

## Valves in Sandwich plate design Nominal size 6

### DESCRIPTION

HYDAC valves in sandwich plate design with nominal size 6 allow the hydraulic control system to be designed modularly using a vertical stacking system.

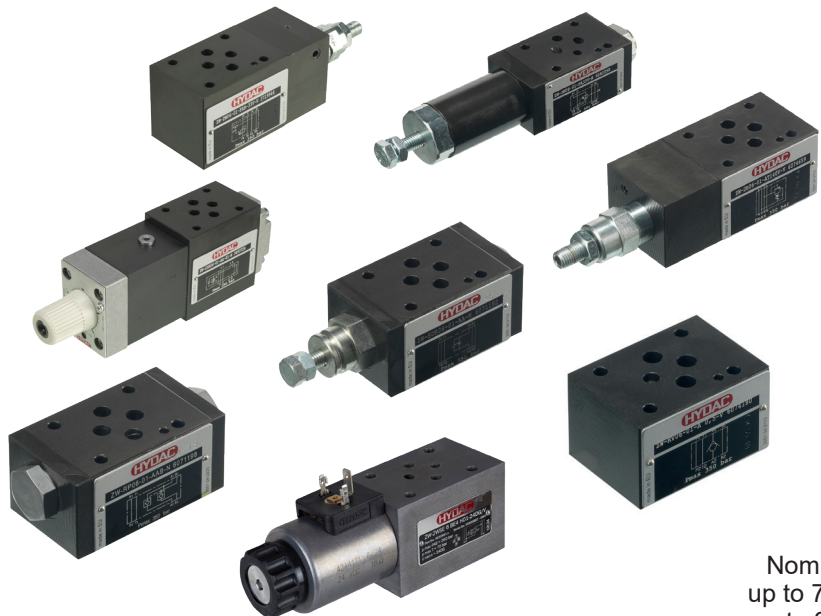
We supply them as pressure reducing valves and pressure relief valves for pressure control and as throttle or flow control valves with a bypass check valve for flow control.

The sandwich plates can also be supplied as check valves for direction control, with and without hydraulic unlocking, and as a pressure compensator for performing the flow control function.

The mounting elements will depend on the modular design of your hydraulic control system and are not included in the scope of delivery for this reason.

### CHARACTERISTICS

- Available with pressure; flow; shut-off and pressure compensator function
- Modular design of the hydraulic control system
- Hole pattern to ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350)



Nom. size 6  
up to 75 l/min  
up to 350 bar

### TECHNICAL DATA

#### General specifications

MTTF <sub>D</sub>	150 - 1200 years, assessment according to DIN EN ISO 13849-1:2016; Table C.1, Confirmation of ISO 13849-2:2013; Tables C.1 and C.2
Ambient temperature range	-20 °C to +60 °C
Installation position	User-definable
Material	Housing: Cast iron Type label: Aluminium
Coating	Valve casing: Phosphate-plated

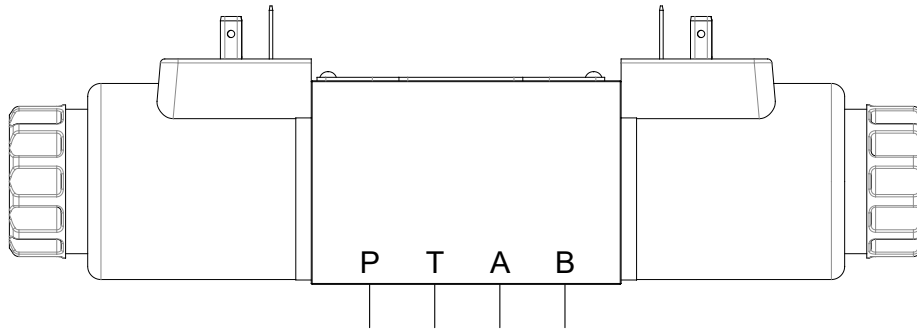
#### Hydraulic specification

Operating pressure	350 bar
Pressurised fluid	Hydraulic fluid according to DIN ISO 51524 Part 1, 2, 3
Temperature range of pressurised fluid	-20 °C to +80 °C
Viscosity	10 - 400 mm <sup>2</sup> /s
Permitted contamination level of operating fluid	Class 20/18/15, according to ISO 4406
Sealing material	FKM (standard), NBR optional

#### Notice:

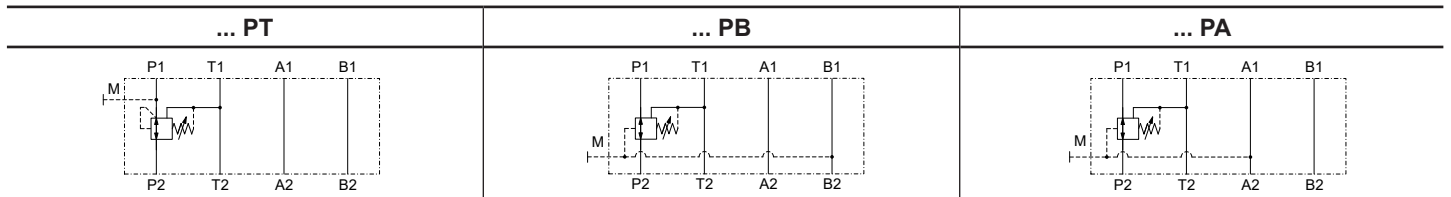
The valve mounting screws are not part of the scope of delivery.

4 cylinder screws ISO 4762 - M5 - 10.9 | The length of the valve mounting screws must be selected to match the components mounted in the vertical stacking system.



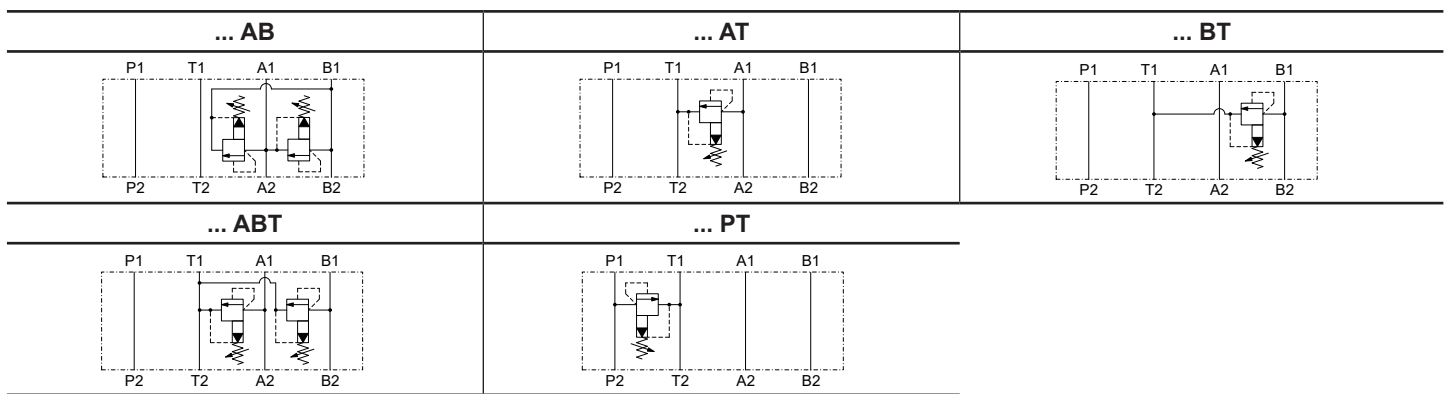
Pressure reducing valve | **ZW-DM06...**

4



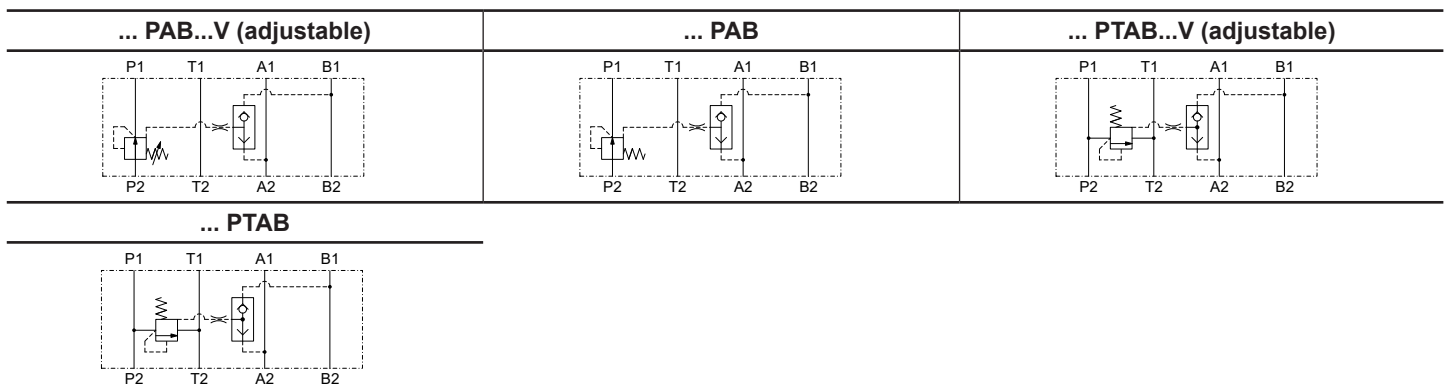
Pressure relief valve | **ZW-DB06...**

8



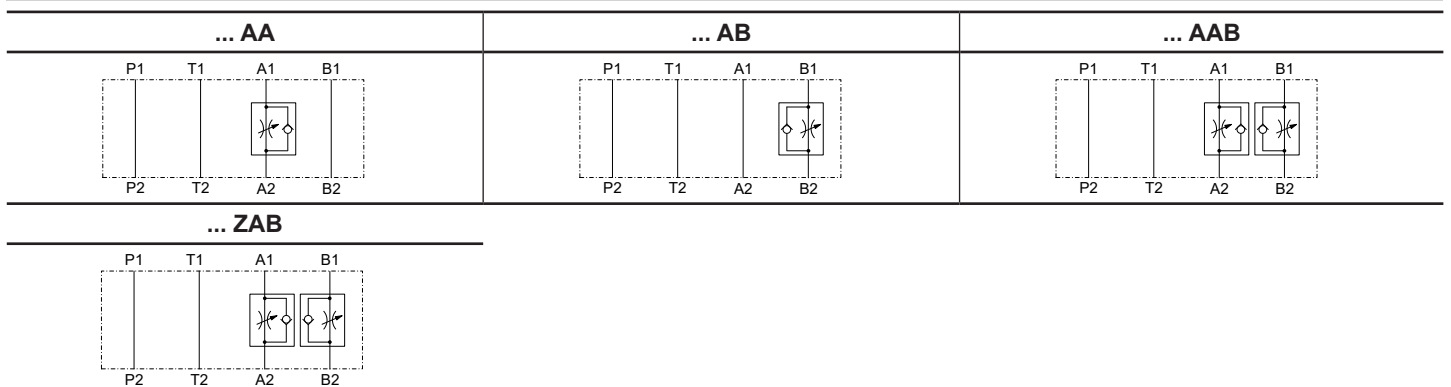
Pressure compensator | **ZW-DW06...**

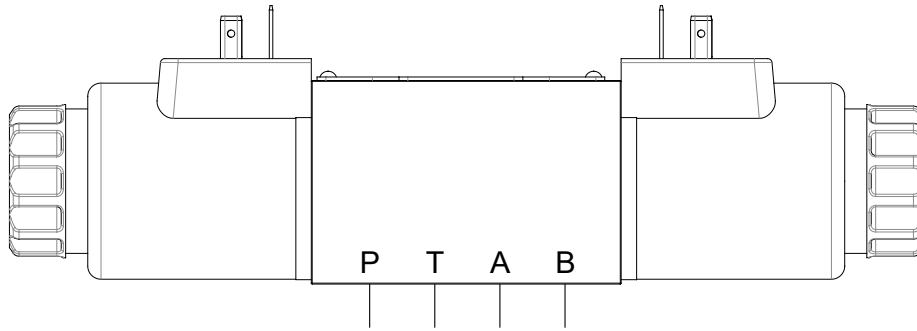
12



Throttle check valve | **ZW-SDR06 ...**

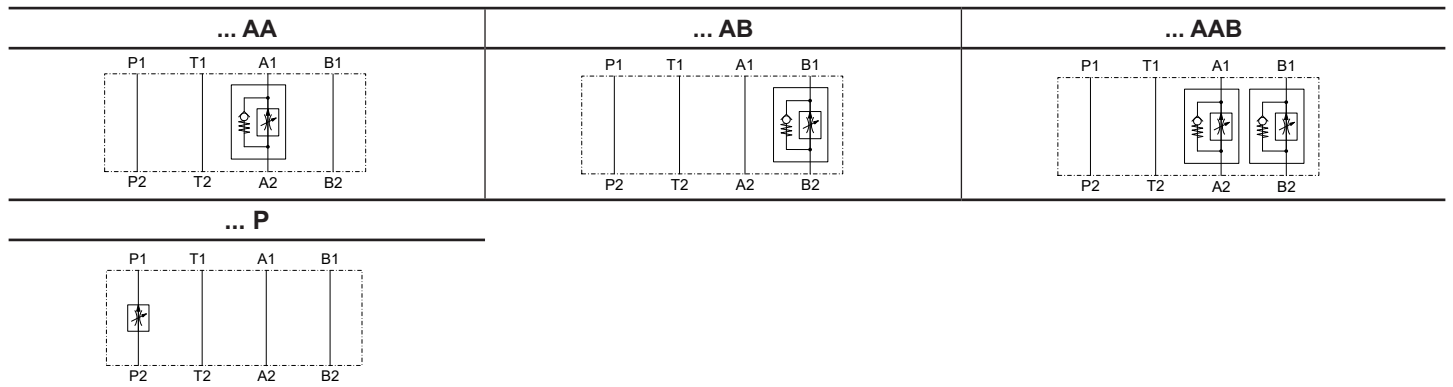
16





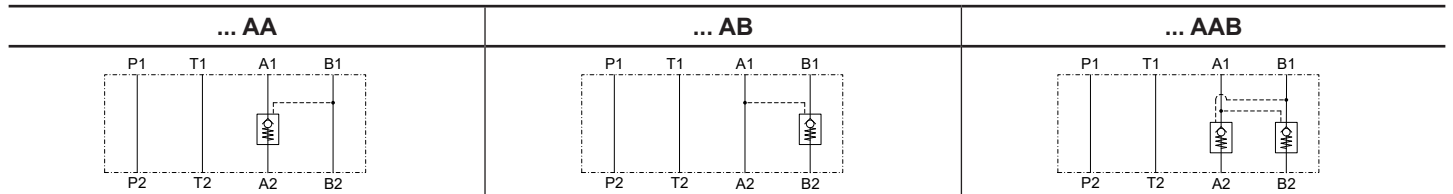
Flow control valve | ZW-2SR06 ...

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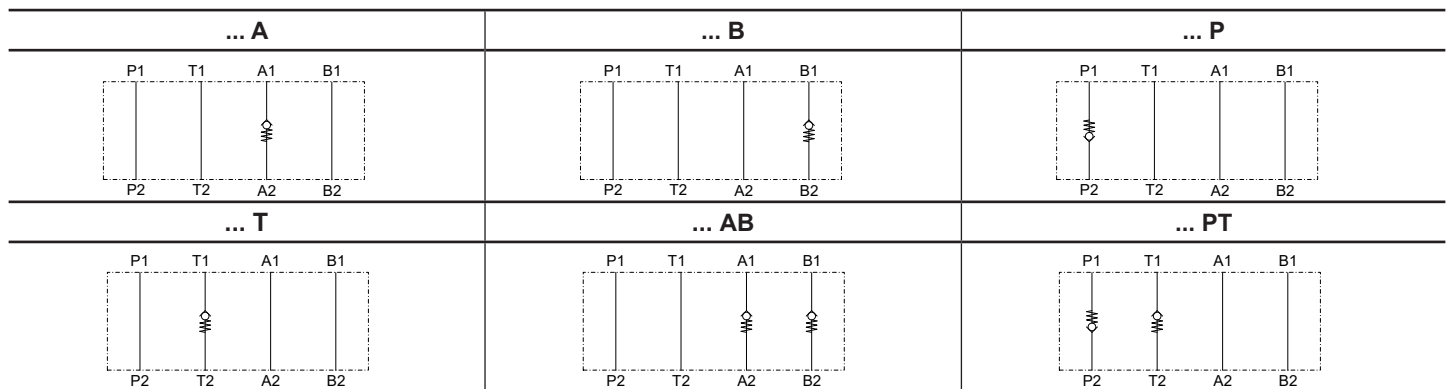
Check valve, unlockable | ZW-RP06 ...

22



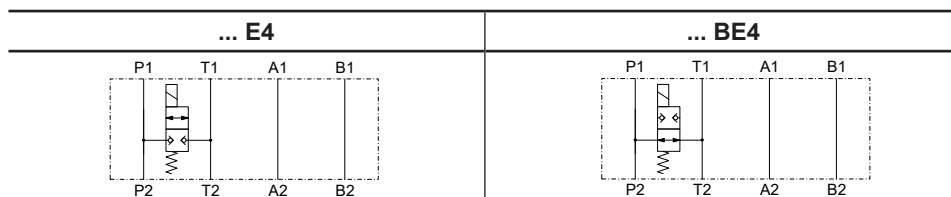
Check valve ZW-RV06 ...

25

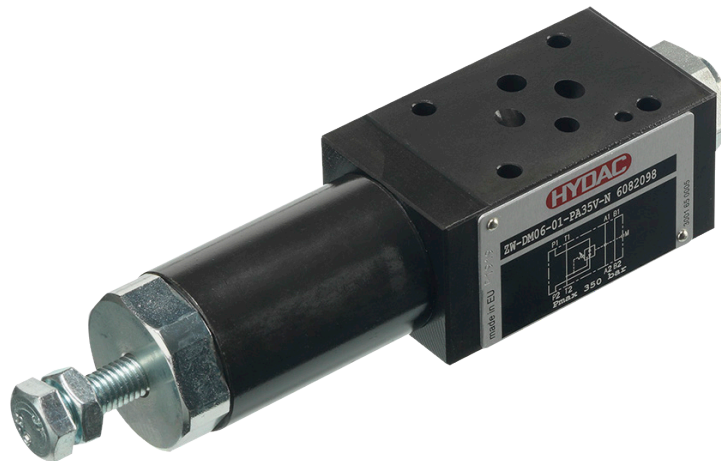


Directional poppet valve | ZW-2WSE6 ...

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# Pressure control valve in Sandwich plate design **ZW-DM06**



## ADDITIONAL TECHNICAL DATA<sup>1</sup>

### General specifications

Weight 1.4 kg

### Hydraulic specifications

Tank pressure ( $p_{max}$ ) 10 bar port T

Flow rate  
max. 50 l/min in controlled line  
max. 75 l/min in free line

Leakage  $\leq 0.08$  l/min

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

## MODEL CODE

**ZW-DM 06 01 PA-35 V N**

### Description

Pressure control valve in sandwich plate design, direct-acting

### Nominal size (NG)

6

### Series

01 = will be specified by the manufacturer

### Spool symbol

PA = Pressure control in port A

PB = Pressure control in port B

PT = Pressure control in port T

### Pressure ranges

35 = 3 to 35 bar

70 = 10 to 70 bar

140 = 30 to 140 bar

280 = 60 to 280 bar

### Adjustment types

V = adjustable using tool

K = adjusting knob (optional)

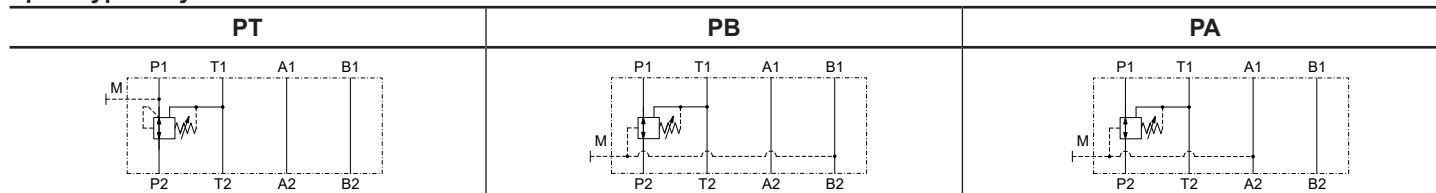
### Sealing material

V = FKM (standard)

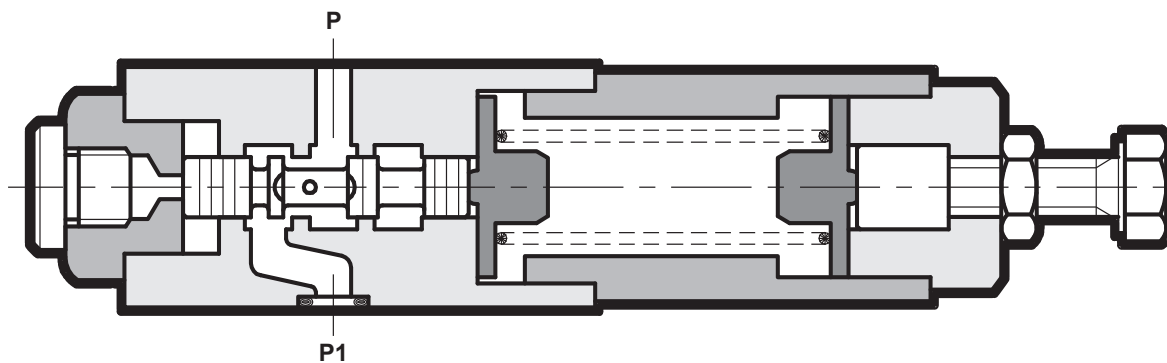
N = NBR

## SYMBOL

### Spool types / symbols



## SECTION VIEW



## FUNCTION

The direct-acting pressure reducing valve in sandwich plate design with nominal size 6 is used to reduce an input pressure of P2 to a smaller output pressure P1. The pressure tapping for the reduced pressure is designed differently according to the symbol:

- reduced pressure in line A → PA
- reduced pressure in line B → PB
- reduced pressure in line P → PT

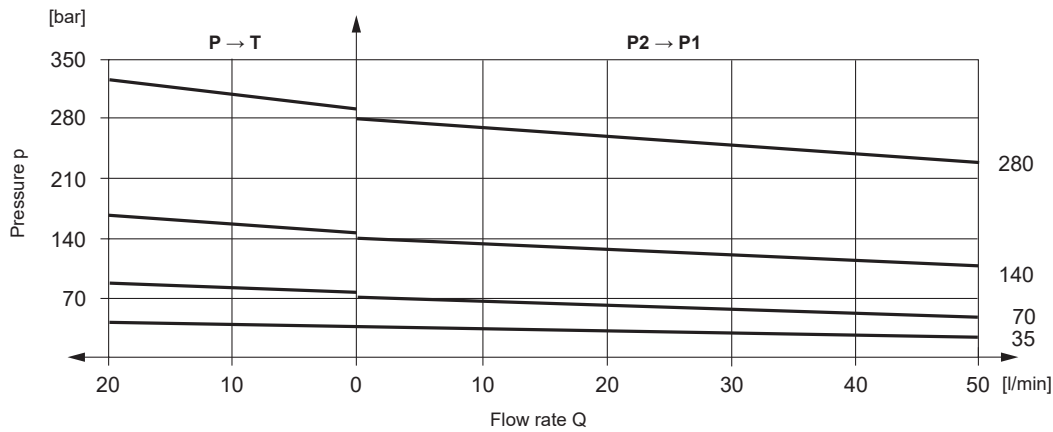
The output pressure P1 can be tapped at measuring port (M).

### Notice:

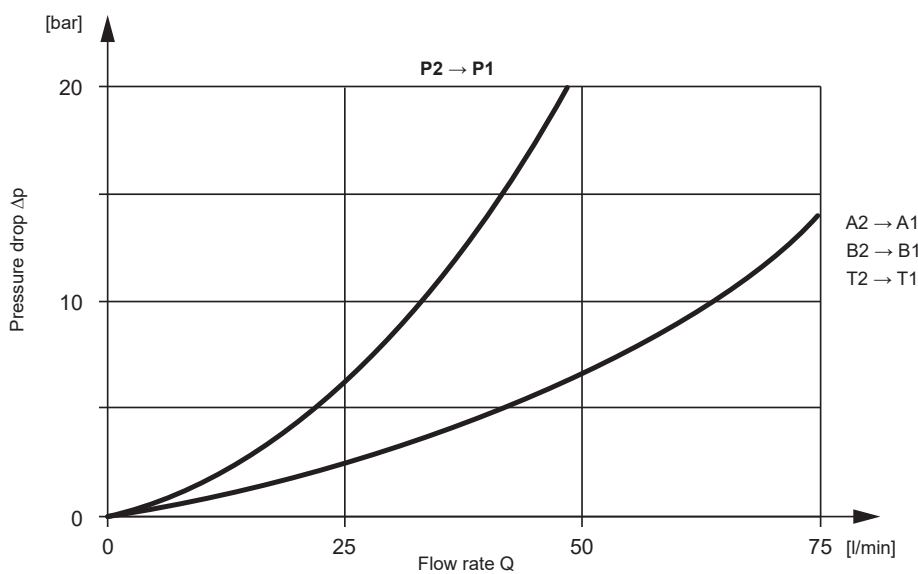
For the versions PA and PB, the pressure losses of the following components must be taken into account when selecting the input pressure.

## TYPICAL PERFORMANCE

p characteristics measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 50 \text{ }^\circ\text{C}$

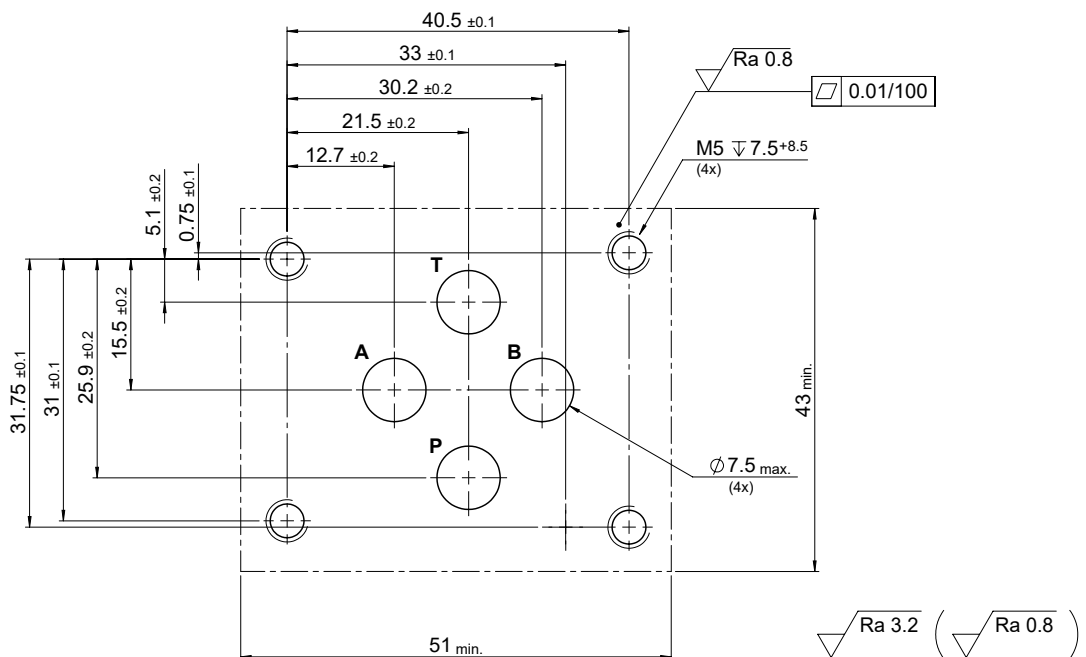


$\Delta p/Q$  characteristics measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 50 \text{ }^\circ\text{C}$



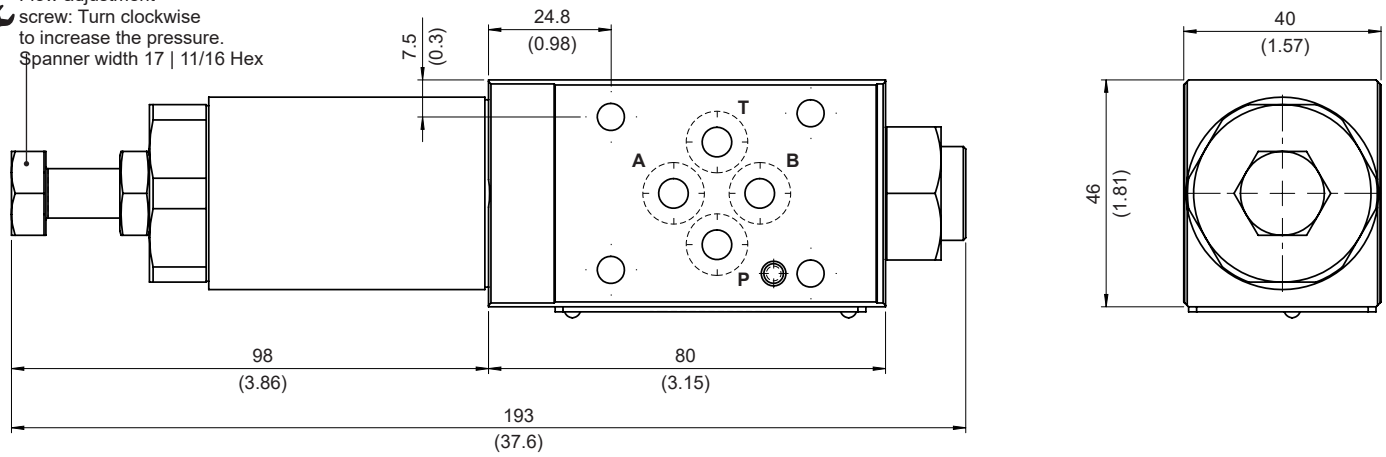
## DIMENSIONS

Hole pattern to ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350)



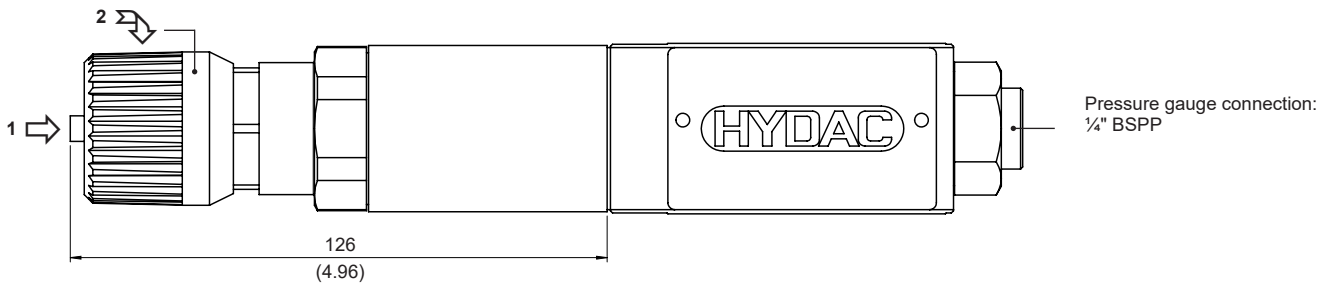
## DIMENSION

Flow adjustment screw: Turn clockwise to increase the pressure.  
Spanner width 17 | 11/16 Hex



Optional with adjustment type K (adjusting knob)

Setting knob, press and turn at the same time when actuating.



## ACCESSORIES

### Spare parts, seal kits

Designation	Material	Code	Part no.
Seal kits (4-part set)	NBR	9.25 x 1.78 80 Sh	3492432
Seal kits (4-part set)	FKM	9.25 x 1.78 80 Sh	3120269

# Pressure relief valve in Sandwich plate design

## ZW-DB06



### ADDITIONAL TECHNICAL DATA<sup>1</sup>

#### General specifications

Weight	1.4 kg
	2.1 kg (only symbol ABT)

#### Hydraulic specifications

Flow rate	max. 75 l/min in controlled lines
	max. 75 l/min in free lines

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

### MODEL CODE

**ZW-DB 06 01 AB-70 V N**

#### Description

Pressure relief valve in sandwich plate design, pilot-operated

#### Nominal size (NG)

6

#### Series

01 = will be specified by the manufacturer

#### Spool symbol

AB = Pressure relief in port A, B	With crossed outflows
AT = Pressure relief in port A	Outflow in port T
BT = Pressure relief in port B	Outflow in port T
PT = Pressure relief in port P	Outflow in port T
ABT = Pressure relief in port A and B	Outflow in port T

#### Pressure ranges

70 = to 70 bar
140 = to 140 bar
210 = to 210 bar
350 = to 350 bar

#### Adjustment types

V = adjustable using tool

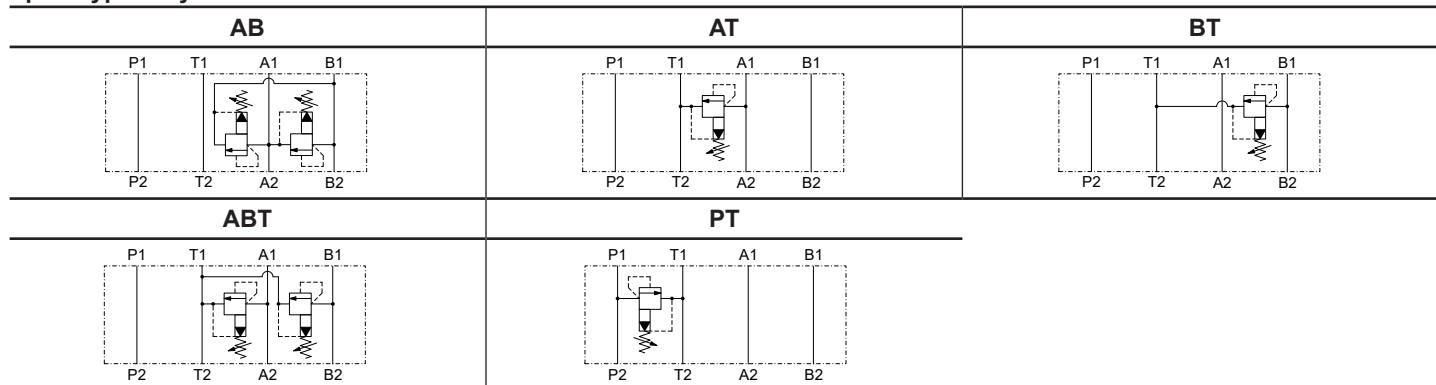
#### Sealing material

V = FKM (standard)
N = NBR



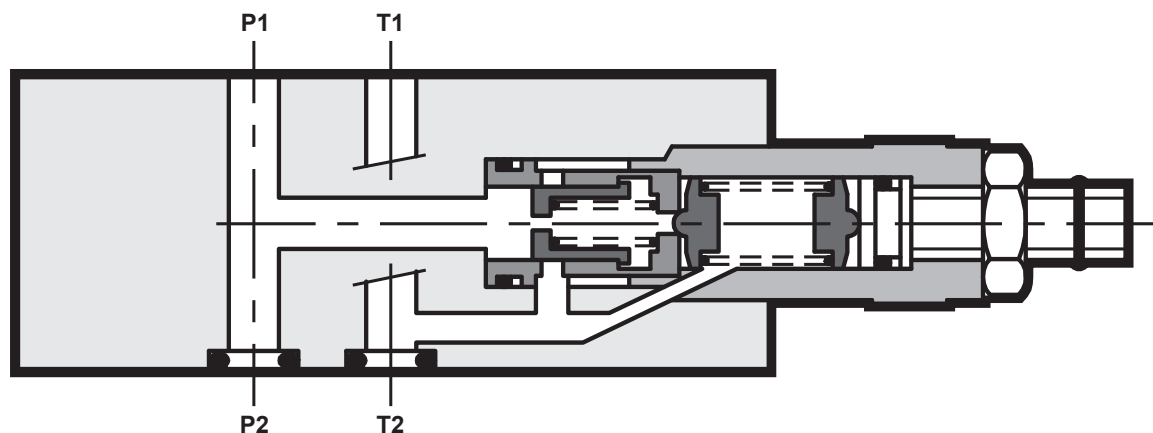
## SYMBOL

### Spool types / symbols



## SECTION VIEW

For example PT



## FUNCTION

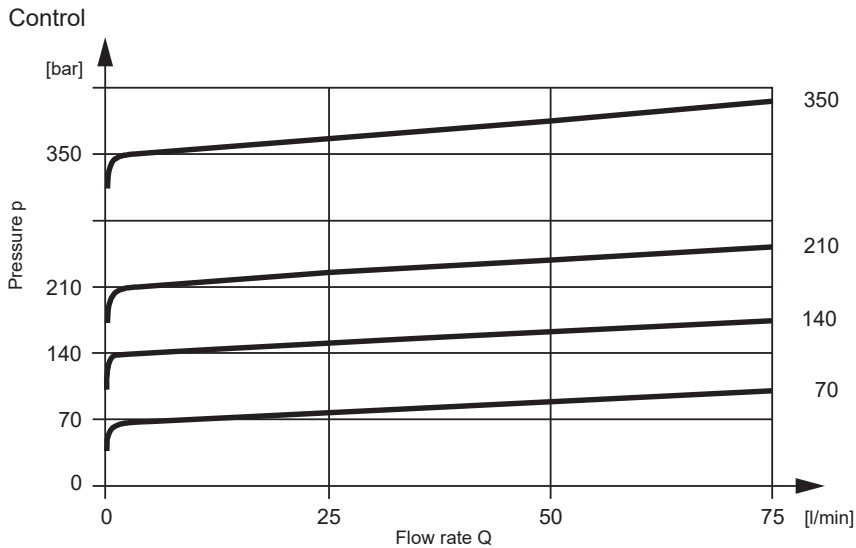
The pressure relief valve is a pilot-operated spool valve in sandwich plate design with nominal size 6 and is designed to limit the pressure in the system.

Notice: The following section applies to the PT version only.

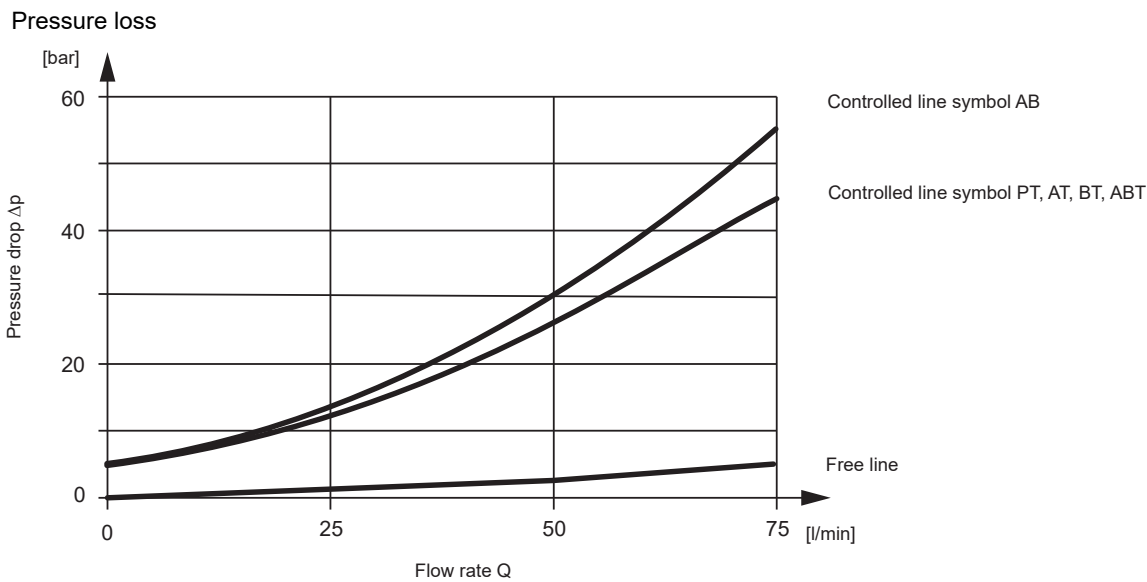
If the pressure at port P exceeds the preset pressure, the pilot stage opens and a small volume flow passes via the pilot stage to the tank. The pressure difference created as a result of this action will cause the main spool to press against the return spring and allows oil to flow from port P to T.

## TYPICAL PERFORMANCE

p/l characteristic measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 50 \text{ }^\circ\text{C}$  | **Notice:** The valve is discharged to minimum set pressure when delivered.

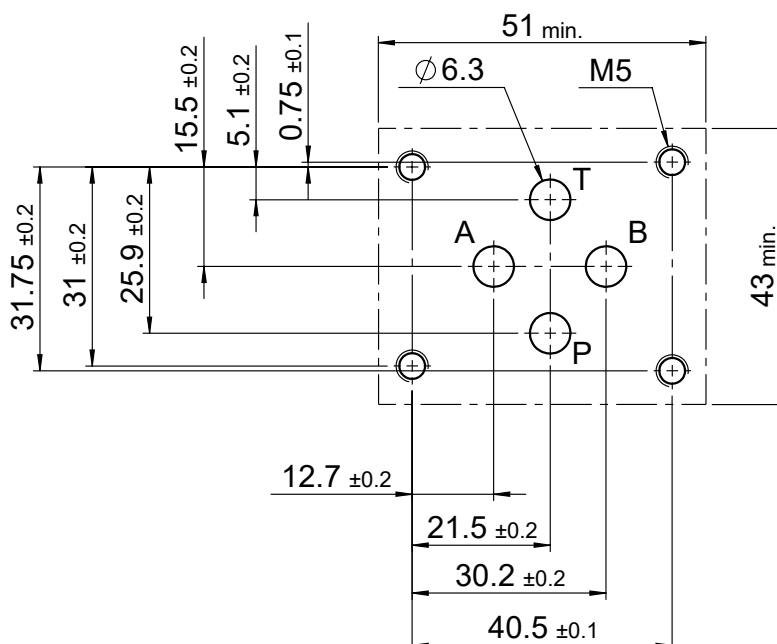


Notice:  
The valve is discharged to minimum set pressure when delivered.



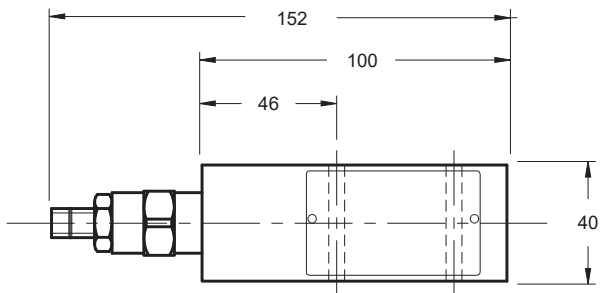
## DIMENSIONS

Hole pattern to ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350)

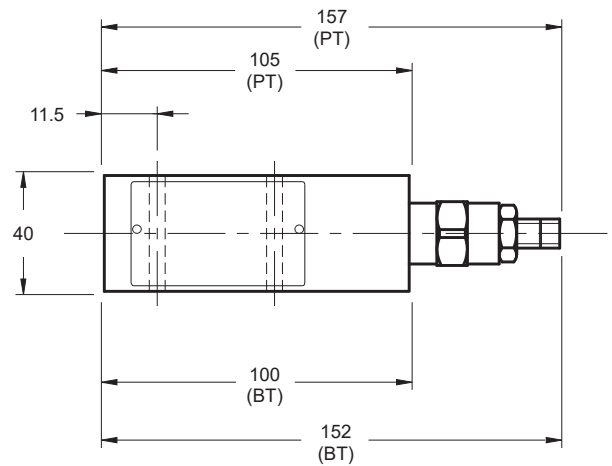


## DIMENSION

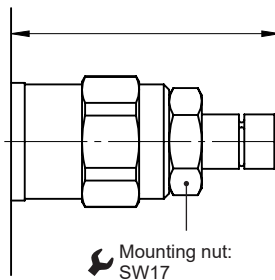
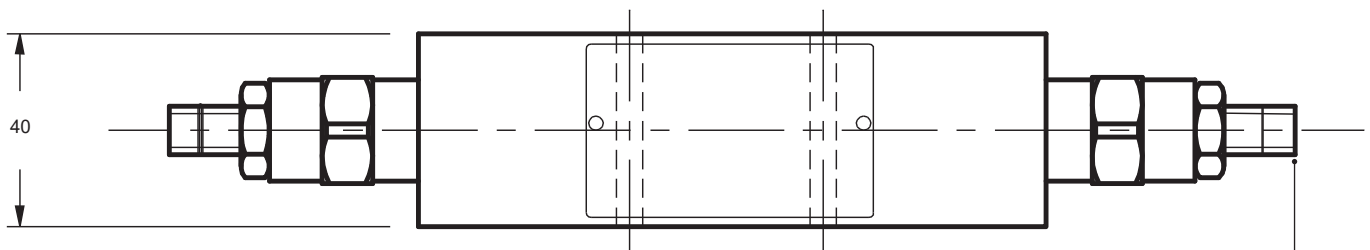
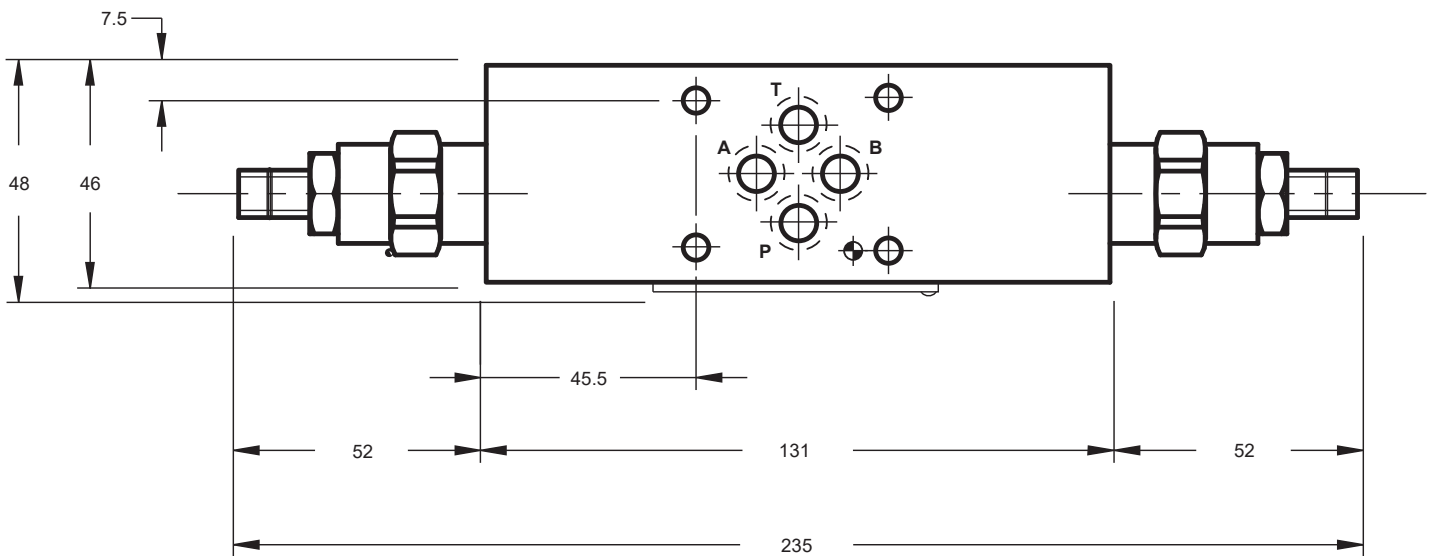
Symbol AT



Symbol PT, BT



Symbol AB, ABT



Flow adjustment screw:  
Turn clockwise to increase the pressure.  
Allen screw size 5

Mounting nut:  
SW17

## ACCESSORIES

### Spare parts, seal kits

Designation	Material	Code	Part no.
Seal kits (4-part set)	NBR	9.25 x 1.78 80 Sh	3492432
Seal kits (4-part set)	FKM	9.25 x 1.78 80 Sh	3120269

# Pressure compensator in Sandwich plate design

## ZW-DW06



### ADDITIONAL TECHNICAL DATA<sup>1</sup>

#### General specifications

Weight 1.5 kg

#### Hydraulic specifications

Flow rate Max. 40 l/min

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

### MODEL CODE

**ZW-DW 06 01 PAB-33 V N**

#### Description

Pressure compensator in sandwich plate design

#### Nominal size (NG)

6

#### Series

01 = will be specified by the manufacturer

#### Spool symbol

PAB = 2-way pressure compensator

PTAB = 3-way pressure compensator

#### Pressure ranges

4 = to 4 bar

8 = to 8 bar

33 = 7 to 33 bar

#### Adjustment types

not stated = non-adjustable

V = adjustable using tool (in the pressure range 7 - 33 bar only)

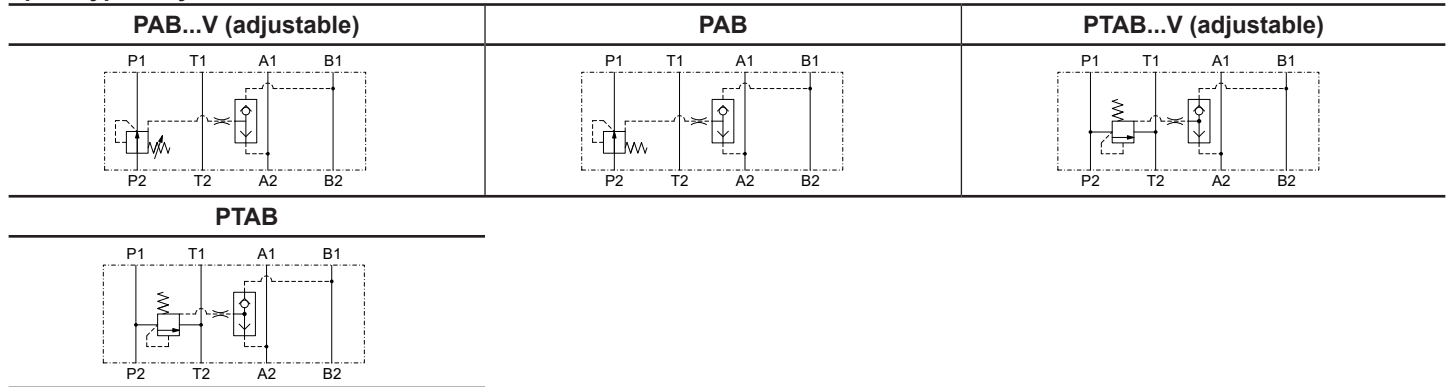
#### Sealing material

V = FKM (standard)

N = NBR

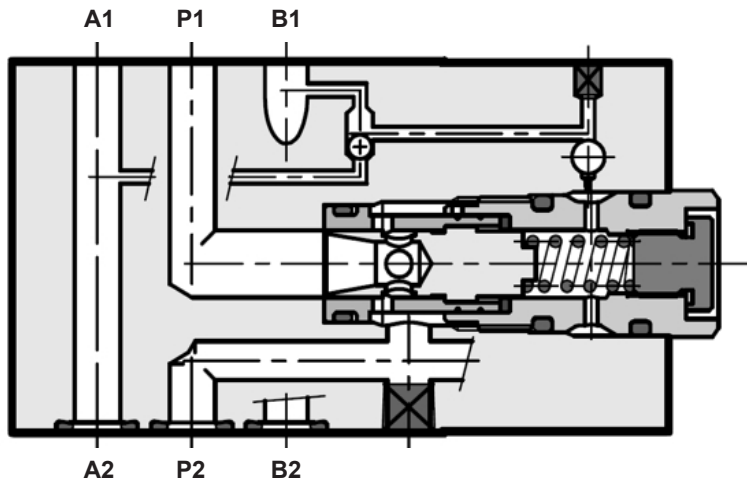
# SYMBOL

## Spool types / symbols



# SECTION VIEW

For example PAB



# FUNCTION

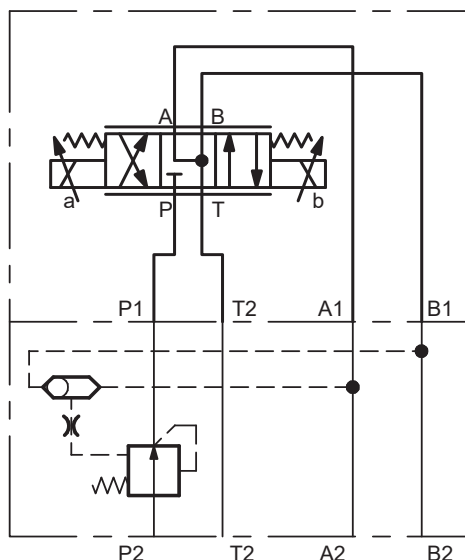
The pressure compensator in sandwich plate design with nominal size 6 keeps the pressure drop constant between input P and, depending on the control of the integrated shuttle valve, either the input to the consumer port A or B. Together with a throttle or a proportional directional valve, there is a constant volume flow to the consumer at port A or B. The control pressure of the pressure compensator can be predefined using a hex socket set screw to between 7 and 33 bar. Non-adjustable pressure compensators are available with a control pressure of 4 or 8 bar.

The valve is available as a 2- or 3-way pressure compensator.

In the case of the 3-way pressure compensator, an excess volume flow is diverted to the tank port T inside the valve.

Application example:

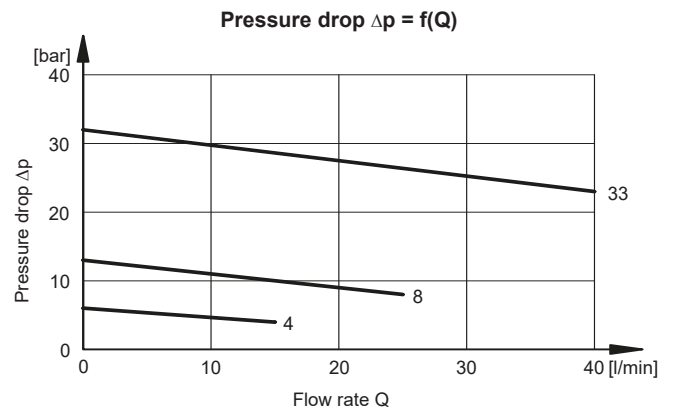
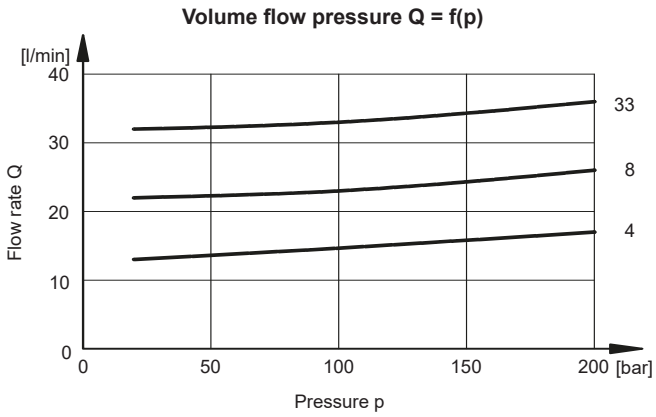
Supply flow control to cylinder port A or B with a proportional directional valve:



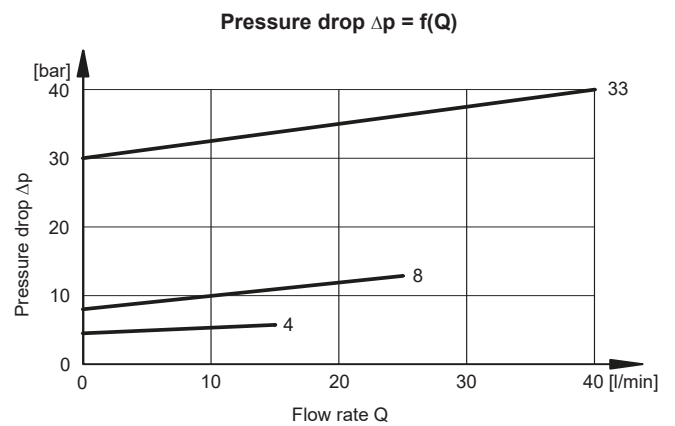
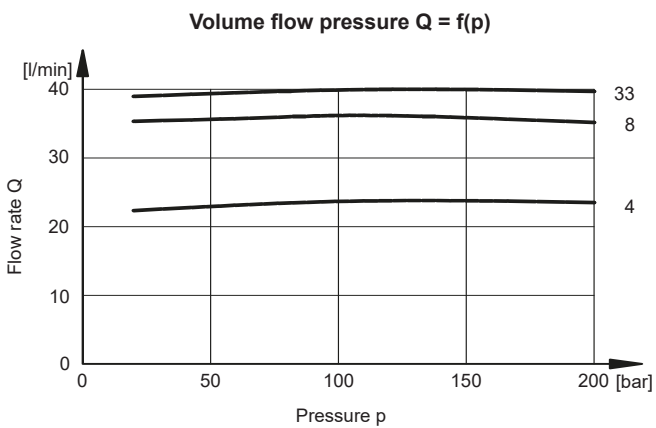
# SAMPLE CHARACTERISTICS

$\Delta p/Q$  characteristics measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 50 \text{ }^\circ\text{C}$

## 2-way pressure compensator

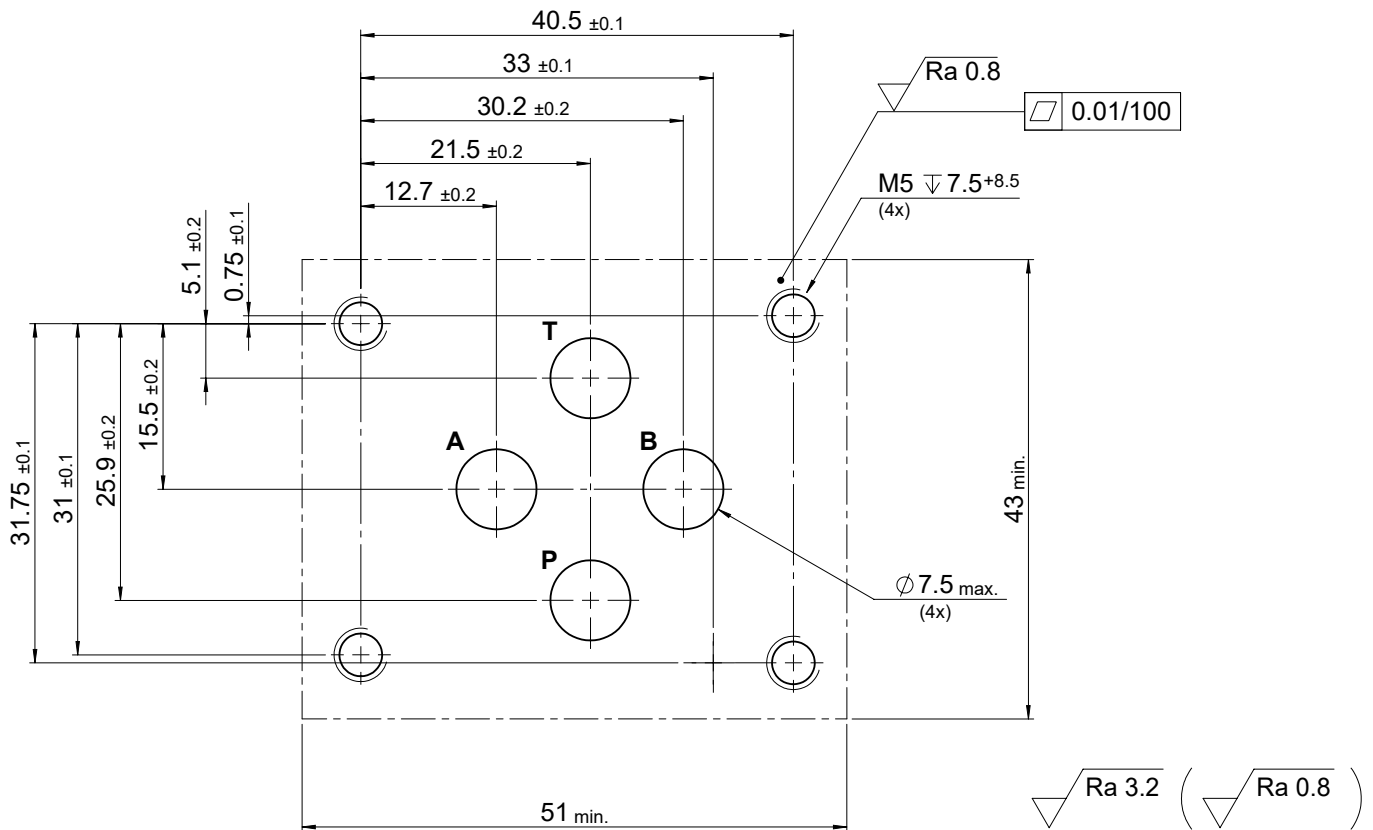


## 3-way pressure compensator

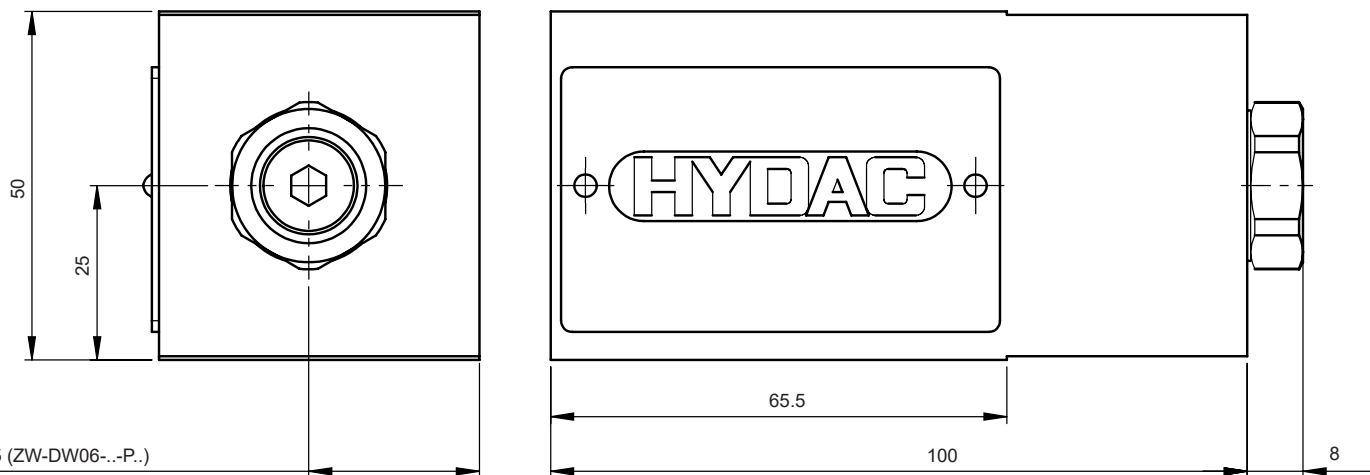


# DIMENSIONS

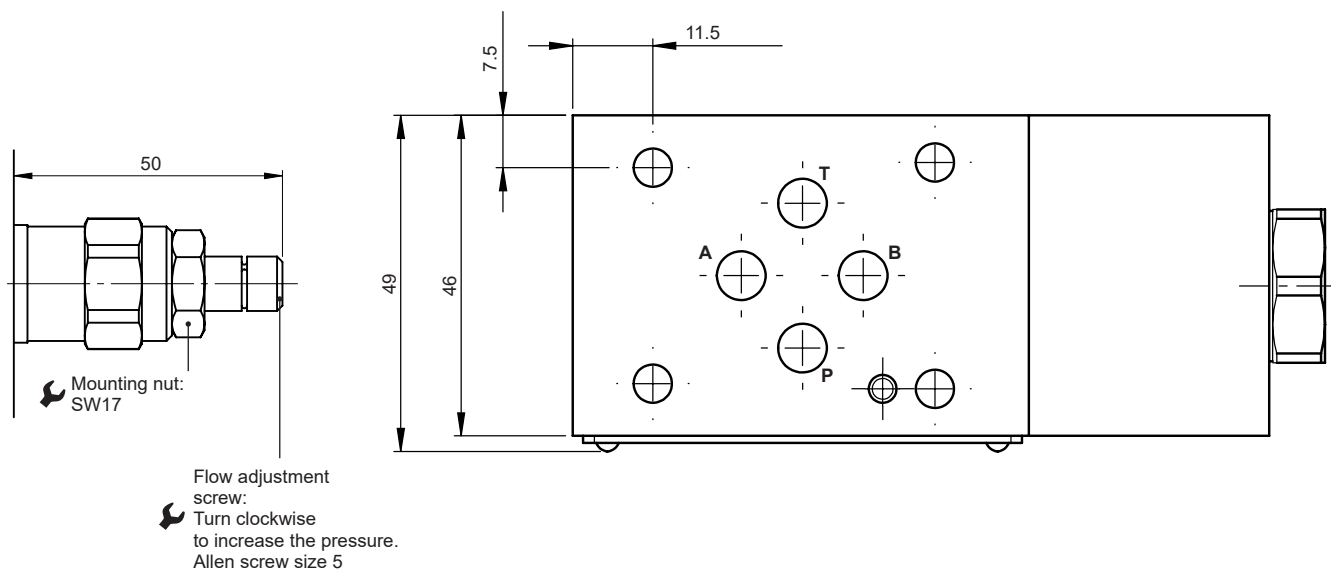
Hole pattern to ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350)



## DIMENSIONS



24.5 (ZW-DW06-...-P.)  
23.0 (ZW-DW06-...-PT.)



## ACCESSORIES

### Spare parts, seal kits

Designation	Material	Code	Part no.
Seal kits (4-part set)	NBR	9.25 x 1.78 80 Sh	3492432
Seal kits (4-part set)	FKM	9.25 x 1.78 80 Sh	3120269

# Throttle check valve in Sandwich plate design

## ZW-SDR06



### ADDITIONAL TECHNICAL DATA<sup>1</sup>

#### General specifications

Weight 1.3 kg

#### Hydraulic specifications

Flow rate max. 75 l/min in free line  
max. 50 l/min in controlled line

Opening pressure check valve Max. 0.5 bar

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

### MODEL CODE

**ZW-SDR 06 01 AAB N**

#### Description

Throttle check valve in sandwich plate design

#### Nominal size (NG)

6

#### Series

01 = will be specified by the manufacturer

#### Spool symbol

AA = Outflow in port A  
AB = Outflow in port B  
AAB = Outflow in port A and B  
ZAB = Inflow in port A and B

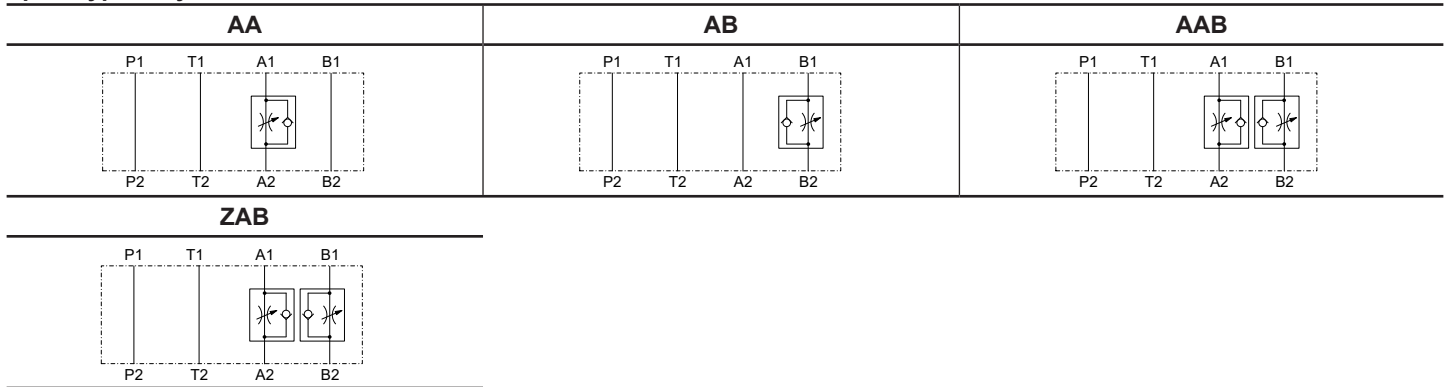
#### Sealing material

V = FKM (standard)  
N = NBR



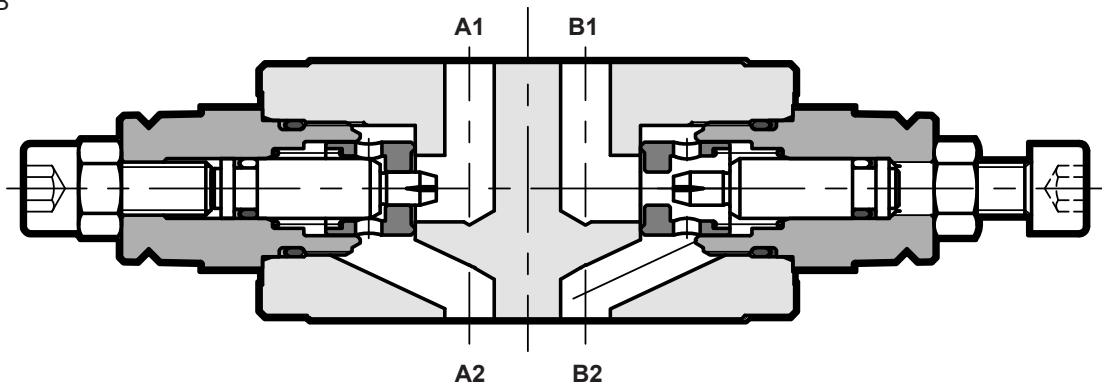
# SYMBOL

## Spool types / symbols



# SECTION VIEW

For example AAB



# FUNCTION

The throttle check valve in sandwich plate design with nominal size 6 is used to control a volume flow in the flow direction. The flow passes freely through the valve in the opposite direction after the opening pressure has been exceeded. The valve opens here when the input pressure at the check valve is greater than the output pressure, including the compression spring force.

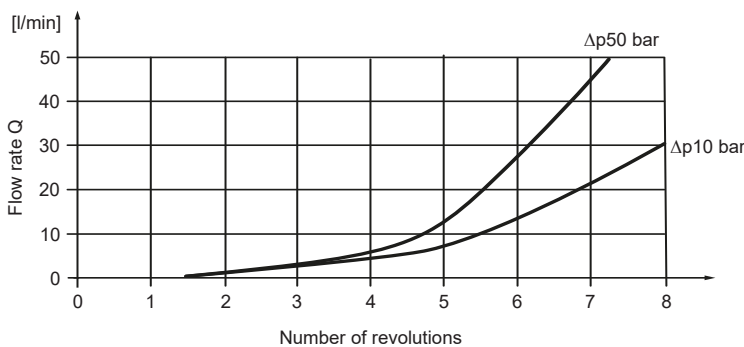
The degree of throttling of the volume flow takes place depending on the design in:

- Volume flow from consumer to mounting spool in line A → AA
- Volume flow from consumer to mounting spool in line B → AB
- Volume flow from consumer to mounting spool in line A and B → AAB
- Volume flow from mounting spool to consumer in line A and B → ZAB

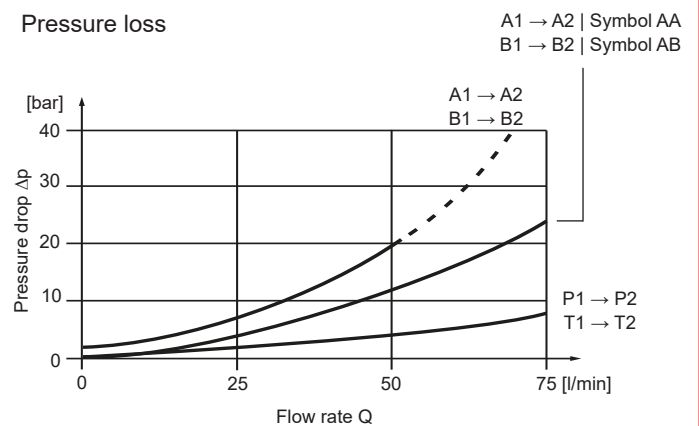
# SAMPLE CHARACTERISTICS

$\Delta p/Q$  characteristics measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{oil}} = 50 \text{ }^\circ\text{C}$

Control



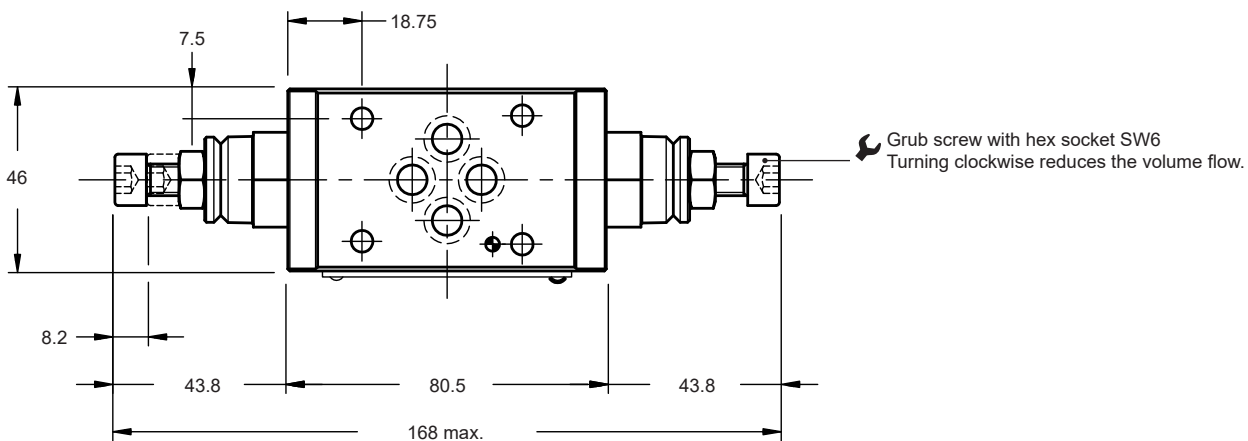
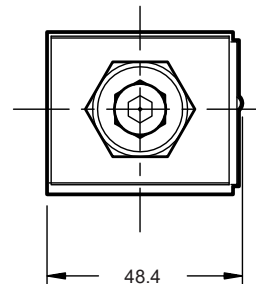
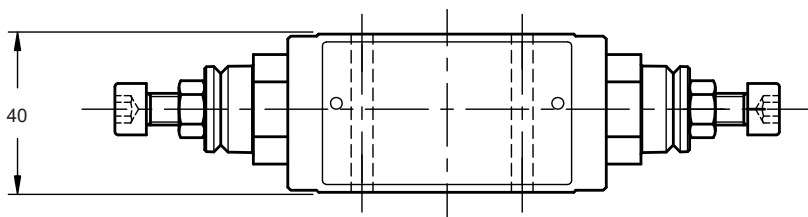
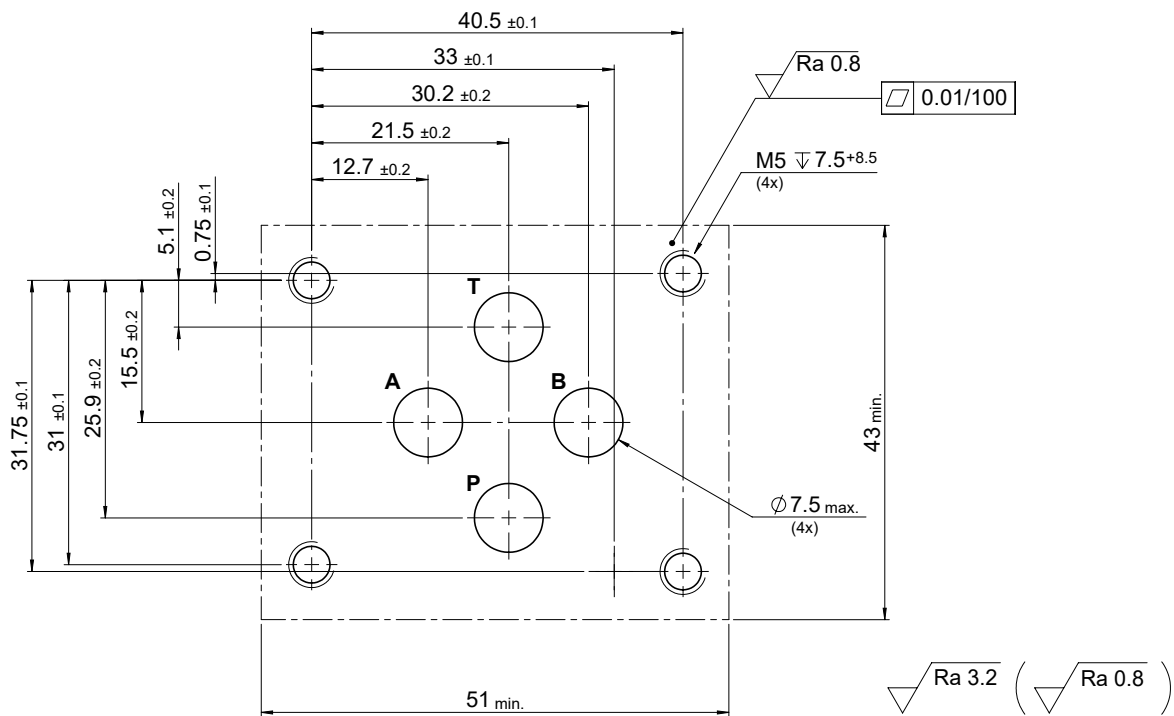
Pressure loss



A1 → A2 | Symbol AA  
B1 → B2 | Symbol AB

## DIMENSIONS

Hole pattern to ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350)



## ACCESSORIES

### Spare parts, seal kits

Designation	Material	Code	Part no.
Seal kits (4-part set)	NBR	9.25 x 1.78 80 Sh	3492432
Seal kits (4-part set)	FKM	9.25 x 1.78 80 Sh	3120269

# Flow control valve in Sandwich plate design

## ZW-2SR06



### ADDITIONAL TECHNICAL DATA<sup>1</sup>

#### General specifications

Weight	3.0 kg 4.1 kg   only symbol AAB
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#### Hydraulic specifications

Operating pressure	250 bar
Flow rate	max. 65 l/min in free line (40 l/min free flow in opposite direction) max. 1, 4, 10, 16, 22, 30 l/min in controlled line
Opening pressure check valve	0.5 bar

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

### MODEL CODE

**ZW-2SR 06 01 AA 01 N**

#### Description

Flow control valve in sandwich plate design

#### Nominal size (NG)

6

#### Series

01 = will be specified by the manufacturer

#### Spool symbol

- AA = Outflow in port A
- AB = Outflow in port B
- AAB = Outflow in port A and B
- P = Outflow in port P

#### Volume flow

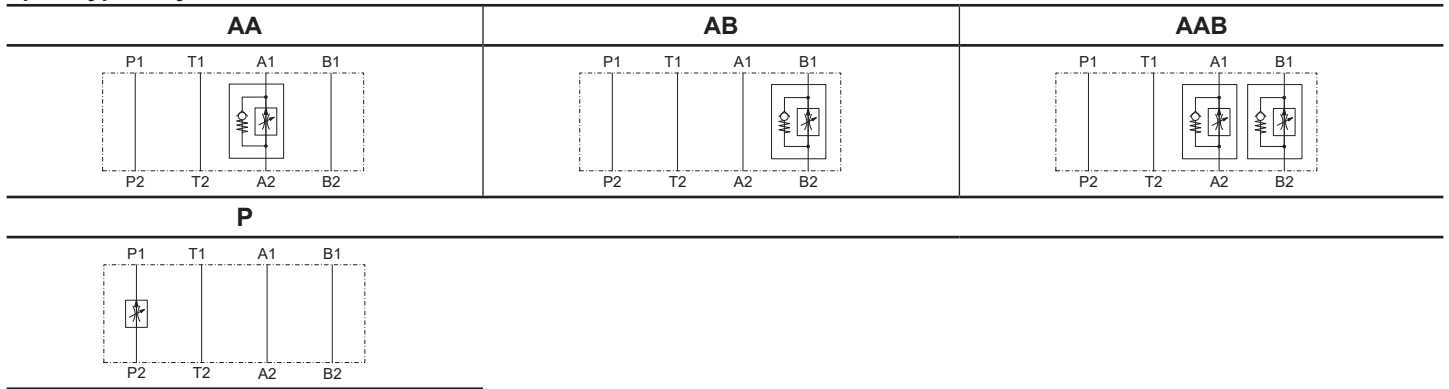
- 01 = 1 l/min
- 04 = 4 l/min
- 10 = 10 l/min
- 16 = 16 l/min
- 22 = 22 l/min
- 30 = 30 l/min

#### Sealing material

- V = FKM (standard)
- N = NBR

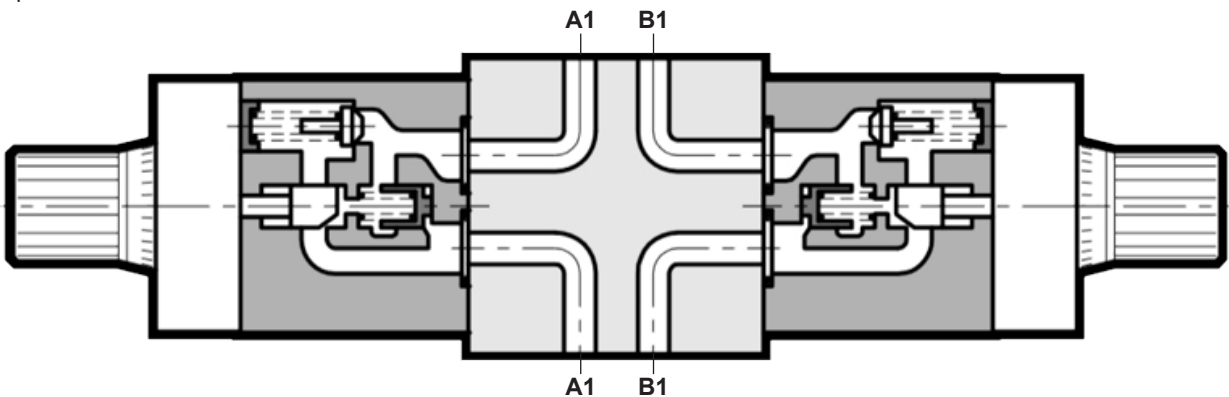
# SYMBOL

## Spool types / symbols



## SECTION VIEW

For example AAB



## FUNCTION

The flow control valve in sandwich plate design with nominal size 6 is used to control a volume flow in the flow direction. The volume flow is kept constant depending on the temperature and pressure drop at the consumer. The flow passes freely through the valve in the opposite direction after the opening pressure has been exceeded. The valve opens here when the input pressure at the check valve is greater than the output pressure, including the compression spring force. It is used to control the speed of an actuating drive, e.g. of a hydraulic cylinder.

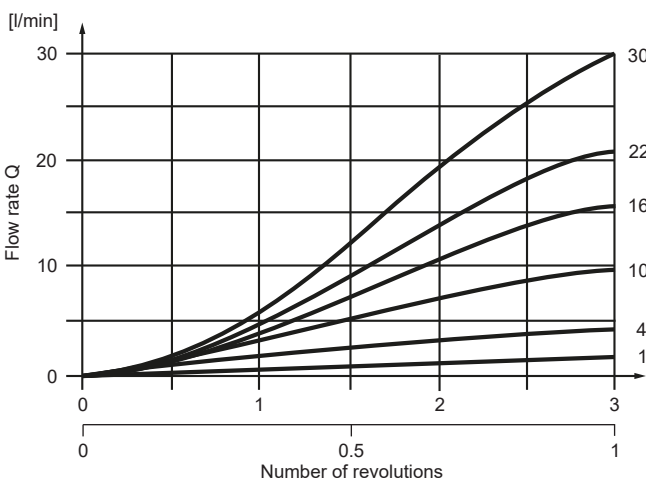
The control of the volume flow takes place depending on the design in:

- Volume flow from consumer to mounting spool in line A → AA
- Volume flow from consumer to mounting spool in line B → AB
- Volume flow from consumer to mounting spool in line A and B → AAB
- Volume flow from consumer to mounting spool in line P

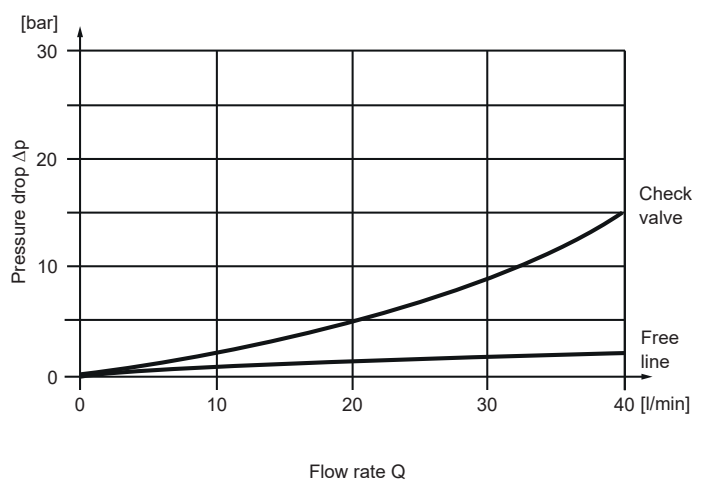
## SAMPLE CHARACTERISTICS

$\Delta p/Q$  characteristics measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 50 \text{ }^\circ\text{C}$

Control



Pressure loss





# Unlockable check valve in sandwich plate design **ZW-RP06**



## ADDITIONAL TECHNICAL DATA<sup>1</sup>

### General specifications

Weight 1.3 kg

### Hydraulic specifications

Flow rate  
max. 75 l/min in free line  
max. 50 l/min in controlled line

Opening pressure check valve 3 bar

Pilot ratio 3.4 : 1

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

## MODEL CODE

**ZW-RP 06 01 AA N**

### Description

Check valve in sandwich plate design, hydraulic, unlockable

### Nominal size (NG)

6

### Series

01 = will be specified by the manufacturer

### Spool symbol

AA = 2-way pressure compensator

AB = 3-way pressure compensator

AAB = Outflow in port A and B

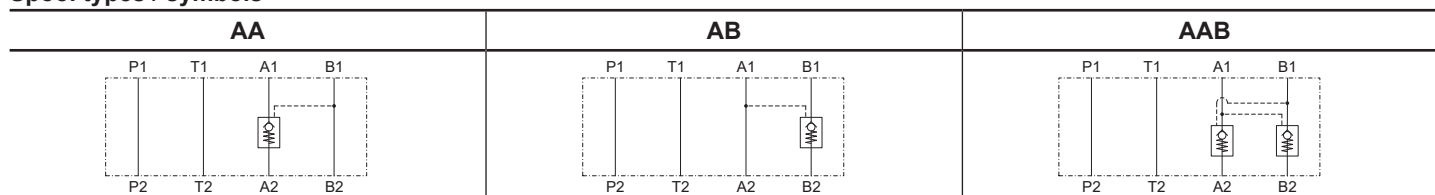
### Sealing material

V = FKM (standard)

N = NBR

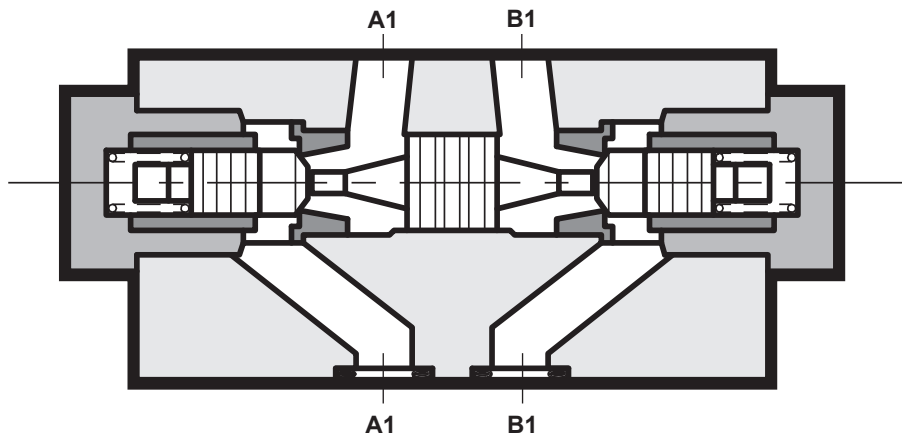
## SYMBOL

### Spool types / symbols



## SECTION VIEW

For example AAB



## FUNCTION

The unlockable check valve in sandwich plate design with nominal size 6 is a direct-acting, spring-loaded poppet valve. It releases a volume flow from the mounting spool to the consumer and locks the volume flow from the consumer to the mounting spool. To do so, the valve plug is pressed into the seat and blocks the flow. If a sufficiently high control pressure is built up in the respective control line, the valve unlocks and a volume flow passes from the consumer to the mounting spool. The required control pressure depends on the pressure difference between the ports to be unlocked.

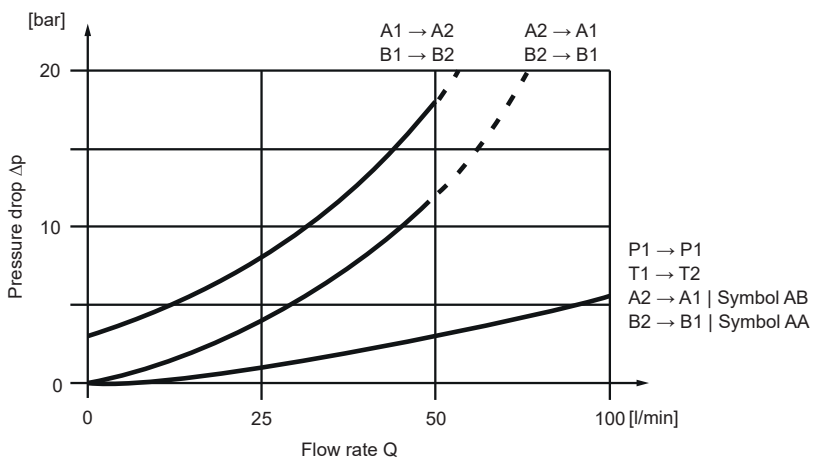
### Notice:

A pressure in the port of the mounting spool influences the required control pressure.

## SAMPLE CHARACTERISTICS

**$\Delta p/Q$  characteristics** measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 50 \text{ }^\circ\text{C}$

Pressure loss







# Check valve in sandwich plate design **ZW-RV06**



## ADDITIONAL TECHNICAL DATA<sup>1</sup>

### General specifications

Weight 1.0 kg

### Hydraulic specifications

Flow rate max. 75 l/min in free line  
max. 50 l/min in controlled line

Opening pressure check valve 0.5 bar | 3 bar | 5 bar

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

## MODEL CODE

**ZW-RV 06 01 A 0.5 N**

### Description

Check valve in sandwich plate design

### Nominal size (NG)

6

### Series

01 = will be specified by the manufacturer

### Spool symbol

A = Stop valve in line  
AB = Stop valve in line B  
P = Stop valve in line P  
T = Stop valve in line T  
AB = Stop valve in line AB  
PT = Stop valve in line PT

### Opening pressure\*

0.5 = 0.5 bar  
3 = 3 bar  
5 = 5 bar

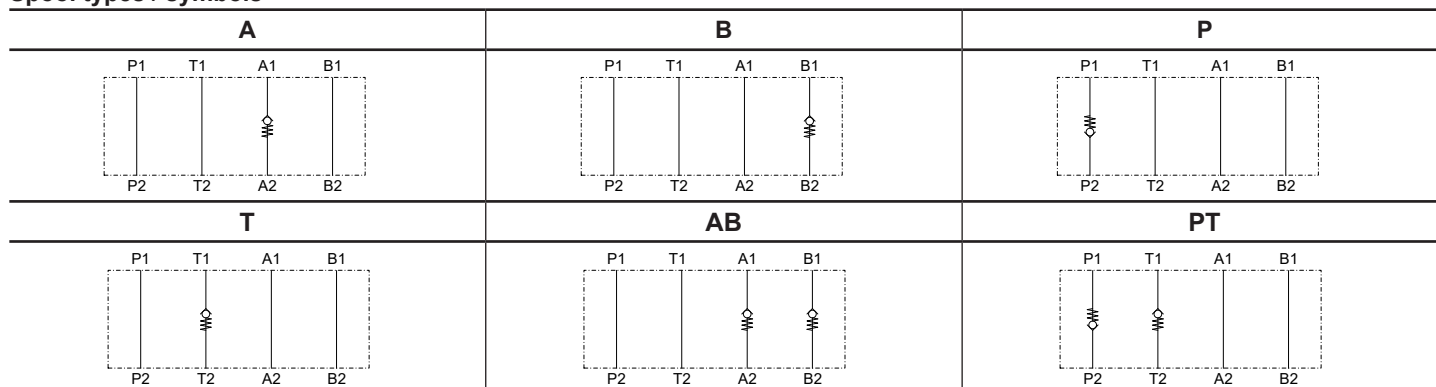
### Sealing material

V = FKM (standard)  
N = NBR

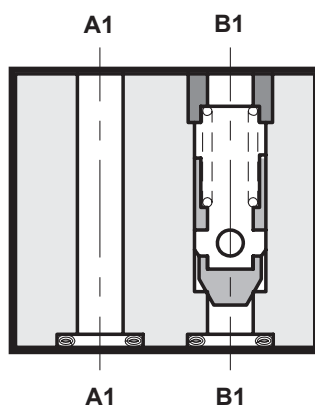
\* Other versions on request.

## SYMBOL

### Spool types / symbols



## SECTION VIEW



## FUNCTION

The check valve in sandwich plate design with nominal size 6 is a direct-acting, spring-loaded poppet valve. After the spring pretensioning force has been overcome, it releases the volume flow in one direction and locks it in the opposite direction. To do so, the valve plug is pressed into the seat and blocks the flow.

- Flow in line A from consumer to mounting spool locked → A
- Flow in line B from consumer to mounting spool locked → B
- Locking return flow to pressure supply → P
- Pretensioning of the outflow to the tank → T
- Flow in line A and B from consumer to mounting spool locked → AB
- Locking return flow to pressure supply and pretensioning of the outflow to the tank → PT

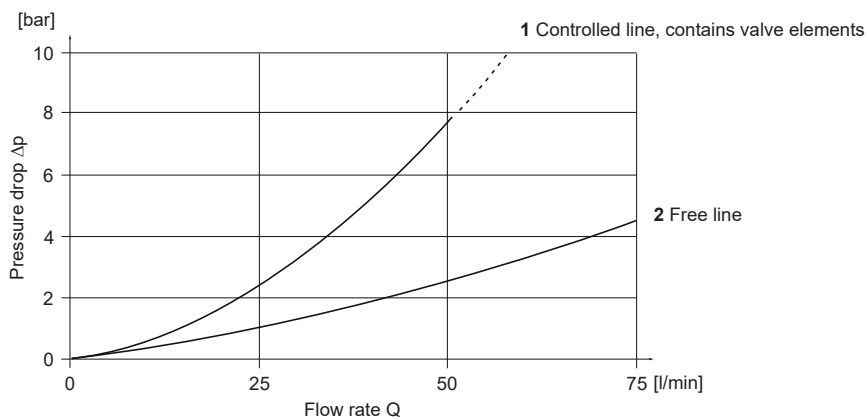
### Notice

Spring-side pressures on the check element add to its opening pressure.

## SAMPLE CHARACTERISTICS

$\Delta p/Q$  characteristics measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 50 \text{ }^\circ\text{C}$

Pressure loss

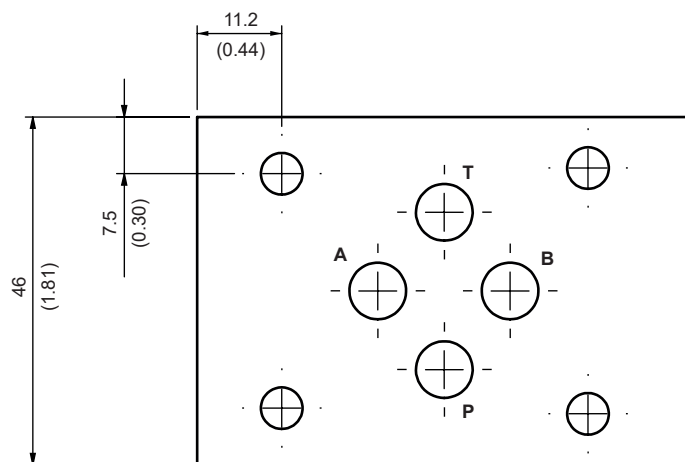
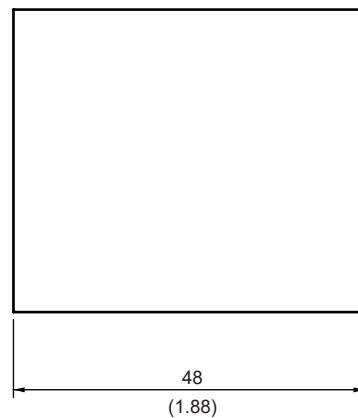
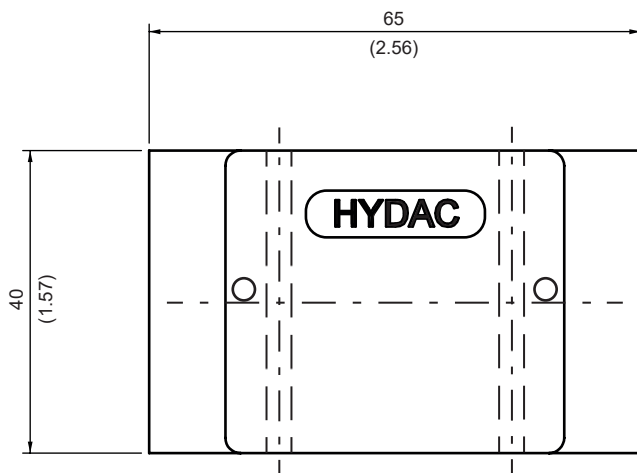
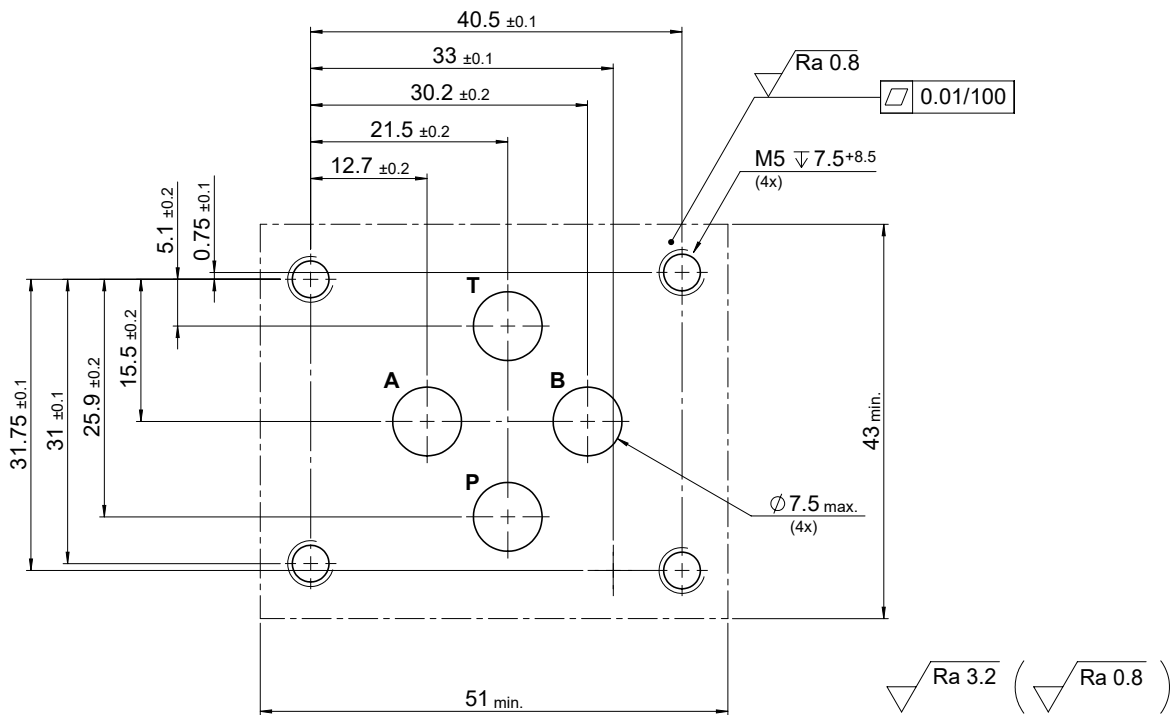


### Note

The opening pressure of the valve is added to the values of the characteristic 1.

## DIMENSIONS

Hole pattern to ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350)

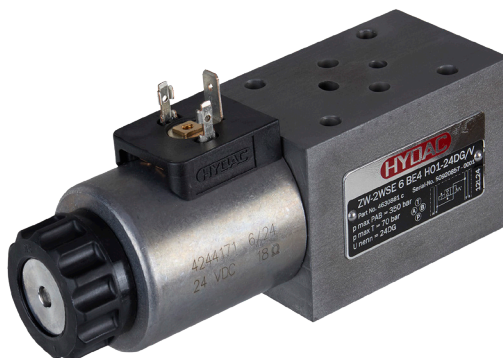


## ACCESSORIES

### Spare parts, seal kits

Designation	Material	Code	Part no.
Seal kits (4-part set)	NBR	9.25 x 1.78 80 Sh	3492432
Seal kits (4-part set)	FKM	9.25 x 1.78 80 Sh	3120269

# Directional poppet valve in sandwich plate design **ZW-2WSE6**



## ADDITIONAL TECHNICAL DATA<sup>1</sup>

### General specifications

Weight 1.7 kg with one solenoid

### Hydraulic specifications

Flow rate Max. 25 l/min

<sup>1</sup> See "Conditions and Instructions for Valves" in brochure 53.000.

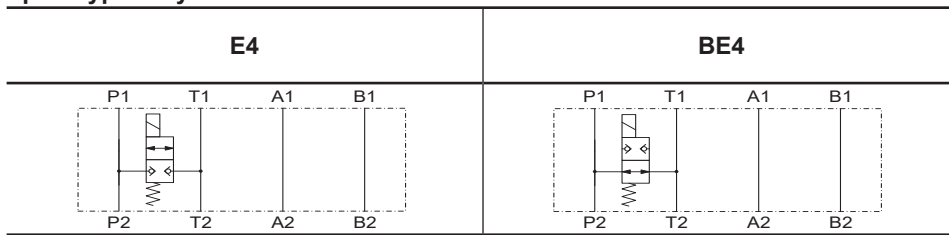
## MODEL CODE

	ZW-2	WSE	6	E4	H01-24	DG	/V
<b>Description</b> Directional poppet valve in sandwich plate design							
<b>Ports</b> 2							
<b>Valve type</b> Directional poppet valve							
<b>Nominal size</b> 6							
<b>Spool symbol</b> E4 = closed when currentless BE4 = open when currentless							
<b>Series</b> H01 = will be specified by the manufacturer							
<b>Nominal voltage of the solenoid*</b> 0 = without 24 = 24 V DC							
<b>Connection type</b> DG = Design A according to DIN EN 175301-803							
Number of poles 3-pole							
Connection radial							
Protection class IP65							
Suppressor diode no							
<b>Sealing material</b> V = FKM							

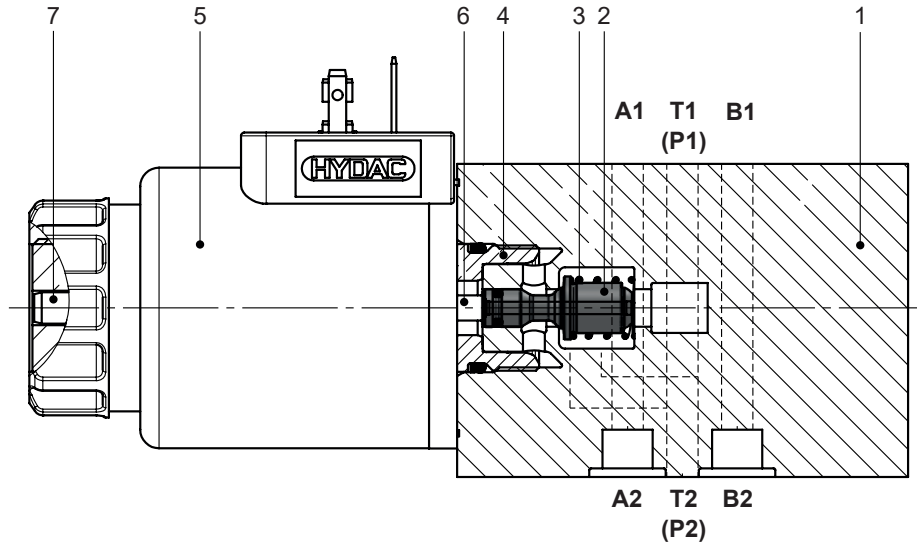
\* Other versions on request.

## SYMBOL

### Spool types / symbols



## SECTION VIEW



## FUNCTION

The solenoid-operated directional poppet sandwich plates of type ZW-2WSE 6 are used to control a volume flow. The valve design is patented and is made up of a valve casing (1) and a cone poppet element (2). The sandwich plate is equipped with a return spring (3) and a pole tube (4) and a solenoid (5). The hydraulic control of the valve is achieved by actuating the cone poppet element by means of a solenoid (5).

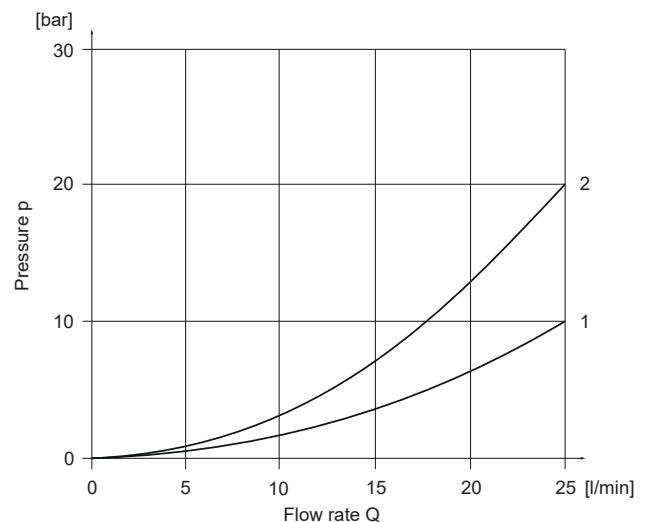
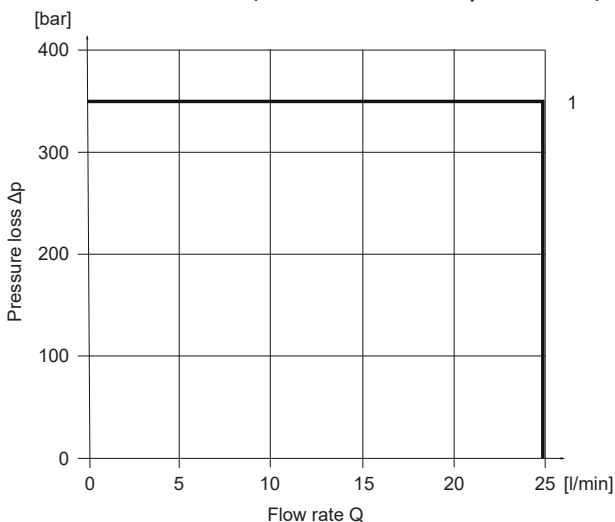
The solenoid is a transformer that converts electrical energy into mechanical energy. When the solenoid is activated, it generates a linear lifting movement of the magnetic spool that is immersed in oil. The spool moves the cone poppet element to the desired position by means of the guide rod (6). This releases a connection between the ports P and T or closes them so as to be leak-tight.

The modular principle of the key components allows both a currentless open and closed version to be implemented. The specially ground cone poppet elements are pressure-compensated and therefore double leak-tight, i.e. pressure reversals, within the permitted port pressures, do not cause them to open accidentally. To achieve optimal switching capacity of the valves, the pressure-tight space of the pole tube should always be filled with oil. Thanks to the corresponding return spring, the cone poppet element is pushed back into its initial position when the solenoid is no longer energised. The manual override (7) enables valve operation without energising the solenoid.

## TYPICAL PERFORMANCE

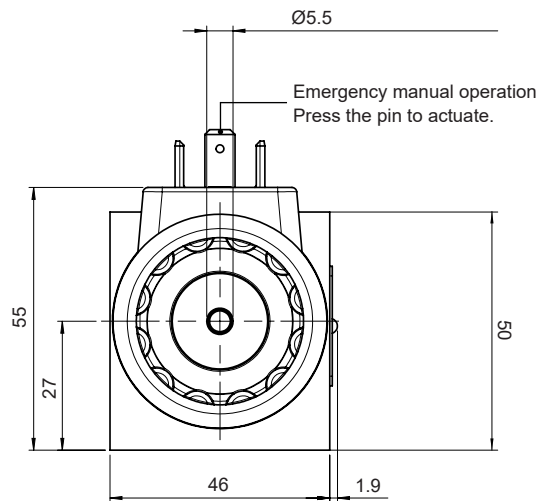
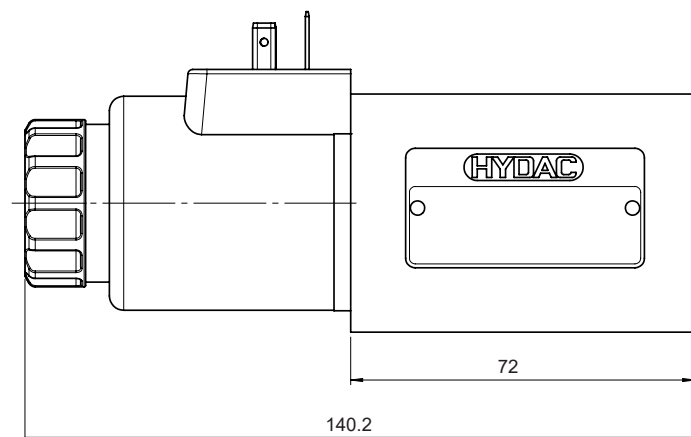
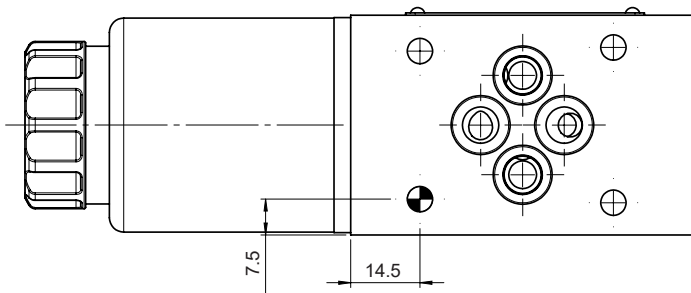
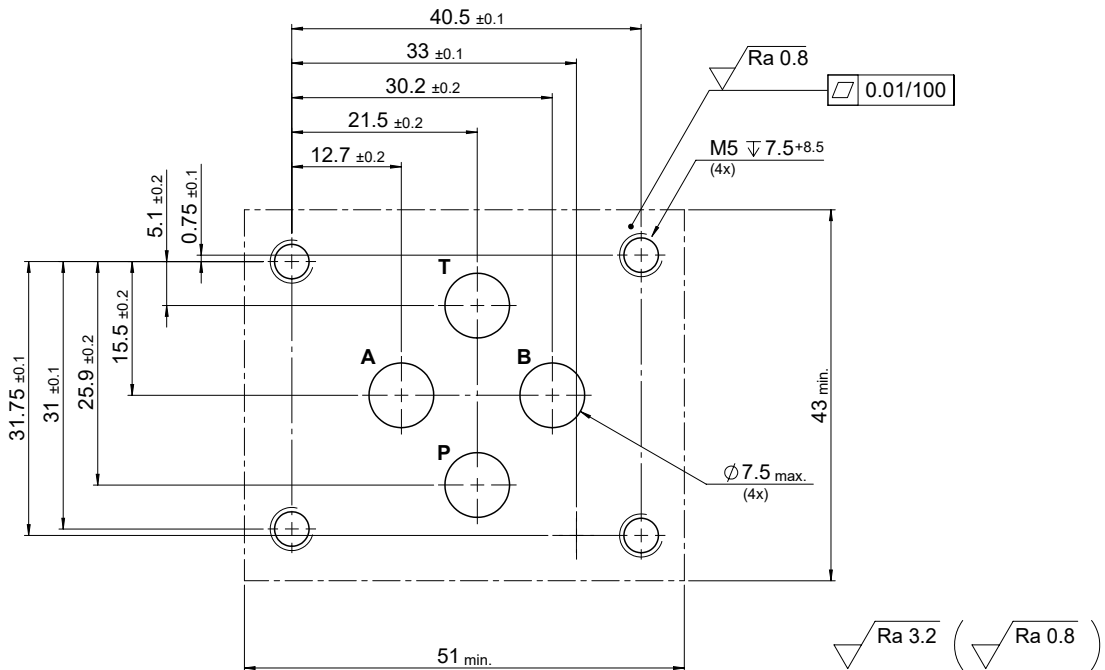
**Pressure loss** measured at  $v = 30 \text{ mm}^2/\text{s}$ ,  $T_{\text{Oil}} = 45 \text{ }^\circ\text{C}$

**Power limit:** Switch-on power  $I_{\text{ON}} \geq 0.7 \times I_{\text{N}}$  | Switch-off power  $I_{\text{OFF}} \leq 0.07 \times I_{\text{N}}$



## DIMENSIONS

Hole pattern to ISO 4401-03-02-0-05 (CETOP 4.2-4-03-350)



## ACCESSORIES

### Spare parts, seal kits

Designation	Material	Code	Part no.
Seal kits (4-part set)	NBR	9.25 x 1.78 80 Sh	3492432
Seal kits (4-part set)	FKM	9.25 x 1.78 80 Sh	3120269

## NOTE

The information in this brochure relates to the operating conditions and fields of application described. For applications and operating conditions not described, please contact the relevant technical departments.

Subject to technical modifications.

Documents are only valid if they have been obtained via the website and are up-to-date.

## HYDAC FLUIDTECHNIK GMBH

Justus-von-Liebig-Str.

**66280 Sulzbach/Saar**

**Germany**

Tel: +49 6897 509-01

Email: [valves@hydac.com](mailto:valves@hydac.com)

Internet: [www.hydac.com](http://www.hydac.com)