

## Pressure relief valve, pilot-operated

### Type DB; DBW



- ▶ Size 52
- ▶ Component series 3X
- ▶ Maximum operating pressure 315 bar
- ▶ Maximum flow 2,000 l/min

#### Features

- ▶ For flange connection
- ▶ For subplate mounting
- ▶ 3 adjustment types for pressure adjustment, optionally:
  - Sleeve with hexagon and protective cap
  - Rotary knob
  - Lockable rotary knob
- ▶ Solenoid-actuated unloading via a built-on directional spool valve
- ▶ Pilot oil return, internal or external
- ▶ Remote control port, optional
- ▶ Main spool insert optionally as seat or spool version

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#### Type-examination tested safety valve type DB(W)...E, Component series 3X, according to the Pressure Equipment Directive 2014/68/EU

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**Ordering code**

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
<b>DB</b>		<b>52</b>					<b>3X</b>	/		<b>U</b>							*

01	Pressure relief valve	<b>DB</b>
02	<b>Without</b> directional valve	<b>no code</b>
	<b>With</b> built-on directional valve	<b>W</b>

03	Size 52	<b>52</b>
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04	 normally closed	<b>A</b> <sup>1)</sup>
	 normally open	<b>B</b> <sup>1)</sup>

**Type of connection**

05	Subplate mounting	<b>P</b>
	Flange connection	<b>F</b>

**Adjustment type for pressure adjustment**

06	Rotary knob	<b>1</b>
	Sleeve with hexagon and protective cap	<b>2</b>
	Lockable rotary knob	<b>3</b> <sup>2)</sup>

**Main spool**

07	Seat version	<b>-</b>
	Spool version	<b>L</b>

08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	<b>3X</b>
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**Pressure rating**

09	Set pressure up to 100 bar	<b>100</b>
	Set pressure up to 315 bar	<b>315</b>

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

10	Internal pilot oil supply and pilot oil return	<b>-</b>
	External pilot oil supply, internal pilot oil return	<b>X</b>
	Internal pilot oil supply, external pilot oil return	<b>Y</b>
	External pilot oil supply and pilot oil return	<b>XY</b>

11	Valve for minimum cracking pressure 3 bar	<b>U</b>
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12	<b>Without</b> directional valve	<b>no code</b>
	<b>With</b> directional spool valve (data sheet 23178)	<b>6E</b> <sup>1)</sup>

13	Direct voltage 24 V	<b>G24</b> <sup>1)</sup>
	AC voltage 230 V 50/60 Hz	<b>W230</b> <sup>1)</sup>

14	<b>With</b> concealed manual override	<b>N9</b> <sup>1)</sup>
	<b>With</b> manual override	<b>N</b> <sup>1)</sup>
	<b>Without</b> manual override	<b>no code</b>

**Electrical connection**

15	<b>Without</b> mating connector; connector DIN EN 175301-803	<b>K4</b> <sup>1; 3)</sup>
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**Ordering code**

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
<b>DB</b>		<b>52</b>					<b>3X</b>	<b>/</b>		<b>U</b>							<b>*</b>


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

16	NBR seals	<b>no code</b>
	FKM seals	<b>V</b>

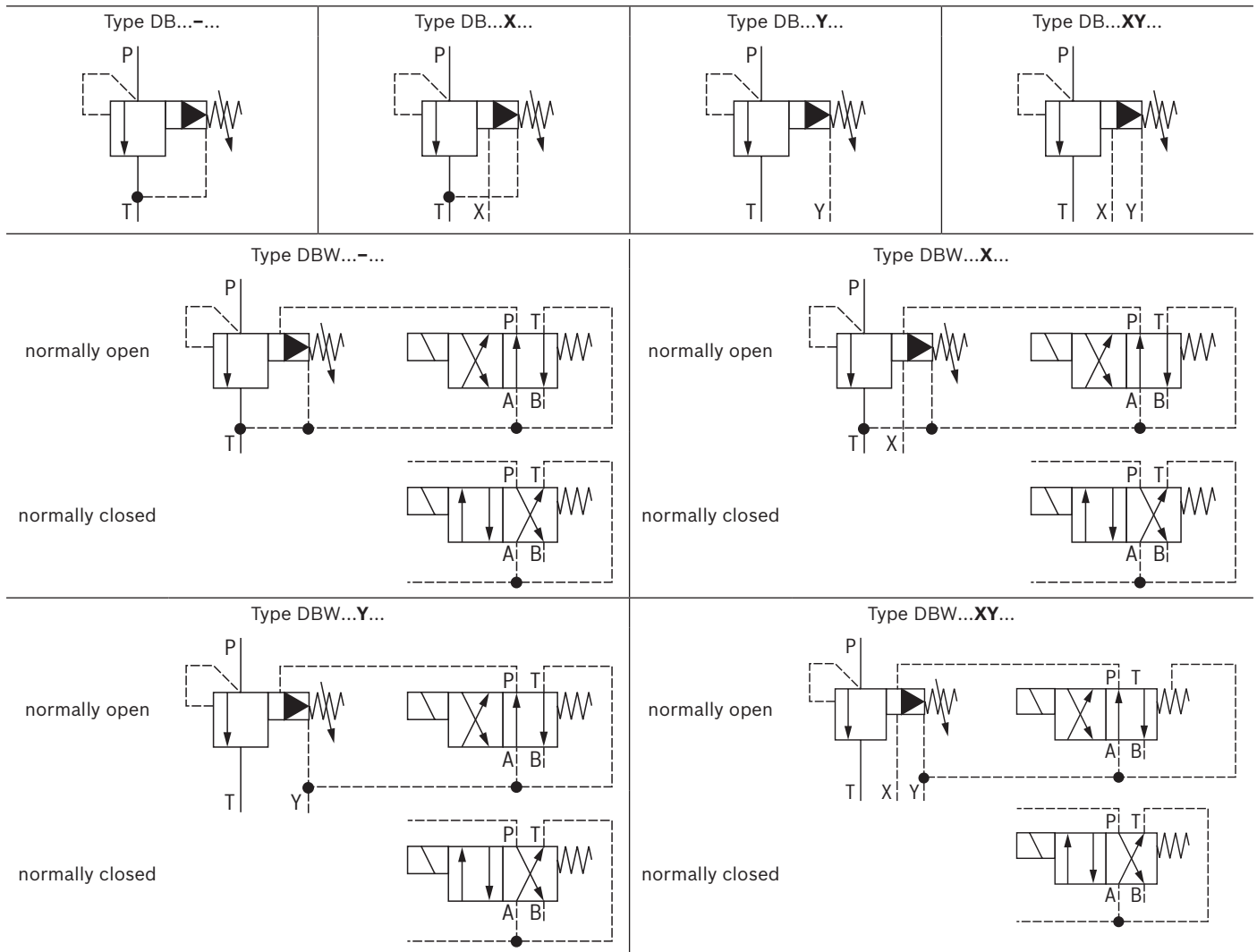
**Equipment Directive**

17	<b>Without</b> type examination	<b>no code</b>
	Type-examination tested safety valves according to Pressure Equipment Directive 2014/68/EU <sup>4)</sup>	<b>E</b>
18	For further details, see the plain text	

- 1) Ordering code only necessary with version with mounted directional valve ("DBW").
- 2) H-key with material no. **R900008158** is included in the scope of delivery.
- 3) Mating connectors, separate order, see page 16.
- 4) See ordering code on page 11.

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

### Symbols





**Technical data**

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

<b>General</b>			
Weight	▶ DB ...	kg	approx. 27
	▶ DBW ...	kg	approx. 28.5
Installation position			any
Ambient temperature range	▶ DB ...	°C	- 30 ... + 80 (NBR seals) - 15 ... + 80 (FKM seals)
	▶ DBW ...	°C	- 30 ... + 50 (NBR seals) - 15 ... + 50 (FKM seals)

<b>Hydraulic</b>			
Maximum operating pressure	▶ Port P, T, X	bar	315
Maximum counter pressure	▶ Port Y - DB ...	bar	315
	- DBW ...Y	bar	210 with DC solenoid
	▶ Port T - DBW ...	bar	160 with AC solenoid
Minimum set pressure		bar	flow-dependent (see characteristic curves page 6)
Maximum set pressure		bar	100; 315
Maximum flow		l/min	2000
Hydraulic fluid			see table page 7
Hydraulic fluid temperature range		°C	- 30 ... + 80 (NBR seals) - 15 ... + 80 (FKM seals)
Viscosity range		mm <sup>2</sup> /s	10 ... 380
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 20/18/15 <sup>1)</sup>

<sup>1)</sup> 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](http://www.boschrexroth.com/filter).

**Notice:**

- ▶ Technical data for directional spool valve see data sheet 23178.
- ▶ Technical data for connection flange see data sheet 45501.
- ▶ Deviating technical data for type-examination tested safety valves can be found on page 12.

## Technical data

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

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP, HLPD, HVL, 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 notices 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.

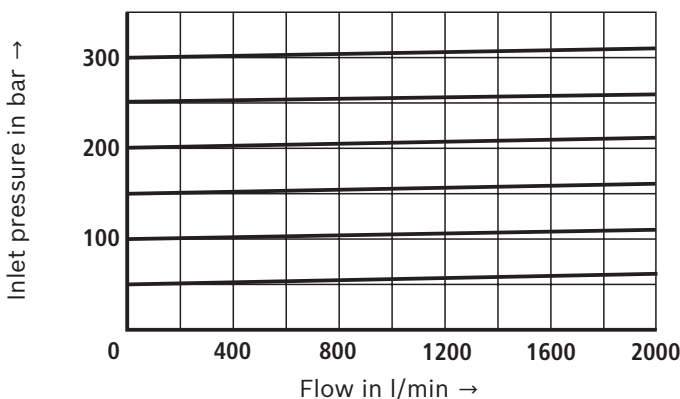
### ▶ Flame-resistant – containing water:

Due to 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 - to back up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.

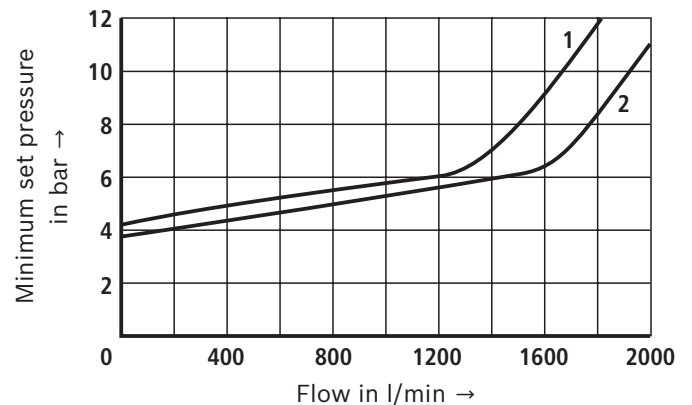
## Characteristic curves

(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$ )

**Inlet pressure dependent on the flow**



**Minimum set pressure dependent on the flow <sup>1)</sup>**



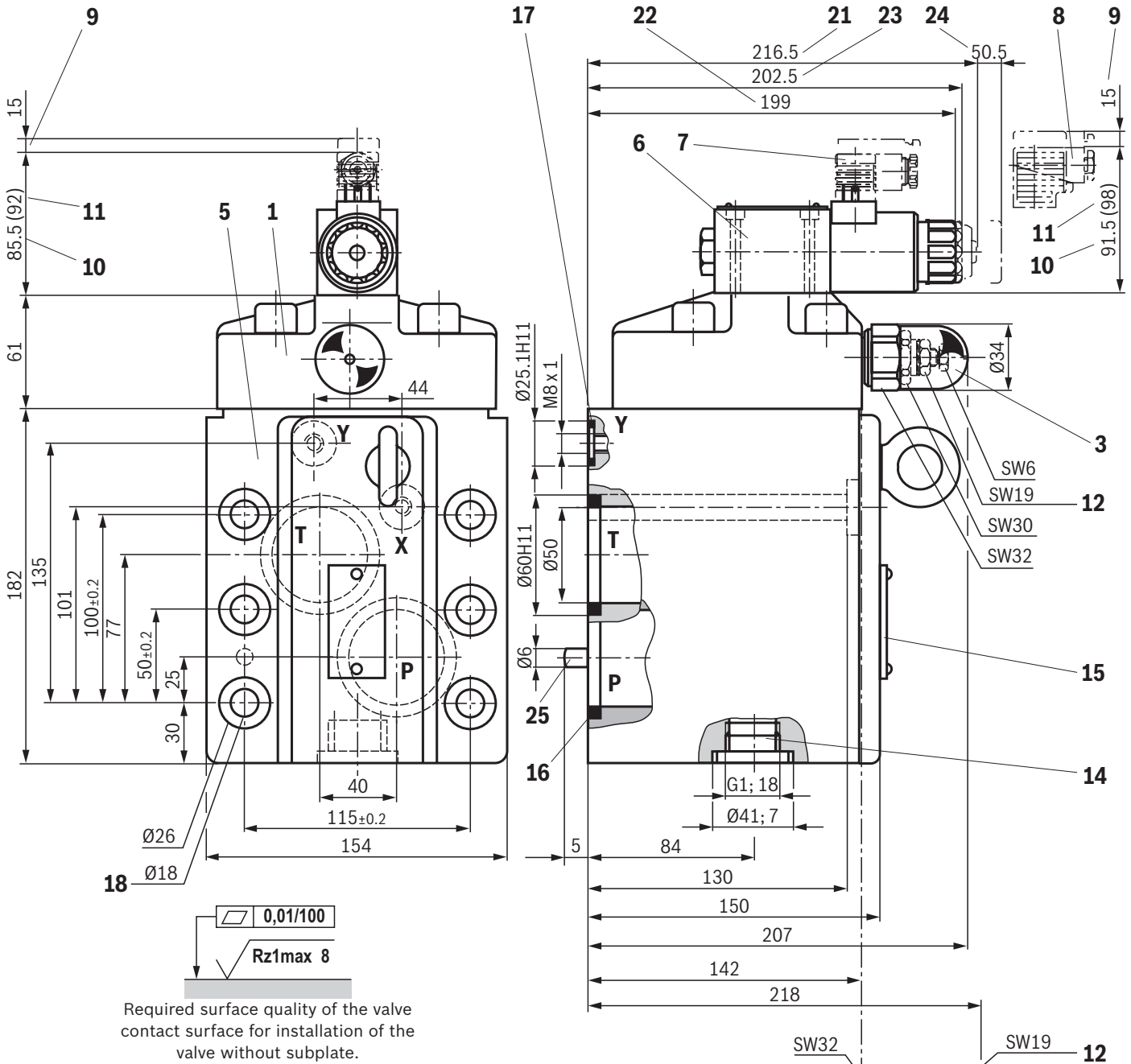
### Notice:

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.

<sup>1)</sup> The characteristic curves apply for output pressure  $p_T = 0$  bar in the entire flow range

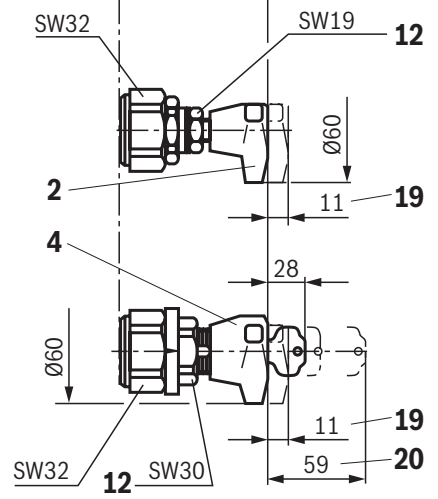
- 1** Spool version
- 2** Seat version

**Dimensions:** Subplate mounting  
(dimensions in mm)



**Notice:**  
Please use the existing mounting bores to fix the valve so that the reaction forces can be absorbed in a risk-free manner.

Item explanations can be found on page 10.  
Deviating dimensions for version "E" see page 12.







## Dimensions

- 1 Pilot control valve
- 2 Adjustment type "1"
- 3 Adjustment type "2"
- 4 Adjustment type "3"
- 5 Main valve
- 6 Directional spool valve NG6, see data sheet 23178
- 7 Mating connector **without** circuitry for connector "K4"  
(separate order, see page 16 and data sheet 08006)
- 8 Mating connector **with** circuitry for connector "K4"  
(separate order, see page 16 and data sheet 08006)
- 9 Space required for removing the mating connector
- 10 Dimension for valve with DC solenoid
- 11 Dimension ( ) for valve with AC solenoid
- 12 Lock nut, tightening torque  $M_A = 10^{+5}$  Nm
- 13 Connection flanges (T and P), see data sheet 45501
- 14 Pressure gauge connection,  
tightening torque  $M_A = 225$  Nm  $\pm 10\%$
- 15 Name plate
- 16 Identical seal rings for ports P and T
- 17 Identical seal rings for ports X and Y
- 18 Valve mounting bores
- 19 Maximum dimension with unloaded valve
- 20 Space required to remove the key
- 21 Dimension for valve with manual override "N"
- 22 Dimension for valve with concealed manual override "N9"
- 23 Dimension for valve without manual override
- 24 Space required to remove the coil
- 25 Locking pin

### Valve mounting screws (separate order)

- ▶ Subplate mounting

**6 hexagon socket head cap screws**  
**ISO 4762 - M16 x 150 - 10.9-flZn-240h-L**  
(friction coefficient  $\mu_{\text{total}} = 0.09 \dots 0.14$ )  
Tightening torque  $M_A = 229$  Nm  $\pm 10\%$   
Material no. **R913000154**

- ▶ Flange connection

**2 hexagon socket head cap screws ISO 4762 - M12 - 10.9**

**Connection flanges** (separate order), see data sheet 45501

**Ordering code:** Type-examination tested safety valves, version "DB(W)...E" <sup>1)</sup>

Designation	Component marking	Maximum flow $q_{Vmax}$ in l/min with pilot oil return		Set response overpressure $p$ in bar
		external "Y"	internal "-"	
DB 52      2    3    4      5    6    7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 3X/ <input type="checkbox"/> <input type="checkbox"/> U <input type="checkbox"/> E	TÜV.SV. <input type="checkbox"/> – 734.46.F.G.p	1000 1500 2000	500 1000 1500	50 ... 110 111 ... 210 211 ... 315
DBW 52    1    2    3    4      5    6    7    8 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 3X/ <input type="checkbox"/> <input type="checkbox"/> U6 <input type="checkbox"/> <input type="checkbox"/> E	TÜV.SV. <input type="checkbox"/> – 734.46.F.G.p			

<input type="checkbox"/> 1	Directional valve, normally closed	<b>A</b>
	Directional valve, normally open	<b>B</b>
<input type="checkbox"/> 2	Subplate mounting	<b>P</b>
	Flange connection	<b>F</b>

**Adjustment type for pressure adjustment**

<input type="checkbox"/> 3	Rotary knob (pressure adjustment sealed, unloading or setting of a lower response pressure possible)	<b>1</b>
	With sealed protective cap (no adjustment/unloading possible)	<b>2</b>

**Main spool**

<input type="checkbox"/> 4	Seat version	<b>-</b>
	Spool version	<b>L</b>

**Pressure**

<input type="checkbox"/> 5	To be entered by the customer, e.g. pressure adjustment $\geq 50$ bar and in 5 bar steps possible	<b>e.g. 150</b>
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**Pilot oil supply and pilot oil return**

<input type="checkbox"/> 6	Internal pilot oil supply and pilot oil return	<b>- 2; 3)</b>
	Pilot oil supply internal, pilot oil return external (recommendation)	<b>Y 3)</b>

**Electrical specifications**

<input type="checkbox"/> 7	See page 2	<b>e.g. EG24N9K4</b>
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**Seal material**

<input type="checkbox"/> 8	NBR seals	<b>no code</b>
	FKM seals	<b>V</b>

<input type="checkbox"/>	Value entered at the factory	
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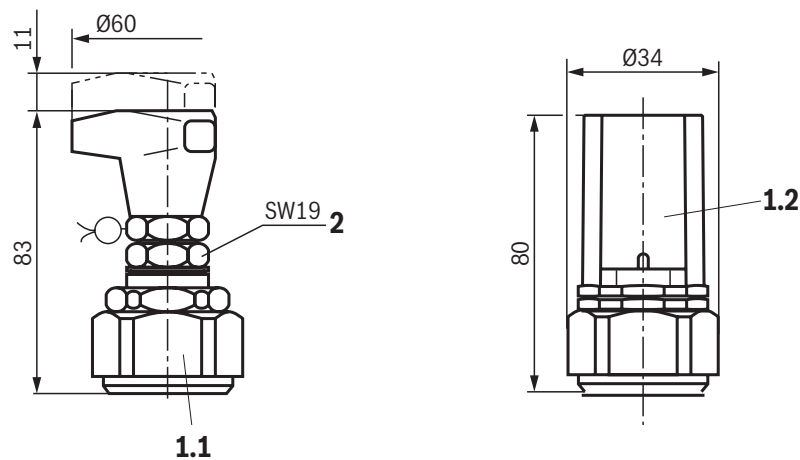
- 1) Component series 3X, according to the Pressure Equipment Directive 2014/68/EU
- 2) Dash "-" **only** necessary with version with attached directional valve (DBW)
- 3) External pilot oil supply "X" not possible!

**Deviating technical data:** Type-examination tested safety valves, version "DB(W)...E" **1)**

Hydraulic						
Version			"DB../.."	"DB../..Y"	"DBW../.."	"DBW../..Y"
Maximum counter pressure	▶ Port Y	bar	–	0	–	0
	▶ Port T	bar	2)	$p_T < 15$	2)	$p_T < 15$
Maximum flow	see table page 11 as well as characteristic curves page 14 ... 15					
Hydraulic fluid	Mineral oil (HL, HLP) according to DIN 51524					
Hydraulic fluid temperature range	°C	–10 ... +60				
Viscosity range	mm <sup>2</sup> /s	12 ... 230				

1) Component series 3X, according to Pressure Equipment Directive 2014/68/EU (For applications outside these parameters, please consult us!)

2) See characteristic curves and explanatory notes for maximum admissible counter pressures on page 14 ... 15

**Deviating dimensions:** Type-examination tested safety valves, version "DB(W)...E" **1)**  
(dimensions in mm)

**1.1** Adjustment type "1" – rotary knob

**1.2** Adjustment type "2", hexagon with safety cap

**2** Lock nut, tightening torque  $M_A = 10^{+5}$  Nm

**Safety instructions:** Type-examination tested safety valves, version "DB(W)...E" <sup>1)</sup>

- ▶ Before ordering a type-examination tested safety valve, it must be observed that for the desired **response overpressure  $p$** , the maximum admissible **flow  $q_{V \max}$**  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 page 11).
- ▶ Discharge lines (ports T and Y) of safety valves must end in a risk-free manner. An accumulation of fluids in the discharge system must **not** be possible (see data sheet AD2000 A2).
- ▶ If a lead seal at the safety valve is removed, the approval according to the PED.
- ▶ The requirements of the Pressure Equipment Directives **2014/68/EU** and of data sheet AD2000 A2 must be generally observed!


 **Application notes must always be observed**

- ▶ In the plant, the response pressure specified in the component marking is set with a flow of 12 l/min (version "Y" with 9 l/min).
- ▶ The maximum admissible flow stated in the component marking (= numerical value instead of the character "G" in the component marking, see page 11) must not be exceeded.

It applies to:

- Pilot oil return **external ("Y") without counter pressure** in the **discharge line Y**; admissible counter pressure in the discharge line (port T) < 15 bar
- Pilot oil return **internal ("no code")**. The maximum flow is only admissible **without counter pressure** in the **discharge line** (port T).

With internal pilot oil return, the system pressure increases by the counter pressure in the discharge line (port T) with increasing flow (observe AD2000 - data sheet A2 - item 6.3). To ensure that this increase in system pressure caused by the flow does not exceed 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 page 14 ... 15).

 **Notice:**

Possible unloading via the directional valve must not be applied for safety-relevant functions. If unloading is required for safety-relevant functions, an additional safety valve must be installed.

<sup>1)</sup> Component series 3X, 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 possible flow 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.

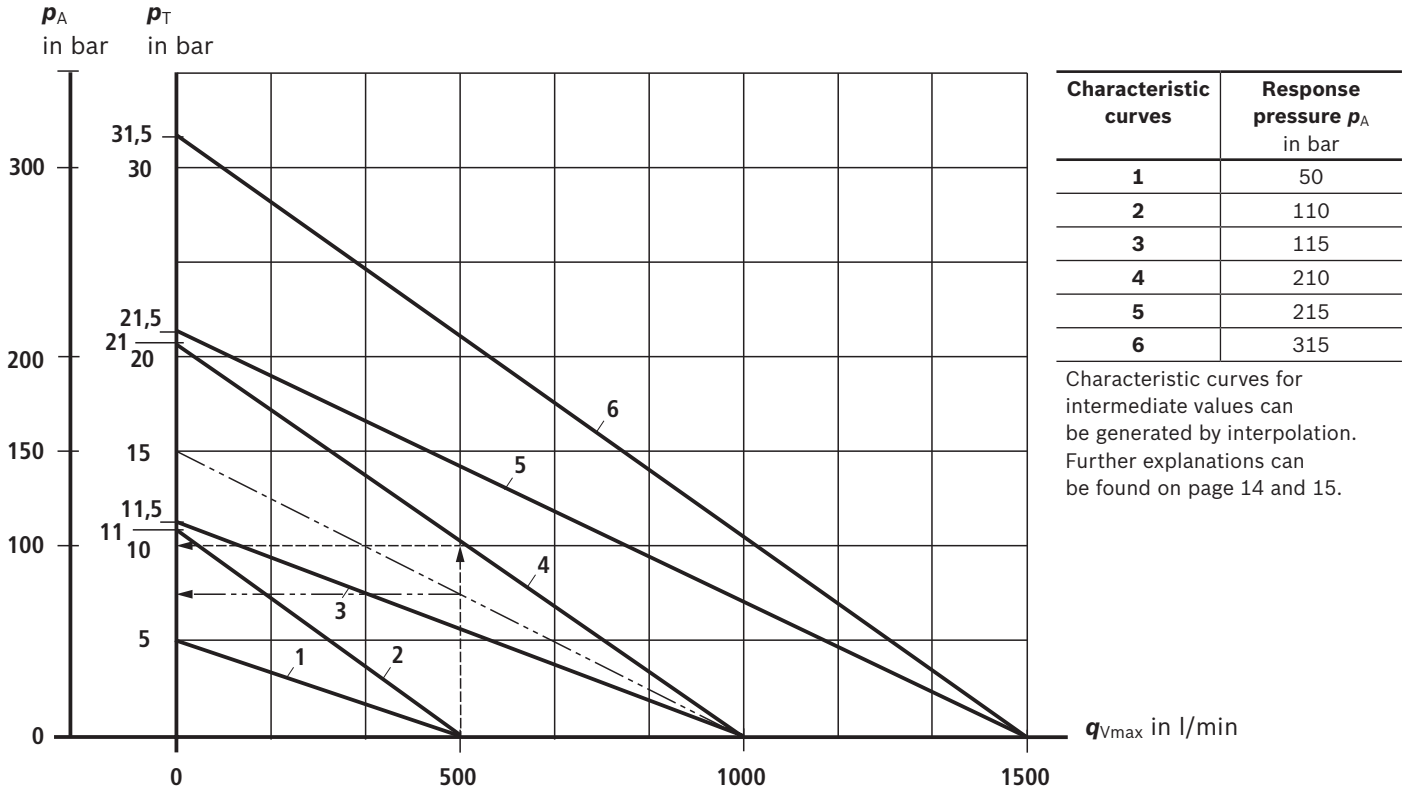
When the flow approaches zero, the maximum counter pressure  $p_T$  is in each case 10% of the response pressure. With increasing flow, the maximum counter pressure  $p_T$  decreases.

**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 position flow 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

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 DB(W) ...-3X/...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  
(sum of all possible counter pressures; also see AD2000 data sheet - A2)  
 $p_{Tmax} = 10\% \times p_A$  (with  $q_V = 0$  l/min) according to PED 2014/68/EU
- $q_{Vmax}$  Maximum flow in l/min

#### Determination of the maximum counter pressure

**Example 1** (with already existing characteristic curve):  
Flow of the system / accumulator to be secured:  $q_{Vmax} = 500$  l/min  
Safety valve set to:  $p_A = 210$  bar.  
Read off the maximum counter pressure  $p_T$  of approx. 10 bar from the diagram (see arrows, dashed line "-----").

**Example 2** (with interpolated characteristic curve):  
Flow of the system / accumulator to be secured:  $q_{Vmax} = 500$  l/min  
Safety valve set to:  $p_A = 150$  bar.  
Value to be marked at the axis referred to as  $p_T$ :  
 $1/10 \times 150$  bar = 15 bar.  
Read off the maximum counter pressure  $p_T$  of approx. 7.5 bar from the diagram (see arrows, dashed/dotted line "- \_ \_ \_").

**Accessories** (separate order)**Mating connectors and cable sets**

Item <sup>1)</sup>	Designation	Version	Short designation	Material number	Data sheet
7, 8	Mating connector; for valves with "K4" connector, 2-pole + PE, design A	Without circuitry, M16 x 1.5, 12 ... 240 V, "a"	Z4	<b>R901017010</b>	<b>08006</b>
		Without circuitry, M16 x 1.5, 12 ... 240 V, "b"		<b>R901017011</b>	
		With indicator light, M16 x 1.5, 12 ... 240 V	Z5L	<b>R901017022</b>	
		With rectifier, M16 x 1.5, 80 ... 240 V	RZ5	<b>R901017025</b>	
		With indicator light and Z-diode-suppressor, M16 x 1.5, 24 V	Z5L1	<b>R901017026</b>	

<sup>1)</sup> See dimensions on page 8 and 9.

**General information**

- ▶ The unloading function (directional valve function with version "DBW") 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 (item 7 on page 5) in the pilot control valve/adjustment type  $p_{\text{spring}} = 200 \text{ bar}$

Hydraulic counter pressure in port T with internal pilot oil return  $p_{\text{hydraulic}} = 50 \text{ bar}$

=> Response pressure =  $p_{\text{spring}} + p_{\text{hydraulic}} = 250 \text{ bar}$

**Further information**

- |  |  |
|--|--|
| ▶ Directional spool valve  | Data sheet 23178   |
| ▶ Connection flanges   | Data sheet 45501   |
| ▶ 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   |
| ▶ Hydraulic valves for industrial applications                               | Operating instructions 07600-B   |
| ▶ General product information on hydraulic products                          | Data sheet 07008   |
| ▶ Assembly, commissioning and maintenance of industrial valves               | Data sheet 07300   |
| ▶ Selection of filters   | <a href="http://www.boschrexroth.com/filter">www.boschrexroth.com/filter</a> |
| ▶ Information on available spare parts                                       | <a href="http://www.boschrexroth.com/spc">www.boschrexroth.com/spc</a>       |

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