested safety valve, it must be ensured that at the desired **response pressure** ***p***, the maximum admissible **flow** $q_{V\,max}$ (= numerical value at the position of letter "G" in the component marking) of the safety valve is higher than the maximum possible flow of the system/accumulator to be secured. In this respect, the applicable regulations must be observed.
- According to the **Pressure Equipment Directive 2014/68/EU**, the increase in the system pressure due to the flow must not exceed 10% of the set response pressure (see component marking).
- The maximum admissible flow $q_{V\,max}$ stated in the component marking must not be exceeded.
- Discharge lines of safety valves must end in a risk-free manner. The accumulation of fluids in the discharge lines must **not** be possible (see AD2000 - data sheet A2).

☞ **Application notes must always be observed**

- In the plant, the response pressure specified in the component marking is set at a flow of 2 l/min.
- The maximum admissible flow specified in the component marking applies to:
  - External pilot oil return **"Y"** without counter pressure in the pilot oil return line: Admissible counter pressure in the discharge line (port T) < 10 bar.
- By removing a lead seal at the safety valve, the approval according to the Pressure Equipment Directive becomes void
- Mounting cavities (see page 15 and 16)
- The requirements of the Pressure Equipment Directives and of data sheet AD2000 A2 must be observed.

Accessories (separate order)

Mating connectors and cable sets

Pos. [1]	Designation	Version	Short designation	Material number	Data sheet
19, 20	Mating connector; for valves with "K4" connector, 2-pole + PE, design A	Without circuitry, M16 x 1.5, 12 ... 240 V, "a"	Z4	**R901017010**	08006
		Without circuitry, M16 x 1.5, 12 ... 240 V, "b"		**R901017011**	
		With indicator light, M16 x 1.5, 12 ... 240 V	Z5L	**R901017022**	
		With rectifier, M16 x 1.5, 80 ... 240 V	RZ5	**R901017025**	
		With indicator light and Z-diode-suppressor, M16 x 1.5, 24 V	Z5L1	**R901017026**	

[1] See dimensions page 13.

General information

- The unloading function (directional valve function with version "W") must not be used for safety functions.
- With version **"B"**, the lowest adjustable pressure (circulation pressure) is set in case of power failure or cable break. With version **"A"**, the pressure limiting function is set in case of power failure or cable break.
- Hydraulic counter pressures in port T with internal pilot oil return and/or port Y with external pilot oil return add 1:1 to the response pressure of the valve set at the pilot control.

Example:
Pressure adjustment of the valve by spring preload (pos. 7 on page 5) in the pilot control valve/adjustment type $\boldsymbol{p}_{spring}$ **= 200 bar**

Hydraulic counter pressure in port T with internal pilot oil return $\boldsymbol{p}_{hydraulic}$ **= 50 bar**

=> Response pressure = $\boldsymbol{p}_{spring}$ **+** $\boldsymbol{p}_{hydraulic}$ **= 250 bar**

Further information

▶ Safety equipment against excessive pressure – safety valves	Data sheet AD 2000 A 2
▶ Subplates	Data sheet 45100
▶ Hydraulic fluids on mineral oil basis	Data sheet 90220
▶ Environmentally compatible hydraulic fluids	Data sheet 90221
▶ MTTFd reliability characteristics regarding the functional safety according to ISO 13849	Data sheet 90294
▶ Hydraulic valves for industrial applications	Operating instructions 07600-B
▶ Information on available spare parts	www.boschrexroth.com/spc

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