Rexroth
Bosch Group

Pressure relief valve, pilot operated

RE 25850/04.05 1/12
Replaces: 07.02

Type DB; DBW


HAD 7178

Size 52
Component series 3X
Maximum operating pressure 315 bar
Maximum flow 2000 L/min

Table of contents

Information on available spare parts:
www.boschrexroth.com/spc

Features

- For flange connection
- For subplate mounting
- 3 pressure adjustment elements optional:
  - Sleeve with hexagon and protective cap
  - Rotary knob
  - Lockable rotary knob
- Solenoid operated unloading through built-on directional valve
- Internal or external pilot oil drain
- Remote control port, optional
- Main spool insert optional as poppet or spool version
- Further information:
  - High-performance directional valve, see RE 23178
  - Connecting flanges, see RE 45501

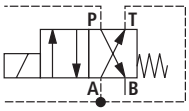
Ordering code

DB		52					3X/		U							*

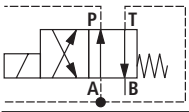
Pressure relief valve = **DB**

Without directional valve = **No code**
With built-on directional valve = **W**

Size 52 = **52**



Normally closed = **A** [1)]



Normally open = **B** [1)]

Version
For subplate mounting = **P**
For flange connection = **F**

Pressure adjustment element
Rotary knob = **1**
Sleeve with hexagon and protective cap = **2**
Lockable rotary knob = **3** [2)]

Main spool
As seated spool version = **–**
As sliding spool version = **L**

Component series 30 to 39 = **3X**
(30 to 39: unchanged installation and connection dimensions)

Pressure stage
Set pressure up to 100 bar = **100**
Set pressure up to 315 bar = **315**

Pilot oil supply
– =
X =
Y =
XY =
Ordering code according to symbols on page 3

U = For minimum cracking pressure of 3 bar

No code = **Without** directional valve
6E [1)] **=** **With** directional valve size 6

G24 [1)] **=** 24 V DC
W230 [1)] **=** AC voltage 230 V; 50/60 Hz

No code = **Without** manual override
N9 [1)] **=** **With concealed** manual override
N [1)] **=** **With** manual override

Electrical connection
Individual connection
K4 [3)] **=** **Without** cable socket, with component plug DIN EN 175301-803

Seal material
No code = NBR seals
V = FKM seals
(other seals on enquiry)
⚠ **Caution!**
Observe compatibility of seals with hydraulic fluid used!

Type testing
No code = Without type testing
E = Type-tested safety valves according to PED 97/23/EC

Further details in clear text

[1)] Indication **only** required for version with built-on directional valve (DBW).

[2)] H-key, order no. **R900008158,** included in the scope of supply

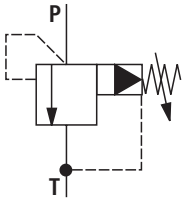
[3)] Cable sockets, separate order, see page 3

For ordering code for type-tested safety valves of type DB(W) 52..3X/..E, see page 10

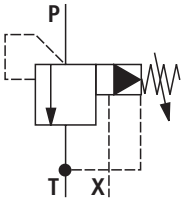
Preferred types and standard components are listed in the EPS (standard price list).

Symbols

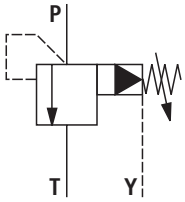
Type DB 52 …**–**..



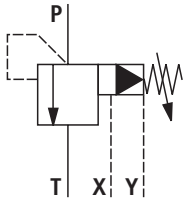
Type DB 52 …**X**..



Type DB 52 …**Y**..

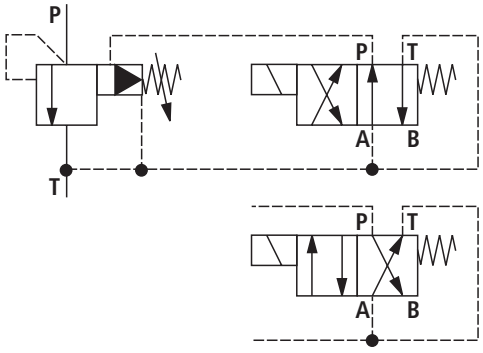


Type DB 52 …**XY**..



Type DBW 52 …**–**..

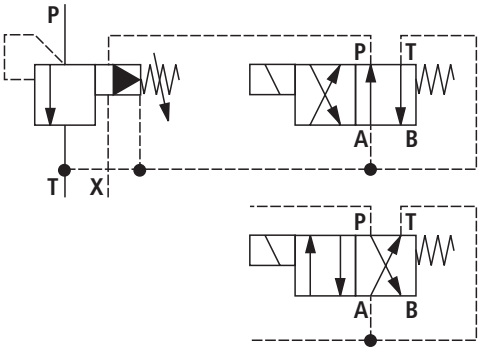
normally open



normally closed

Type DBW 52 …**X**..

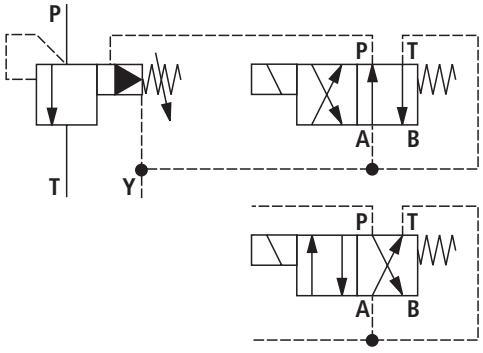
normally open



normally closed

Type DBW 52 …**Y**..

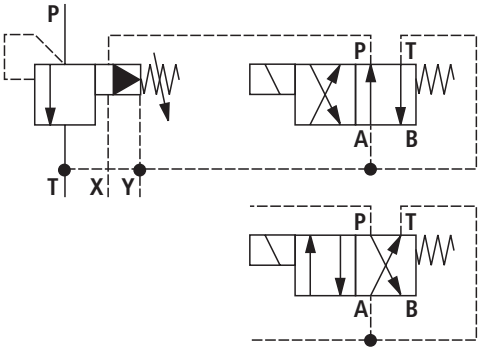
normally open



normally closed

Type DBW 52 …**XY**..

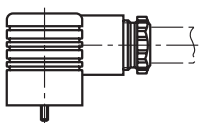
normally open

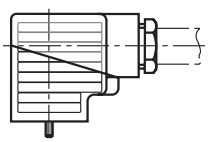


normally closed

Cable sockets to DIN EN 175301-803

Details and further cable sockets, see RE 08006





	Material no.			
Colour	Without circuitry	With LED lamp 12 … 240 V	With rectifier 12 … 240 V	With LED lamp and Zener diode suppressor circuit 24 V
Grey	**R901017010**	–	–	–
Black	**R901017011**	**R901017022**	**R901017025**	**R901017026**

Function, section, symbol

Pressure control valves of type DB/DBW are pilot operated pressure relief valves. They are used for limiting (DB) or for the limitation and solenoid-operated unloading of a system pressure.

These pressure relief valves basically consist of a pilot control valve (1) with pressure adjustment element (2), a main valve (3) with main spool insert (4) and an optional directional valve (5).

Pressure relief valves of type DB

The pressure applied by the system acts on the main spool (4). At the same time, the pressure is applied via the pilot lines (6), which are fitted with orifices, to the spring-loaded side of the main spool (4) and to the pilot control valve (1). When the system pressure exceeds the value set on the spring (7), the poppet (10) of the pilot control valve opens. The hydraulic fluid can now flow from the spring-loaded side of the main spool (4) via the spring chamber of the pilot control valve (1) internally via port T – or externally via port Y - to the tank. Due to the combination of orifices in the pilot lines, a pressure differential arises across the main spool, which causes the connection from P to T to open. The hydraulic fluid flows from channel P to channel T at the set operating pressure.

The pressure relief valve can be unloaded remotely controlled or changed over to another pressure value via port X X (8).

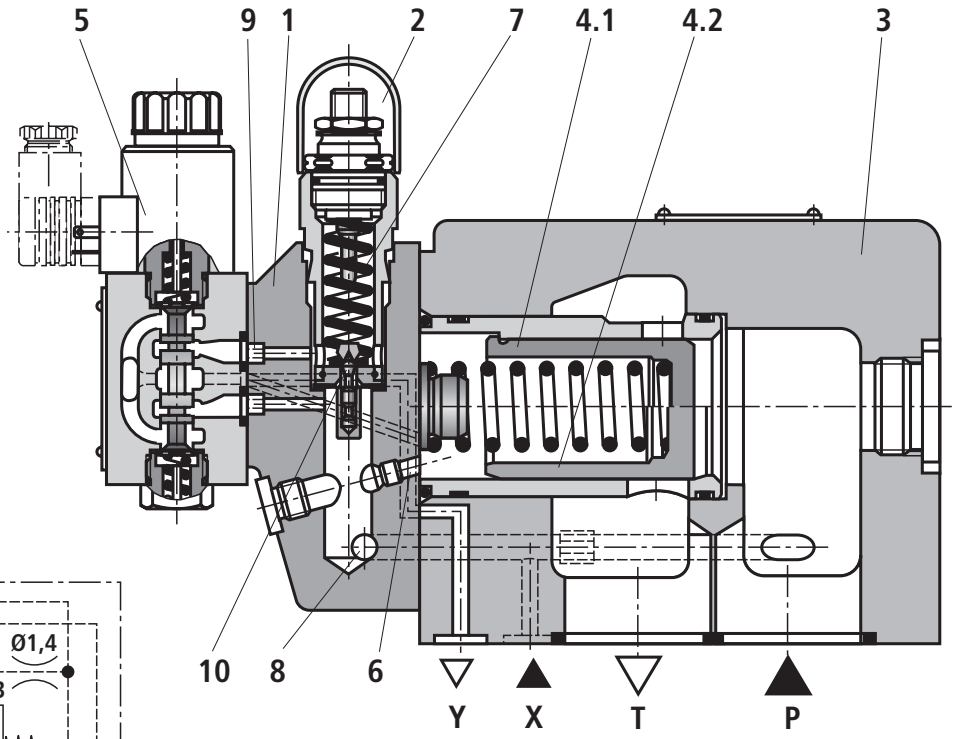
Pressure relief valves of type DBW

In principle, the function of this valve corresponds to that of valve type DB. Unloading on the main spool (4) is, however, achieved by operating the built-on directional valve (5).

To reduce tank pressure peaks when changing over to pressureless circulation by operation of the directional valve, the main spool of sliding spool design (4.1) can be used.

Influence on the turn-off time

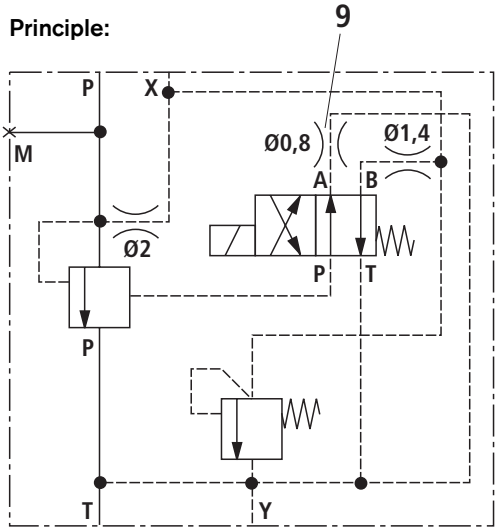
The turn-off time can be influenced by means of orifice (9), which has a Ø0.8 as a standard. By changing this orifice (9), the turn-off time can be extended or shortened. This has no effect on the pressure relief function.



Type DBW 52 BP2.3X/…XYU6EG24N9K4

4.1 Sliding spool
4.2 Seated spool

Principle:



With type DBW 52 …**Y**… the connection T–Y is closed.

Technical data (for applications outside these parameters, please consult us!)

General

Weight	Type DB 52 ...	kg	approx. 27
	Type DBW 52 ...	kg	approx. 28.5
Installation orientation			Optional
Ambient temperature range	Type DB 52...	°C	– 30 to + 80 (NBR seals) – 15 to + 80 (FKM seals)
	Type DBW 52...	°C	– 30 to + 50 (NBR seals) – 15 to + 50 (FKM seals)
Technical data of the directional valve			See data sheet RE 23178
Connecting flanges			See data sheet RE 45501

Minimum strength of materials for subplates, flanges, etc.:
The materials must be selected so that sufficient safety is provided under all conceivable operating conditions, e.g.: resistance to pressure, safety against stripping of threads and tightening torques.

Hydraulic

Maximum operating pressure	Ports P, T, X		bar	315
Maximum backpressure	Port Y	Type DB 52 ...	bar	315
		Type DBW…Y	bar	210 for DC solenoid
	Port T	Type DBW…	bar	160 for AC solenoid
Minimum set pressure			bar	Depends on flow (see characteristic curve on page 6)
Maximum set pressure			bar	100; 315
Maximum flow			L/min	2000
Hydraulic fluid				Mineral oil (HL, HLP) to DIN 51524 [1]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape-seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic esters) [2]; other hydraulic fluids on enquiry
Hydraulic fluid temperature range			°C	– 30 to + 80 (NBR seals) – 15 to + 80 (FKM seals)
Viscosity range			mm^2/s	10 to 380
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)				Class 20/18/15 [3]

[1] Suitable for NBR and FKM seals

[2] Suitable only for FKM seals

[3] The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, increases the service life of components.
For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

Deviating technical data for type-tested safety valves [1)]

Hydraulic

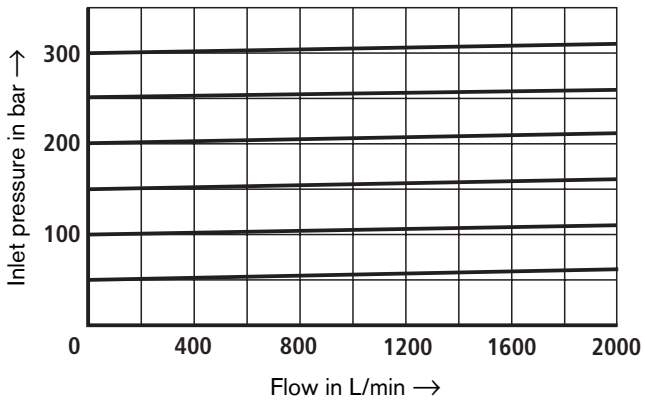
Maximum flow			See table on page 10 and characteristic curves on page 12			
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524 and DIN 51524-1			
Hydraulic fluid temperature range		°C	– 20 to + 60 (NBR seals) – 15 to + 60 (FKM seals)			
Viscosity range		mm^2/s	12 to 230			
Maximum backpressures			DB../..	DB../..Y	DBW../..	DBW../..Y
	Port Y	bar	–	0	–	0
	Port T	bar	[2)]	$p_T < 15$	[2)]	$p_T < 15$

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

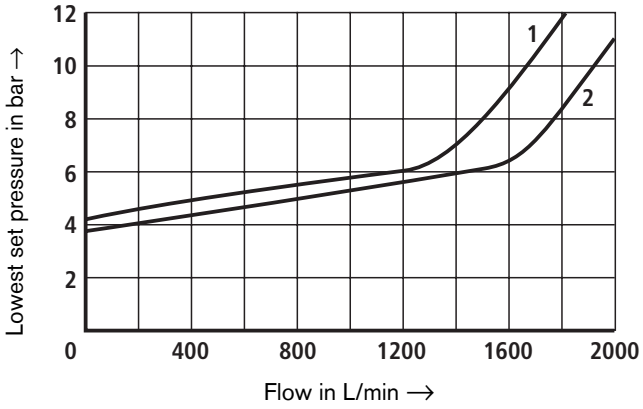
[2)] See characteristic curves and explanations on max. permissible backpressures on pages 10 and 11 .

Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40$ °C ± 5 °C)

The characteristic curves were measured with external pilot oil drain and pressureless return flow of the pilot oil.



With internal pilot oil drain, the inlet pressure increases by the outlet pressure present in port T.



1 Main spool insert with sliding spool

2 Main spool insert with seated spool

General notes

- The unloading function (directional valve function of DBW) must not be used for safety functions!
- With type DBW 52 **B**..3X/... , the lowest settable pressure (circulation pressure) is set in the event of a power failure or cable break.
  With type DBW 52 **A**..3X/..., the pressure relief function is set in the event of a power failure or cable break.
- In the case of internal pilot oil drain, the hydraulic backpressures in port T or , in the case of external pilot oil drain, the hydraulic backpressures in port Y are fully added to the response pressure of the valve set on the pilot control.

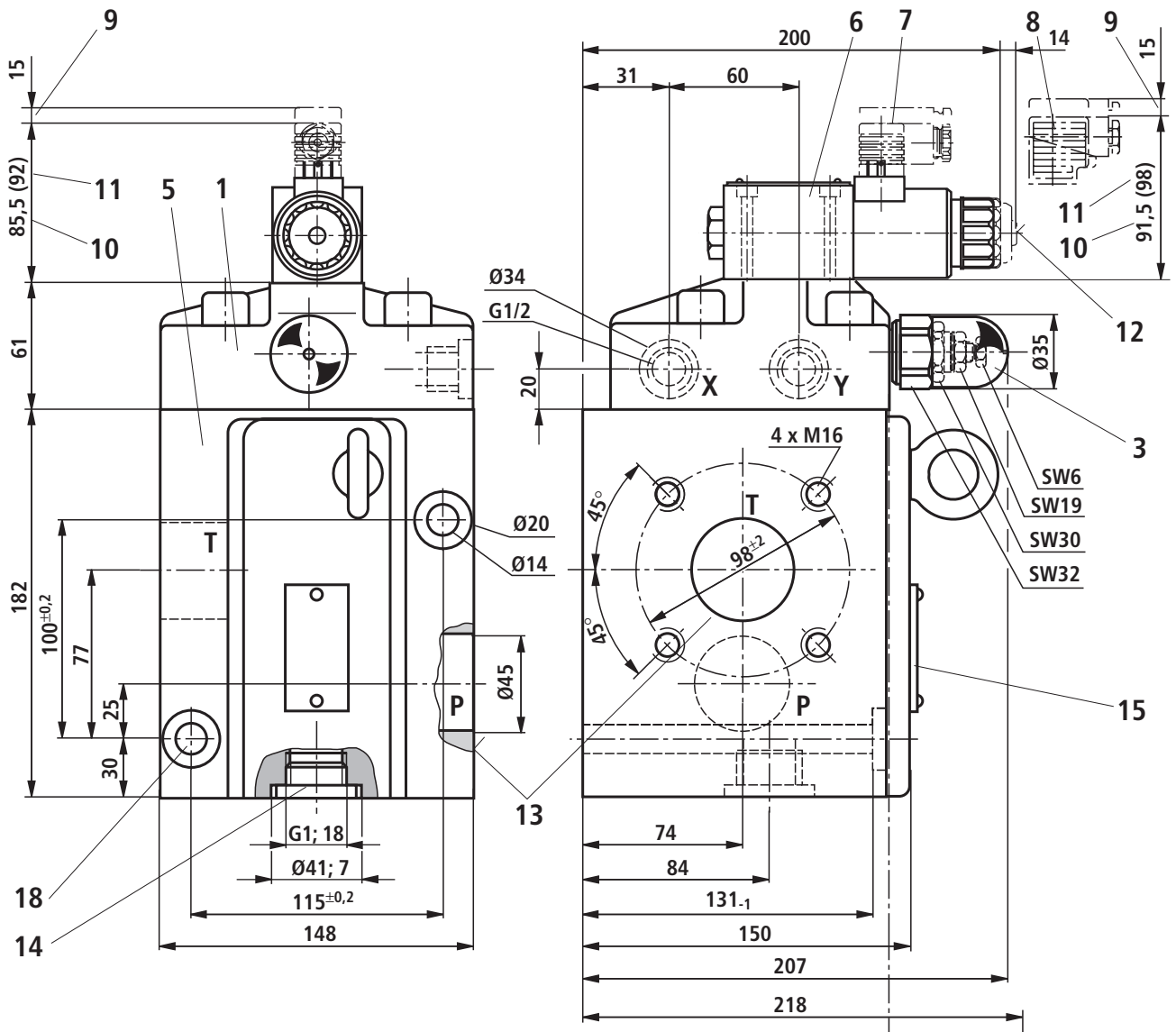
Example:

Pressure adjustment of the valve by spring pre-loading item 7 on page 4 in the pilot control valve/adjustment unit
$\boldsymbol{p_{spring} = 200}$ **bar**

Hydraulic backpressure in port T with internal pilot oil drain
$\boldsymbol{p_{hydraulic} = 50}$ **bar**

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

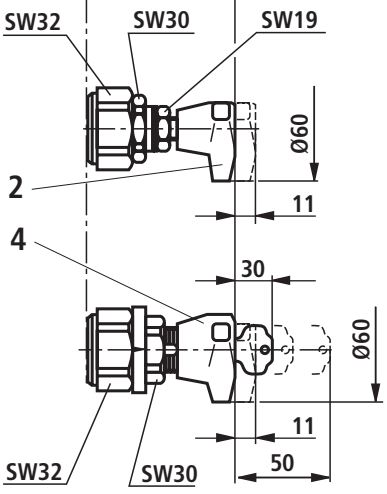
Unit dimensions: Flange connection (nominal dimensions in mm)



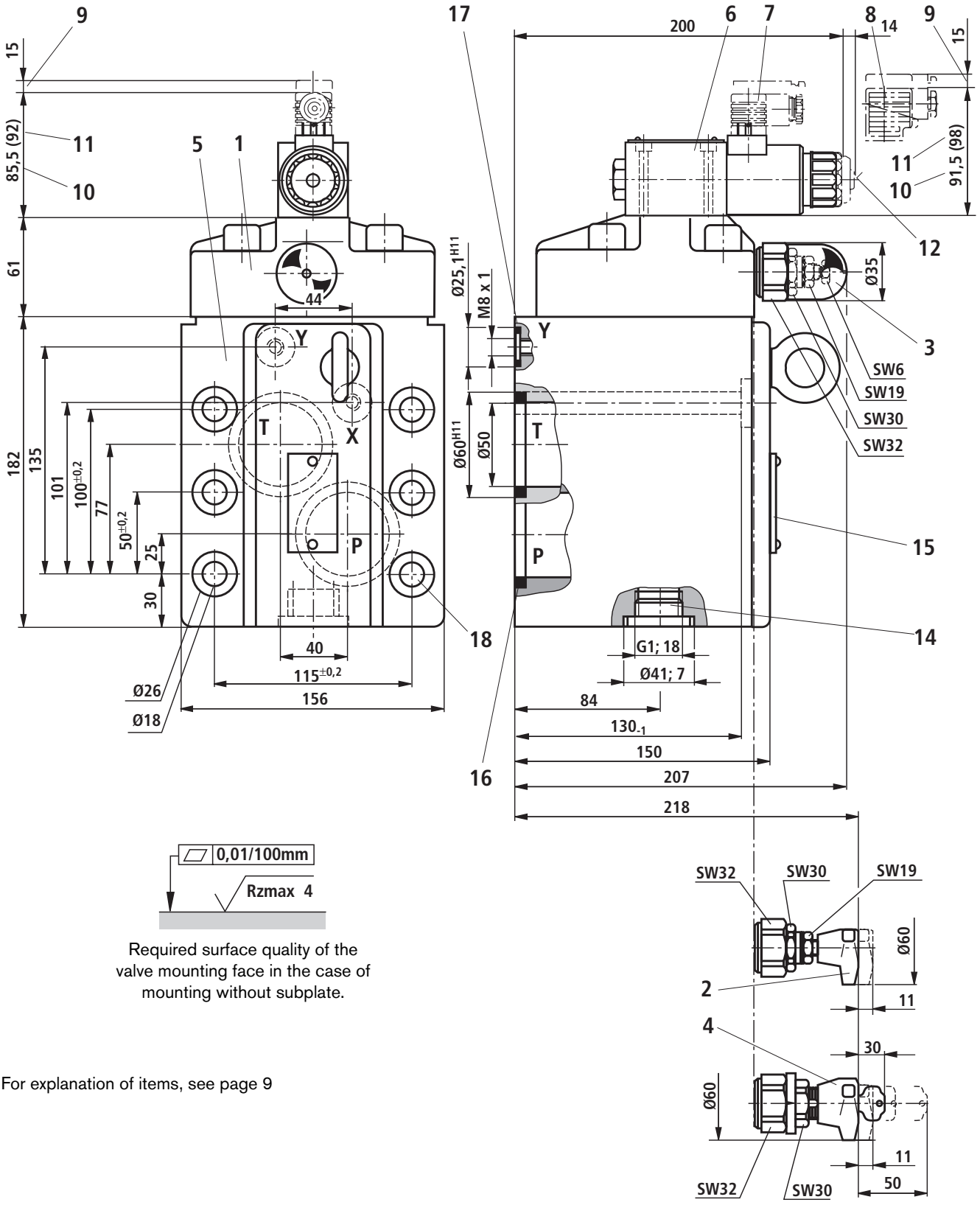
Explanation of items, see page 9

⚠ Caution!

Please fix the valve by means of the fixing bores so that reactive forces can be safely absorbed!



Unit dimensions: subplate mounting (nominal dimensions in mm)



Required surface quality of the valve mounting face in the case of mounting without subplate.

For explanation of items, see page 9

⚠ Caution!

Please fix the valve by means of the fixing bores so that reactive forces can be safely absorbed!

Explanation of items

1 Pilot control valve
2 Adjustment type "1"
3 Adjustment type "2"
4 Adjustment type "3"
5 Main valve
6 Directional valve size 6, see RE 23178
7 Cable socket **without** circuitry (separate order, see page 3)
8 Cable socket **with** circuitry (separate order, see page 3)
9 Space required to remove cable socket
10 Dimension for valve with DC solenoid
11 Dimension ( ) for valve with AC solenoid
12 Manual override, optional
13 Connecting flange (T and P), see RE 45501
14 Pressure gauge connection
15 Nameplate
16 Identical seal rings for ports P and T
17 Identical seal rings for ports X and Y
18 Valve fixing bores

Valve fixing screws for flange connection
(separate order)
– **2 socket head cap screws ISO 4762 - M12 - 10.9**

Valve fixing screws for subplate mounting
(separate order)
– **6 socket head cap screws ISO 4762 - M16 x 150 - 10.9-flZn-240h-L**
(friction coefficient $\mu_{total} = 0.09$ to 0.14);
tightening torque $M_T = 229$ Nm ± 10%,
material no. **R913000154**

Subplate for subplate mounting (separate order):
G 479/10
(suitable connecting flange, see RE 45501)

Ordering code: Type-tested safety valves (type DB(W) 52 …E) in accordance with Pressure Equipment Directive 97/23/EC

Designation	Component code	Max. permissible flow qV_{max} in L/min with pilot oil return external "Y"	Max. permissible flow qV_{max} in L/min with pilot oil return internal "–"	Set response pressure *p* in bar
DB 52 [2][3][4] 3X/ [5][6] U [7] E	TÜV.SV. ☐ – 734.46.F.G.p	1000 1500 2000	500 1000 1500	50 … 110 111 … 210 211 … 315
DBW 52 [1][2][3][4] 3X/ [5][6] U6 [*] [7] E	TÜV.SV. ☐ – 734.46.F.G.p			

[1] Directional valve, normally closed **= A**
Directional valve, normally open **= B**

[2] For subplate mounting **= P**
For flange connection **= F**

[3] Adjustment element: hand wheel (pressure setting sealed, unloading or setting of a lower response pressure possible) **= 1**
Adjustment element with sealed protective cap (no adjustment/unloading possible) **= 2**

[4] Valve with seated main spool **= –**
Valve with sliding main spool **= L**

[5] Pressure must be entered by the customer in the designation, e.g. pressure setting ≥ 50 bar and in 5-bar increments possible **= 150**

[6] Internal pilot oil supply and drain **= – [1) 2)]**
Recommendation: Internal pilot oil supply, External pilot oil drain **= Y [2)]**

[*] Ordering code of electrical data (see page 2) e.g. **= EG24N9K4**

[7] NBR seals **= No code**
FKM seals **= V**

☐ Details entered in the factory

[1)] Dash "–" required **only** for version with built-on directional valve (DBW)

[2)] External pilot oil supply "X" impossible!

Safety notes: Type-tested safety valves (type DB(W) 52 …E) in accordance with Pressure Equipment Directive 97/23/EC

– Before ordering a type-tested safety valve, please note that at the requested **response pressure *p*** the max. permissible **flow $q_{V\,max}$** of the safety valve is greater than the max. possible flow of the system.

  The corresponding regulations must be observed!

– According to **PED 97/23/EC** the increase in the system pressure caused by the flow must not be greater than 10% of the set response pressure (see component code).

– Drain lines (ports T and Y) of safety valves must allow safe and reliable draining. **No** fluid may collect in the drain lines.

– The removal of the seal on the safety valve results in the loss of the approval according to the PED!

– Generally observe the requirements laid down in Pressure Equipment Directive 97/23 EC and in the AD2000 sheet A2!

– ⚠ **Caution!**
  The unloading function provided by the directional valve must not be used for safety-relevant tasks! Should an unloading function be required for safety-relevant tasks, an additional unloading valve must be installed.

☞ **Notes on the operation must be strictly observed!**

The response pressure specified in the component code is factory-set at a flow of 12 L/min.

The max. permissible flow (= figure in the place of letter “G” in the component code, see page 10) must not be exceeded.

The following is valid:

– Pilot oil drain **“external“** (= **Y** in the ordering code **without backpressure** in **drain line Y**, permissible backpressure in the drain line (port T) < 15 bar

– Pilot oil drain **“internal“** (= no code in the ordering code). The max. permissible flow is permitted only **without backpressure** in the **drain line** (port T).

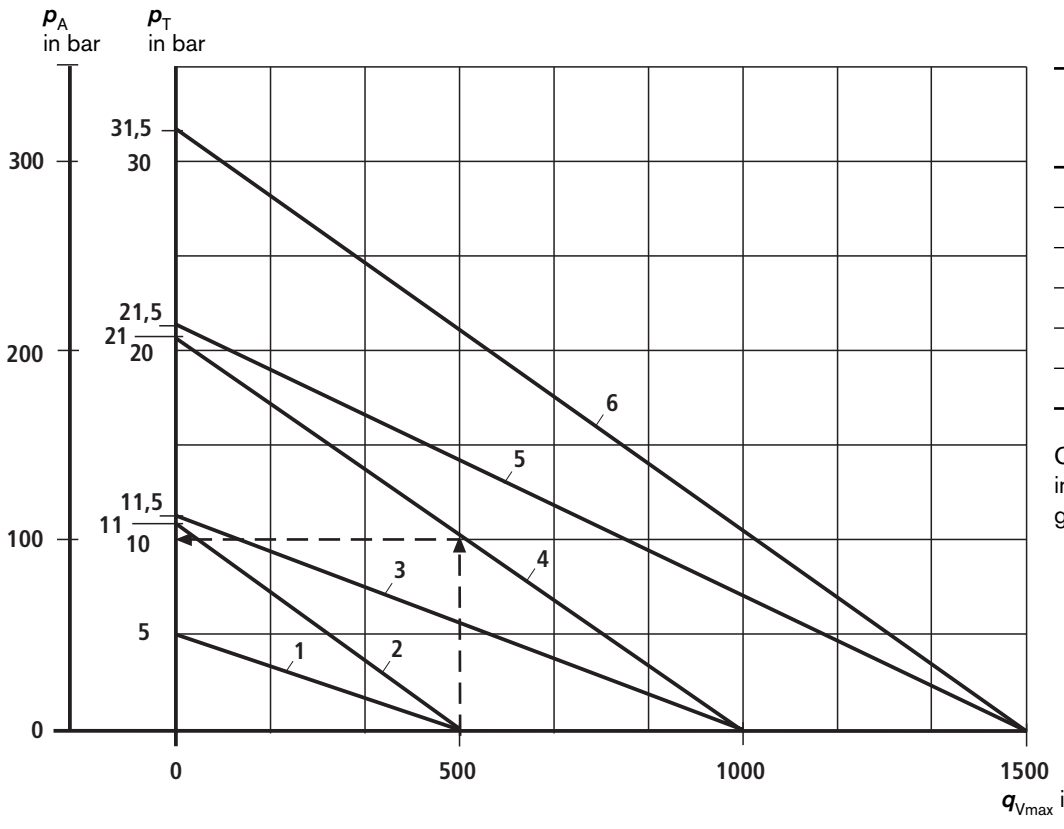
With internal pilot oil drain, as the flow increases, the system pressure rises by the backpressure in the drain line (port T) (observe AD2000 - sheet A2, para. 6.3!).

In order to limit this increase in the system pressure due to the flow to a maximum of 10% of the set response pressure, the permissible flow must be reduced in dependence upon the backpressure in the drain line (port T) (see diagram on page 12).

Safety notes: Type-tested safety valves (type DB(W) 52 …E) in accordance with Pressure Equipment Directive 97/23/EC

Max. permissible flow q_{Vmax} in dependence upon backpressure p_T in the drain line with internal pilot oil drain

Type DB(W) 52 ..3X/...E



Char. curve	Response pressure p_A in bar
1	50
2	110
3	115
4	210
5	215
6	315

Characteristic curves for intermediate values can be generated by interpolation.

p_A = Response pressure in bar

p_T = Max. permissible backpressure in the drain line (port T)
(sum of all possible backpressures, see also AD2000 sheet - A2)

$p_{T\,max}$ = 10% x p_A (at q_V = 0 L/min)

$q_{V\,max}$ = Max. permissible flow in L/min

Explanation of diagram

Example:

Given: System / accumulator flow to be safeguarded $q_{V\,max}$ = 500 L/min

Set response pressure of the safety valve p_A = 210 bar

Searched: p_T = ?

Solution: See arrows in the diagram: p_T (500 L/min; 210 bar) = 10 bar

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