

Pressure relief valve, direct operated

Type DBD



- ▶ Size 6 ... 30
- ▶ Component series 1X
- ▶ Maximum operating pressure 630 bar
- ▶ Maximum flow 330 l/min



Features

- ▶ As screw-in cartridge valve (cartridge)
- ▶ For threaded connection
- ▶ For subplate mounting
- ▶ Adjustment types for pressure adjustment, optionally:
 - Bushing with hexagon and protective cap
 - Rotary knob
 - Hand wheel
 - Lockable rotary knob
- ▶ Corrosion-protected design

Contents

Features	1
Ordering code	2, 3
Function, section, symbol	4
Technical data	5, 6
Characteristic curves	7, 8
Dimensions	9 ... 13

Type-examination tested safety valve type DBD...E according to Pressure Equipment Directive 2014/68/EU

(in the following shortly PED)

Deviating technical data	14
Ordering code	15
Characteristic curves	16
Deviating dimensions	17
Sheet cut-out for front panel mounting	18
Safety instructions	19
Counter pressure in the discharge line	19 ... 23
Further information	24

Ordering code

01	02	03	04	05	06	07	08	09	10	11
DBD				1X	/					*

01	Pressure relief valve, direct operated	DBD
----	--	-----

Adjustment type for pressure adjustment

02		NG6	NG8	NG10	NG15	NG20	NG25	NG30	
	Bushing with hexagon and protective cap	✓	✓	✓	✓	✓	✓	✓	S
	Rotary knob ¹⁾	✓	✓	✓	✓	✓	-	-	H
	Hand wheel ²⁾	-	-	-	-	-	✓	✓	H
	Lockable rotary knob ^{1; 3; 4)}	✓	✓	✓	✓	✓	-	-	A

03	Size 6 (port G1/4)	6
	Size 8 (port G3/8)	8
	Size 10 (port G1/2)	10
	Size 15 (port G3/4)	15
	Size 20 (port G1)	20
	Size 25 (port G1 1/4)	25
	Size 30 (port G1 1/2)	30

Type of connection

04		NG6	NG8	NG10	NG15	NG20	NG25	NG30	
	As screw-in cartridge valve (cartridge)	✓	-	✓	-	✓	-	✓	K
	For threaded connection	✓	✓	✓	✓	✓	✓	✓	G
	For subplate mounting	✓	-	✓	-	✓	-	✓	P

05	Component series 10 ... 1Z (10 ... 1Z: unchanged installation and connection dimensions)	1X
----	--	----

Pressure rating ⁵⁾

06		NG6	NG8	NG10	NG15	NG20	NG25	NG30	
	Set pressure up to 25 bar	✓	✓	✓	✓	✓	✓	✓	25
	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 400 bar	✓	✓	✓	✓	✓	-	-	400
	Set pressure up to 630 bar ⁶⁾	-	-	✓	-	-	-	-	630

Corrosion resistance (for availability see table on page 3)

07	None	no code
	Improved corrosion protection (240 h salt spray test according to EN ISO 9227)	J3
	High corrosion protection (720 h salt spray test according to EN ISO 9227)	J5

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

08	NBR seals	no code
	FKM seals	V

Line connection

09	Pipe thread according to ISO 228/1	no code
	SAE thread	12


Equipment Directive

10	Without type-examination procedure	no code
	Type-examination tested safety valve according to PED 2014/68/EU ⁷⁾	E

11	Further details in the plain text	
----	-----------------------------------	--


Ordering code

- 1) For size 20, only available for the pressure ratings 25, 50 or 100 bar.
- 2) Available for the pressure ratings 25, 50 or 100 bar only.
- 3) Key with material no. **R900008158** is included in the scope of delivery.
- 4) Not available for type-examination tested safety valves "E".
- 5) When selecting the pressure rating, please observe the characteristic curves and notices on page 8.
- 6) With version "G" and "P", only available as "SO292", see page 9 and 12.
- 7) See ordering code on page 15.

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

Availability corrosion resistance (Without type-examination procedure; only adjustment type "S")

Type of connection	NG6	NG8	NG10	NG15	NG20	NG25	NG30
As screw-in cartridge valve "K"	no code, J5	–	no code, J5	–	no code, J5	–	no code, J5
For threaded connection "G"	no code, J3	no code	no code, J3	no code	no code, J3	no code	no code, J3
For subplate mounting "P"	no code, J3	–	no code, J3	–	no code, J3	–	no code, J3

 **Notice:**
Deviating ordering code for type-examination tested safety valves "E" can be found on page 15

Function, section, symbol

Pressure relief valves of type DBD are direct operated seat valves. They are used for limiting a system pressure. The valves basically consist of sleeve (1), spring (2), poppet with damping piston (3) (pressure rating 25 ... 400 bar) or ball (4) (pressure rating 630 bar) and adjustment type (5). The system pressure can be set steplessly via the adjustment type (5). The spring (2) pushes the poppet (3) or the ball (4) onto the seat. Channel P is connected to the system. The pressure existing in the system acts on the poppet surface (or the ball). If the pressure in channel P exceeds the value set at the spring (2), the poppet (3) or the ball (4) opens against the spring (2). Now, hydraulic fluid from channel P flows into channel T. The stroke of the poppet (3) is limited by the embossing (6).

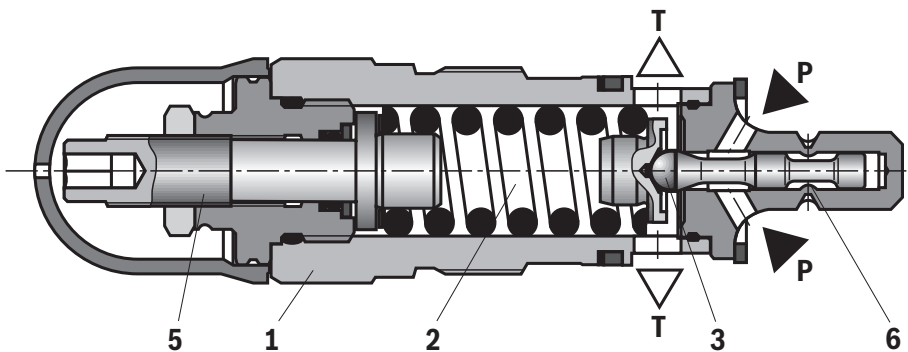
In order to achieve good pressure adjustment over the entire pressure range, the entire pressure range has been divided into 7 pressure ratings. One pressure rating corresponds to a certain spring for a maximum operating pressure that can be set by means of that spring.

Notice:

The adjustment type (5) is constructed so that it cannot be lost. Due to the gimbal-mounting, the adjustment element remains loose (movable) in the adjustment type (5) in case of complete unloading. Pressure rating "25":

If despite completely unloaded adjustment type, the minimum pressure does not settle, the adjustment element has to be "pulled back" to the stop due to the low spring and/or restoring force.

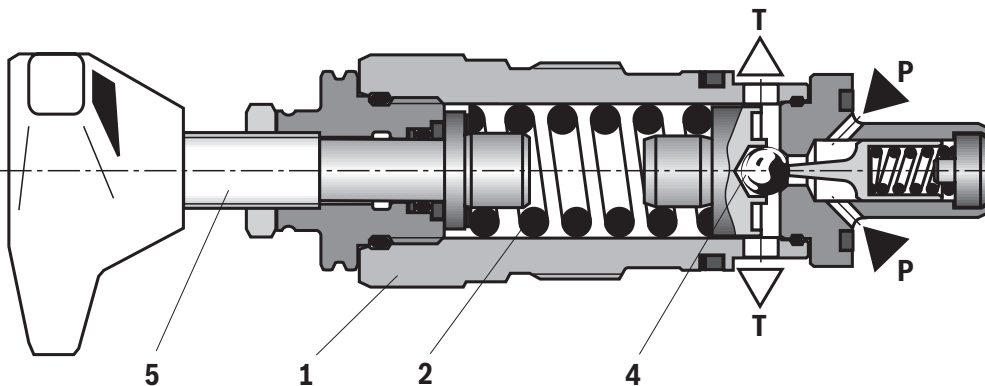
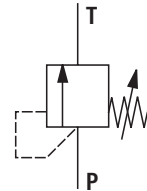
For pressure adjustment / increase, the adjustment element can then be screwed in again.



Type DBDS..K1X/...

Version pressure rating 25 ... 400 bar (poppet seat valve)

Symbol



Type DBDH 10 K1X/...

Version pressure rating 630 bar (ball seat valve, only NG10)

Technical data

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

General					
Size	NG	6, 8	10	15, 20	25, 30
Weight	See pages 9, 11 and 12				
Installation position	any				
Ambient temperature range	°C	-30 ... +80 (NBR seals) -15 ... +80 (FKM seals)			
Minimum stability of the housing materials	Housing materials are to be selected so that there is sufficient safety for all imaginable operating conditions (e. g. with reference to pressure resistance, thread stripping strengths and tightening torques).				
MTTF _D values according to EN ISO 13849	years	150 ... 1200 (for more information see data sheet 08012)			

Hydraulic						
Maximum operating pressure	► Input					
	– Standard	bar	400	400	400	315
	– Version "630"	bar	–	630	–	–
	► Output	bar	315	315	315	315
Minimum set pressure	See characteristic curves page 7					
Maximum flow (standard valves)	See characteristic curves page 8					
Hydraulic fluid	See table page 6					
Hydraulic fluid temperature range	°C	-30 ... +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.

Deviating technical data for type-examination tested safety valves can be found on page 14.



Notice:

Hydraulic counter pressures in port T add 1:1 to the response pressure of the valve set at the adjustment type.

Example:

- Pressure adjustment of the valve due to spring preload (item 2 on page 4) $p_{\text{spring}} = 200 \text{ bar}$
- Hydraulic counter pressure in port T: $p_{\text{hydraulic}} = 50 \text{ bar}$
- ⇒ Response pressure = $p_{\text{spring}} + p_{\text{hydraulic}} = 250 \text{ bar}$

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, HVLDP	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	ISO 15380	90221
		HEES		
	▶ Soluble in water	HEPG	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	ISO 12922	90222
		HFDU (ester base)		
		HFDR		
	▶ Containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	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.

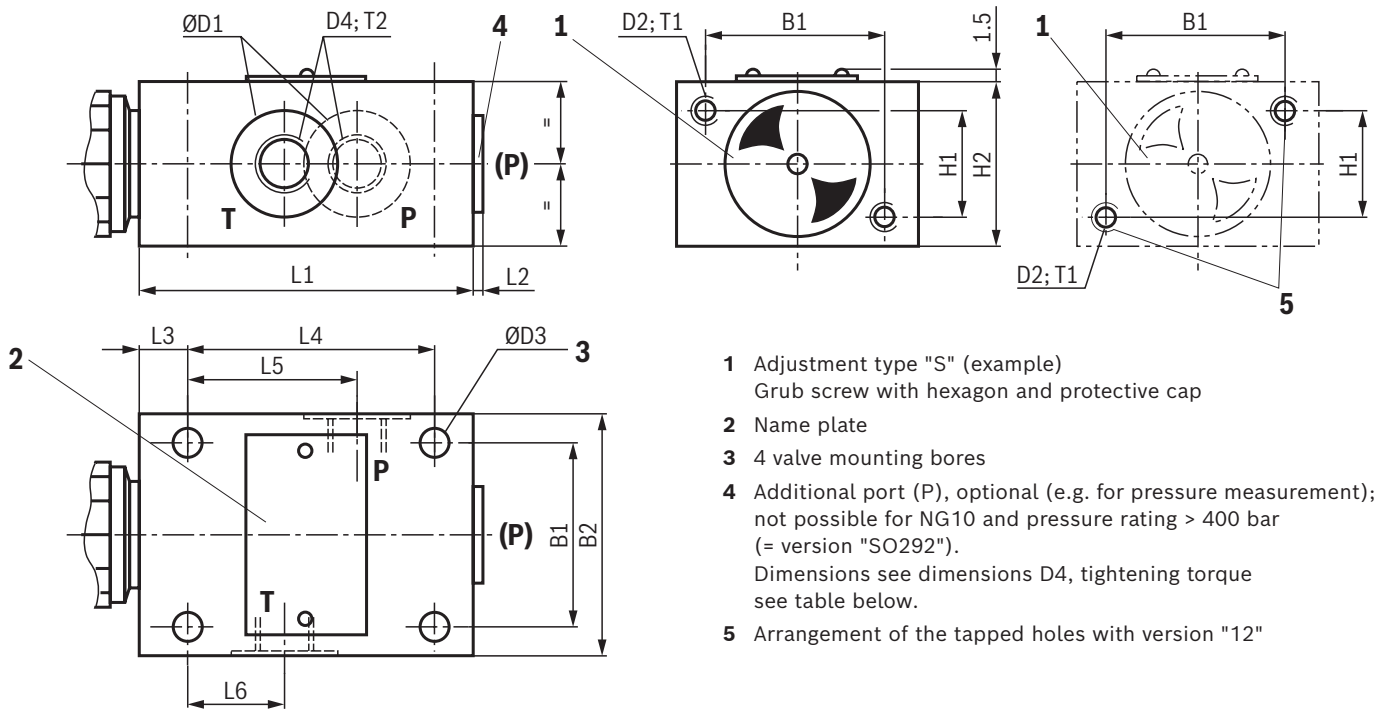
▶ Bio-degradable and flame-resistant – containing water:

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.

Dimensions: Threaded connection
(dimensions in mm)



- 1 Adjustment type "S" (example)
Grub screw with hexagon and protective cap
- 2 Name plate
- 3 4 valve mounting bores
- 4 Additional port (P), optional (e.g. for pressure measurement);
not possible for NG10 and pressure rating > 400 bar
(= version "SO292").
Dimensions see dimensions D4, tightening torque
see table below.
- 5 Arrangement of the tapped holes with version "12"

NG	B1	B2	$\text{ØD1}^{1)}$	D2 ¹⁾	ØD3	D4 ¹⁾	Tightening torques M_A in Nm for fittings ²⁾	
							Plug screw (4)	Pipe fittings
6	45	60	25	M6	6.6	G1/4	30	60
8	60	80	28	M8	9	G3/8	40	90
10	60	80	34	M8	9	G1/2	60	130
15	70	100	42	M8	9	G3/4	80	200
20	70	100	47	M8	9	G1	135	380
25	100	130	56	M10	11	G1 1/4	480	500
30	100	130	65	M10	11	G1 1/2	560	600

NG	H1	H2	L1	L2	L3	L4	L5	L6	T1	T2 ¹⁾	Weight, approx. in kg
6	25	40	80	4	15	55	40	20	10	12	1.5
8	40	60	100	4	20	70	48	21	15	12	3.7
10	40	60	100	4	20	70	48	21	15	14	3.7
15	50	70	135	4	20	100	65	34	18	16	6.4
20	50	70	135	5.5	20	100	65	34	18	18	6.4
25	60	90	180	5.5	25	130	85	35	20	20	13.9
30	60	90	180	5.5	25	130	85	35	20	22	13.9

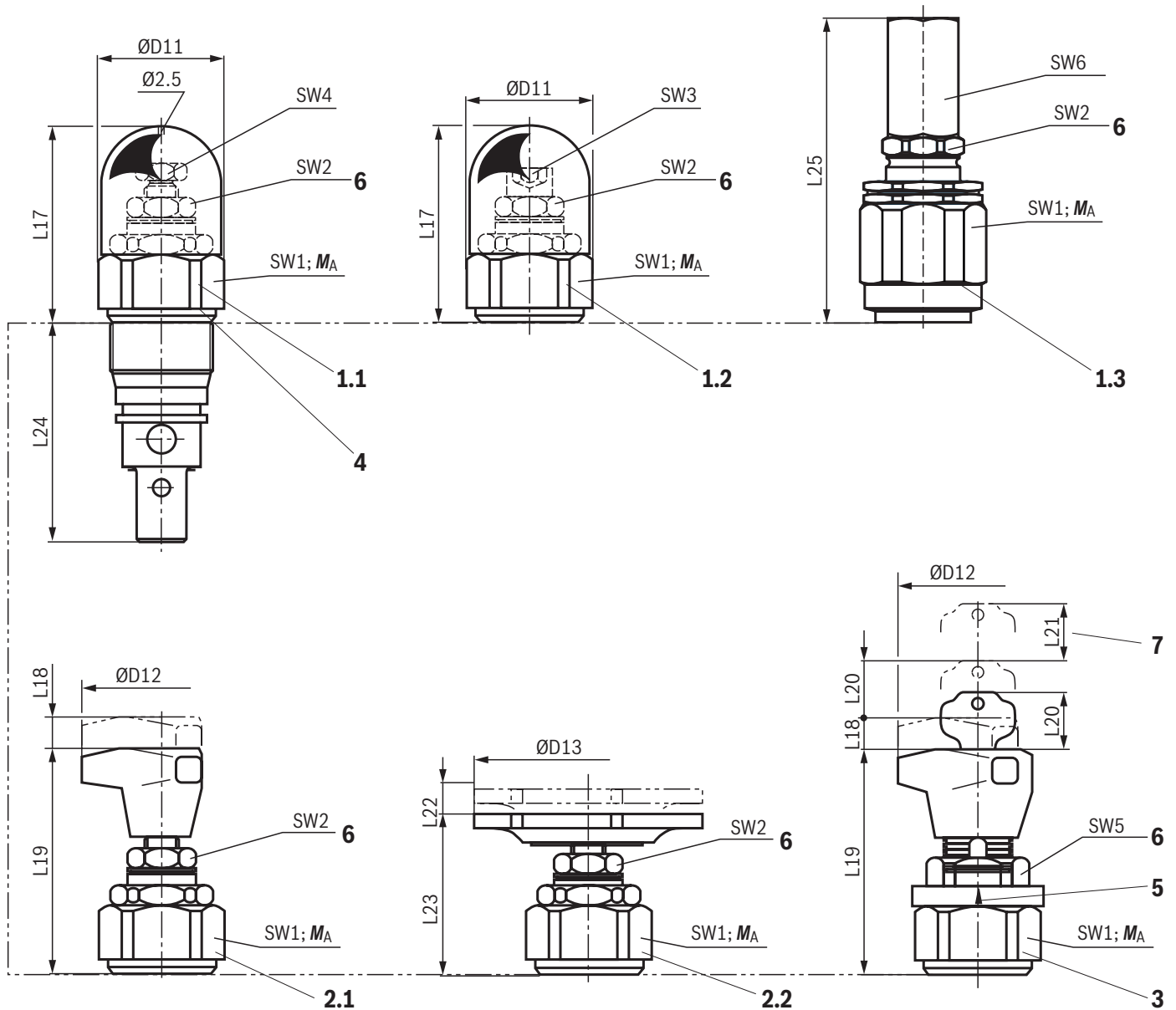
1) Deviating dimensions for version "12"

NG	ØD1	D2	D4	T2
6	21	1/4"-20 UNC	7/16"-20 UNF	12
8	25	5/16"-18 UNC	9/16"-18 UNF	13
10	32	5/16"-18 UNC	3/4"-16 UNF	15
15	41	5/16"-18 UNC	1 1/16"-12 UN	20
20	49	5/16"-18 UNC	1 5/16"-12 UN	20
25	58	3/8"-16 UNC	1 5/8"-12 UN	20
30	70	3/8"-16 UNC	1 7/8"-12 UN	16

2) The tightening torques are guidelines, referring to the maximum operating pressure and when using a manual torque wrench (tolerance $\pm 10\%$).

For the versions and dimensions of the adjustment types refer to page 10 and 11.

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

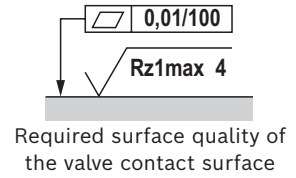
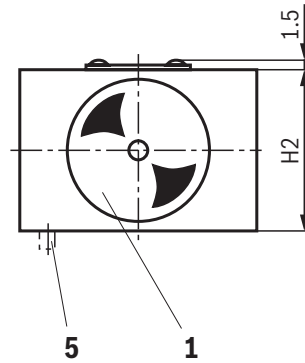
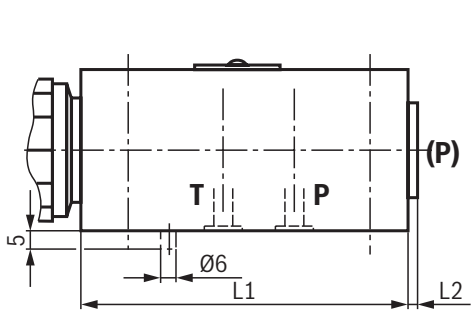


- 1.1 Adjustment type "S" – Grub screw with hexagon and protective cap; internal hexagon (NG6 ... NG20)
- 1.2 Adjustment type "S" – Grub screw with hexagon and protective cap; external hexagon (NG30)
- 1.3 Adjustment type "S" – Grub screw with hexagon and protective cap; version "J3" and "J5"
- 2.1 Adjustment type "H" – rotary knob (NG6 ... NG20)
- 2.2 Adjustment type "H" – hand wheel (NG30)
- 3 Adjustment type "A" – lockable rotary knob NG6 ... NG10 (NG20 ... 100 bar)
- 4 Type designation

- 5 Marking (adjustment of the zero position after the valve has been screwed in; then fixing of the ring by horizontal shifting until it engages on the plug screw SW6).
- 6 Lock nut, tightening torque $M_A = 10^{+5}$ Nm
- 7 Space required to remove the key

Dimensional tables see page 11, installation bore see page 13.

Dimensions: Subplate mounting
(dimensions in mm)



- 1 Adjustment type "S" (example)
Grub screw with hexagon and protective cap
- 2 Name plate
- 3 4 valve mounting bores
- 4 Additional port (P), optional (e.g. for pressure measurement); not possible for NG10 and pressure rating > 400 bar (= version "SO292"). Tightening torques see dimensional table on page 9)
- 5 Locking pin (only with type-examination tested safety valves)

For the versions and dimensions of the adjustment types refer to page 10 and 11.

NG	B1	B2	ØD3	H2	L1	L2	L3
6	45	60	6.6	40	80	4	15
10	60	80	9	60	100	4	20
20	70	100	9	70	135	5.5	20
30	100	130	11	90	180	5.5	25

NG	L4	L5	L6	L18	Port P		Weight, approx. in kg
					"no code"	"12"	
6	55	40	20	15	G1/4	7/16"-20 UNF	1.5
10	70	45	21	15	G1/2	3/4-16 UNF	3.7
20	100	65	34	15	G3/4	1 5/16"-12 UN	6.4
30	130	85	35	15	G1 1/4	1 7/8-12 UN	13.9

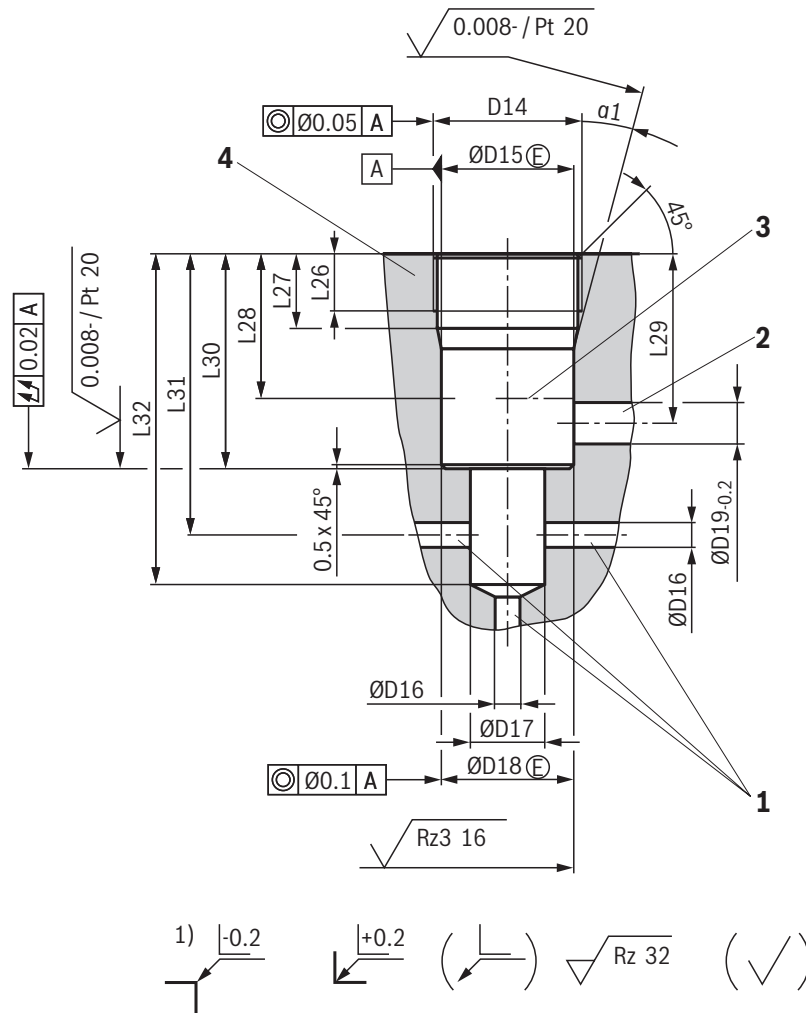
Valve mounting screws (separate order)

Size	Quantity	Hexagon socket head cap screws	Material number
6	4	ISO 4762 - M6 x 50 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{total} = 0.09 \dots 0.14$; tightening torque $M_A = 12.5 \text{ Nm} \leq 10\%$	R913048088
10	4	ISO 4762 - M8 x 70 - 10.9-FlZn/nc/480h/C Tightening torque $M_A = 28 \text{ Nm} \leq 10\%$	R913014548
20	4	ISO 4762 - M8 x 90 - 12.9-flZn/nc/480h/C Tightening torque $M_A = 28 \text{ Nm} \leq 10\%$	R913069227
30	4	ISO 4762 - M10 x 110 - 12.9-flZn/nc/480h/C Tightening torque $M_A = 56 \text{ Nm} \leq 10\%$	R913059433

Notice:

- ▶ For reasons of stability, exclusively the specified valve mounting screws shall be used.
- ▶ As replacement, you can use screws specified according to DIN 912.

Dimensions: Installation bore
(dimensions in mm)



- 1 Port P, at any place at the circumference or at the front side
- 2 Port T, at any place at the circumference
- 3 Depth of fit
- 4 Minimum stability of the housing materials, see Technical data page 5.

1) All seal ring insertion faces are rounded and free of burrs
Tolerance for all angles $\pm 0.5^\circ$

NG	D14	ØD15	ØD16	ØD17	ØD18	ØD19
6	M28 x 1.5	25H9	6	15	24.9 ^{+0.152} -0.2	12
10	M35 x 1.5	32H9	10	18.5	31.9 ^{+0.162} -0.2	15
20	M45 x 1.5	40H9	20	24	39.9 ^{+0.162} -0.2	22
30	M60 x 2	55H9	30	38.75	54.9 ^{+0.174} -0.2	34

NG	L26	L27	L28	L29	L30	L31	L32	α1
6	15	19	30	36	45	56.5±5.5	65	15 °
10	18	23	35	41.5	52	67.5±7.5	80	15 °
20	21	27	45	55	70	91.5±8.5	110	20 °
30	23	29	45	63	84	113.5±11.5	140	20 °

Type-examination tested safety valves

The functionality of these valves corresponds to that of the standard series (see page 4). Valves of type DBD..1X/..E are, however, type-examination tested pressure relief valves according to the Pressure Equipment Directive 2014/68/EU and intended for use as safety valves. At the factory, the response pressure is set to a fixed maximum value using the adjustment type. Afterwards, the safety valve is sealed and/or secured using a safety cap which cannot be disassembled in non-destructive manner.

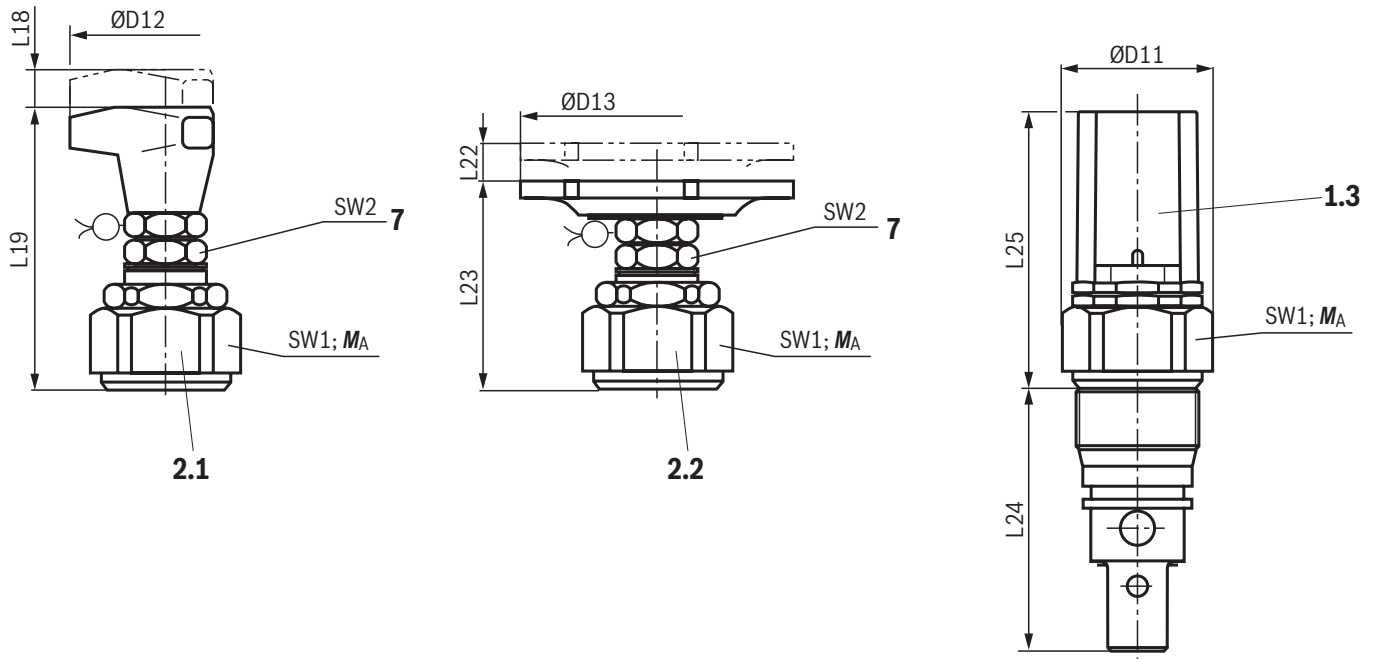
The safety valves are available with graded response pressures (in 5 bar steps). The valve version provided with a safety cap can no longer be adjusted. With valve versions equipped with rotary knob or hand wheel, the valve spring can be unloaded by the user. This way, a response pressure lower than the factory setting can be set without the need of removing the lead seal.

Deviating technical data: Type-examination tested safety valves type DBD ¹⁾

General		
Ambient temperature range	°C	-10 ... +80
Conformity		CE according to Pressure Equipment Directive 2014/68/EU
Hydraulic		
Set response pressure	bar	see last figure of the component marking page 15
Maximum counter pressure in the discharge line	bar	see characteristic curves page 19 ... 23
Maximum flow	l/min	The last but one figure of the component marking attached at the safety valve is always binding, see page 15. For valve types which have a variable maximum flow depending on the response pressure, the discharge coefficient is specified at this place (see page 16).
Hydraulic fluid		Hydraulic fluids according to DIN 51524: Hydraulic oils HL and HLP are suitable for safety valves with NBR or FKM seals.
Hydraulic fluid temperature range (= TS)	°C	-10 ... +60
Viscosity range	mm ² /s	12 ... 230

¹⁾ Component series 1X, according to the Pressure Equipment Directive 2014/68/EU

Deviating dimensions: Screw-in cartridge valve as type-examination tested safety valve type DBD ¹⁾ (dimensions in mm)



NG	ØD11	ØD12	ØD13	L18	L19	L22	L23	L24	L25
6	34	60	40	11	83	11	63	64.5	80
10	38	60	40	11	79	11	59	78.5	76.5
20	48	60	40	11	77	11	57	107	72.5
30	63	-	80	-	-	11	87	134	93

NG	SW1	SW2	Tightening torques M_A in Nm for screw-in cartridge valves ²⁾			Weight, approx. in kg
			Pressure rating in bar			
			up to 200	up to 400	up to 630	
6	32	19	50±5	80±5	-	0.4
10	36	19	100±5	150±10	200±10	0.5
20	46	19	150±10	300±15	-	1
30	60	19	350±20	500±30	-	2.2

- 1.3 Adjustment type "S" – hexagon with safety cap
- 2.1 Adjustment type "H" – rotary knob (see table below)
- 2.2 Adjustment type "H" – hand wheel (see table below)
- 7 Lock nut, tightening torque $M_A = 10^{+5}$ Nm

- 1) Component series 1X, according to the Pressure Equipment Directive 2014/68/EU
- 2) The tightening torques are guidelines with a friction coefficient $\mu_{total} = 0.12$ and when using a manual torque wrench.

Adjustment type for corrosion resistance

	NG6	NG10	NG20	NG30
Without corrosion protection	2.1	2.1	2.1	2.2
Version "J3" and "J5"	2.2	2.2	2.2	2.2