Rexroth
Bosch Group

Safety valves, direct operated

RE 25010-XC/11.16
Replaces: 06.09

Type DBDH ...XC...E

Size 6 … 30
Component series 1X

CE

Safety valves – For potentially explosive areas

Information on explosion protection:

- Area of application in accordance with the Explosion Protection Directive 2014/34/EU: **IM2, II2G, II2D**
- Types of protection of the valve solenoids: c (EN 13463-5)

Information on safety:

- Area of application as a type-examination tested valve according to the Pressure Equipment Directive 2014/68/EU

Table of contents

Features

- As ATEX units according to directive 2014/34/EU for areas of application **IM2, II2G, II2D**
- As type-examination tested safety valves according to the Pressure Equipment Directive 2014/68/EU
- As screw-in cartridge valve (cartridge)
- For threaded connection
- For subplate mounting
- Adjustment by means of hand wheel

Ordering code

DBD	H			1X/		XC		E

Pressure relief valve, direct operated

Adjustment type for pressure adjustment
Hand wheel **= H**

Size 6 **= 6**
Size 10 **= 10**
Size 20 **= 20**
Size 30 **= 30**

Screw-in cartridge valve (cartridge) **= K**
Threaded connection **= G**
Subplate mounting **= P**

Component series 10 ... 19 **= 1X**
(10 ... 19: unchanged installation and connection dimensions)

Set response pressure [1]
Size 6 **= 30** … **400**
Size 10 **= 30** … **630**
Size 20 **= 30** … **400**
Size 30 **= 30** … **315**

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

Seal material
V = FKM seals
no code = NBR seals [2]

Notice:
Observe compatibility of seals with hydraulic fluid used.

XC = Explosion protection "Structural safety", for details see information on explosion protection, page 5

[1] Limitations of use see page 4

[2] Only possible for NG10 and pressure ratings < 315 bar

Component marking

Type-examination tested safety valves bear a coded component marking. It always comprises identical elements, the meaning of which is shown in the following **example**:

TÜV . SV . 13 - 390 . 4,5 . F . 30 . 500

Set response pressure in bar
Maximum admissible flow in l/min without counter pressure in the discharge line or discharge coefficient
Valve for fluid
Smallest flow diameter in front of the valve seat in mm
Number of the component marking assigned by VdTÜV
Last digit of the year of the last extension of the validity of the component marking
Safety valve
Mark of the notified body which has carried out the type-examination procedure

Function, section, symbol

Valves of type DBDH ...XC...E are type-examination tested, direct operated pressure relief valves according to Pressure Equipment Directive 2014/68/EU. They are used to limit a system pressure and are intended for use as safety valves. In case the pre-set response pressure at channel P is exceeded, the valves will respond and internally connect channel P and channel T. Depending on the variant, the valves are designed as screw-in cartridge valve ("K") for screw-in into block designs, as valve with threaded connection ("G"), or as valve for subplate mounting "P").

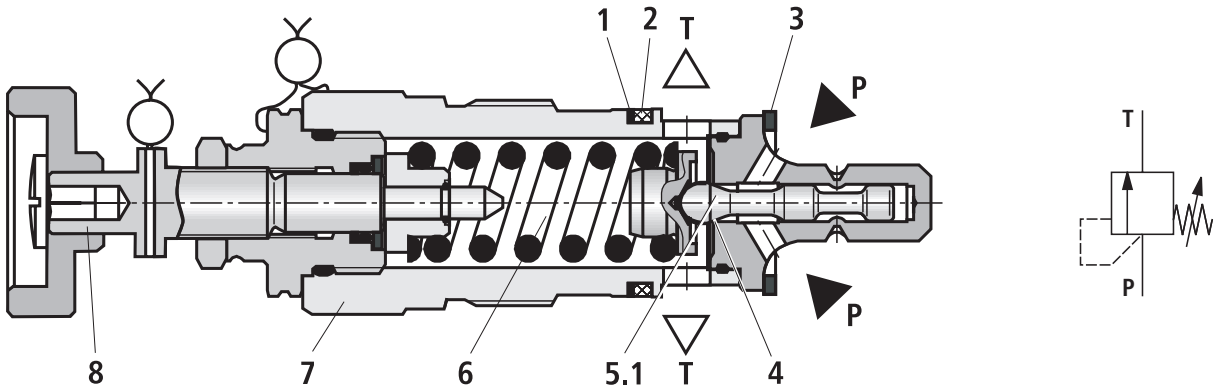
The actual screw-in cartridge valve used in all variants basically comprises sleeve (7), spring (6), poppet (5.1, response pressures up to 400 bar) or ball (5.2, response pressures from 405 bar), valve seat (4) and the adjustment element (8). The spring pushes the poppet (5.1) and/or the ball (5.2) onto the valve seat (4). The response pressure is set to a fix value at the factory using the adjustment element (8), afterwards, the valve is sealed.

Channel P is connected to the system. The pressure existing in the system acts on the poppet and/or on the ball. If the pressure in channel P exceeds the value specified by the spring preload, the poppet and/or the ball is lifted off the valve seat against the spring force and connects channel P and T. The hydraulic fluid flows from channel P into T. The maximum stroke of the poppet is limited by structural measures.

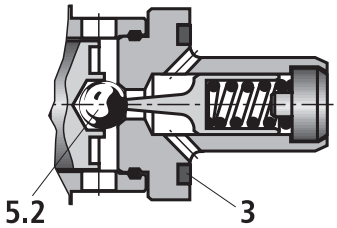
The valves are available with graded response pressures (in 5 bar steps). Using the hand wheel, the valve spring can be unloaded and you can set a lower response pressure than that of the factory setting without having to remove the lead seal. Refer to the operating instructions 25010-XC-B.

Sample figure and related symbol:

Screw-in cartridge valve **DBDH 10 K1X/...XC...E**
Response pressures 30 … 400 bar



Response pressures 405 … 630 bar (ball seat valve NG10)



1, 2 Support ring, O-ring at the valve body

3 Axial sealing with individual seal

Technical data

general

Installation position		Any
Ambient temperature range	°C	–20 … +80 (FKM seals) –30 … +80 (NBR seals)
Storage temperature range	°C	–20 … +80 (FKM seals) –30 … +80 (NBR seals)
Weight		See page 10 … 13
Surface protection for versions "G" and "P"		Painting, layer thickness max. 100 μm
Protection class according to EN 60529+A1		IP 65

hydraulic [1)]

Set response pressure		bar	See last figure of the component marking page 2
Maximum counter pressure in the discharge line		bar	See characteristic curves page 6 … 9
Maximum flow		l/min	See characteristic curves page 5
Hydraulic fluid			See table below
Hydraulic fluid temperature range	Safety valve	°C	–10 … +60
	Standard valve	°C	–15 … +80
Viscosity range	Safety valve	mm^2/s	12 … 230
	Standard valve	mm^2/s	12 … 800
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)			Class 20/18/15 [2)]
Limitations of use	Response pressure p_A		See characteristic curves page 5 … 9 and last figure of the component marking page 2
	Maximum flow q_{Vmax}		See characteristic curves page 5 … 9 and last but one figure of the component marking page 2

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP	NBR, FKM	DIN 51524	90220

☞ **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.

1) Measured with a viscosity ν = 32 mm^2/s and a hydraulic fluid temperature of 40° C

2) 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.

Available filters can be found at www.boschrexroth.com/filter.

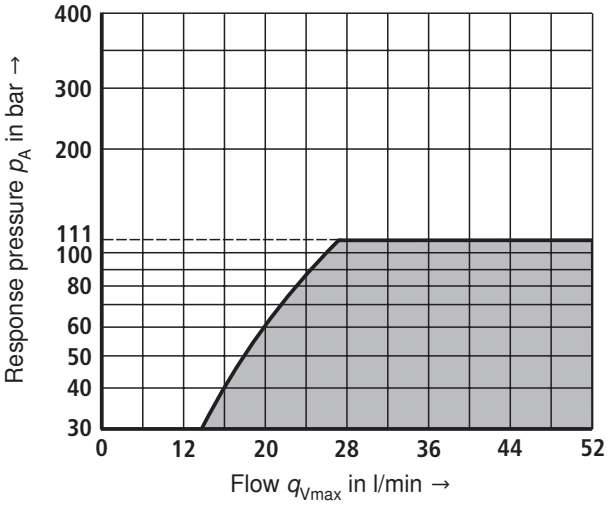
Technical data

Information on explosion protection

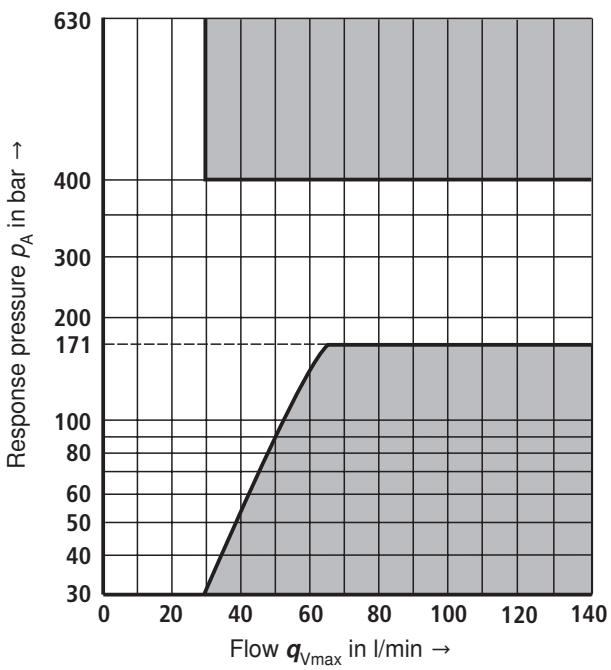
Area of application according to directive 2014/34/EU		IM2, II2G	IM2, II2D
Type of protection valve		c (EN 13463-5)	c (EN 13463-5)
Maximum surface temperature	°C	125	114
Temperature class		T4	–
Protection class		–	IP 65
Special conditions for safe use		The screw-in cartridge valve (cartridge) must not be painted!	

Characteristic curves: Maximum flow

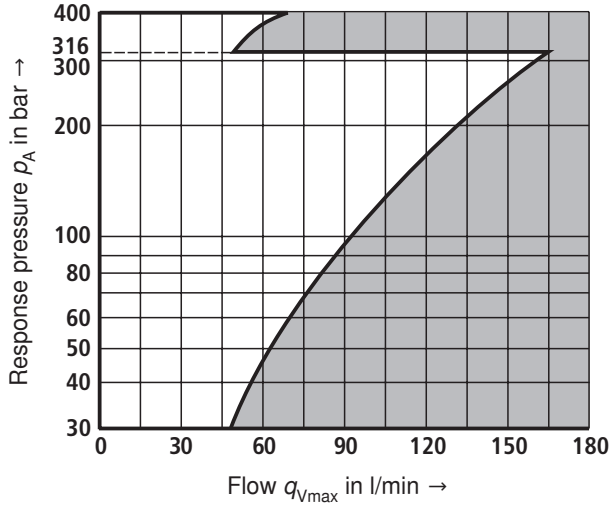
Size 6



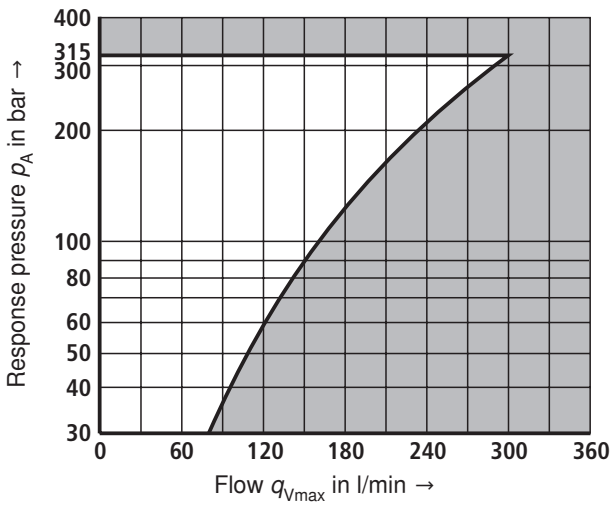
Size 10



Size 20



Size 30



Notes:

– Value pairs located in **the gray areas** of the characteristic curves can **not** be realized with the valve!

– The characteristic curves shown here are only valid for a counter pressure of 0 bar in the discharge line.

Important information on the operation according to Pressure Equipment Directive 2014/68/EU

- Before ordering a type-examination tested safety valve, it has to be noted that with the desired response pressure p, the maximum admissible flow q_{Vmax} of the safety valve is larger than the maximum possible flow of the system / accumulator to be secured.
  In this connection, the corresponding regulations are to be observed!
- According to the Pressure Equipment Directive 2014/68/EU, the increase in the system pressure by the flow must not exceed 10% of the set response pressure (see component marking). The maximum flow q_{Vmax} specified in the component marking must not be exceeded. Discharge lines of safety valves must end in a risk-free way. Any collection of liquid in the discharge system must be prevented (see AD2000 leaflet A2).

The application notes must imperatively be observed!

- In the plant, the response pressure specified in the component marking is set with a flow of 2 l/min.
- The maximum admissible flow specified in the component marking applies to applications without counter pressure in the discharge line (port T).
- When the lead seal at the safety valve is removed, the approval according to the Pressure Equipment Directive will become invalid!
- The requirements of the Pressure Equipment Directive and those of AD2000 leaflet A2 must generally be observed!
- We recommend securing type-examination tested safety valves against inadmissible removal from the screw-in housing/block by wiring and sealing with the housing/block (bore available in the adjustment element).

Notice

The increasing flow increases the system pressure by the counter pressure in the discharge line (port T). Observe AD2000 leaflet A2, point 6.3!
So that this increase in the system pressure caused by the flow does not exceed 10% of the set response pressure, the admissible flow must be reduced dependent on the counter pressure in the discharge line (port T) (see page 6 ... 9).

Characteristic curves: Counter pressure in the discharge line

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

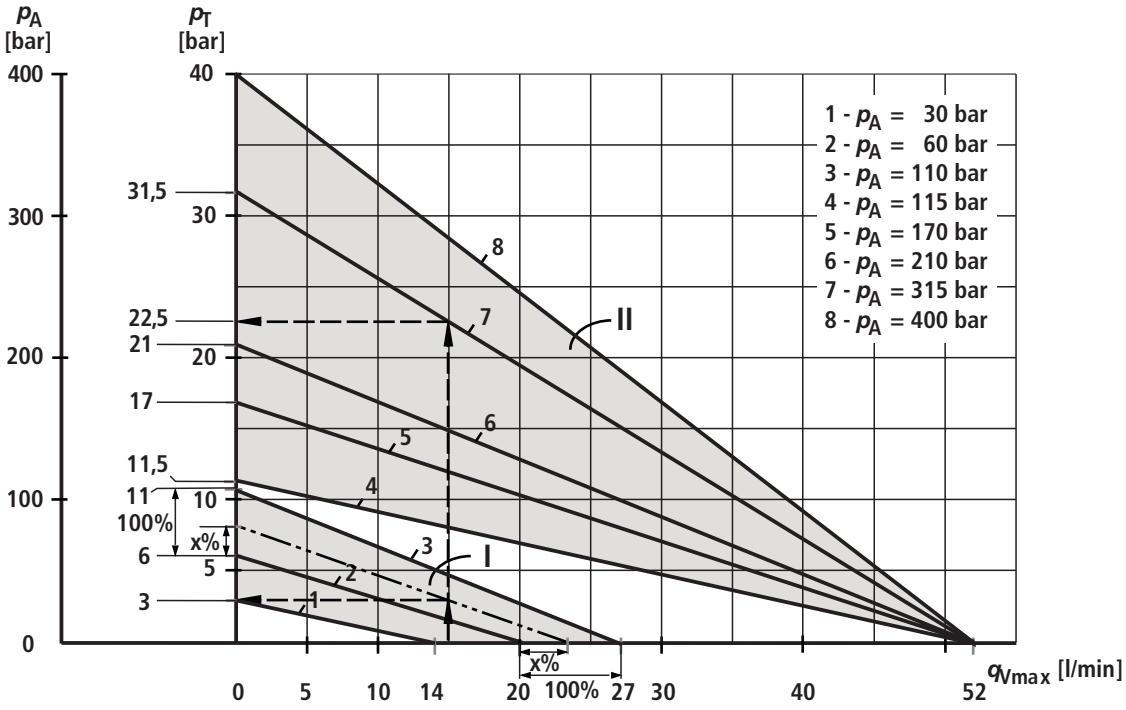
With a flow approaching zero, the maximum counter pressure p_T is in each case 10% of the response pressure. With increasing flow, the maximum counter pressure p_T is reduced.

Interpolation of intermediate values from the diagram

1. At the p_T axis, 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 DBDH **6**...1X/...XC...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 … 110 bar and q_{Vmax} = 14 … 27 l/min
▭ **II**	Interpolation area **II**, for valves with p_A = 115 … 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).

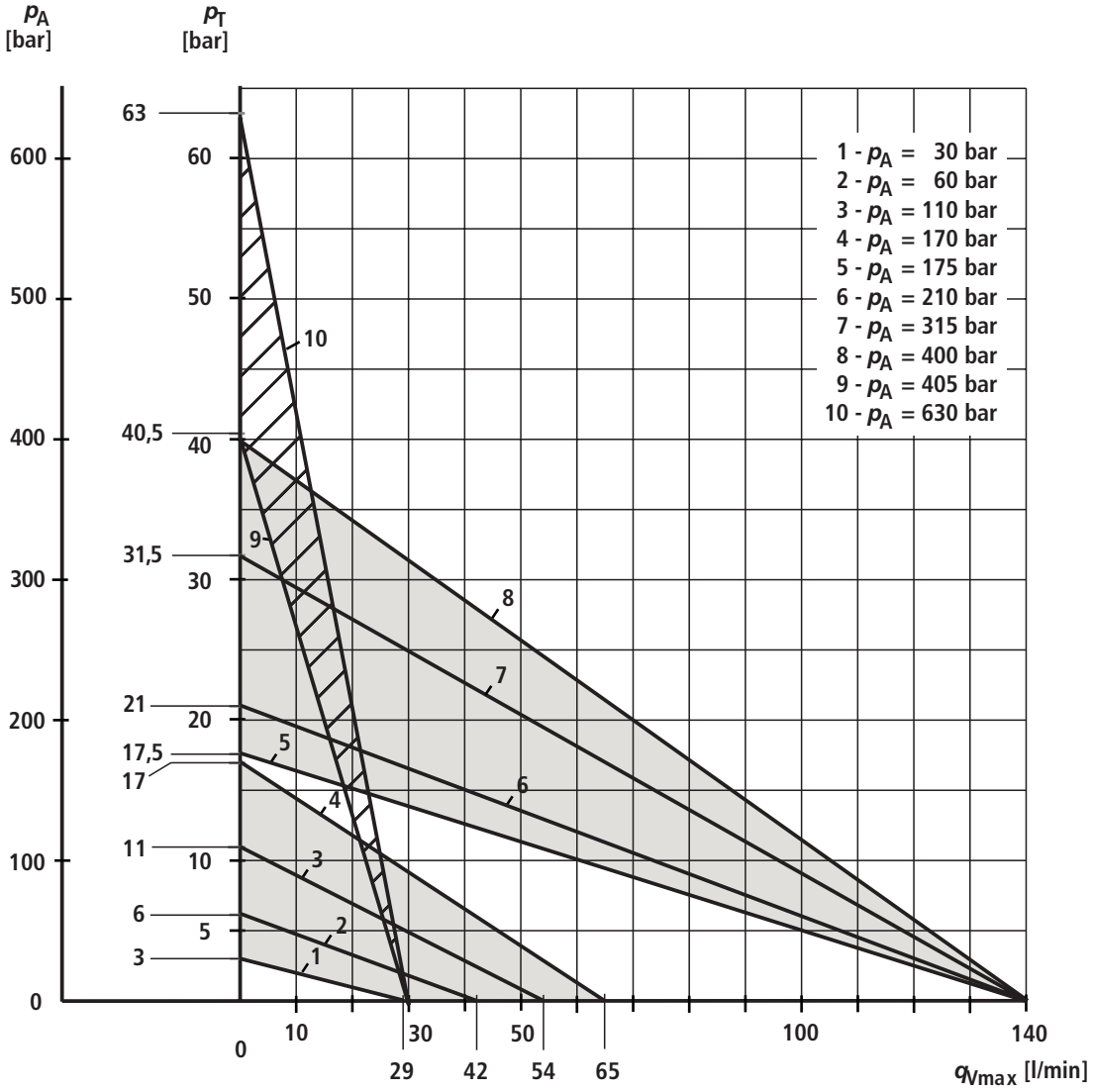
Example 2 (with interpolated characteristic curve):

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 x 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 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/...XC...E with different response pressures p_A.

Intermediate values can be determined by means of interpolation. Regarding the procedure for interpolation refer to page 6.



p_A Response pressure in bar

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

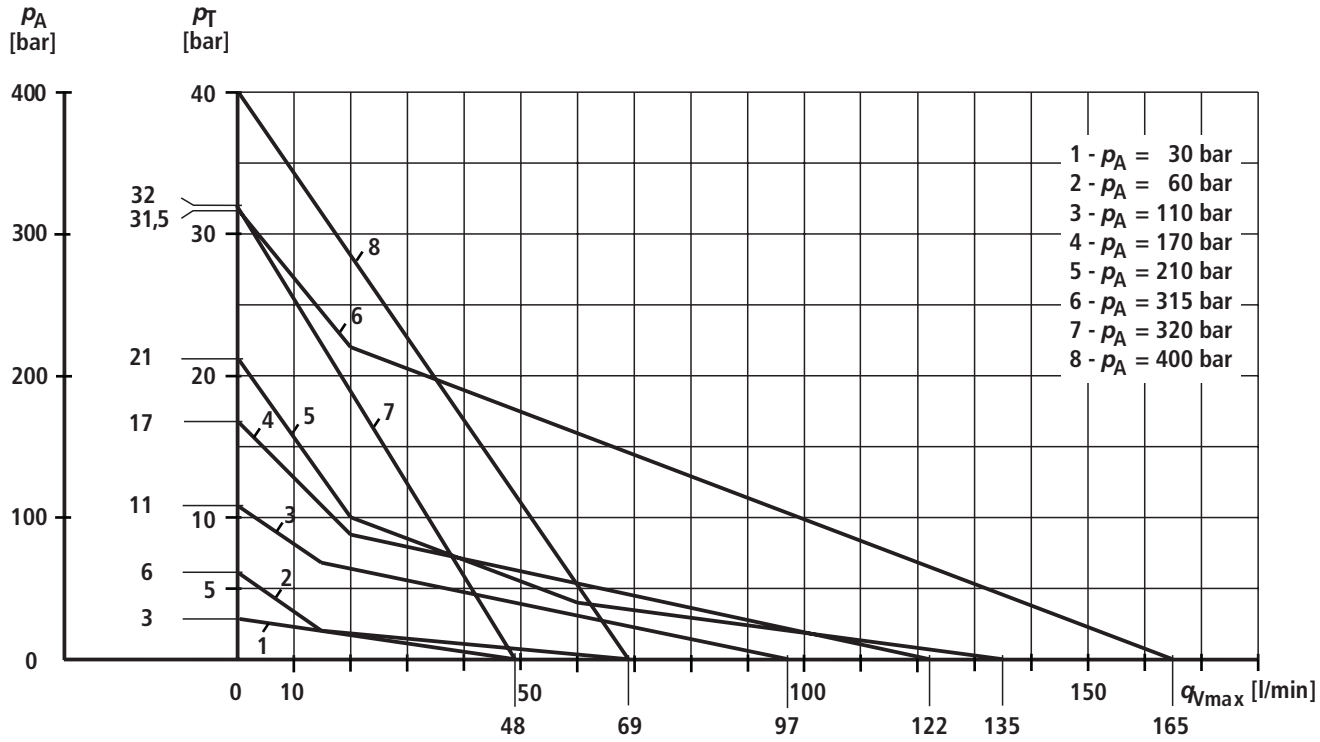
q_{Vmax} Maximum flow in l/min

Interpolation areas

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

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 DBDH **20**...1X/...XC...E with different response pressures p_A.

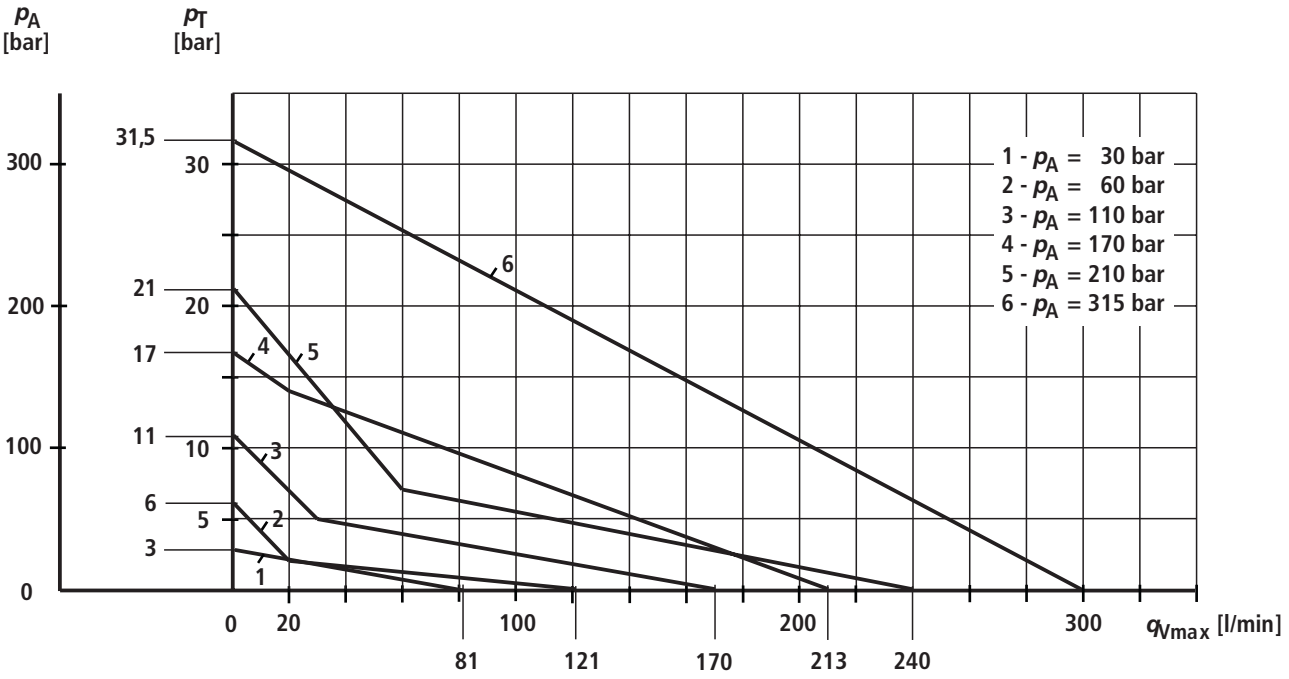
Intermediate values can be determined by means of interpolation. Regarding the procedure for interpolation refer to page 6.



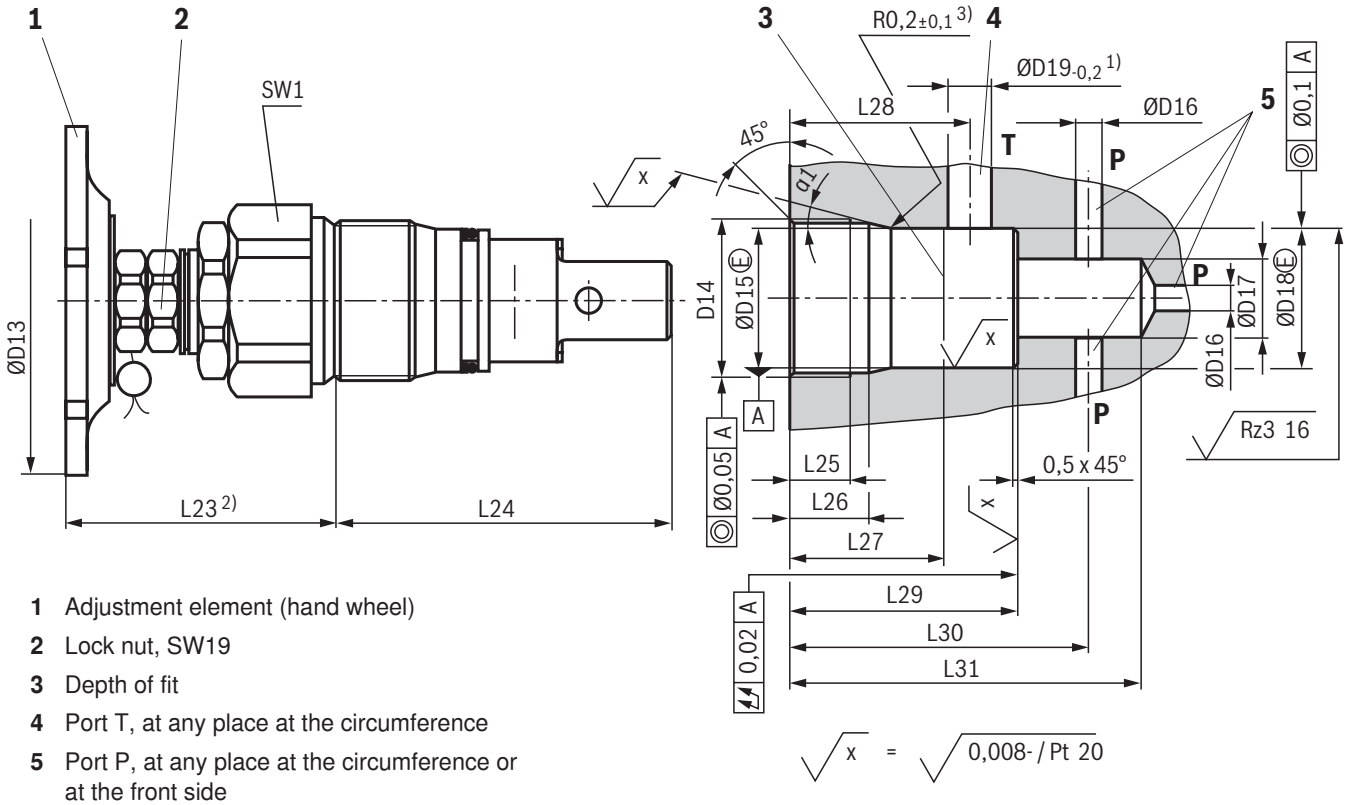
Characteristic curves: Counter pressure in the discharge line – size 30

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 DBDH **30**...1X/...XC...E with different response pressures p_A.

Intermediate values can be determined by means of interpolation. Regarding the procedure for interpolation refer to page 6.



Dimensions: Version "K", NG6 … NG30 (dimensions in mm)



1 Adjustment element (hand wheel)

2 Lock nut, SW19

3 Depth of fit

4 Port T, at any place at the circumference

5 Port P, at any place at the circumference or at the front side

1) Maximum dimension

2) Maximum dimension with lowest set response pressure

3) Edge at the seal ring insertion face rounded and free of burrs

4) All seal ring insertion faces are rounded and free of burrs
Tolerance for all angles ±0.5 °

Tolerance: DIN 7167 and ISO 14405
General tolerances: ISO 2768-mk

Screw-in cartridge valve

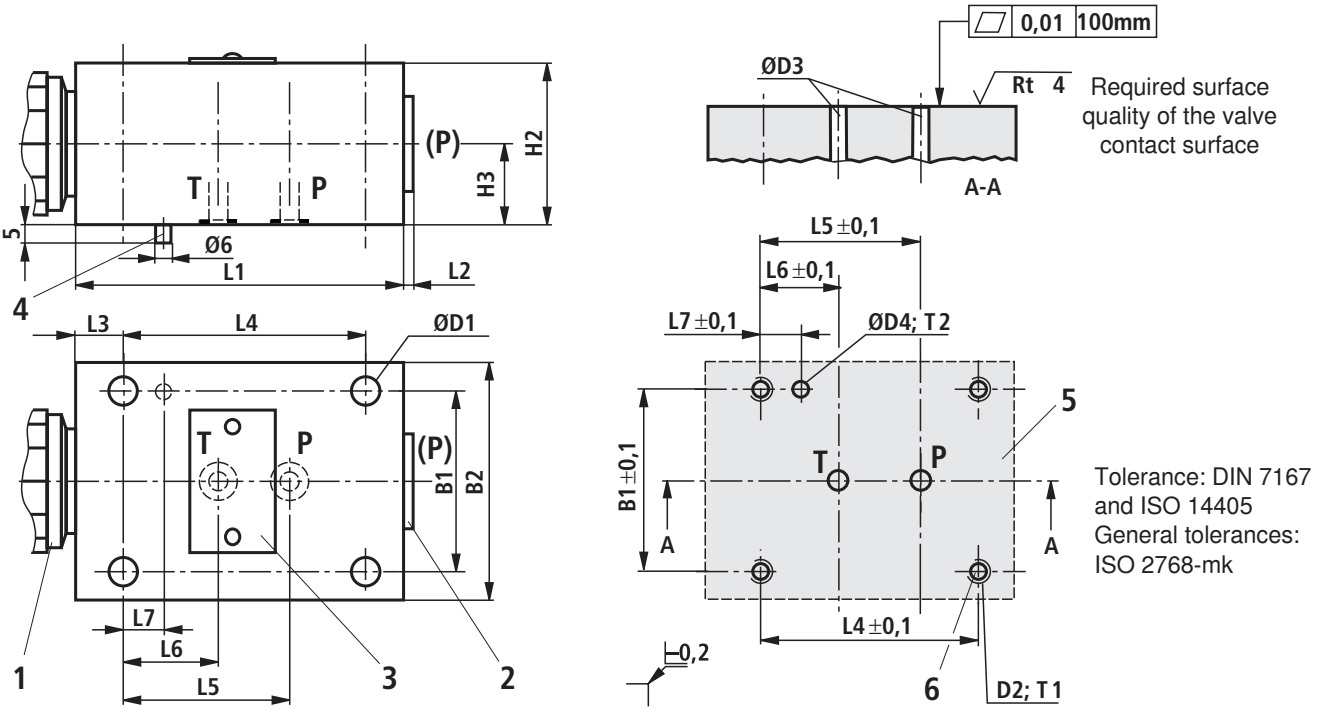
NG	ØD13	L23	L24	SW1	Tightening torques M_A in Nm for screw-in cartridge valves 5) Pressure rating in bar up to 200	up to 400	up to 630	Weight in kg
6	40	81	64.5	32	50±5	80±5	–	ca. 0.4
10	40	77	77	36	100±5	150±10	200±10	ca. 0.5
20	40	71	106	46	150±10	300±15	–	ca. 1
30	80	97	131	60	350±20	500±30	–	approx. 2.2

Mounting cavity

NG	D14	ØD15	ØD16	ØD17	ØD18	ØD19	L25	L26	L27	L28	L29	L30	L31	α1
6	M28 x 1.5	25^{H9}	6	15	$24.9^{+0.152}_{-0.2}$	12	15	19	30	36	45	56.5 ± 5.5	65	15°
10	M35 x 1.5	32^{H9}	10	18.5	$31.9^{+0.162}_{-0.2}$	15	18	23	35	41.5	52	67.5 ± 7.5	80	15°
20	M45 x 1.5	40^{H9}	20	24	$39.9^{+0.162}_{-0.2}$	22	21	27	45	55	70	91.5 ± 8.5	110	20°
30	M60 x 2	55^{H9}	30	38.75	$54.9^{+0.174}_{-0.2}$	34	23	29	45	63	84	113.5 ± 11.5	140	20°

5) The tightening torques are guidelines with a friction coefficient μ_{total} = 0.12 and when using a manual torque wrench.

Dimensions: Version "P", NG6 …NG30 (dimensions in mm)



1 Screw-in cartridge valve, sample representation (dimensions see page 10)

2 Connection bore (**P**), e. g. for pressure measurement; upon delivery, closed with plug screw (see dimensional table)
Not available with NG10 with pressure ratings > 400 bar

3 Name plate

4 Locating pin

5 Valve contact surface

6 4 valve mounting bores

Valve mounting screws (separate order)

For reasons of stability, exclusively the following valve mounting screws may be used:

– **4 hexagon socket head cap screws ISO 4762…-flZn-240h-L**
(friction coefficient μ_{total} = 0.09 to 0.14)

NG	Dimension	Property class	Material number
6	M6 x 50	10.9	**R913000151**
10	M8 x 70	10.9	**R913000149**
20	M8 x 90	12.9	**R913000150**
30	M10 x 110	12.9	**R913000148**

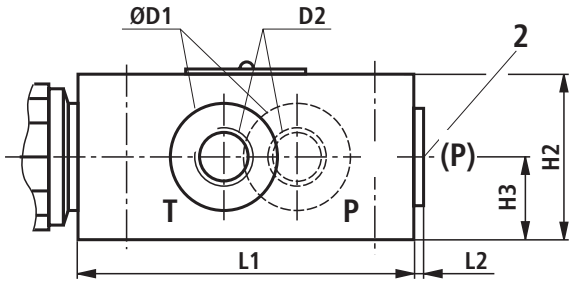
Pressure relief valve

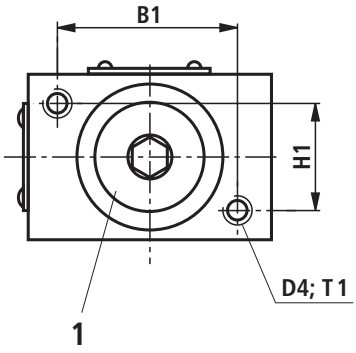
NG	B1	B2	ØD1	H2	H3	L1	L2	L3	L4	L5	L6	L7	(P)	**Weight** in kg
6	45	60	6.6	40	20	80	4	15	55	40	20	15	G1/4	ca. 1.5
10	60	80	9	60	30	100	4	20	70	45	21	15	G1/2	ca. 3.7
20	70	100	9	70	35	135	5.5	20	100	65	34	15	G3/4	ca. 6.4
30	100	130	11	90	45	180	5.5	25	130	85	35	15	G1 1/4	ca. 13.9

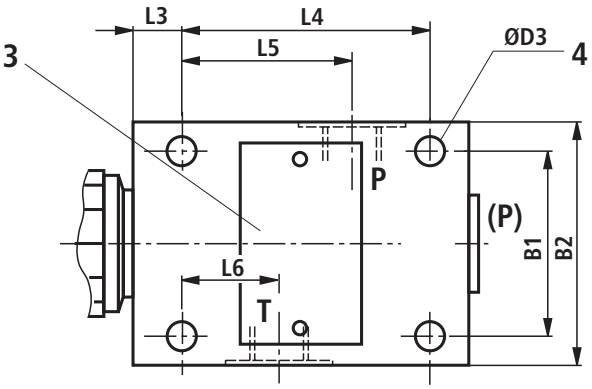
NG	Maximum overall length with lowest set response pressure
6	165
10	181
20	212
30	283

Detailed dimensions of the connection diagrams										
NG	**B1**	**D2**	**ØD3**	**ØD4**	**L4**	**L5**	**L6**	**L7**	**T1**	**T2**
6	45	M6	6	7.5	55	40	20	15	15	6.5
10	60	M8	10	7.5	70	45	21	15	15	6.5
20	70	M8	20	7.5	100	65	34	15	22	6.5
30	100	M10	30	7.5	130	85	35	15	22	6.5

Dimensions: Version "G", NG6 … NG30 (dimensions in mm)







Tolerance: DIN 7167 and ISO 14405
General tolerances: ISO 2768-mk

1 Screw-in cartridge valve, sample representation (dimensions see page 10)

2 Connection bore (**P**), (e. g. for pressure measurement) with plug screw (see dimensional table)
Not available with NG10 with pressure ratings > 400 bar

3 Name plate

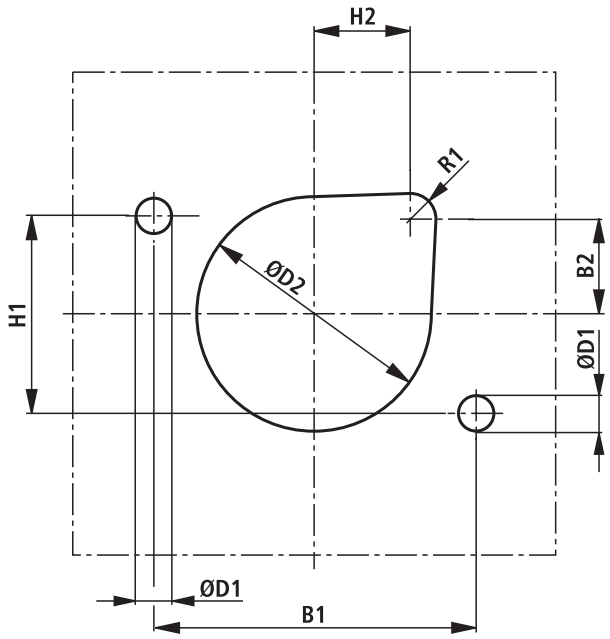
4 4 valve mounting bores

Pressure relief valve

NG	B1	B2	ØD1	D2	ØD3	D4	H1	H2	H3	L1	L2	L3	L4	L5	L6	T1	(P)	**Weight** in kg
6	45	60	25	G1/4	6.6	M6	25	40	20	80	4	15	55	40	20	10	G1/4	ca. 1.5
10	60	80	34	G1/2	9	M8	40	60	30	100	4	20	70	48	21	15	G1/2	ca. 3.7
20	70	100	47	G1	9	M8	50	70	35	135	5.5	20	100	65	34	18	G1	ca. 6.4
30	100	130	65	G1 1/2	11	M10	60	90	45	180	5.5	25	130	85	35	20	G1 1/2	ca. 13.9

NG	Maximum overall length with lowest set response pressure
6	165
10	181
20	212
30	283

Dimensions: Sheet cutout for valve mounting with version "P"
(dimensions in mm)



NG	B1	B2	H1	H2	ØD1H13	ØD2H13	R1
6	45	12.5	25	22.5	7	40	8
10	60	20.5	40	20.5	9	44	8
20	70	24	50	24	9	55	8
30	100	29.5	60	29.5	11	73	8

Further information

Use of non-electrical hydraulic components in an explosive environment (ATEX)	Data sheet 07011
Hydraulic fluids on mineral oil basis	Data sheet 90220
Environmentally compatible hydraulic fluids	Data sheet 90221
Flame-resistant, water-free hydraulic fluids	Data sheet 90222
Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)	Data sheet 90223
Safety valves, direct operated	Operating instructions 25010-XC-B
Selection of the filters	www.boschrexroth.com/filter
Information on available spare parts	www.boschrexroth.com/spc

Notes

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Notes

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Notes

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