**RE 26585**
Edition: 2022-07
Replaces: 2019-06

rexroth
A Bosch Company

# Pressure reducing valve, direct operated

# Type ZDR


H7751

- Nominal size 10
- Component series 5X
- Maximum operating pressure 350 bar
- Maximum flow 160 l/min

## Features

- Sandwich plate valve
- Porting pattern according to ISO 4401-05-04-0-05
- 4 pressure ratings
- 4 adjustment types, optionally:
  - Rotary knob
  - Sleeve with hexagon and protective cap
  - Lockable rotary knob with scale
  - Rotary knob with scale
- Check valve, optional (version "A")
- Pressure reduction in channel A, B or channel P
- Corrosion-protected design

## Contents

## Ordering code

| 01 | 02 | 03 | 04 | 05 | 06 | | 07 | | 08 | 09 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Z** | **DR** | **10** | **D** | | | **–** | **5X** | **/** | | **Y** | | | | |

| | | |
|---|---|---|
| 01 | Sandwich plate valve | **Z** |
| 02 | Pressure reducing valve | **DR** |
| 03 | Size 10 | **10** |
| 04 | Direct operated | **D** |
| 05 | Pressure reduction in channel A② | **A ◊** |
| | Pressure reduction in channel P① (pilot oil supply from channel B) | **B** |
| | Pressure reduction in channel P① | **P ◊** |

**Adjustment type**

| | | |
|---|---|---|
| 06 | Rotary knob | **1** |
| | Sleeve with hexagon and protective cap ("J3" version without protective cap) | **2 ◊** |
| | Lockable rotary knob with scale | **3** [1)] |
| | Rotary knob with scale | **7** |
| 07 | Component series 50 ... 59 (50 ... 59: unchanged installation and connection dimensions) | **5X** |

**Maximum secondary pressure**

| | | |
|---|---|---|
| 08 | 25 bar | **25** |
| | 75 bar | **75 ◊** |
| | 150 bar | **150 ◊** |
| | 210 bar | **210 ◊** |
| | 315 bar (only version "B" and "P") | **315 ◊** |
| 09 | Pilot oil supply internal, pilot oil return external | **Y** |
| 10 | **With** check valve (only version "A") | **no code** |
| | **Without** check valve | **M ◊** |

**Corrosion resistance**

| | | |
|---|---|---|
| 11 | None | **no code ◊** |
| | Improved corrosion protection (240 h salt spray test according to EN ISO 9227); (only version "1" and "2") | **J3** |

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

| | | |
|---|---|---|
| 12 | NBR seals | **no code ◊** |
| | FKM seals | **V** |

**Connection thread**

| | | |
|---|---|---|
| 13 | Pipe thread according to ISO 228/1 | **no code ◊** |
| | SAE thread | **/12** |

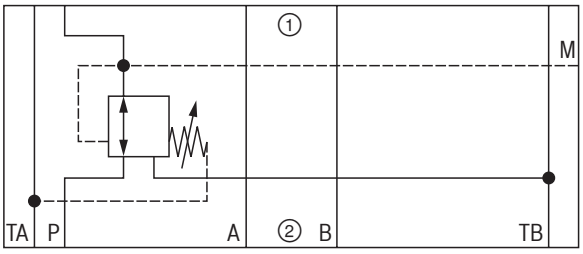
[1)] H-key with material no. **R900008158** is included in the scope of delivery.

☞ **Notice:**
To port X and Y bored according to ISO 4401-05-05-0-05 (e.g. for pilot-operated directional valve NG10), version "SO30" applies at the end of the ordering code.

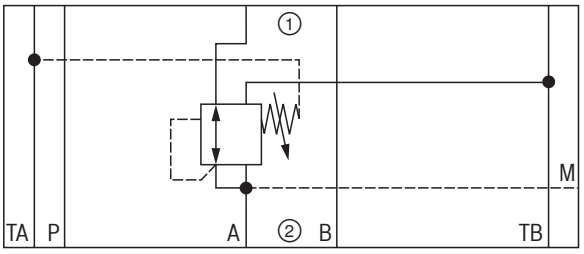
☞ **Notice: ◊** = Preferred type

## **Symbols** (① = component side, ② = plate side)

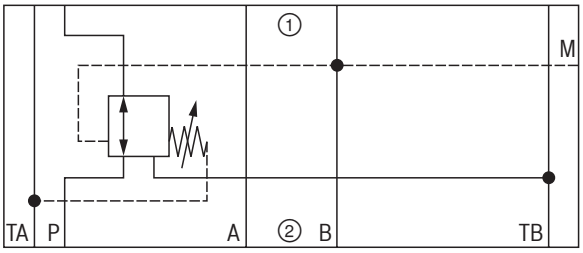
Version **"P...YM"**



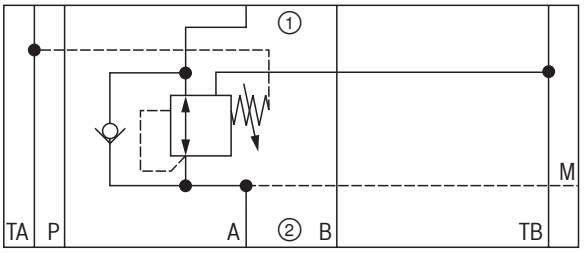

Version **"A...YM"**




Version **"B...YM"**




Version **"A...Y"**




☞ **Notice:**
Deviating from ISO 4401, port T is in this data sheet called TA, port T1 is called TB.

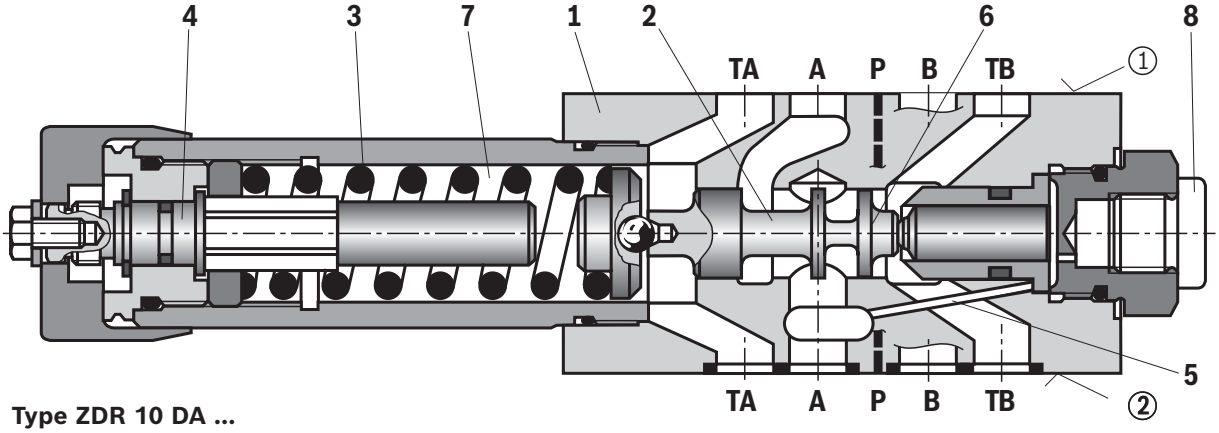
## Function, section

The valve type ZDR is a direct operated pressure reducing valve in sandwich plate design with pressure limitation of the secondary circuit. It is used to reduce the system pressure.
The pressure reducing valve basically comprises housing (1), control spool (2), compression spring (3), adjustment type (4) and an optional check valve.
The secondary pressure is set via the adjustment type (4).

**Version "A"**
The valve is open in initial position. Hydraulic fluid can flow from channel A① to channel A② without restrictions. The pressure in channel A② is simultaneously applied via the control line (5) at the piston area opposite the compression spring (3). If the pressure in channel A② exceeds the value set at the compression spring (3), the control spool (2) is pushed against the compression spring (3) to control position and keeps the set pressure in channel A② at a constant level.
Control signal and pilot oil are supplied internally via the control line (5) from channel A②.
If the pressure in channel A② increases further due to an external force effect at the actuator, it pushes the control spool (2) even further against the compression spring (3).
In this way, channel A② is connected to the tank via the control edge (6) at the control spool (2) and the housing (1). So much hydraulic fluid is discharged into the tank that the pressure does not increase any further.
The leakage oil drain from the spring chamber (7) is always effected externally via channel TA.
A measuring port (8) allows for the control of the secondary pressure at the valve.
A check valve can be used for free flow back from channel A② to A① with version "A".

**Versions "P" and "B".**
With version "P", the pressure reduction is effected in channel P①. Control signal and pilot oil are supplied internally from channel P①.
With version "B", the pressure is reduced in channel P①; but the pilot oil is extracted from channel B.
If the directional valve is in spool position P to A, the pressure in channel B may not exceed the set secondary pressure. Otherwise, there is pressure reduction in channel A.

☞ **Notice:**
If used without directional valve, channels TA and TB are connected to each other (e. g. in the cover plate).
During set-up of a directional seat valve NG10, a sandwich plate type HSZ10A078-3X/M00 (material no. R900537264) has to be used.




**Type ZDR 10 DA ...**

① = component side
② = plate side

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

| **General** | | | |
|---|---|---|---|
| Type of connection | | | Subplate mounting |
| Porting pattern | | | ISO 4401-05-04-0-05 |
| Weight | | kg | 2.8 |
| Installation position | | | Any |
| Ambient temperature range | | °C | –20 ... +80 (NBR seals)<br>–15 ... +80 (FKM seals) |
| Conformity | ▶ RoHS directive | | 2015/65/EU [1] |

| **Hydraulic** | | | |
|---|---|---|---|
| Maximum operating pressure | ▶ Input | | |
| | – Version "B", "P" | bar | 350 |
| | – Version "A" | bar | 315 |
| | ▶ Output | bar | 25; 75; 150; 210; 315 [2] |
| Hydraulic fluid | | | See table below |
| Hydraulic fluid temperature range | | °C | –20 ... +80 (NBR seals)<br>–15 ... +80 (FKM seals) |
| Viscosity range | | $mm^2/s$ | 10 ... 800 |
| Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c) | | | Class 20/18/15 [3] |
| Maximum flow | ▶ Version "B", "P" | l/min | 160 |
| | ▶ Version "A" | l/min | 80 |
| Maximum counter pressure | ▶ Port T | bar | 160 |

1) The product fulfills the substance requirements of the RoHS directive 2015/65/EU.

2) Only version "B" and "P"

3) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

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

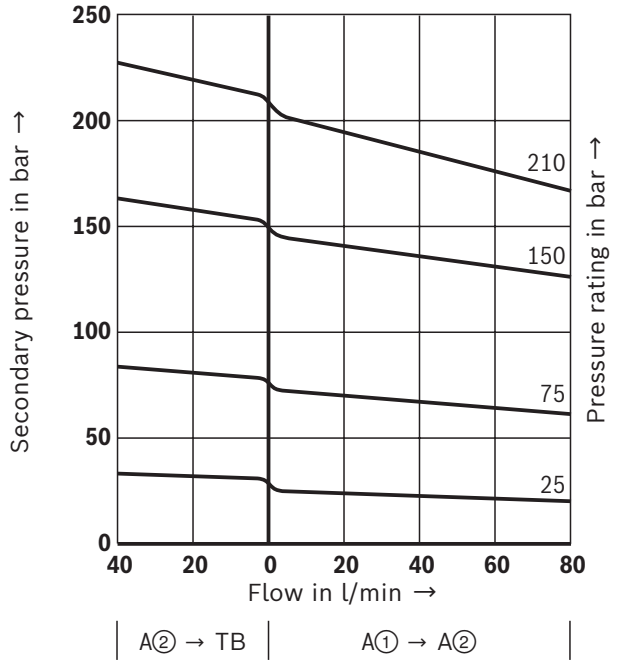
| Hydraulic fluid | | Classification | Suitable sealing materials | Standards | Data sheet |
|---|---|---|---|---|---|
| Mineral oils | | HL, HLP | NBR, FKM | DIN 51524 | 90220 |
| Bio-degradable | ▶ Insoluble in water | HETG | FKM | ISO 15380 | 90221 |
| | | HEES | FKM | | |
| | ▶ Soluble in water | HEPG | FKM | ISO 15380 | |
| Flame-resistant | ▶ Water-free | HFDU (glycol base) | FKM | ISO 12922 | 90222 |
| | | HFDU (ester base) | FKM | | |
| | | HFDR | FKM | | |
| | ▶ Containing water | HFC (Fuchs: Hydrotherm 46M, Fuchs Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046) | NBR | ISO 12922 | 90223 |

☞ **Important information on hydraulic fluids:**

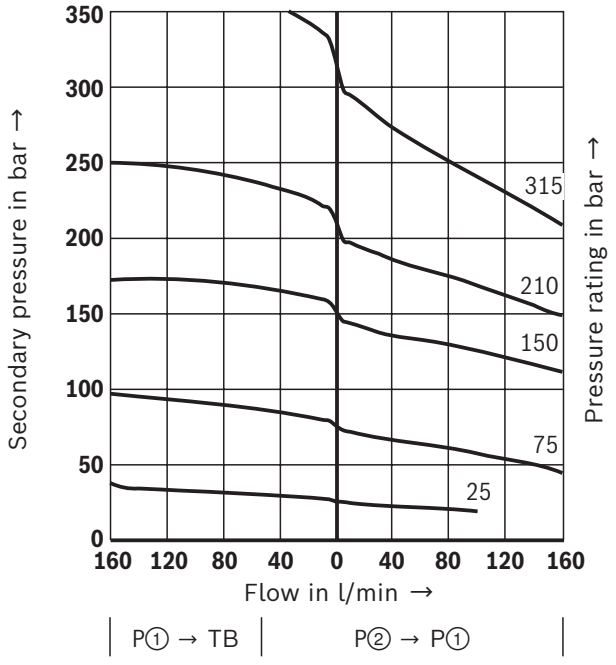
- ▶ For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ Bio-degradable and flame-resistant – containing water:
  If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.
- ▶ Flame-resistant – containing water:
  Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – backing up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.

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

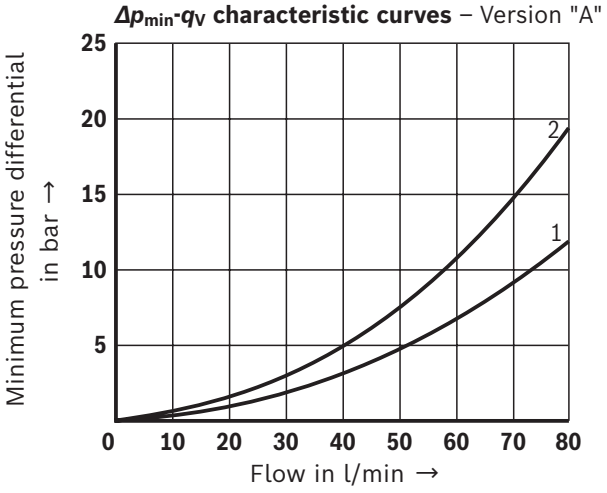
**$p_A$-$q_V$ characteristic curves** – Version "A"



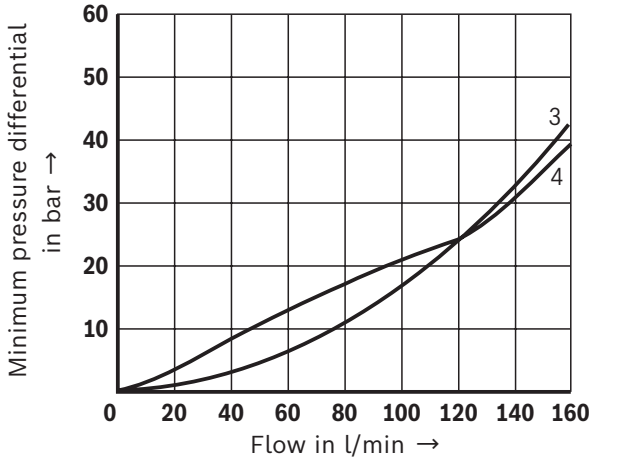

**$p_A$-$q_V$ characteristic curves** – Version "B" and "P"



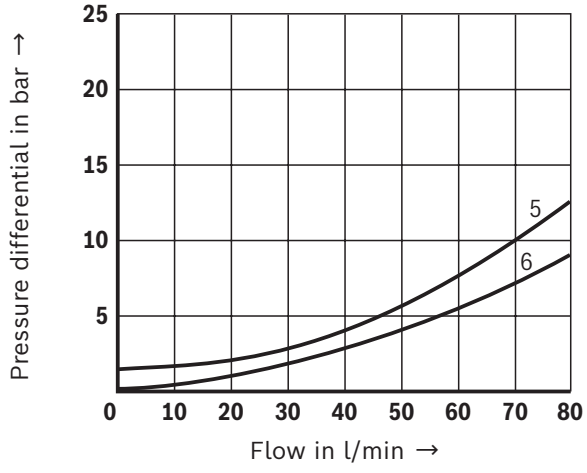

**$\Delta p_{min}$-$q_V$ characteristic curves** – Version "A"




**$\Delta p_{min}$-$q_V$ characteristic curves** – Version "B" and "P"



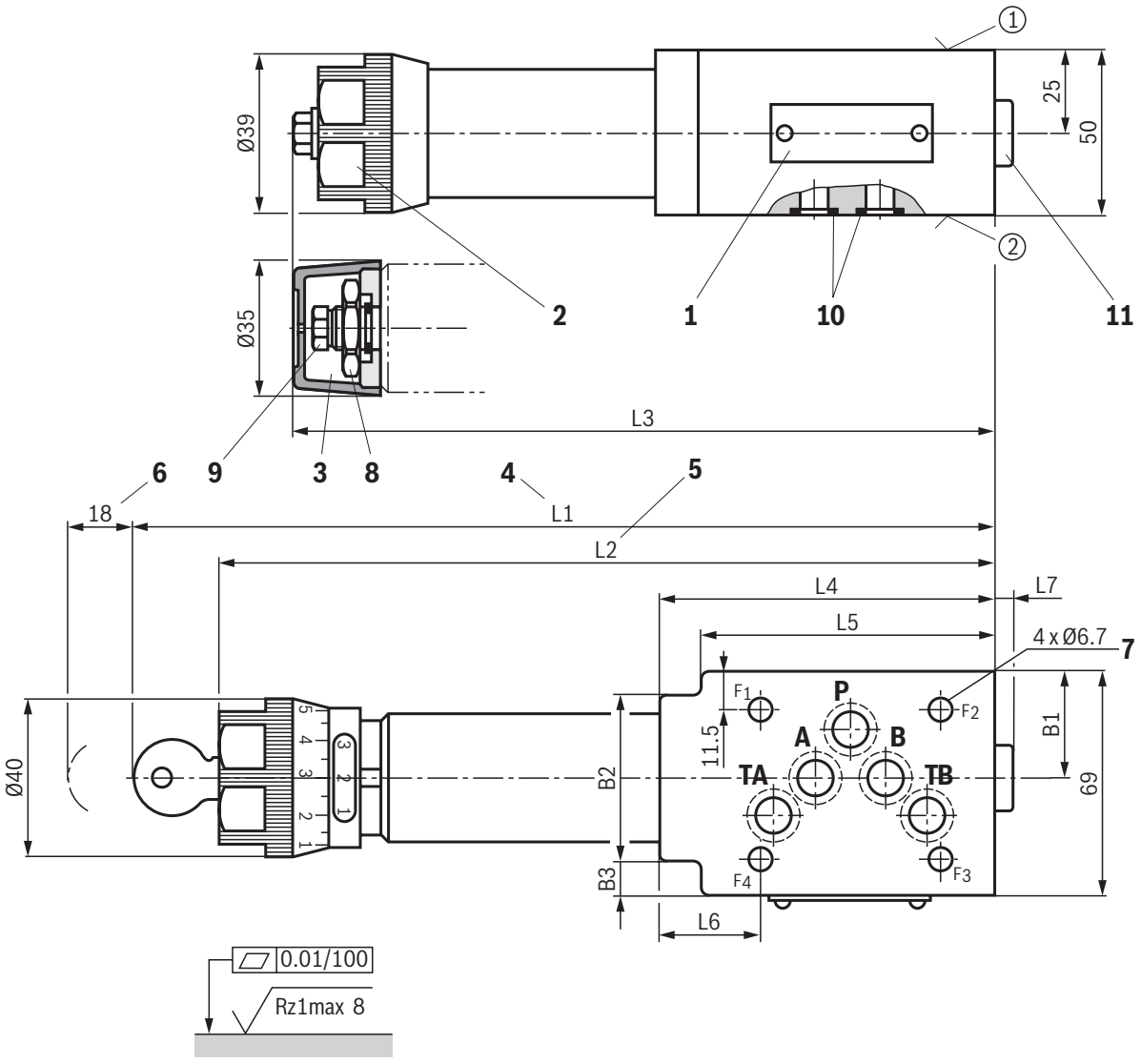

**$\Delta p$-$q_V$ characteristic curves** – Version "A"




**1** A① → A②
**2** A② → TB (3rd way; version "210")
**3** P② → P①
**4** P① → TB (3rd way; version "210")
**5** A② → A①; flow only via check valve
**6** A② → A①; flow via check valve and fully opened control cross-section

☞ **Notes:**
- ▶ Typical characteristic curves which are subject to tolerance variations.
- ▶ The curve development is maintained if the pressure is set lower according to the pressure rating.
- ▶ The characteristic curves apply for output pressure $p_T$ = 0 bar in the entire flow range.

## Dimensions
(dimensions in mm)




Required surface quality of the valve contact surface

| Version | L1 | L2 | L3 | L4 | L5 | L6 | L7 [1] | B1 | B2 | B3 | Measuring port [1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Internal hexagon | Tightening torque $M_A$ in Nm |
| **"A"** | 254 | 230 | 210 | 104 | 93 | 31.5 | 4 | 32.9 | 51 | 12 | SW6 | 23 ±10% |
| **"B", "P"** | 242 | 218 | 198 | 93 | – | 18.5 | 15 | 35 | – | – | SW6 | 23 ±10% |

**[1] Deviating dimensions for version "12"**

| Version | L7 | Measuring port | |
|---|---|---|---|
| | | Internal hexagon | Tightening torque $M_A$ in Nm |
| **"A"** | 1.7 | 3/16" | 23 ±10% |
| **"B", "P"** | 12.7 | 3/16" | 23 ±10% |

**Notice:**
- To port X and Y bored according to ISO 4401-05-05-0-05 (e.g. for pilot-operated directional valve NG10), version "SO30" applies at the end of the ordering code.
- The dimensions are nominal dimensions which are subject to tolerances.

**Item explanations** and **valve mounting screws** see page 9.

## Dimensions

① component side – Porting pattern according to ISO 4401-05-04-0-05

② plate side – Porting pattern according to ISO 4401-05-04-0-05

**1** Name plate
**2** Adjustment type "1"
**3** Adjustment type "2"
**4** Adjustment type "3"
**5** Adjustment type "7"
**6** Space required to remove the key
**7** Valve mounting bores
**8** Lock nut, wrench size 24
**9** Hexagon, wrench size 10
**10** Identical seal rings for ports A, B, P, TA, TB
**11** Measuring port; hold the reducing piece SW24 in place when loosening the plug screw.

**Valve mounting screws** (separate order)
**4 hexagon socket head cap screws ISO 4762 - M6 - 10.9**

☞ **Notice:**
Length and tightening torque of the valve mounting screws must be calculated according to the components mounted under and over the sandwich plate valve.

## Further information

| | |
|---|---|
| ▶ Hydraulic valves for industrial applications | Operating instructions 07600-B |
| ▶ Subplates | Data sheet 45100 |
| ▶ 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 |
| ▶ Use of non-electrical hydraulic components in an explosive environment (ATEX) | Data sheet 07011 |
| ▶ Information on available spares | |