

## Valves in sandwich plate design Nominal size 16

### DESCRIPTION

HYDAC valves in sandwich plate design in nominal size 16 enable modular design of the hydraulic control via stacked valve assembly. We supply them as pressure reducing valve for pressure control, as needle valve for volume control and as check valve, pilot-to-open and non-pilot-to-open, for direction control.

The mounting elements are dependent on the modular design of your hydraulic control and are thus not included in the scope of delivery

### FEATURES

- Available with pressure, flow and check function
- Modular design of hydraulic control
- Interface according to ISO 4401-07-07-0-05 (Cetop 7)



up to 300 l/min  
up to 350 bar

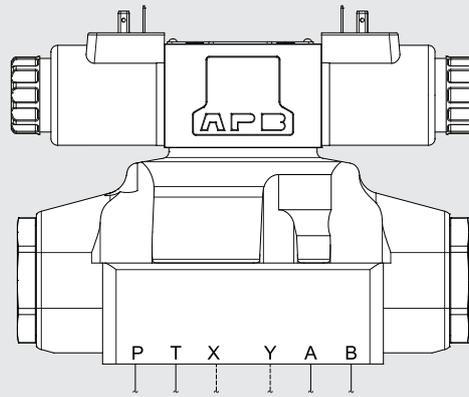
### TECHNICAL DATA\*

General specifications		
Ambient temperature	[°C]	-20 to +60
Installation position		No orientation restrictions
Material		Casing: Cast iron Name plate: Aluminium
Surface coating		Valve casing: Phosphate plated
Hydraulic specifications		
Operating pressure	[bar]	350
Operating fluid		Hydraulic oil to DIN 51524 Part 1, 2 and 3
Temperature range of operating fluid	[°C]	-20 to +70
Viscosity	[mm <sup>2</sup> /s]	15 to 400
Permitted contamination level of operating fluid		Class 20/18/15 according to ISO 4406
Sealing material		NBR (standard), FKM

\* see "Conditions and Instructions for Valves" in brochure 53.000

# CONTENTS

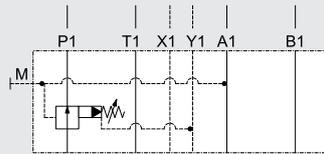
Directional valve



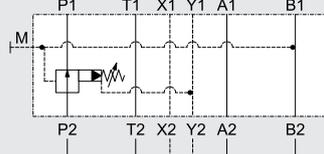
## Pressure reducing valves

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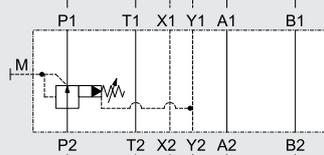
ZW-DM16...PA



ZW-DM16...PB



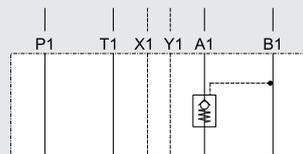
ZW-DM16...PT



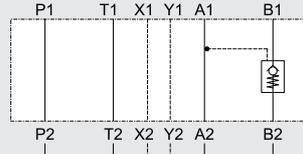
## Check valves pilot-to-open

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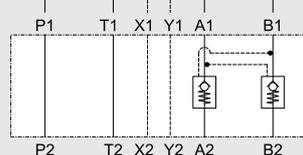
ZW-RP16...AA



ZW-RP16...AB



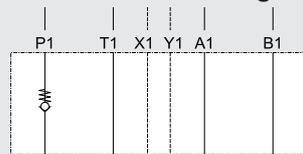
ZW-RP16...AAB



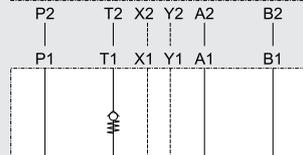
## Check valves

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ZW-RV16...P



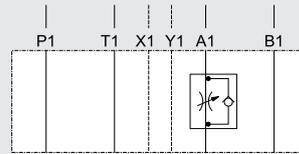
ZW-RV16...T



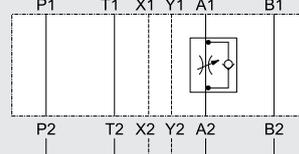
## Needle valves

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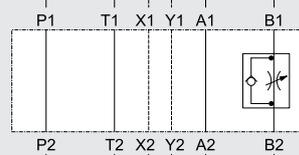
ZW-SDR16...AA



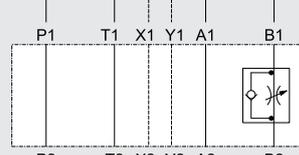
ZW-SDR16...ZA



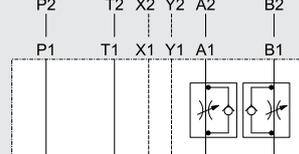
ZW-SDR16...AB



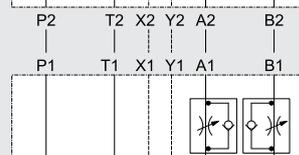
ZW-SDR16...ZB



ZW-SDR16...AAB



ZW-SDR16...ZAB



## Accessories

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# PRESSURE REDUCING VALVE IN SANDWICH PLATE DESIGN ZW – DM16



## SUPPLEMENTARY TECHNICAL DATA

General specifications		
Weight	[kg]	7.4
Hydraulic specifications		
Nominal flow	[l/min]	100 (pressure range 07/070) 300

## MODEL CODE

ZW-DM 16 - 70 - PA - 070 V - N

### Type

Pressure reducing valve in sandwich plate design, pilot-operated

### Nominal size

16

### Series

70 = specified by manufacturer

### Spool symbol

PA = pressure control in port A  
PB = pressure control in port B  
PT = pressure control in port P

### Pressure ranges

07/070 = 7 to 70 bar  
070 = 15 to 70 bar  
140 = 35 to 140 bar  
250 = 70 to 250 bar

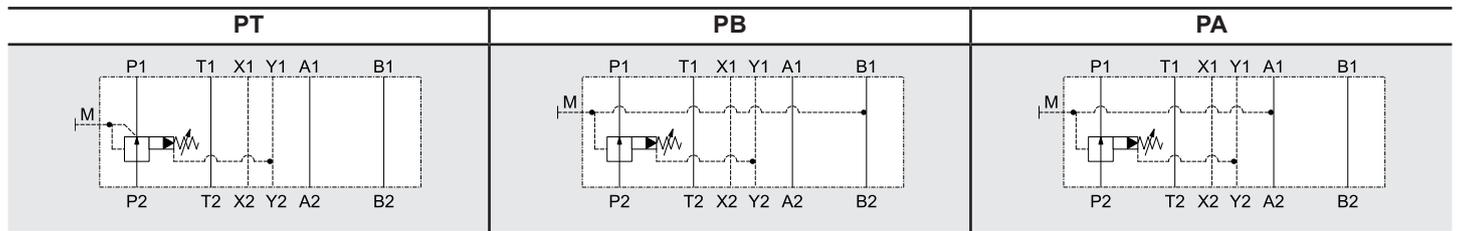
### Adjustment types

V = adjustable using tool

### Sealing material

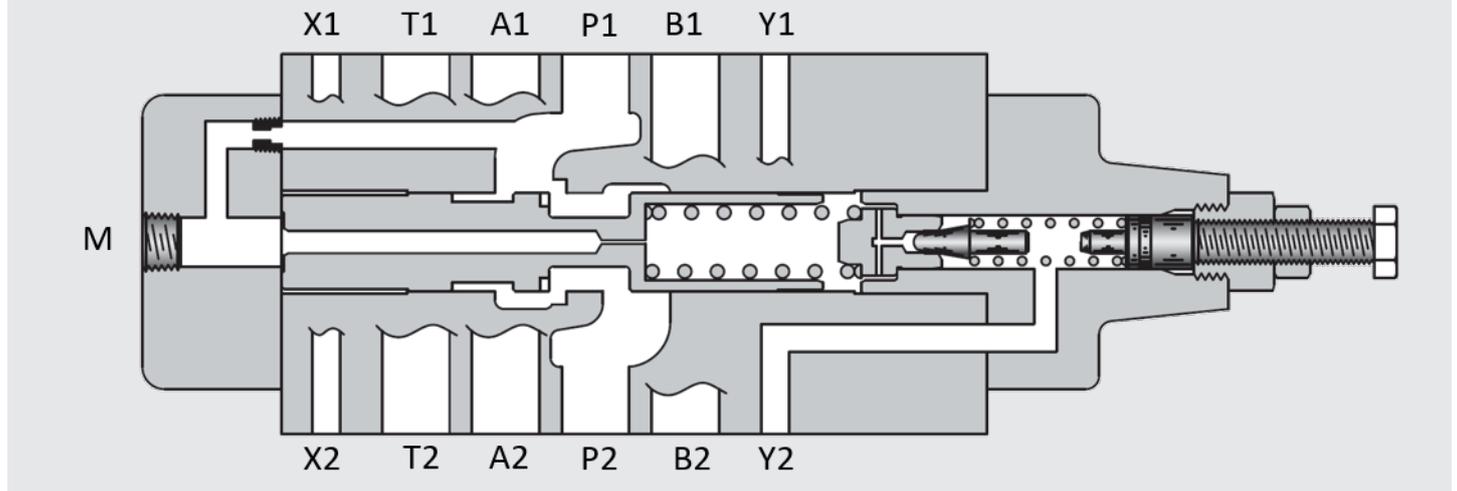
N = NBR (standard)  
V = FKM

## SPOOL TYPES / SYMBOLS



## SECTION VIEW

Example PA



## FUNCTION

The pilot-operated pressure reducing valve in spool valve design in nominal size 16 is used to reduce the inlet pressure at P2 to a smaller outlet pressure P1. The pressure tapping for the reduced pressure is designed differently depending on the symbol:

- reduced pressure in port A → PA
- reduced pressure in port B → PB
- reduced pressure in port T → PT

The outlet pressure P1 can be tapped at measuring port M.

Port Y is to be used and to be drained without pressure. Pressures at port Y are additive to the pressure setting.

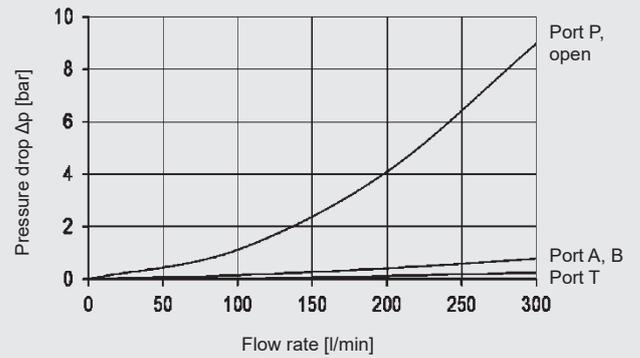
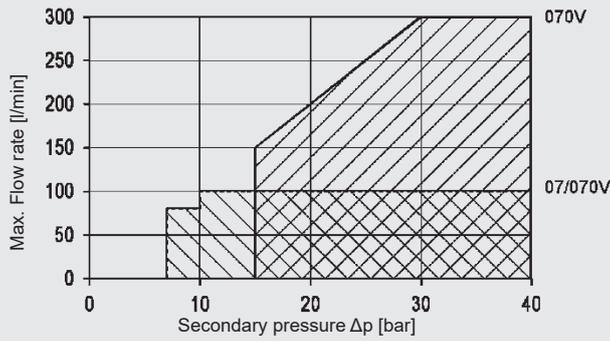
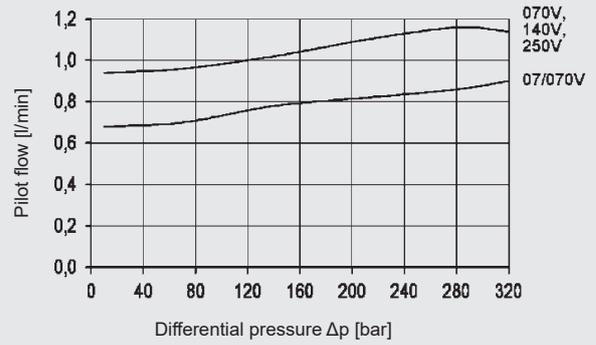
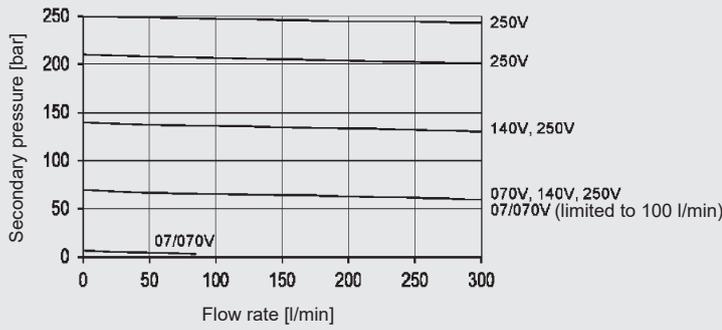
### Hint

In designs PA and PB, the pressure losses of the subsequent components must be considered when selecting the inlet pressure.

The casings have O-ring seals at the ports on the plate side.

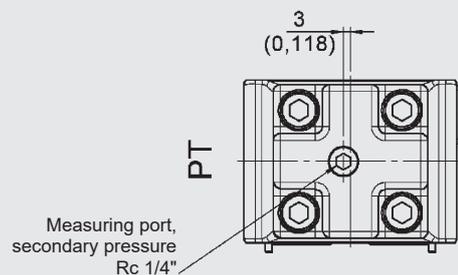
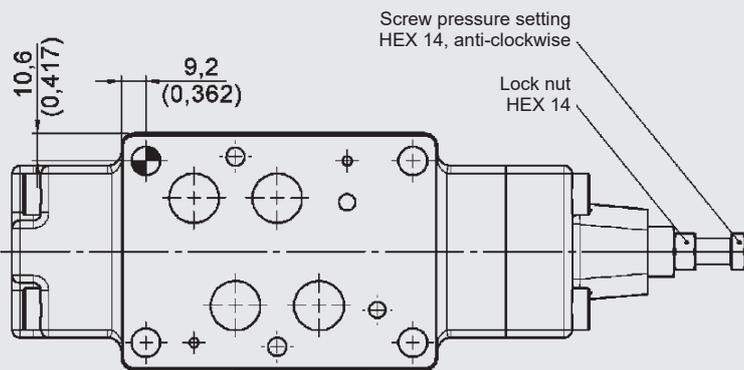
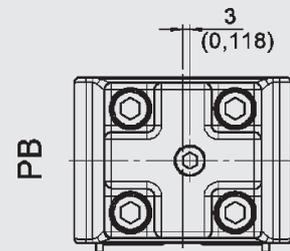
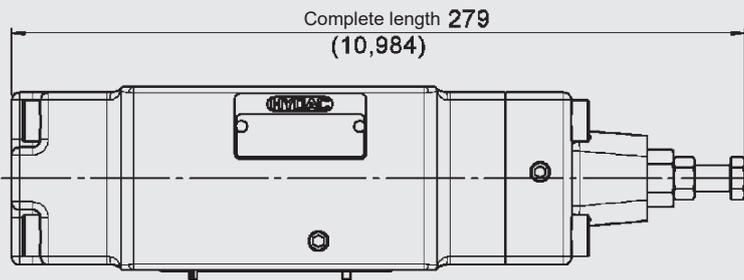
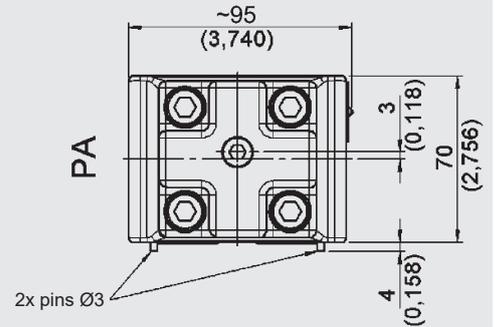
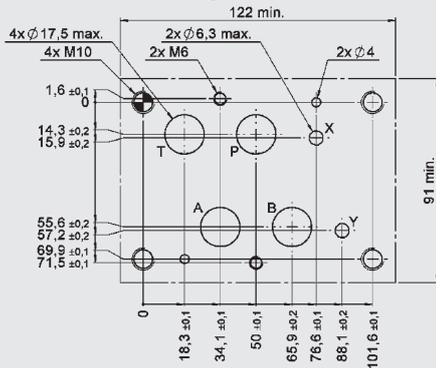
# PERFORMANCE

Measured at  $v = 35 \text{ mm}^2/\text{s}$  and  $T_{\text{oil}} = 45 \text{ }^\circ\text{C}$



# DIMENSIONS

Interface according to ISO 4401-07-07-0-05 (Cetop 7)



# NEEDLE VALVE IN SANDWICH PLATE DESIGN ZW – SDR16



## SUPPLEMENTARY TECHNICAL DATA

General specifications		
Weight	[kg]	7.4 7.6 (symbols AAB and ZAB)
Hydraulic specifications		
Cracking pressure	[bar]	0.4
Nominal flow	[l/min]	300

## MODEL CODE

ZW-SDR 16 - 70 - AA - N

### Type

Needle valve in sandwich plate design, pilot-operated

### Nominal size

16

### Series

70 = specified by manufacturer

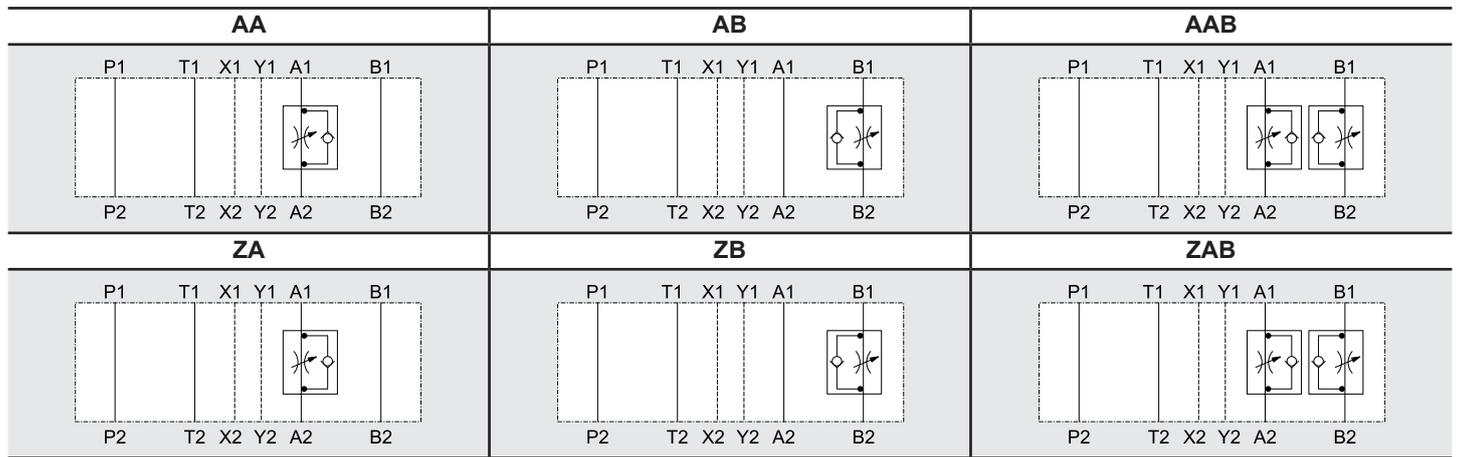
### Spool symbol

AA = meter-out in port A  
 AB = meter-out in port B  
 AAB = meter-out in port A and B  
 ZA = meter-in in port A  
 ZB = meter-in in port B  
 ZAB = meter-in in port A and B

### Sealing material

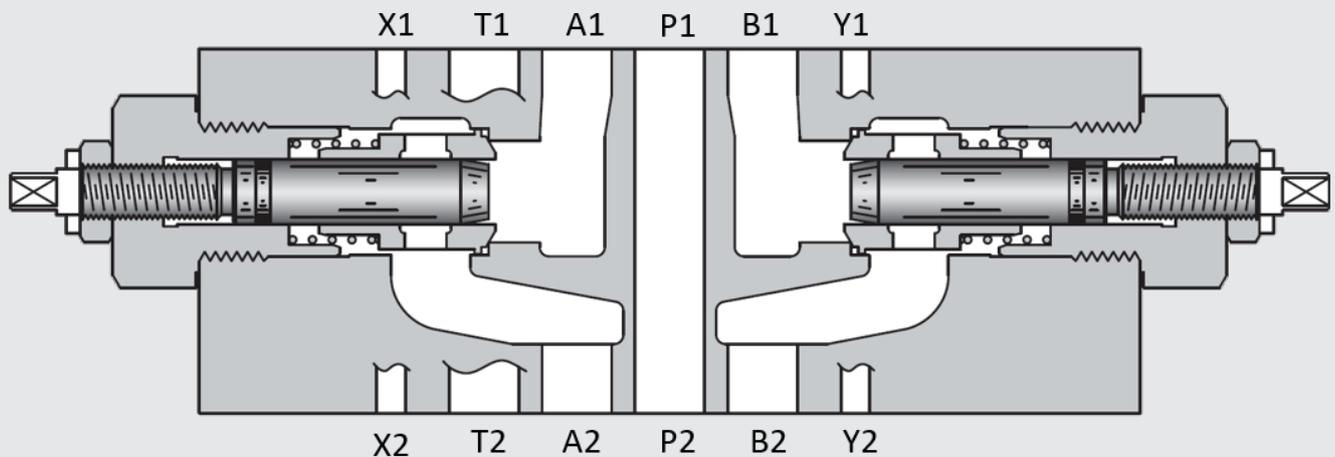
N = NBR (standard)  
 V = FKM

## SPOOL TYPES / SYMBOLS



## SECTION VIEW

Example ZAB



## FUNCTION

The needle valve in nominal size 16 is used to control a flow rate in flow direction.

In the reverse direction there is free flow through the valve if the cracking pressure is exceeded. The valve opens when the inlet pressure at the check valve is higher than the outlet pressure including the pressure spring force.

The throttling of the flow rate depends on the version:

- flow from consumer to directional valve in port A → AA
- flow from consumer to directional valve in port B → AB
- flow from consumer to directional valve in port A and B → AAB
- flow from directional valve to consumer in port A → ZA
- flow from directional valve to consumer in port B → ZB
- flow from directional valve to consumer in port A and B → ZAB

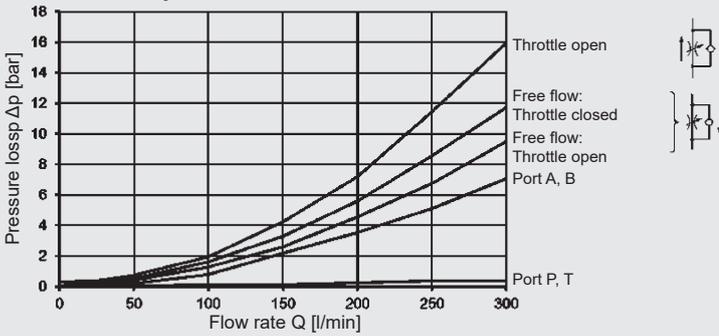
### Hint

The casings have O-ring seals at the ports on the plate side.

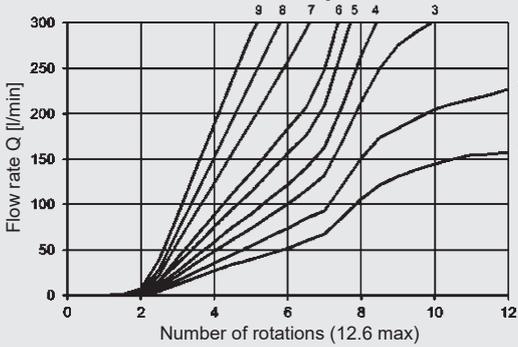
# PERFORMANCE

Measured at  $v = 35 \text{ mm}^2/\text{s}$  and  $T_{\text{oil}} = 45 \text{ }^\circ\text{C}$

## Pressure drop



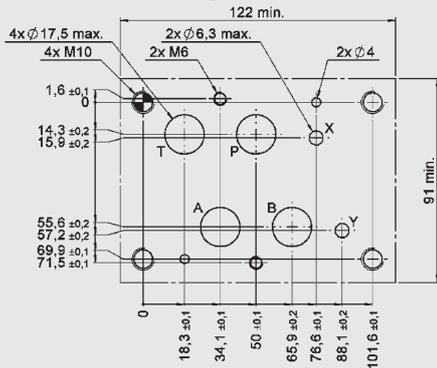
## Measure flow rate vs. throttle position



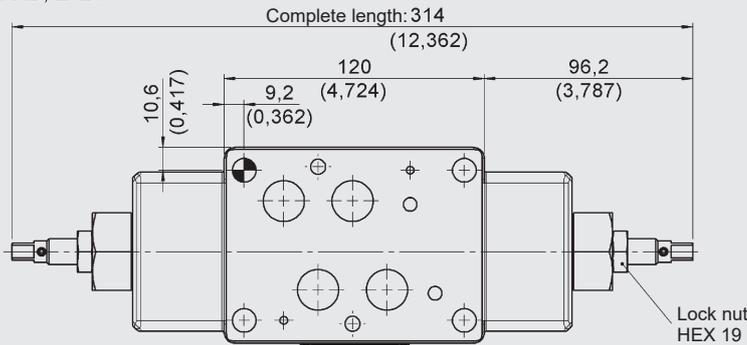
Curve	Measure flow rate vs. screw position
1	$\Delta p = 5 \text{ bar}$
2	$\Delta p = 10 \text{ bar}$
3	$\Delta p = 20 \text{ bar}$
4	$\Delta p = 30 \text{ bar}$
5	$\Delta p = 50 \text{ bar}$
6	$\Delta p = 70 \text{ bar}$
7	$\Delta p = 140 \text{ bar}$
8	$\Delta p = 210 \text{ bar}$
9	$\Delta p = 315 \text{ bar}$

# DIMENSIONS

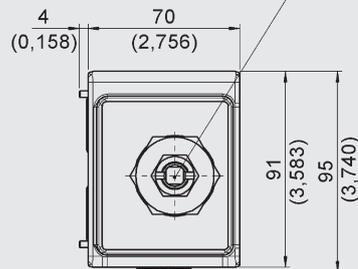
Interface according to ISO 4401-07-07-0-05 (Cetop 7)



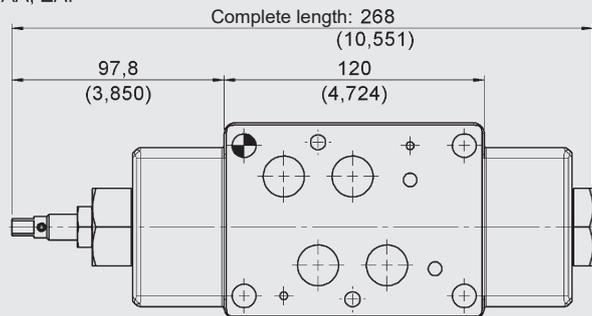
AAB, ZAB:



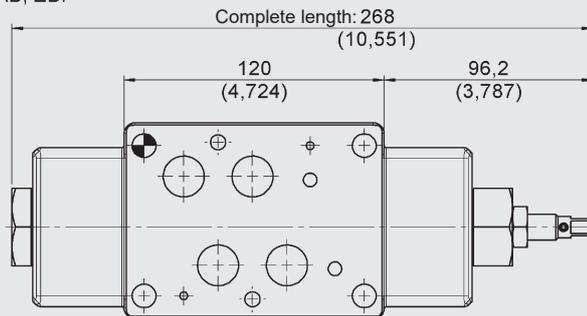
Throttle setting  
Wrench size 8  
anticlockwise



AA, ZA:



AB, ZB:



**CHECK VALVE PILOT-TO-OPEN  
IN SANDWICH PLATE DESIGN  
ZW – RP16**



**SUPPLEMENTARY TECHNICAL DATA**

General specifications		
Weight	[kg]	7.3
Hydraulic specifications		
Nominal flow	[l/min]	300
Pilot ratio		9.5 : 1

**MODEL CODE**

**ZW-RP 16 - 70 - AA - 2 - N**

**Type**

Check valve, pilot-to-open in sandwich plate design

**Nominal size**

16

**Series**

70 = specified by manufacturer

**Spool symbol**

- AA = check function in port A
- AB = check function in port B
- AAB = check function in ports A and B

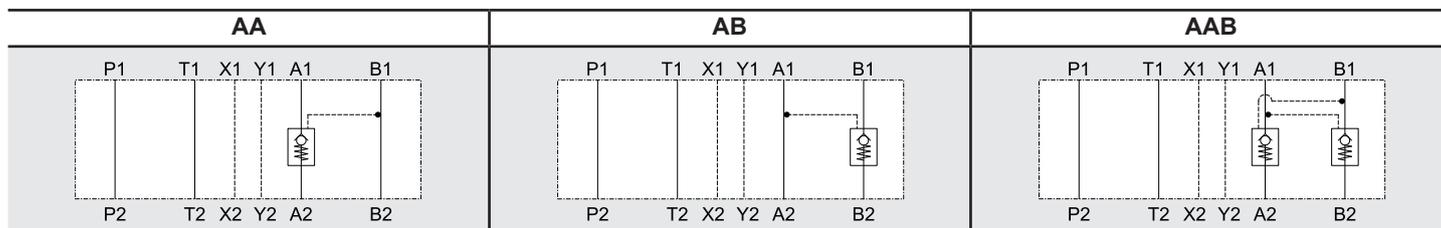
**Cracking pressure**

- 2 = 2 bar
- 4 = 4 bar

**Sealing material**

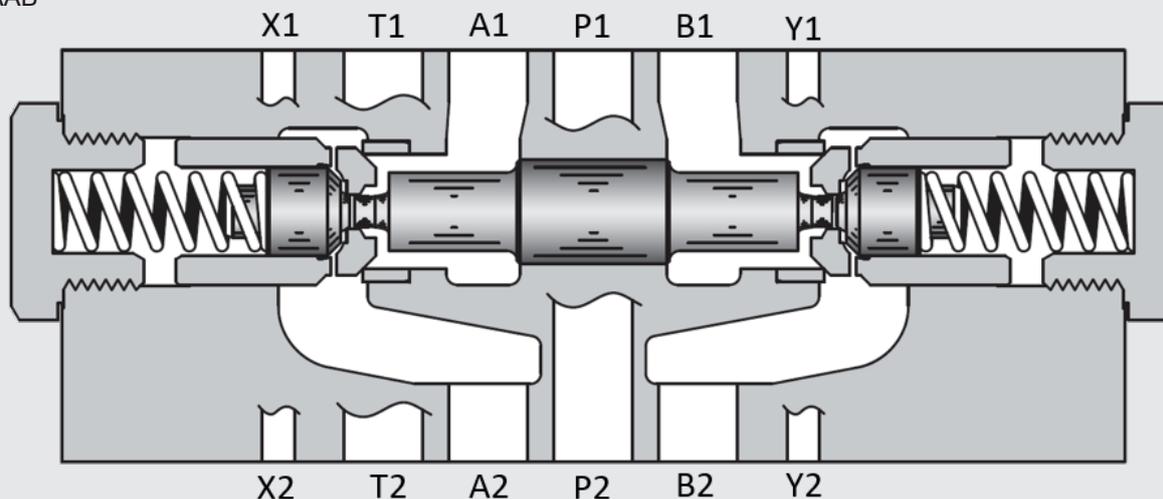
- N = NBR (standard)
- V = FKM

## SPOOL TYPES / SYMBOLS



## SECTION VIEW

Example AAB



## FUNCTION

The check valve, pilot-to-open in sandwich plate design in nominal size 16 is a direct-acting, spring-loaded poppet valve. It releases flow from the directional valve to the consumer and blocks flow from the consumer to the directional valve. To achieve this, the valve poppet is pressed into the seat and blocks the flow. If sufficiently high pilot pressure is built up in the relevant pilot port, the valve is unblocked and flow flows from the consumer to the directional valve. The required pilot pressure is based on the pressure difference between the ports to be unblocked.

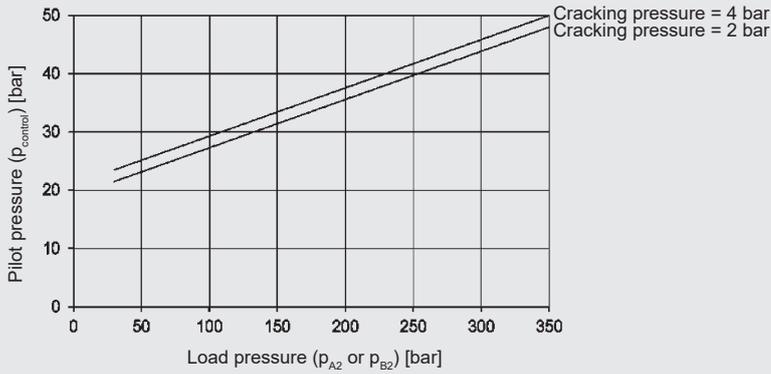
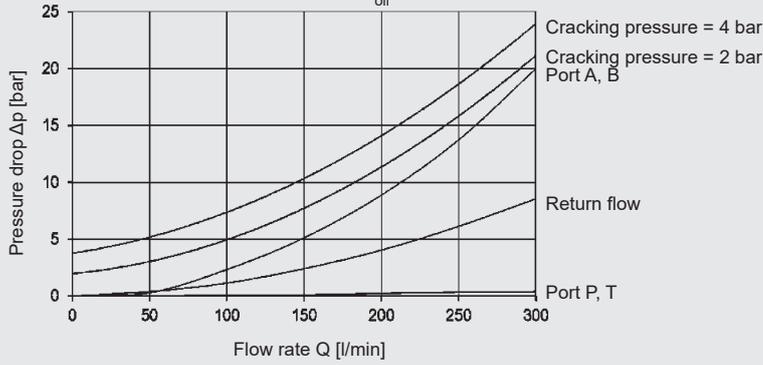
## NOTICE

The casings have O-ring seals at the ports on the plate side.

A pressure in the port of the directional valve influences the required control pressure.

# PERFORMANCE

Measured at  $v = 35 \text{ mm}^2/\text{s}$  and  $T_{\text{oil}} = 45 \text{ }^\circ\text{C}$



Use the following formula to calculate the min. required pilot pressure in port B:

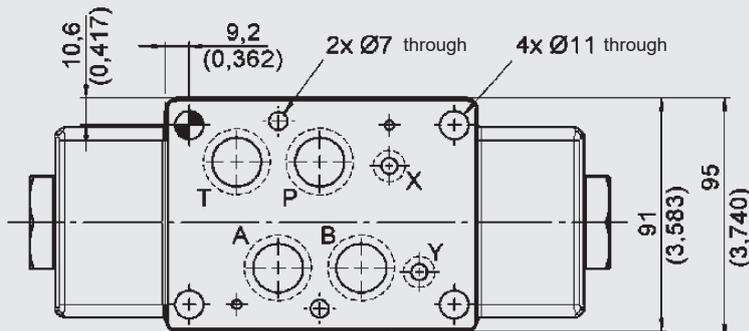
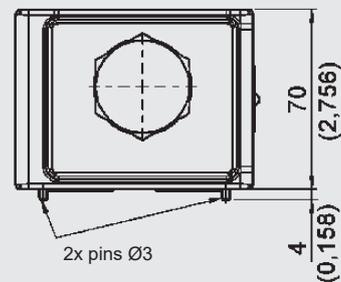
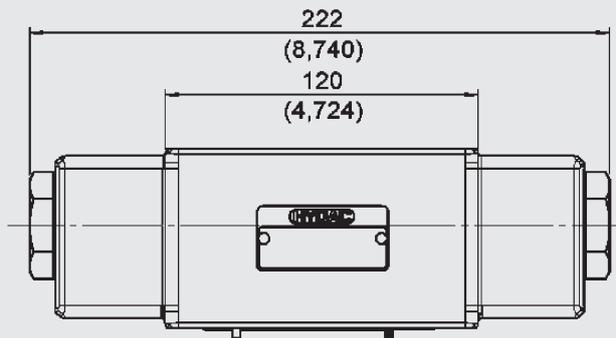
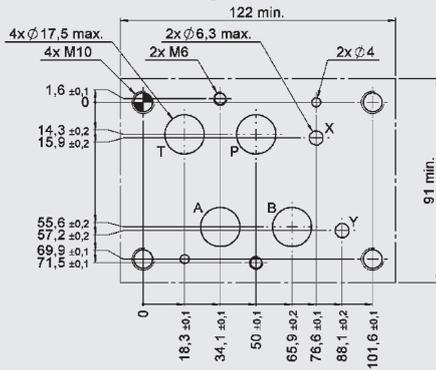
$$p_{\text{control}} = \frac{p_{A2} - p_{A1}}{\varphi} + p_{A1}$$

Use the following formula to calculate the min. required pilot pressure in port A:

$$p_{\text{control}} = \frac{p_{B2} - p_{B1}}{\varphi} + p_{B1}$$

# DIMENSIONS

Interface according to ISO 4401-07-07-0-05 (Cetop 7)



# CHECK VALVE IN SANDWICH PLATE DESIGN ZW – RV16



## SUPPLEMENTARY TECHNICAL DATA

General specifications		
Weight	[kg]	4.6 (symbol P) 5.4 (symbol T)
Hydraulic specifications		
Nominal flow	[l/min]	300

## MODEL CODE

ZW-RV 16 - 70 - P - 2 - N

### Type

Check valve in sandwich plate design

### Nominal size

16

### Series

70 = specified by manufacturer

### Spool symbol

P = check valve in port P

T = check valve in port T

### Cracking pressure

0.35 = 0.35 bar

2 = 2 bar

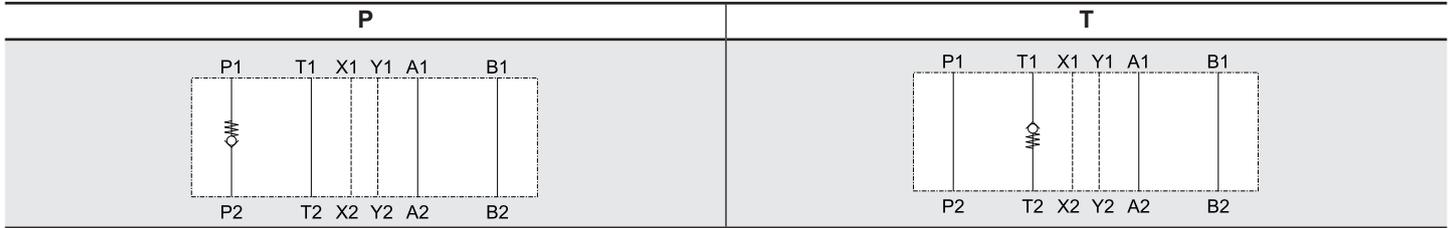
4 = 4 bar

### Sealing material

N = NBR (standard)

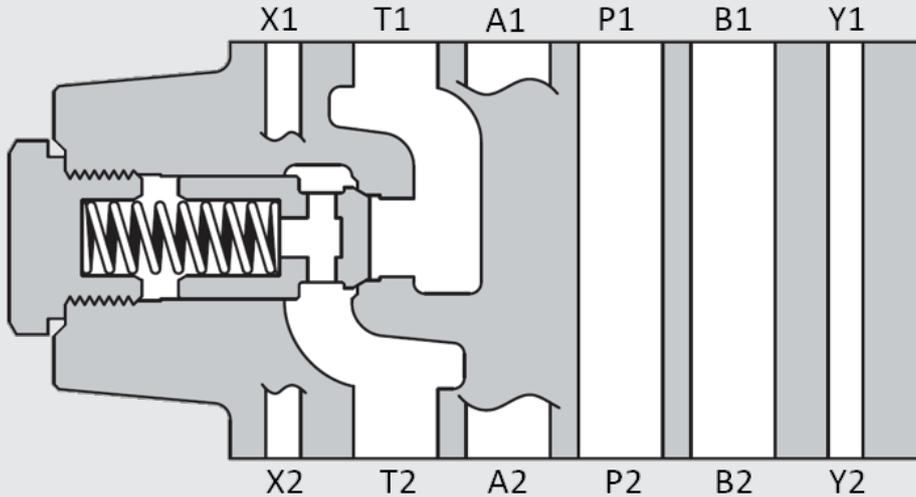
V = FKM

## SPOOL TYPES / SYMBOLS



## SECTION VIEW

Example T



## FUNCTION

The check valve in sandwich plate design in nominal size 16 is a direct-acting, spring-loaded poppet valve.

The valve releases a flow in one direction after exceeding the spring force and blocks the flow in the opposite direction. To achieve this, the valve poppet is pressed into the seat and blocks the flow.

- Version P: return flow blocked to fluid power supply
- Version T: preload of meter-out to tank

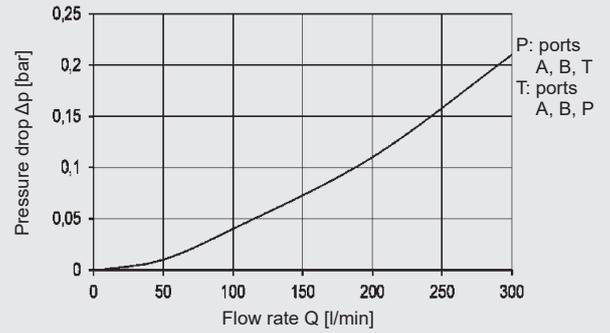
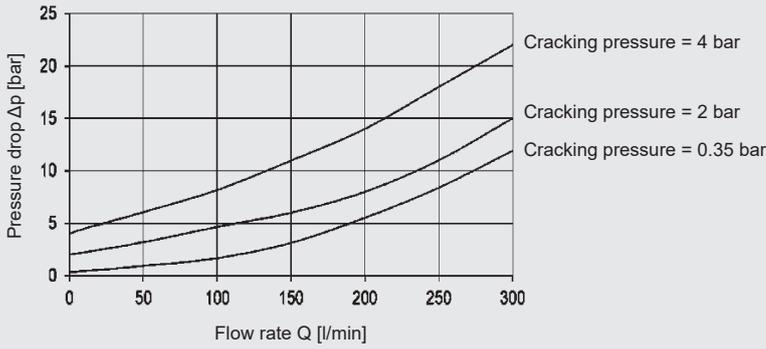
## Hint

The casings have O-ring seals at the ports on the plate side.

Tank pressures in T2 are additive to the spring preload force.

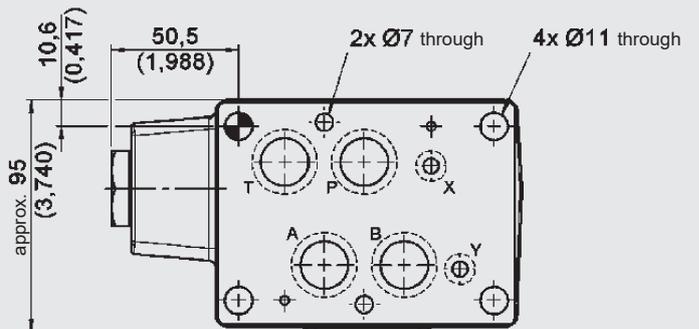
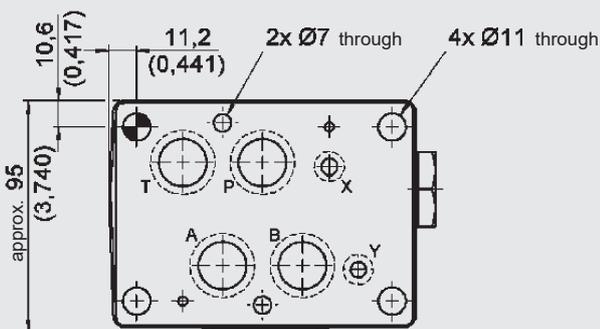
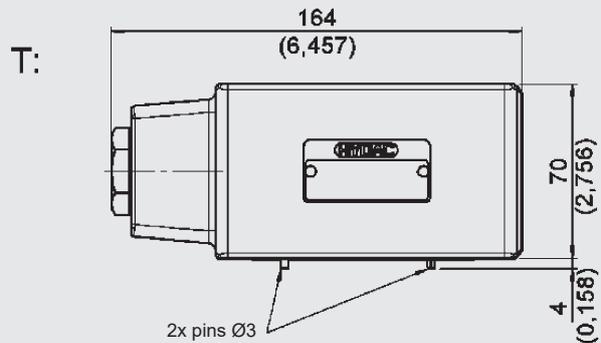
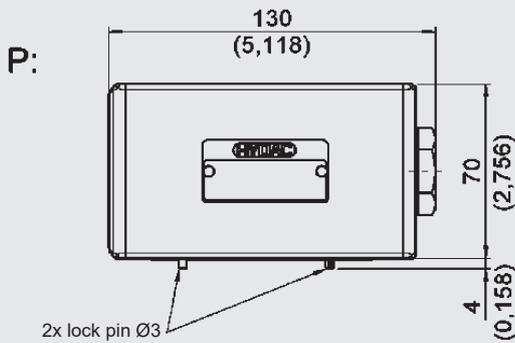
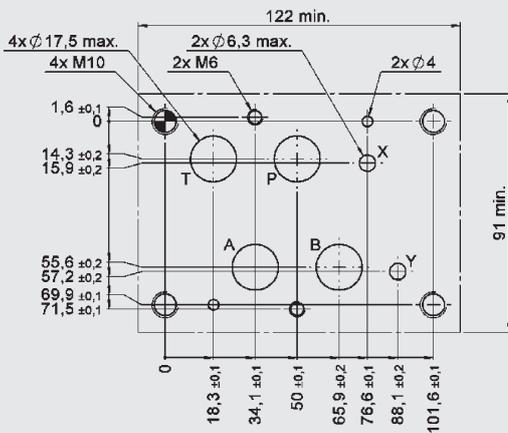
# PERFORMANCE

Measured at  $v = 35 \text{ mm}^2/\text{s}$  and  $T_{\text{oil}} = 45 \text{ }^\circ\text{C}$



# DIMENSIONS

Interface according to ISO 4401-07-07-0-05 (Cetop 7)



## ACCESSORIES

	Designation	Part no.
Seal kits (6-part set)	22.22 x 2.62 -NBR -90 Sh (4 pieces) 10.82 x 1.78 -NBR -90 Sh (2 pieces)	3524553
	22.22 x 2.62 -FKM -90 Sh (4 pieces) 10.82 x 1.78 -FKM -90 Sh (2 pieces)	3524634

### Note

The information in this brochure relates to the operating conditions and applications described.  
For applications or operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

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