

Pressure relief valve, direct operated

Type DBD

RE 25402

Edition: 2016-07

Replaces: 2014-08



- ▶ Size 6 ... 30
- ▶ Component series 1X
- ▶ Maximum operating pressure 630bar [9150 psi]
- ▶ Maximum flow 330 l/min [87 US gpm]

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

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

(in the following shortly PED)

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Ordering code

| | | | | | | | | | |
|-----|----|----|----|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 |
| 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 ⁵⁾ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | G |
| | For subplate mounting | ✓ | - | ✓ | - | ✓ | - | ✓ | P |

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

Pressure rating ⁶⁾

| 06 | | NG6 | NG8 | NG10 | NG15 | NG20 | NG25 | NG30 | |
|----|---|-----|-----|------|------|------|------|------|-----|
| | Set pressure up to 25 bar [362 psi] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 25 |
| | Set pressure up to 50 bar [725 psi] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 50 |
| | Set pressure up to 100 bar [1450 psi] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| | Set pressure up to 200 bar [2900 psi] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 200 |
| | Set pressure up to 315 bar [4568 psi] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 315 |
| | Set pressure up to 400 bar [5800 psi] | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | 400 |
| | Set pressure up to 630 bar [9150 psi] ⁷⁾ | - | - | ✓ | - | - | - | - | 630 |

Seal material

| | | |
|----|--|---------|
| 07 | NBR seals | no code |
| | FKM seals | V |
| | Observe compatibility of seals with hydraulic fluid used! (Other seals upon request) | |

Line connection


| | | |
|----|------------------------------------|---------|
| 08 | Pipe thread according to ISO 228/1 | no code |
| | SAE thread | 12 |

Equipment Directive

| | | |
|----|--|---------|
| 09 | Without type-examination procedure | no code |
| | Type-examination tested safety valve according to PED 2014/68/EU ⁸⁾ | E |

| | | |
|----|---|--|
| 10 | For further information, see the plain text | |
|----|---|--|

Explanation of the footnotes see page 3.

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

Ordering code

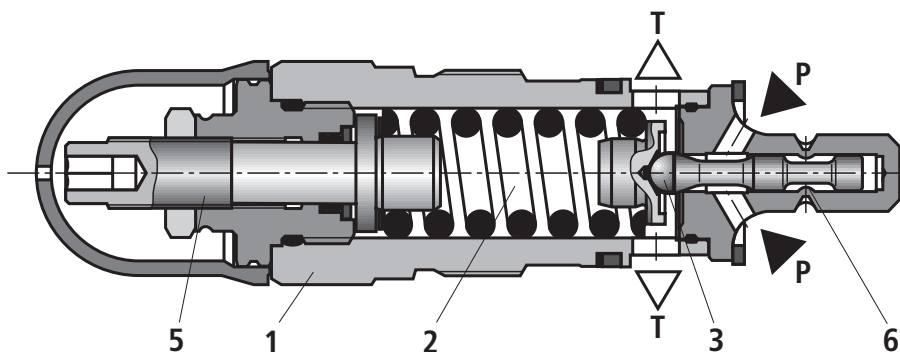
- 1) With size 20, only available for the pressure ratings 25, 50 or 100 bar.
- 2) Only available for the pressure ratings 25, 50 or 100 bar.
- 3) Key with material no. **R900008158** is included in the scope of delivery.
- 4) Not available for type-examination tested safety valves.
- 5) Not available for type-examination tested safety valves of size 8, 15 and 25.
- 6) When selecting the pressure rating, please observe the characteristic curves and notes on page 5.
- 7) With version "G" and "P", only available as "SO292", see page 6 and 9.
- 8) See ordering code on page 11.

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).

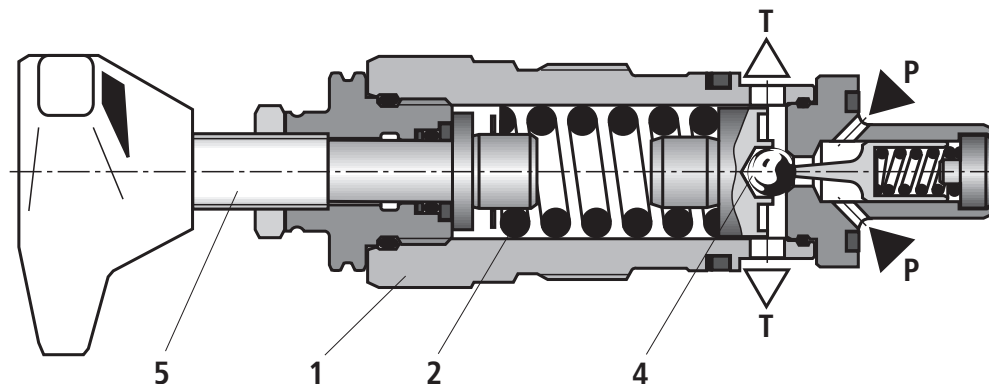
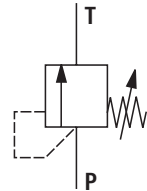
In order to achieve good pressure adjustment over the entire pressure range, the entire pressure range has been divided into 7 pressure ratings. One pressure rating corresponds to a certain spring for a maximum operating pressure that can be set by means of that spring.



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)

Notes:

- 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.

Technical data

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

| general | | | | | |
|--|---|---|----|--------|--------|
| Size | NG | 6, 8 | 10 | 15, 20 | 25, 30 |
| Weight | See pages 6, 8 and 10 | | | | |
| Installation position | Any | | | | |
| Ambient temperature range | °C [°F] | -30 ... +80 [-22 ... +176] (NBR seals) -15 ... +80 [5 ... 176] (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 regard to pressure resistance, thread stripping strengths and tightening torques). | | | | |

| hydraulic | | | | | | |
|---|----------------------------------|---|------------|------------|------------|------------|
| Maximum operating pressure | - Input | bar [psi] | 400 [5800] | 630 [9150] | 400 [5800] | 315 [4568] |
| | - Output | bar [psi] | 315 [4568] | 315 [4568] | 315 [4568] | 315 [4568] |
| Maximum flow (standard valves) | See characteristic curves page 5 | | | | | |
| Hydraulic fluid | See table below | | | | | |
| Hydraulic fluid temperature range | °C [°F] | -30 ... +80 [-22 ... +176] (NBR seals) -15 ... +80 [5 ... 176] (FKM seals) | | | | |
| Viscosity range | mm ² /s [SUS] | 10 ... 800 [60 ... 3710] | | | | |
| Maximum admissible degree of contamination of the hydraulic fluid; Cleanliness class according to ISO 4406 (c) | Class 20/18/15 ¹⁾ | | | | | |

| 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 | ISO 15380 | 90221 |
| | | HEES | | |
| | ▶ Soluble in water | HEPG | ISO 15380 | |

Important notes on hydraulic fluids:

- ▶ For more 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 solenoid surface temperature.

- ▶ **Bio-degradable and flame-resistant:** If this hydraulic fluid is used, small amounts of dissolved zinc may get into the hydraulic system.

¹⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.
For the selection of the filters, see www.boschrexroth.com/filter.

Deviating technical data for type-examination tested safety valves can be found on page 12.

Notice:

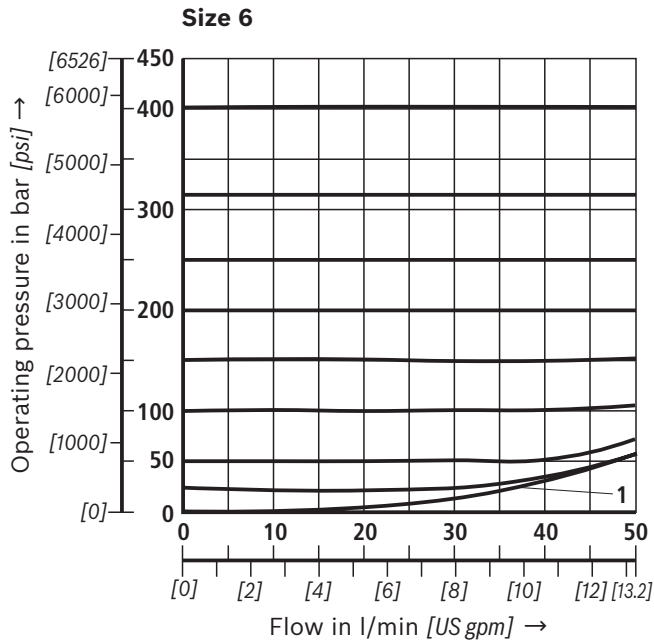
Hydraulic counter pressures in port T add 1:1 to the response pressure of the valve set at the adjustment type.

Example:

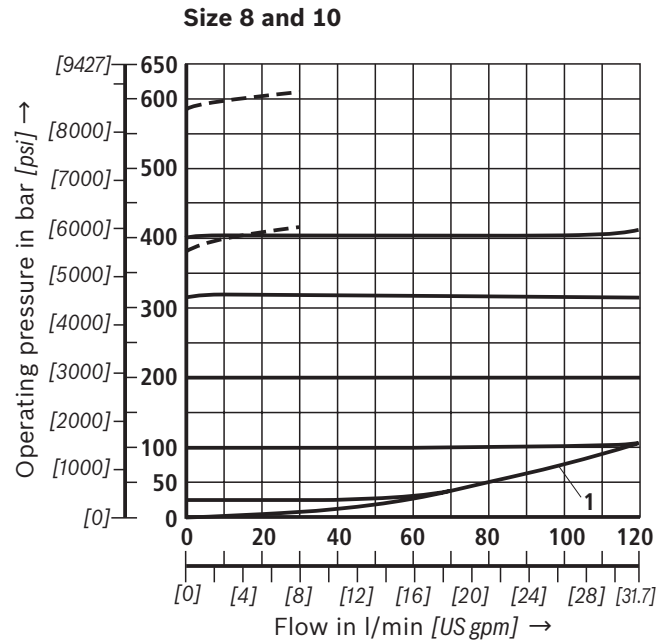
- ▶ Pressure adjustment of the valve due to spring preload (item 2 on page 3) $p_{\text{spring}} = 200 \text{ bar}$
- ▶ Hydraulic counter pressure in port T: $p_{\text{hydraulic}} = 50 \text{ bar}$
- ▶ \Rightarrow Response pressure = $p_{\text{spring}} + p_{\text{hydraulic}} = 250 \text{ bar}$

Characteristic curves

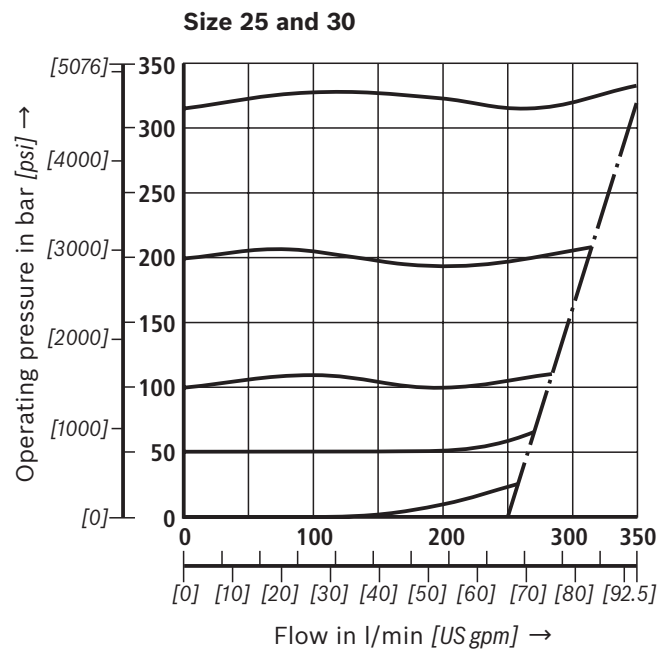
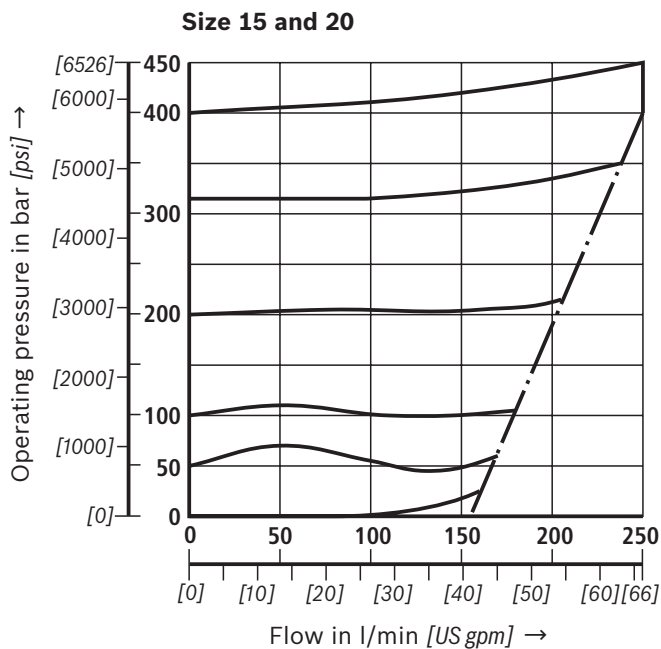
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$ [104 ± 9 °F])



1 = minimum adjustable pressure



--- = pressure rating 630 bar [9150 psi] (only NG10)

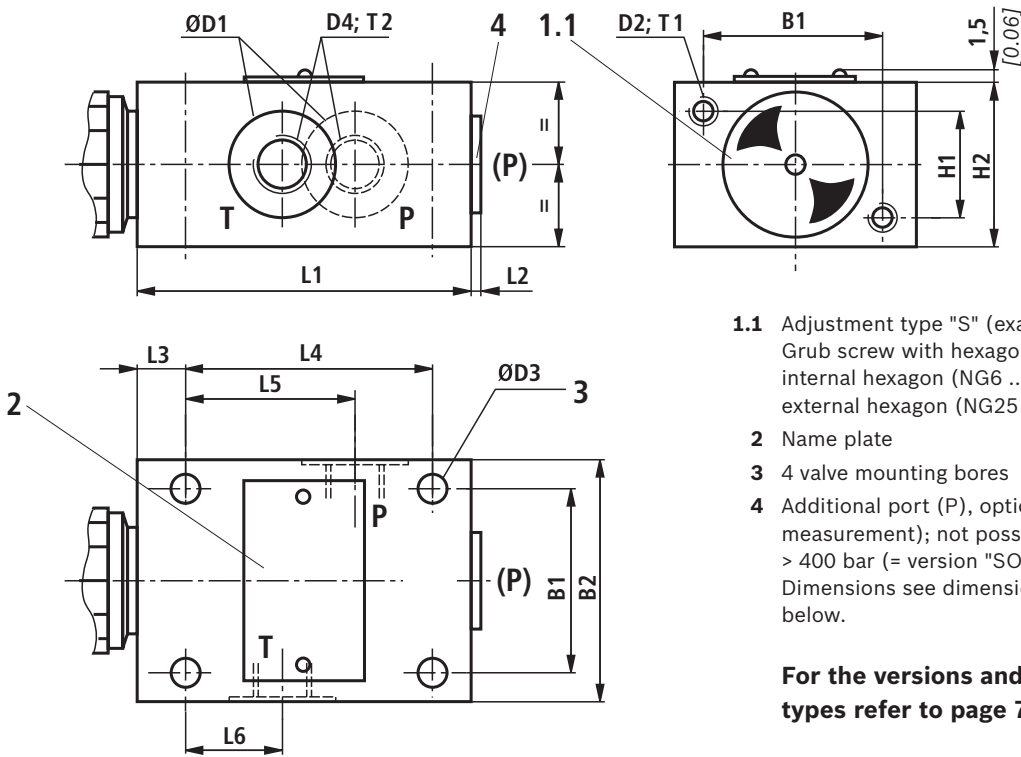


Notes:

- ▶ The characteristic curves apply to the pressure at the valve output $p = 0$ bar across the entire flow range.
- ▶ The characteristic curves only apply with the specified environmental and temperature conditions. It has to be noted that the development of the characteristic curve will be influenced in case of deviating boundary conditions.

- ▶ The characteristic curves refer to the specified pressure ratings (e.g. 200 bar). The more the set pressure value differs from the nominal pressure rating (e.g. < 200 bar), the larger the pressure increase with increasing flow gets.

Dimensions: Threaded connection
(dimensions in mm [inch])



- 1.1 Adjustment type "S" (example)
Grub screw with hexagon and protective cap;
internal hexagon (NG6 ... NG20)
external hexagon (NG25 and 30)
- 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.

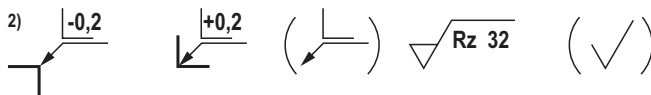
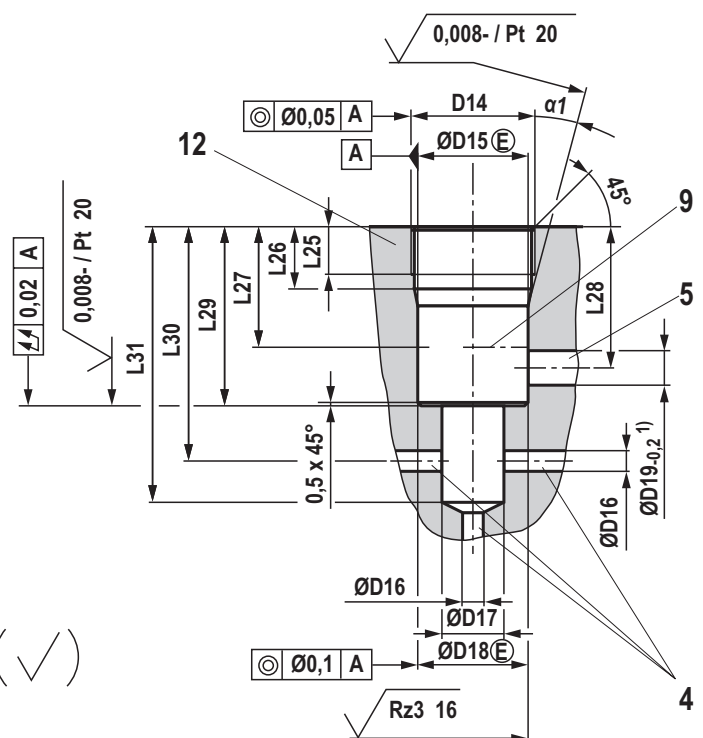
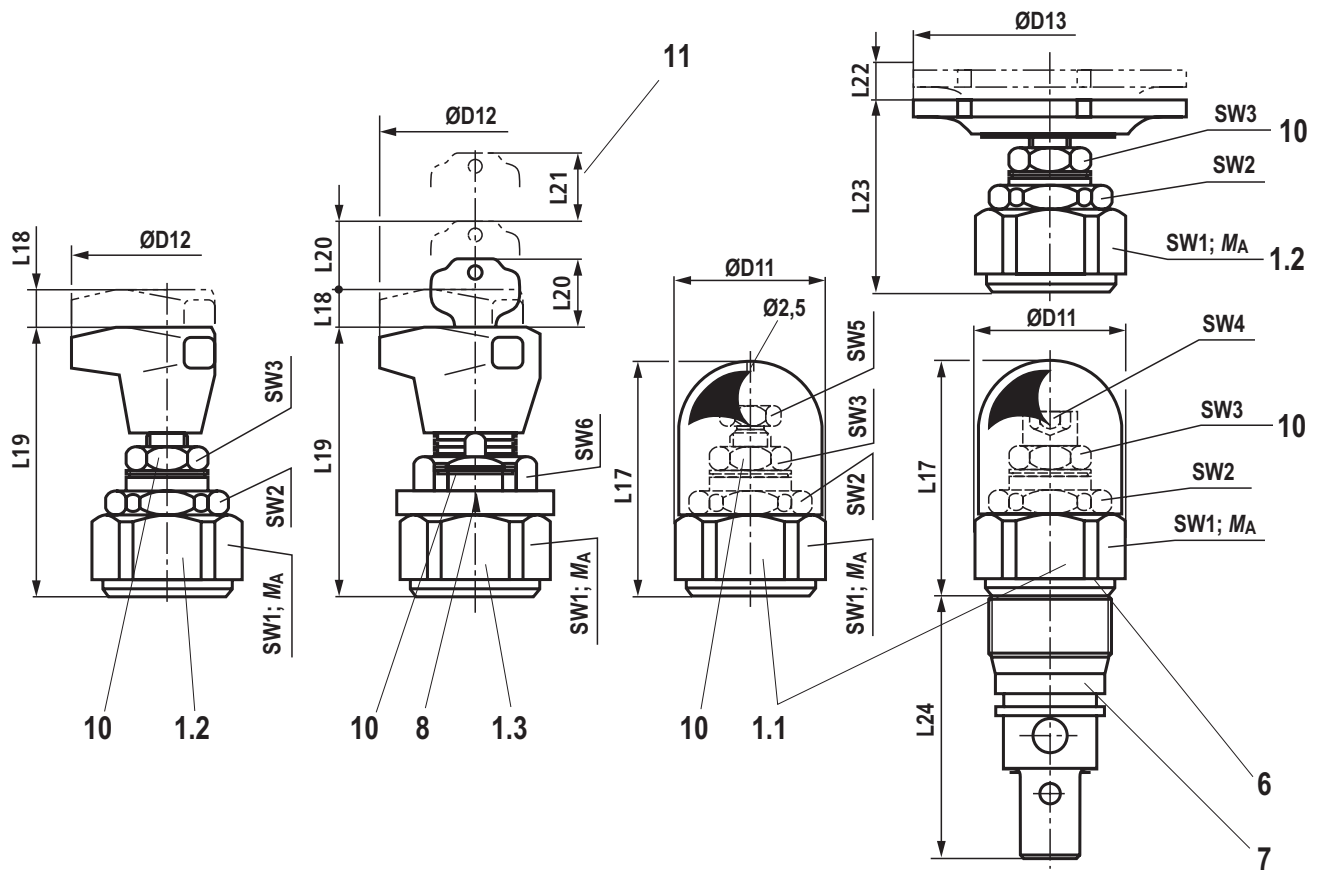
For the versions and dimensions of the adjustment types refer to page 7 and 8.

| NG | B1 | B2 | ØD1 | D2 | ØD3 | D4 | Tightening torques M_A in Nm [ft-lbs] for fittings ¹⁾ | |
|----|------------|------------|-----------|-----|------------|--------|---|---------------|
| | | | | | | | Plug screw (4) | Pipe fittings |
| 6 | 45 [1.77] | 60 [2.36] | 25 [0.98] | M6 | 6.6 [0.26] | G1/4 | 30 [22] | 60 [44] |
| 8 | 60 [2.36] | 80 [3.15] | 28 [1.10] | M8 | 9 [0.35] | G3/8 | 40 [29] | 90 [66] |
| 10 | 60 [2.36] | 80 [3.15] | 34 [1.34] | M8 | 9 [0.35] | G1/2 | 60 [44] | 130 [95] |
| 15 | 70 [2.76] | 100 [3.94] | 42 [1.65] | M8 | 9 [0.35] | G3/4 | 80 [59] | 200 [147] |
| 20 | 70 [2.76] | 100 [3.94] | 47 [1.85] | M8 | 9 [0.35] | G1 | 135 [99] | 380 [280] |
| 25 | 100 [3.94] | 130 [5.12] | 56 [2.21] | M10 | 11 [0.43] | G1 1/4 | 480 [354] | 500 [368] |
| 30 | 100 [3.94] | 130 [5.12] | 65 [2.56] | M10 | 11 [0.43] | G1 1/2 | 560 [413] | 600 [442] |

| NG | H1 | H2 | L1 | L2 | L3 | L4 | L5 | L6 | T1 | T2 | Weight, approx. in kg [lbs] |
|----|-----------|-----------|------------|------------|-----------|------------|-----------|-----------|-----------|-----------|--------------------------------|
| 6 | 25 [0.98] | 40 [1.57] | 80 [3.15] | 4 [0.16] | 15 [0.59] | 55 [2.17] | 40 [1.57] | 20 [0.79] | 10 [0.39] | 12 [0.47] | 1.5 [3.3] |
| 8 | 40 [1.57] | 60 [2.36] | 100 [3.94] | 4 [0.16] | 20 [0.79] | 70 [2.76] | 48 [1.89] | 21 [0.83] | 15 [0.59] | 12 [0.47] | 3.7 [8.2] |
| 10 | 40 [1.57] | 60 [2.36] | 100 [3.94] | 4 [0.16] | 20 [0.79] | 70 [2.76] | 48 [1.89] | 21 [0.83] | 15 [0.59] | 14 [0.55] | 3.7 [8.2] |
| 15 | 50 [1.97] | 70 [2.76] | 135 [5.32] | 4 [0.16] | 20 [0.79] | 100 [3.94] | 65 [2.56] | 34 [1.34] | 18 [0.71] | 16 [0.63] | 6.4 [14.1] |
| 20 | 50 [1.97] | 70 [2.76] | 135 [5.32] | 5.5 [0.22] | 20 [0.79] | 100 [3.94] | 65 [2.56] | 34 [1.34] | 18 [0.71] | 18 [0.71] | 6.4 [14.1] |
| 25 | 60 [2.36] | 90 [3.54] | 180 [7.09] | 5.5 [0.22] | 25 [0.98] | 130 [5.12] | 85 [3.35] | 35 [1.38] | 20 [0.79] | 20 [0.79] | 13.9 [30.6] |
| 30 | 60 [2.36] | 90 [3.54] | 180 [7.09] | 5.5 [0.22] | 25 [0.98] | 130 [5.12] | 85 [3.35] | 35 [1.38] | 20 [0.79] | 22 [0.87] | 13.9 [30.6] |

¹⁾ The tightening torques are guidelines, referring to the maximum operating pressure and when using a manual torque wrench (tolerance ±10%).

Dimensions: Screw-in cartridge valve
(dimensions in mm [inch])



1) Maximum dimension
2) All seal ring insertion faces are rounded and free of burrs
Tolerance for all angles $\pm 0,5^\circ$

Dimensional tables and item explanations see page 8.

Dimensions: Screw-in cartridge valve (dimensions in mm [inch])

Screw-in cartridge valve

| NG | ØD11 | ØD12 | ØD13 | L17 | L18 | L19 | L20 | L21 | L22 | L23 | L24 |
|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| 6 | 34 [1.34] | 60 [2.36] | – | 72 [2.83] | 11 [0.43] | 83 [3.26] | 28 [1.10] | 20 [0.79] | – | – | 64.5 [2.54] |
| 10 | 38 [1.50] | 60 [2.36] | – | 68 [2.68] | 11 [0.43] | 79 [3.11] | 28 [1.10] | 20 [0.79] | – | – | 77 [3.03] |
| 20 | 48 [1.89] | 60 [2.36] | – | 65 [2.56] | 11 [0.43] | 77 [3.03] | 28 [1.10] | 20 [0.79] | – | – | 106 [4.17] |
| 30 | 63 [2.48] | – | 80 [3.15] | 83 [3.26] | – | – | – | – | 11 [0.43] | 56 [2.21] | 131 [5.16] |

| NG | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | Tightening torques M_A in Nm [ft-lbs] for screw-in cartridge valves ²⁾ | | | Weight, approx. in kg [lbs] |
|----|-----|-----|-----|-----|-----|-----|--|------------------|------------------|--------------------------------|
| | | | | | | | Pressure rating in bar [psi] | | | |
| | | | | | | | up to 200 [2900] | up to 400 [5800] | up to 630 [9150] | |
| 6 | 32 | 30 | 19 | 6 | – | 30 | 50±5 [37±3.7] | 80±5 [59±4] | – | 0.4 [0.88] |
| 10 | 36 | 30 | 19 | 6 | – | 30 | 100±5 [74±3.5] | 150±10 [110±3.5] | 200±10 [148±7.5] | 0.5 [1.10] |
| 20 | 46 | 36 | 19 | 6 | – | 30 | 150±10 [111±7.5] | 300±15 [221±11] | – | 1 [2.21] |
| 30 | 60 | 46 | 19 | – | 13 | – | 350±20 [258±19.5] | 500±30 [369±22] | – | 2.2 [4.85] |

²⁾ The tightening torques are guidelines with a friction coefficient $\mu_{\text{total}} = 0.12$ and when using a manual torque wrench.

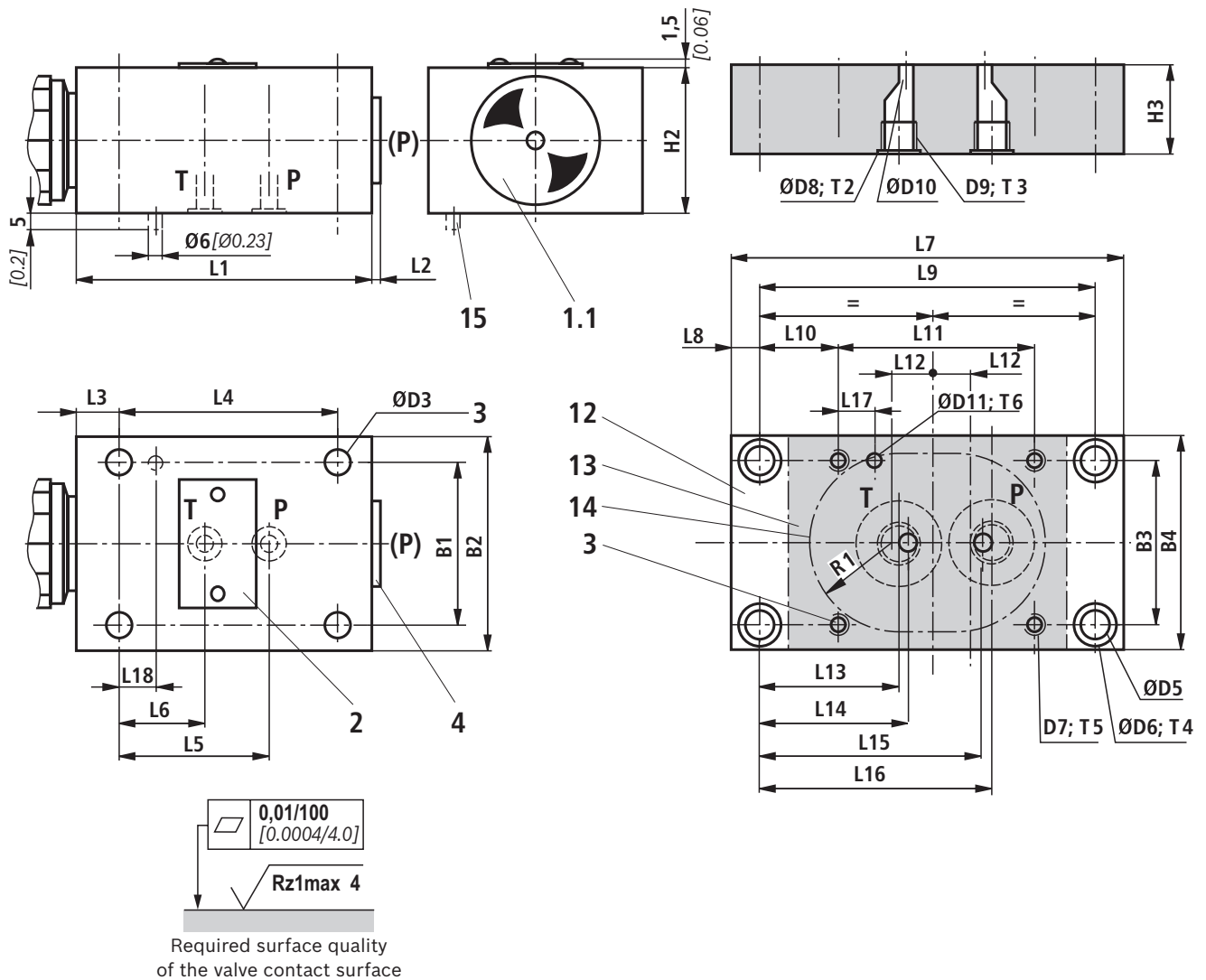
Mounting cavity

| NG | D14 | ØD15 | ØD16 | ØD17 | ØD18 | | ØD19 |
|----|-----------|----------------------|-----------|--------------|--------------------------------|--|-----------|
| 6 | M28 x 1.5 | 25H9 [0.9843+0.002] | 6 [0.24] | 15 [0.59] | 24.9 ^{+0.152} –0.2 | [0.9803] ^[+0.006] [0.00786] | 12 [0.47] |
| 10 | M35 x 1.5 | 32H9 [1.2598+0.0024] | 10 [0.39] | 18.5 [0.73] | 31.9 ^{+0.162} –0.2 | [1.2559] ^[+0.0064] [–0.0079] | 15 [0.59] |
| 20 | M45 x 1.5 | 40H9 [1.5748+0.0024] | 20 [0.79] | 24 [0.95] | 39.9 ^{+0.162} –0.2 | [1.5709] ^[+0.0063] [–0.0079] | 22 [0.87] |
| 30 | M60 x 2 | 55H9 [2.1654+0.0029] | 30 [1.18] | 38.75 [1.53] | 54.9 ^{+0.174} –0.2 | [2.1614] ^[+0.0069] [–0.0079] | 34 [1.34] |

| NG | L25 | L26 | L27 | L28 | L29 | L30 | L31 | $\alpha 1$ |
|----|-----------|-----------|-----------|-------------|-----------|-------------------------|------------|------------|
| 6 | 15 [0.59] | 19 [0.75] | 30 [1.18] | 36 [1.42] | 45 [1.77] | 56,5±5,5 [2.22±0.217] | 65 [2.56] | 15° |
| 10 | 18 [0.71] | 23 [0.91] | 35 [1.38] | 41.5 [1.63] | 52 [2.05] | 67.5±7.5 [2.66±0.295] | 80 [3.15] | 15° |
| 20 | 21 [0.83] | 27 [1.06] | 45 [1.77] | 55 [2.17] | 70 [2.76] | 91.5±8.5 [3.60±0.335] | 110 [4.33] | 20° |
| 30 | 23 [0.91] | 29 [1.14] | 45 [1.77] | 63 [2.48] | 84 [3.31] | 113.5±11.5 [4.47±0.453] | 140 [5.51] | 20° |

- | | |
|---|---|
| <p>1.1 Adjustment type "S" – Grub screw with hexagon and protective cap; internal hexagon (NG6 ... NG20), external hexagon (NG30)</p> <p>1.2 Adjustment type "H" – rotary knob (NG6 ... NG20), hand wheel (NG30)</p> <p>1.3 Adjustment type "A" – lockable rotary knob NG6 ... NG10 (NG20 up to 100 bar [1450 psi])</p> <p>4 Port P, at any place at the circumference or at the front side</p> <p>5 Port T, at any place at the circumference</p> <p>6 Type designation</p> <p>7 Pressure rating (stamped in)</p> | <p>8 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).</p> <p>9 Depth of fit</p> <p>10 Lock nut, tightening torque $M_A = 10^{+5}$ Nm [7.4^{+3.7} ft-lbs]</p> <p>11 Space required to remove the key</p> <p>12 Minimum stability of the housing materials, see Technical data page 4.</p> |
|---|---|

Dimensions: Subplate mounting
(dimensions in mm [inch])



- 1.1 Adjustment type "S" (example)
Grub screw with hexagon and protective cap;
internal hexagon (NG6 ... NG20), external hexagon (NG30)
- 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 6)
- 12 Subplate (type designation see table on page 10)
- 13 Valve contact surface
- 14 Front panel break-through
- 15 Locking pin (only with type-examination tested safety valves)

For reasons of stability, exclusively the following valve mounting screws may be used (separate order):
4 hexagon socket head cap screws ISO 4762 - f1Zn-240h-L¹⁾
 (friction coefficient $\mu_{total} = 0.09 \dots 0.14$)

| NG | Dimension | Property class | M_A in Nm [ft-lbs] ²⁾ | Material number |
|----|-----------|----------------|------------------------------------|-----------------|
| 6 | M6 x 50 | 10.9 | 12.5 [9.2] | R913000151 |
| 10 | M8 x 70 | 10.9 | 28 [20.7] | R913000149 |
| 20 | M8 x 90 | 12.9 | 28 [20.7] | R913000150 |
| 30 | M10 x 110 | 12.9 | 56 [41.3] | R913000148 |

4 hexagon socket head cap screws UNC upon request

¹⁾ As replacement, you can also use specified screws according to DIN 912.
²⁾ For tightening, use a manual torque wrench with a tolerance $\leq 10\%$.

For the versions and dimensions of the adjustment types refer to page 7 and 8.

Dimensions: Subplate mounting (dimensions in mm [inch])

Pressure relief valve

| NG | B1 | B2 | ØD3 | H2 | L1 | L2 | L3 |
|----|------------|------------|------------|-----------|------------|------------|-----------|
| 6 | 45 [1.77] | 60 [2.36] | 6.6 [0.26] | 40 [1.57] | 80 [3.15] | 4 [0.16] | 15 [0.59] |
| 10 | 60 [2.36] | 80 [3.15] | 9 [0.35] | 60 [2.36] | 100 [3.94] | 4 [0.16] | 20 [0.79] |
| 20 | 70 [2.76] | 100 [3.94] | 9 [0.35] | 70 [2.76] | 135 [5.32] | 5.5 [0.22] | 20 [0.79] |
| 30 | 100 [3.94] | 130 [5.12] | 11 [0.43] | 90 [3.54] | 180 [7.09] | 5.5 [0.22] | 25 [0.98] |

| NG | L4 | L5 | L6 | L18 | Port P | Weight, approx. in kg [lbs] |
|----|------------|-----------|-----------|-----------|--------|-----------------------------|
| 6 | 55 [2.17] | 40 [1.57] | 20 [0.79] | 15 [0.59] | G1/4 | 1.5 [3.3] |
| 10 | 70 [2.76] | 45 [1.77] | 21 [0.83] | 15 [0.59] | G1/2 | 3.7 [8.2] |
| 20 | 100 [3.94] | 65 [2.56] | 34 [1.34] | 15 [0.59] | G3/4 | 6.4 [14.1] |
| 30 | 130 [5.12] | 85 [3.35] | 35 [1.37] | 15 [0.59] | G1 1/4 | 13.9 [30.6] |

Subplates

| NG | Type | B3 | B4 | ØD5 | ØD6 | D7 | ØD8 | D9 |
|----|-------------------|------------|------------|------------|-----------|-----------------|-----------|-----------------------|
| 6 | G300/01 [G300/12] | 45 [1.77] | 60 [2.36] | 6.6 [0.26] | 11 [0.43] | M6 [1/4-20 UNC] | 25 [0.98] | G1/4 [SAE 4; 7/16-20] |
| 10 | G661//01 | 60 [2.36] | 80 [3.15] | 6.6 [0.26] | 11 [0.43] | M8 | 25 [0.98] | G3/8 |
| | G662/01 | 60 [2.36] | 80 [3.15] | 6.6 [0.26] | 11 [0.43] | M8 | 34 [1.34] | G1/2 |
| 20 | G303/01 | 70 [2.76] | 100 [3.94] | 11 [0.43] | 18 [0.71] | M8 | 42 [1.65] | G3/4 |
| | G304/01 | 70 [2.76] | 100 [3.94] | 11 [0.43] | 18 [0.71] | M8 | 47 [1.85] | G1 |
| 30 | G305/01 | 100 [3.94] | 130 [5.12] | 11 [0.43] | 18 [0.71] | M10 | 56 [2.20] | G1 1/4 |
| | G306/01 | 100 [3.94] | 130 [5.12] | 11 [0.43] | 18 [0.71] | M10 | 65 [2.56] | G1 1/2 |

| NG | ØD10 | ØD11 | H3 | L7 | L8 | L9 | L10 | L11 | L12 |
|----|-----------|----------|-----------|------------|-------------|------------|-------------|------------|-------------|
| 6 | 6 [0.24] | 8 [0.32] | 25 [0.98] | 110 [4.33] | 8 [0.32] | 94 [3.70] | 22 [0.87] | 55 [2.17] | 10 [0.39] |
| 10 | 10 [0.39] | 8 [0.32] | 25 [0.98] | 135 [5.32] | 10 [0.39] | 115 [4.53] | 27.5 [1.08] | 70 [2.76] | 12.5 [0.49] |
| | 10 [0.39] | 8 [0.32] | 25 [0.98] | 135 [5.32] | 10 [0.39] | 115 [4.53] | 27.5 [1.08] | 70 [2.76] | 12.5 [0.49] |
| 20 | 15 [0.59] | 8 [0.32] | 40 [1.57] | 170 [6.69] | 15 [0.59] | 140 [5.51] | 20 [0.79] | 100 [3.94] | 20 [0.79] |
| | 20 [0.79] | 8 [0.32] | 40 [1.57] | 170 [6.69] | 15 [0.59] | 140 [5.51] | 20 [0.79] | 100 [3.94] | 20 [0.79] |
| 30 | 30 [1.18] | 8 [0.32] | 40 [1.57] | 190 [7.48] | 12.5 [0.49] | 165 [6.50] | 17.5 [0.67] | 130 [5.12] | 22.5 [0.89] |

| NG | L13 | L14 | L15 | L16 | L17 | T2 | T3 | T4 | T5 |
|----|-------------|-------------|--------------|-------------|-----------|-----------|-----------|-------------|-----------|
| 6 | 39 [1.54] | 42 [1.65] | 62 [2.44] | 65 [2.56] | 15 [0.59] | 1 [0.039] | 15 [0.59] | 9 [0.35] | 15 [0.59] |
| 10 | 40.5 [1.59] | 48.5 [1.91] | 72.5 [2.85] | 80.5 [3.17] | 15 [0.59] | 1 [0.039] | 15 [0.59] | 9 [0.35] | 12 [0.47] |
| | 40.5 [1.59] | 48.5 [1.91] | 72.5 [2.85] | 80.5 [3.17] | 15 [0.59] | 1 [0.039] | 16 [0.63] | 9 [0.35] | 15 [0.59] |
| 20 | 45 [1.77] | 54 [2.13] | 85 [3.35] | 94 [3.70] | 15 [0.59] | 1 [0.039] | 20 [0.79] | 13 [0.51] | 22 [0.87] |
| | 42 [1.65] | 54 [2.13] | 85 [3.35] | 97 [3.82] | 15 [0.59] | 1 [0.039] | 20 [0.79] | 13 [0.51] | 22 [0.87] |
| 30 | 42 [1.65] | 52.5 [2.07] | 102.5 [4.04] | 113 [4.45] | 15 [0.59] | 1 [0.039] | 24 [0.95] | 11.5 [0.45] | 22 [0.87] |

| NG | T6 | R1 | Weight, approx. in kg [lbs] |
|----|----------|--|-----------------------------|
| 6 | 6 [0.24] | 25 ⁺² [0.98 ^{+0.079}] | 1.5 [3.3] |
| 10 | 6 [0.24] | 30 ⁺⁵ [1.18 ^{+0.197}] | 2 [4.4] |
| 20 | 6 [0.24] | 40 ⁺³ [1.57 ^{+0.118}] | 5.5 [12.1] |
| 30 | 6 [0.24] | 55 ⁺⁴ [2.16 ^{+0.157}] | 8 [17.6] |

Notice:

The specified subplates are **not** approved for use with type-examination tested safety valve according to Pressure Equipment Directive 2014/68/EU!

Type-examination tested safety valves

The functionality of these valves corresponds to that of the standard series (see page 3). 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 and a response pressure lower than the factory setting can be set without the need of removing the lead seal.

Ordering code: Type-examination tested safety valves type DBD ¹⁾

| NG | Type designation | Component marking |
|----|--|---|
| 6 | DBDS 6K1X/ <input type="checkbox"/> E | TÜV.SV. <input type="checkbox"/> -849.5.F. α_w G .p. |
| | DBDH 6K1X/ <input type="checkbox"/> E | |
| | DBDS 6G1X/ <input type="checkbox"/> E | |
| | DBDH 6G1X/ <input type="checkbox"/> E | |
| | DBDS 6P1X/ <input type="checkbox"/> E | |
| | DBDH 6P1X/ <input type="checkbox"/> E | |
| 10 | DBDS 10K1X/ <input type="checkbox"/> E | TÜV.SV. <input type="checkbox"/> -850.6.F. α_w G .p. |
| | DBDH 10K1X/ <input type="checkbox"/> E | |
| | DBDS 10G1X/ <input type="checkbox"/> E | TÜV.SV. <input type="checkbox"/> -390.4,5.F.30.p. ²⁾ |
| | DBDH 10G1X/ <input type="checkbox"/> E | |
| | DBDS 10P1X/ <input type="checkbox"/> E | |
| | DBDH 10P1X/ <input type="checkbox"/> E | |

Pressure in the type designation is to be entered by the customer; pressure adjustment ≥ 30 bar [435 psi] and possible in 5 bar [72 psi] steps.

Information is entered at the factory

| NG | Type designation | Component marking |
|----|--|--|
| 20 | DBDS 20K1X/ <input type="checkbox"/> E | TÜV.SV. <input type="checkbox"/> -361.10.F. α_w .p. |
| | DBDH 20K1X/ <input type="checkbox"/> E | |
| | DBDS 20G1X/ <input type="checkbox"/> E | |
| | DBDH 20G1X/ <input type="checkbox"/> E | |
| | DBDS 20P1X/ <input type="checkbox"/> E | |
| | DBDH 20P1X/ <input type="checkbox"/> E | |
| 30 | DBDS 30K1X/ <input type="checkbox"/> E | TÜV.SV. <input type="checkbox"/> -362.15.F. α_w .p. |
| | DBDH 30K1X/ <input type="checkbox"/> E | |
| | DBDS 30G1X/ <input type="checkbox"/> E | |
| | DBDH 30G1X/ <input type="checkbox"/> E | |
| | DBDS 30P1X/ <input type="checkbox"/> E | |
| | DBDH 30P1X/ <input type="checkbox"/> E | |

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

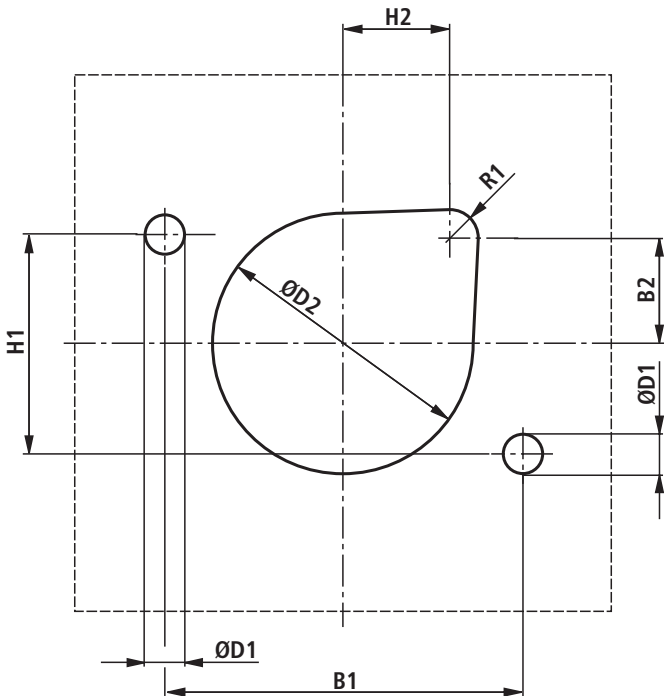
²⁾ Component marking for DBD. 10.1X/...; 400 bar [5801 psi] < p ≤ 630 bar [9150 psi]

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

| general | | |
|--|--------------------------|--|
| Ambient temperature range | °C [°F] | -10 ... +80 [+14... +176] |
| hydraulic | | |
| Set response pressure | bar [psi] | See last figure of the component marking page 11 |
| Maximum counter pressure in the discharge line | bar [psi] | See characteristic curves page 15 ... 19 |
| Maximum flow | l/min [US gpm] | The last but one figure of the component marking attached at the safety valve is always binding, see page 11. For valve types which have a variable maximum flow depending on the response pressure, the discharge coefficient is specified at this place (see page 14). |
| 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 | °C [°F] | -10 ... +60 [+14... +140] |
| Viscosity range | mm ² /s [SUS] | 12 ... 230 [55 ... 1066] |

1) Component series 1X, according to Pressure Equipment Directive 2014/68/EU (For applications outside these parameters, please consult us!)

Dimensions: Sheet cut-out for front panel mounting with type-examination tested safety valves type DBD 1) (dimensions in mm [inch])



| NG | B1 | B2 | H1 | H2 |
|----|------------|-------------|-----------|-------------|
| 6 | 45 [1.77] | 12.5 [0.49] | 25 [0.98] | 22.5 [0.89] |
| 10 | 60 [2.36] | 20.5 [0.81] | 40 [1.57] | 20.5 [0.81] |
| 20 | 70 [2.76] | 24 [0.94] | 50 [1.97] | 24 [0.94] |
| 30 | 100 [3.94] | 29.5 [1.16] | 60 [2.36] | 29.5 [1.16] |

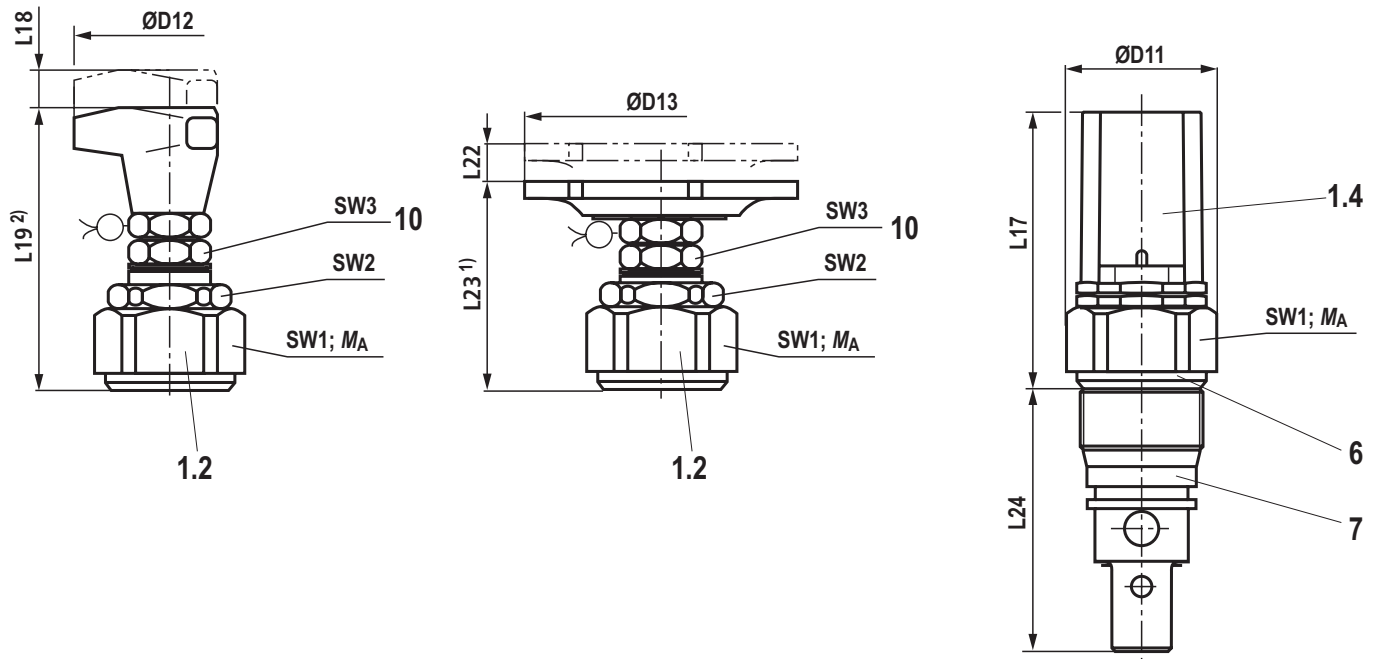
| NG | ØD1H13 | ØD2H13 | R1 |
|----|-----------|-----------|----------|
| 6 | 7 [0.27] | 40 [1.57] | 8 [0.32] |
| 10 | 9 [0.35] | 44 [1.73] | 8 [0.32] |
| 20 | 9 [0.35] | 55 [2.17] | 8 [0.32] |
| 30 | 11 [0.43] | 73 [2.87] | 8 [0.32] |

Notice:

With valves type DBDH.K..1X/..E, the hand wheel must be removed before the front panel assembly of the screw-in cartridge valve and reassembled afterwards.

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

Deviating dimensions: Cartridge valve as type-examination tested safety valve type DBD 1)
 (dimensions in mm [inch])



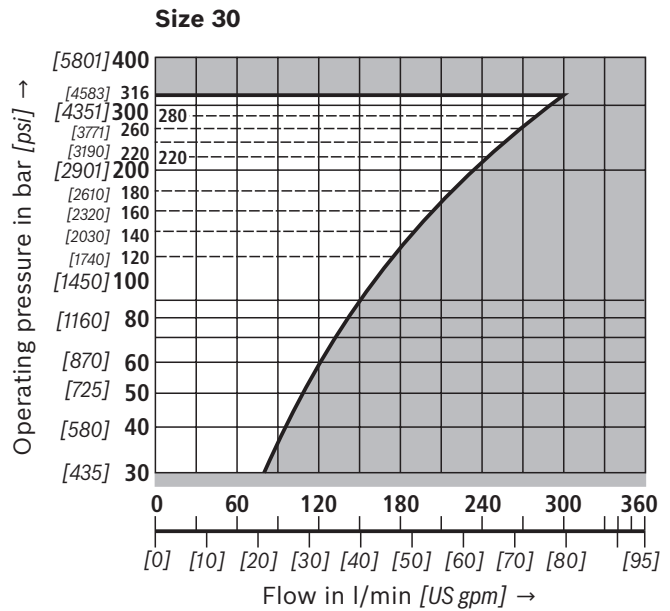
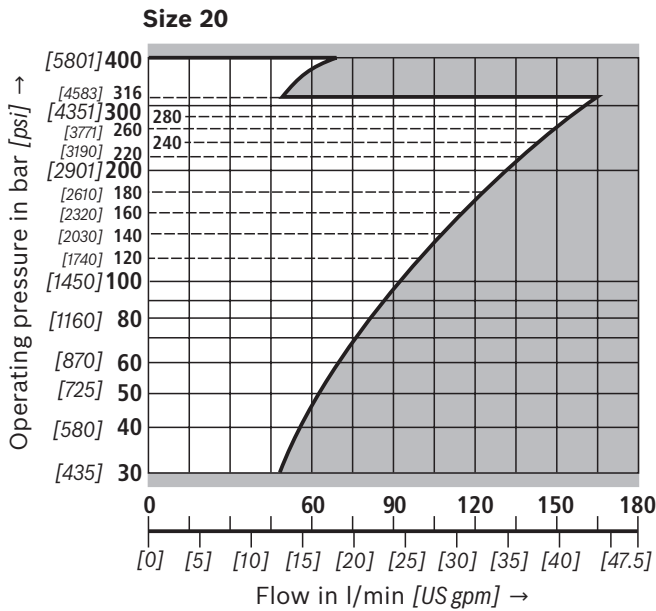
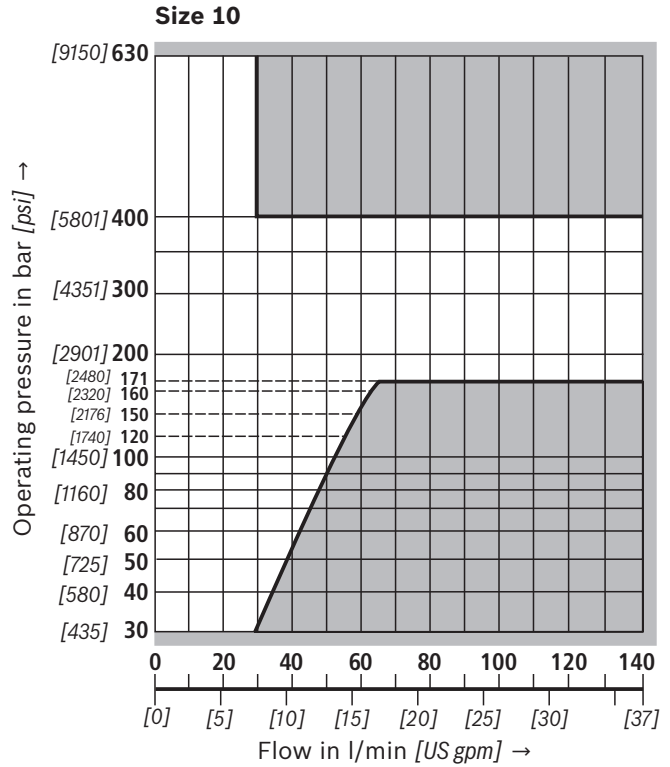
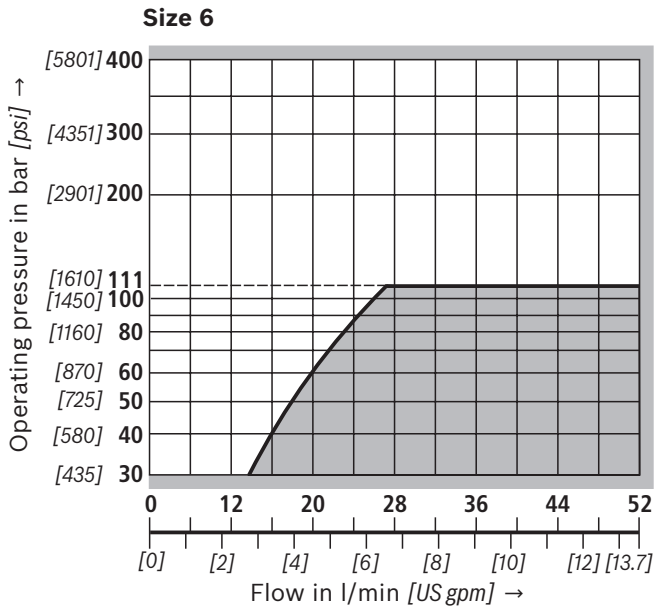
| NG | ØD11 | ØD12 | ØD13 | L17 | L18 | L19 | L22 | L23 | L24 |
|----|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-----------|-------------|
| 6 | 34 [1.34] | 60 [2.36] | – | 80 [3.15] | 11 [0.43] | 83 [3.26] | – | – | 64,5 [2.54] |
| 10 | 38 [1.50] | 60 [2.36] | – | 76,5 [3.01] | 11 [0.43] | 79 [3.11] | – | – | 78,5 [3.09] |
| 20 | 48 [1.89] | 60 [2.36] | – | 72,5 [2.85] | 11 [0.43] | 77 [3.03] | – | – | 107 [4.21] |
| 30 | 63 [2.48] | – | 80 [3.15] | 93 [3.66] | – | – | 11 [0.43] | 56 [2.21] | 134 [5.28] |

| NG | SW1 | SW2 | SW3 | Tightening torques M_A in Nm [ft-lbs] for screw-in cartridge valves ³⁾ | | | Weight, approx. in kg [lbs] |
|----|-----|-----|-----|--|------------------|------------------|--------------------------------|
| | | | | Pressure rating in bar [psi] | | | |
| | | | | up to 200 [2900] | up to 400 [5800] | up to 630 [9150] | |
| 6 | 32 | 30 | 19 | 50±5 [37±3.7] | 80±5 [59±4] | – | 0,4 [0.88] |
| 10 | 36 | 30 | 19 | 100±5 [74±3.5] | 150±10 [110±3.5] | 200±10 [148±7.5] | 0,5 [1.10] |
| 20 | 46 | 36 | 19 | 150±10 [111±7.5] | 300±15 [221±11] | – | 1 [2.21] |
| 30 | 60 | 46 | 19 | 350±20 [258±19.5] | 500±30 [369±22] | – | 2,2 [4.85] |

- 1.2 Adjustment type "H" – rotary knob (NG6 ... NG20), hand wheel (NG30)
- 1.4 Adjustment type "S" – hexagon with safety cap
- 4 Port P, at any place at the circumference or at the front side
- 6 Type designation
- 7 Pressure rating (stamped in)
- 10 Lock nut, tightening torque $M_A = 10^{+5}$ Nm [7.4^{+3.7} ft-lbs]

- ¹⁾ Component series 1X according to the Pressure Equipment Directive 2014/68/EU
- ²⁾ Maximum dimension with lowest set response pressure
- ³⁾ The tightening torques are guidelines with a friction coefficient $\mu_{total} = 0.12$ and when using a manual torque wrench.

Characteristic curves: Type-examination tested safety valves type DBD 1)



Notice:
 Value pairs located in the areas of the characteristic curves with gray background can not be realized with the safety valve.
 The characteristic curves shown here are only valid for a counter pressure of 0 bar in the discharge line.

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

Safety instructions: Type-examination tested safety valves type DBD ¹⁾

- ▶ Before ordering a type-examination tested safety valve, it must be observed that for the desired **response pressure p** , the maximum admissible **flow q_{Vmax}** of the safety valve must be larger than the maximum possible flow of the system/accumulator to be secured. 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 on page 11).
- ▶ The maximum admissible flow q_{Vmax} 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 system must **not** be possible (see data sheet AD2000 A2).



It is imperative to observe the application notes!

- ▶ In the plant, the response pressure specified in the component marking is set at a flow of 2 l/min [0.53 US gpm].
- ▶ The maximum flow stated in the component marking applies for applications without counter pressure in the discharge line (port T).
- ▶ By removing the lead seal at the safety valve, the approval according to the Pressure Equipment Directive becomes void!
- ▶ Basically, the requirements of the Pressure Equipment Directive and of data sheet AD2000 A2 have to be observed!
- ▶ It is recommended to secure type-examination tested safety valves against inadmissible disassembly by means of wiring and sealing with the housing/block (bore available in the adjustment type).



Notice:

The system pressure increases by the counter pressure in the discharge line (port T) due to the increasing flow. (Observe the data sheet AD 2000 A 2, point 6.3!) To ensure that this increase in system pressure caused by the flow does not exceed the value of 10% of the set response pressure, the admissible flow has to be reduced dependent on the counter pressure in the discharge line (port T) (see diagrams on pages 15 ... 19).

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

Characteristic curves: Counter pressure in the discharge line

In principle, the valve should be operated without counter pressure in the discharge line, if possible. In case of counter pressure in the discharge line, the maximum flow possible is reduced. There is a relationship between maximum counter pressure p_T in the discharge line and flow q_V , which can be seen from the following characteristic curve. Characteristic curves for intermediate values of the response pressure which are not listed must be determined by means of interpolation.

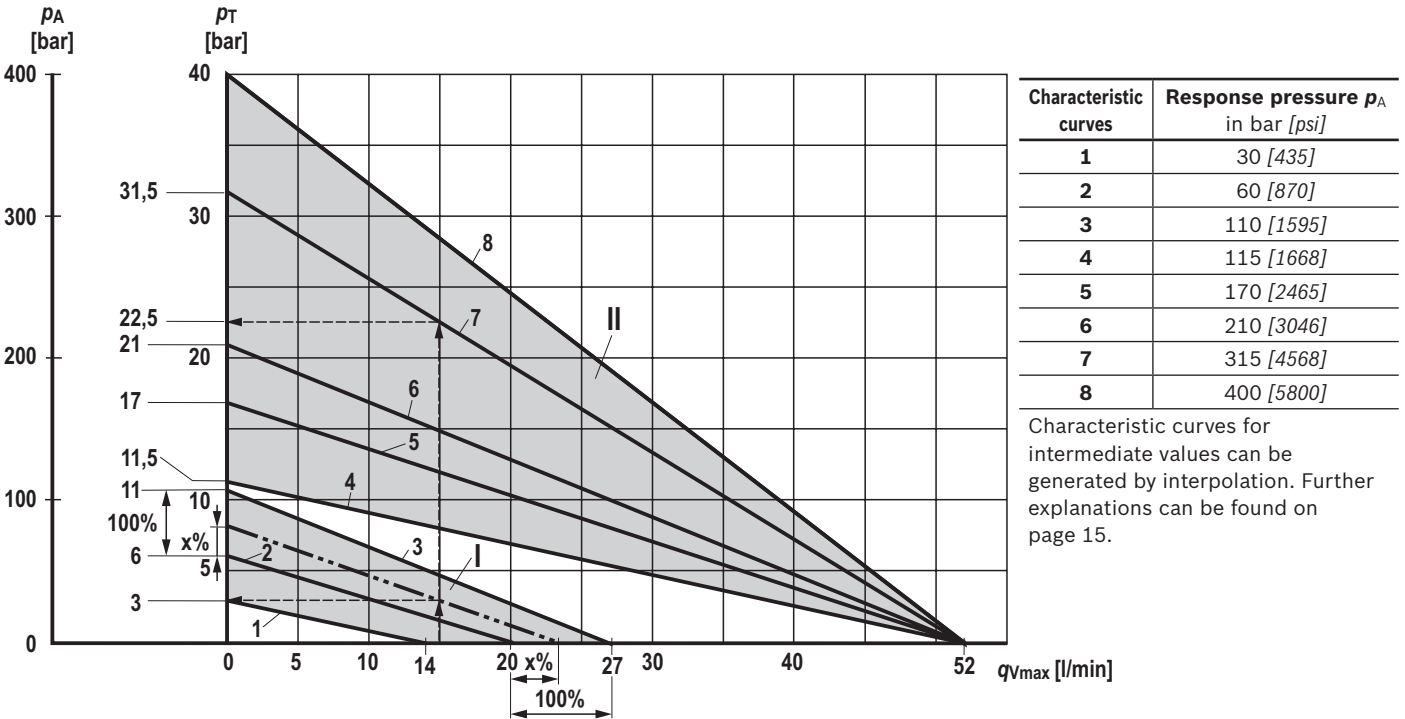
When the flow approaches zero, the maximum counter pressure p_T is in each case 10% of the response pressure. With increasing flow, the maximum counter pressure p_T decreases.

Interpolation of intermediate values from the diagram

1. At the axis p_T , mark 1/10 of the value of p_A .
2. Determine the next lower and the next higher characteristic curve for this point. The point marked at p_T divides the section between lower and higher characteristic curve on the p_T axis with a certain percentage.
3. At the q_{Vmax} axis, divide the section between next lower and next higher characteristic curve in the same percentage as the section at the p_T axis. From the zero-crossing on the q_{Vmax} axis determined in that way, draw a straight line to the value on the p_T axis marked before.
4. Mark the system flow to be secured at the q_{Vmax} axis.
5. Read off the maximum counter pressure for this value using the line at the p_T axis drawn before.

Characteristic curves: Counter pressure in the discharge line – size 6

Diagram for determining the maximum counter pressure p_T in the discharge line at port T of the valve dependent on the flow q_{Vmax} for valves DBD. 6...1X/...E with different response pressures p_A .



- p_A Response pressure in bar
- p_T Maximum counter pressure in the discharge line (port T) in bar
- q_{Vmax} Maximum flow in l/min
- I Interpolation area I, for valves with $p_A = 30 \dots 110$ bar and $q_{Vmax} = 14 \dots 27$ l/min
- II Interpolation area II, for valves with $p_A = 115 \dots 400$ bar and $q_{Vmax} = 52$ l/min

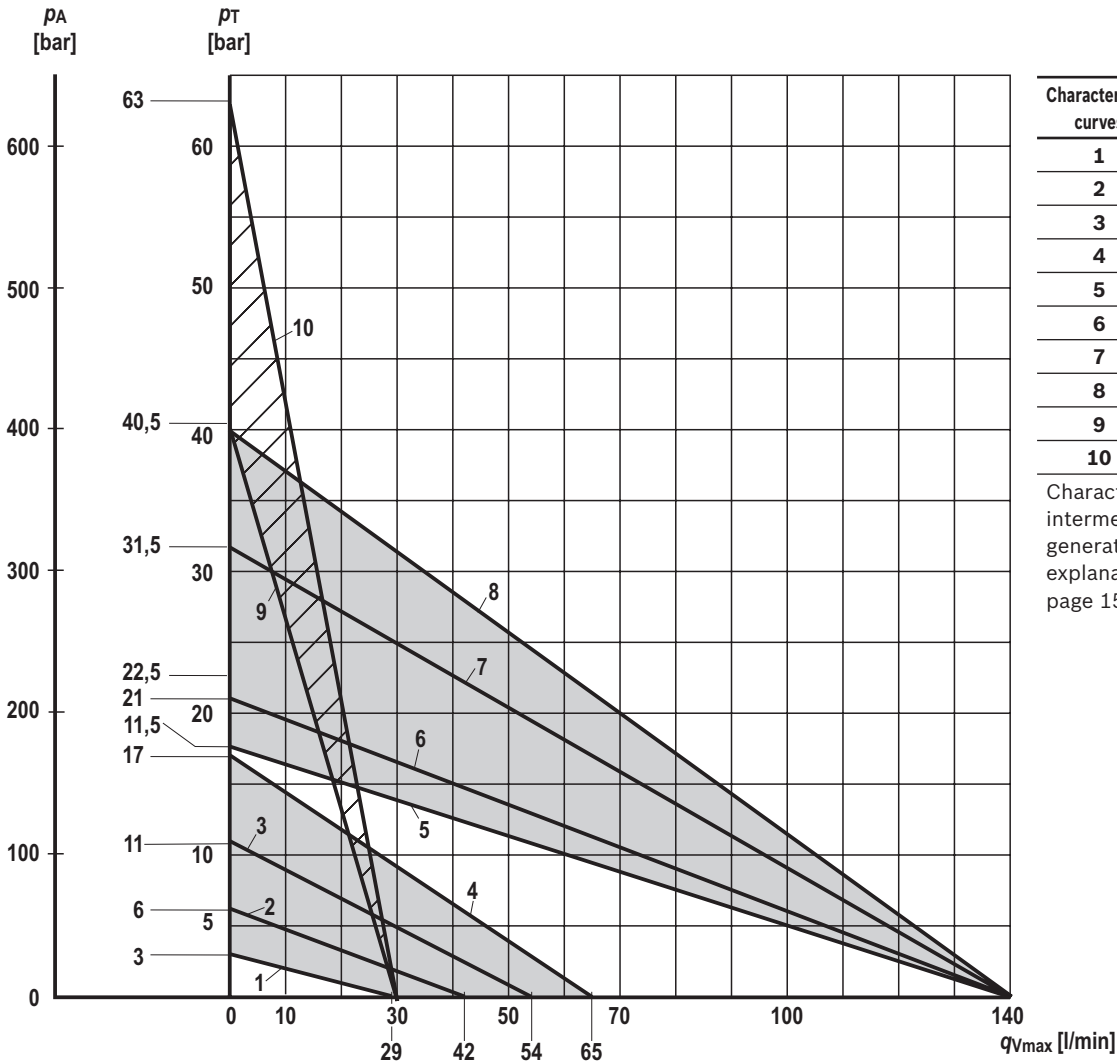
Determination of the maximum counter pressure

Example 1 (with already existing characteristic curve):
 Flow of the system / accumulator to be secured: $q_{Vmax} = 15$ l/min
 Safety valve set to: $p_A = 315$ bar.
 Read off the maximum counter pressure p_T of approx. 22,5 bar from the diagram (see arrows, characteristic curve 7).

Example 2 (with interpolated characteristic curve):
 Flow of the system / accumulator to be secured: $q_{Vmax} = 15$ l/min
 Safety valve set to: $p_A = 80$ bar.
 Value to be marked at the axis referred to as p_T :
 $1/10 \times 80$ bar = 8 bar.
 Read off the maximum counter pressure p_T of approx. 3 bar from the diagram (see arrows, dashed characteristic curve).

Characteristic curves: Counter pressure in the discharge line – size 10

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the valve dependent on the flow q_{Vmax} for valves DBDH 10...1X/...E with different response pressures p_A .

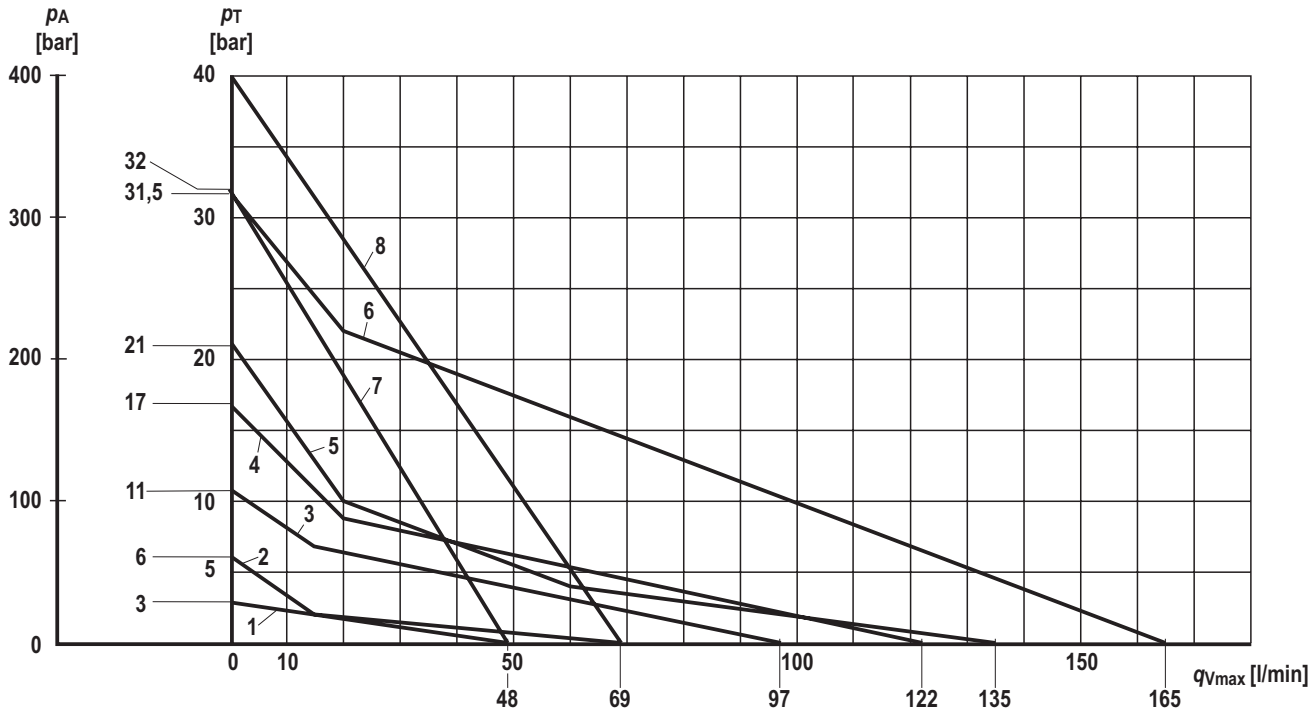


| Characteristic curves | Response pressure p_A in bar [psi] |
|-----------------------|--------------------------------------|
| 1 | 30 [435] |
| 2 | 60 [870] |
| 3 | 110 [1595] |
| 4 | 170 [2465] |
| 5 | 175 [2538] |
| 6 | 210 [3046] |
| 7 | 315 [4568] |
| 8 | 400 [5800] |
| 9 | 405 [5874] |
| 10 | 630 [9150] |

Characteristic curves for intermediate values can be generated by interpolation. Further explanations can be found on page 15.

Characteristic curves: Counter pressure in the discharge line – size 20

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the valve dependent on the flow q_{Vmax} for valves DBDH 20...1X/...E with different response pressures p_A .



p_A Response pressure in bar

p_T Maximum counter pressure in the discharge line (port T) in bar

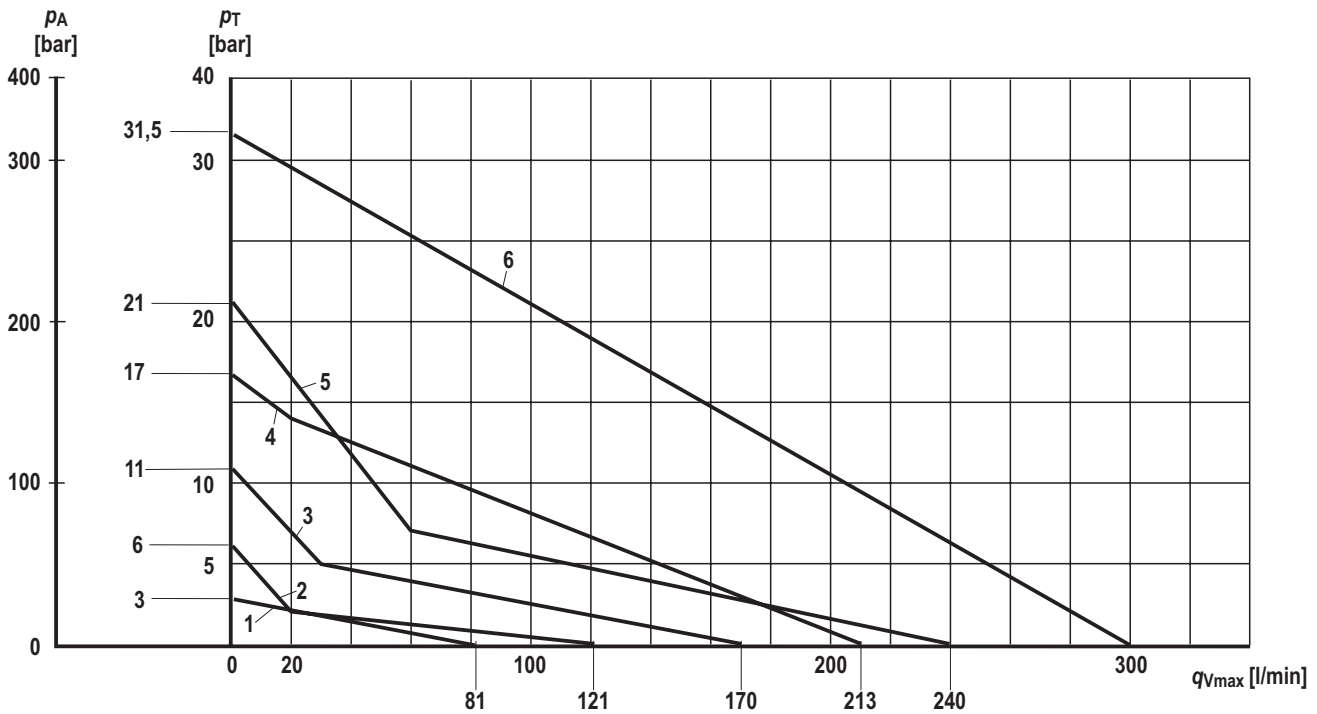
q_{Vmax} Maximum flow in l/min

| Characteristic curves | Response pressure p_A in bar [psi] |
|-----------------------|---|
| 1 | 30 [435] |
| 2 | 60 [870] |
| 3 | 110 [1595] |
| 4 | 170 [2465] |
| 5 | 210 [3046] |
| 6 | 315 [4568] |
| 7 | 320 [4641] |
| 8 | 400 [5800] |

Characteristic curves for intermediate values can be generated by interpolation. Further explanations can be found on page 15.

Characteristic curves: Counter pressure in the discharge line – size 30

Diagram for determining the maximum admissible counter pressure p_T in the discharge line at port T of the valve dependent on the flow q_{Vmax} for valves DBDH 30...1X/...E with different response pressures p_A .



- p_A Response pressure in bar
 p_T Maximum counter pressure in the discharge line (port T) in bar
 q_{Vmax} Maximum flow in l/min

| Characteristic curves | Response pressure p_A in bar [psi] |
|-----------------------|---|
| 1 | 30 [435] |
| 2 | 60 [870] |
| 3 | 110 [1595] |
| 4 | 170 [2465] |
| 5 | 210 [3046] |
| 6 | 315 [4568] |

Characteristic curves for intermediate values can be generated by interpolation. Further explanations can be found on page 15.