

RE 28 163/02.03

Replaces: 11.02

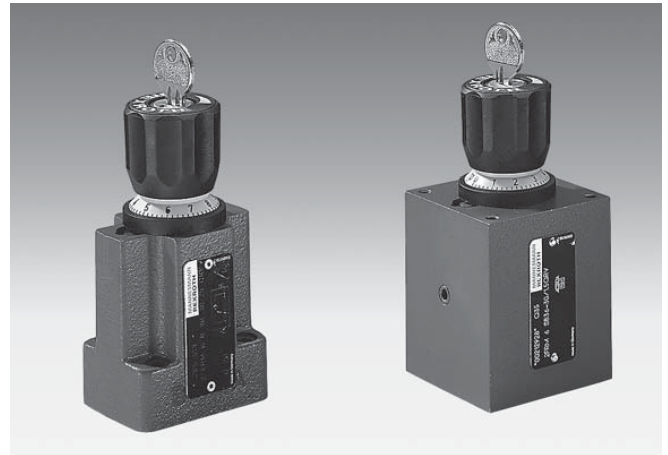
**2-way flow control valve
Type 2FRM 6**

Nominal size 6

Series 3X

Maximum operating pressure 315 bar ¹⁾

Maximum flow 32 L/min

¹⁾ When used in conjunction with a rectifier plate
up to 210 bar

H/A/D 5851/97 + H/A/D 5852/97

Types 2FRM 6 .36-3X/...V and 2FRM 6 SB36-3X/...V

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Features

- Porting pattern to DIN 24340, Form A, **without** locating pin hole (standard)
- Porting pattern to ISO 4401 and CETOP–RP 121 H, **with** locating pin hole, (ordering detail **.../60** at the end of the valve type code)
- For subplates see catalogue sheet RE 45 052 (separate order), see page 7
- External closing of the pressure compensator, optional
- Panel mounting with a G 3/8 connection thread
- Check valve, optional
- Rotary knob with scale, optional lockable



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Ordering details: 2-way flow control valve

2FRM 6 6 -3X/ V *

2-way flow control valve

Nominal size 6

= 6

With external closing of the pressure compensator (suppression of the start-up jump) = **A**

Without external closing of the pressure compensator = **B**

Without external closing of the pressure compensator = **SB**
For panel mounting

Adjustment elements

Lockable rotary knob with scale ¹⁾ = **3**

Rotary knob with scale = **7**

Zero position of the marking at port P = **6**

Series 30 to 39 = **3X**
(30 to 39 unchanged installation and connection dimensions)

¹⁾ H-key with Material No. **R900008158** is included within the scope of supply

²⁾ Locating pin 3 x 8 DIN EN ISO 8752, Material No. **R900005694** (separate order)

Further details in clear text

No code = Without locating pin hole
/60²⁾ = With locating pin hole

V = FKM seals
(other seals on request)

⚠ Attention!
The compatibility of the seals and pressure fluid has to be taken into account!

R = With check valve

M = Without check valve

	Flow (A → B)
0,2Q =	Up to 0.2 L/min
0,6Q =	Up to 0.6 L/min
1,5Q =	Up to 1.5 L/min
3Q =	Up to 3.0 L/min
6Q =	Up to 6.0 L/min
10Q =	Up to 10.0 L/min
16Q =	Up to 16.0 L/min
25Q =	Up to 25.0 L/min
32Q =	Up to 32.0 L/min

Ordering details: rectifier sandwich plate, not for panel mounting

Z4S 6 -1X/ V *

Rectifier sandwich plate

Nominal size 6

= 6

Series 10 to 19 = **1X**
(10 to 19 unchanged installation and connection dimensions)

Further details in clear text

V = FKM seals
(other seals on request)

⚠ Attention!
The compatibility of the seals and pressure fluid has to be taken into account!

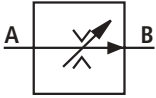

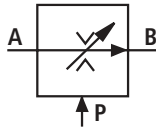
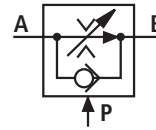
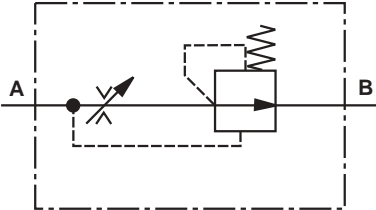
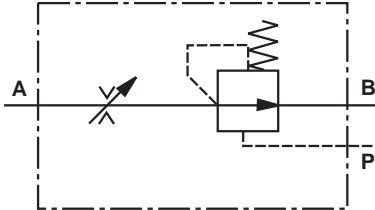
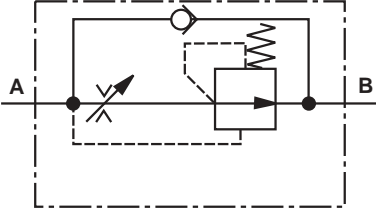
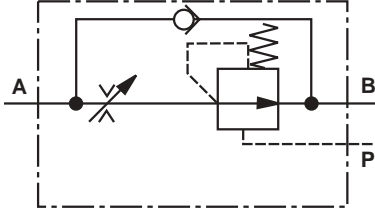
Preferred types

Type 2FRM	Material number
2FRM 6 B36-3X/0,2QMV	R900205577
2FRM 6 B36-3X/0,6QMV	R900205578
2FRM 6 B36-3X/1,5QRV	R900205507
2FRM 6 B36-3X/3QMV	R900205516
2FRM 6 B36-3X/3QRV	R900205517
2FRM 6 B36-3X/6QMV	R900205518
2FRM 6 B36-3X/6QRV	R900205519
2FRM 6 B36-3X/10QMV	R900205508
2FRM 6 B36-3X/10QRV	R900205509
2FRM 6 B36-3X/16QRV	R900205511
2FRM 6 B36-3X/25QRV	R900205513
2FRM 6 B36-3X/32QRV	R900205515

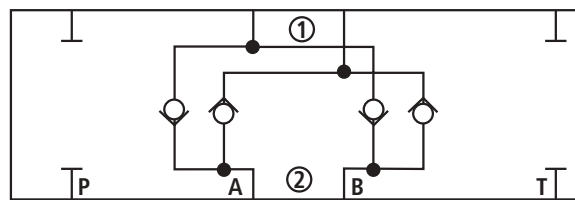
Type Z4S	Material number
Z4S 6-1X/V	R900489356

Further preferred types and standard components can be found in the EPS (Standard Price List).

Symbols: 2-way flow control valves (simplified, detailed)

<p>Flow control valve: Simplified (without check valve; without external closing)</p>  <p>Type 2FRM 6 B..-3X/..MV Type 2FRM 6 SB..-3X/..MV</p>	<p>Flow control valve: Simplified (with check valve; without external closing)</p>  <p>Type 2FRM 6 B..-3X/..RV Type 2FRM 6 SB..-3X/..RV</p>	<p>Flow control valve: Simplified (without check valve; with external closing)</p>  <p>Type 2FRM 6 A..-3X/..MV</p>	<p>Flow control valve: Simplified (with check valve; with external closing)</p>  <p>Type 2FRM 6 A..-3X/..RV</p>
<p>Flow control valve: Detailed (without check valve; without external closing)</p>  <p>Type 2FRM 6 B..-3X/..MV Type 2FRM 6 SB..-3X/..MV</p>	<p>Flow control valve: Detailed (without check valve; with external closing)</p>  <p>Type 2FRM 6 A..-3X/..MV</p>		
<p>Flow control valve: Detailed (with check valve; without external closing)</p>  <p>Type 2FRM 6 B..-3X/..RV Type 2FRM 6 SB..-3X/..RV</p>	<p>Flow control valve: Detailed (with check valve; with external closing)</p>  <p>Type 2FRM 6 A..-3X/..RV</p>		

Symbols: rectifier sandwich plate (① = component side, ② = subplate side)



Function, section: type 2FRM 6 B...

General:

The flow control valve type 2 FRM is a 2-way flow control valve.

It is used for maintaining a constant flow, independent of pressure and temperature.

The valve basically comprises of a housing (1), rotary knob (2), orifice bush (3), pressure compensator (4) and an optional check valve.

Flow control valve type 2FRM 6 B.-3X/..MV (without external closing, without check valve)

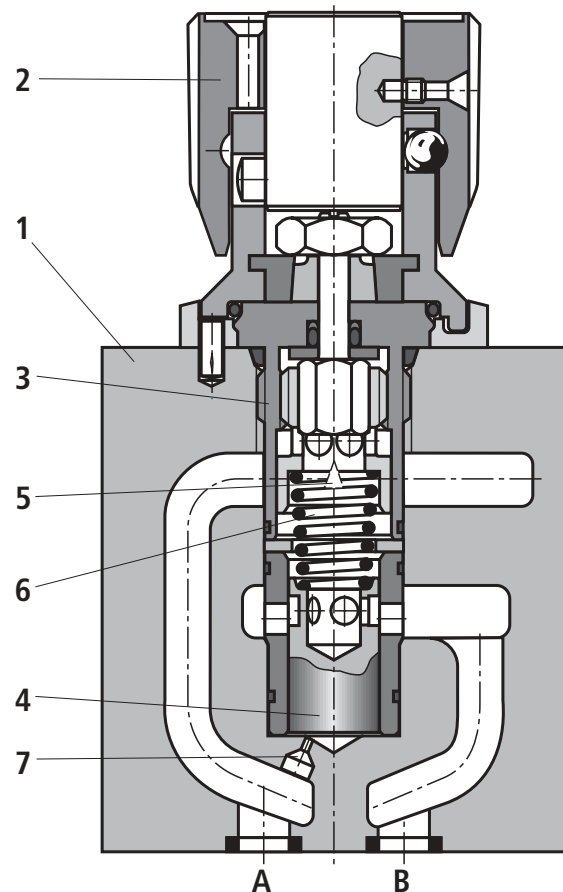
Flow from port A to port B is throttled at throttle position (5). The throttle cross-section is varied by turning the rotary knob (2).

In order to keep the flow constant, independent of pressure, a pressure compensator (4) is fitted in port B downstream of the throttle position (5).

The compression spring (6) presses the orifice bush (3) and the pressure compensator (4) outwards against their respective stops and thus keeps the pressure compensator (4) in the open position when there is no flow through the valve. When fluid flows through the valve, the pressure acting in port A applies a force to the pressure compensator (4) via orifice (7).

The pressure compensator (4) moves into the compensating position until the forces balance. If the pressure in port A rises, then the pressure compensator (4) moves in the closing direction, until a balance of forces is once more attained. Due to this continuous compensating action of the the pressure compensator, a constant flow is obtained.

In order to control a flow through the valve in both directions, a rectifier sandwich plate type Z4S 6 may be fitted below this flow control valve.



Type 2FRM 6 B76-3X/..MV

Function, section: type 2FRM 6 SB...

Flow control valve type 2FRM 6 SB.-3X/..RV (without external closing, with check valve, for panel mounting)

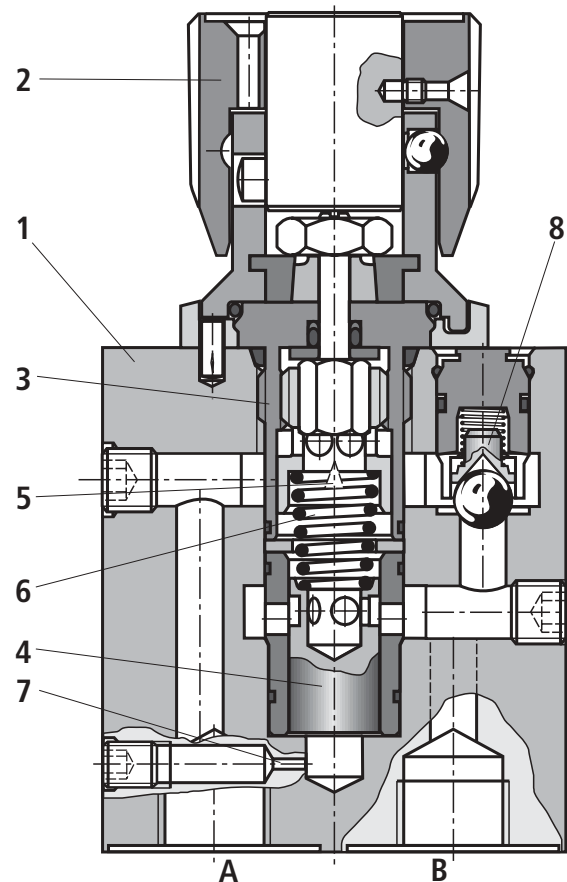
Flow from port A to port B is throttled at throttle position (5). The throttle cross-section is varied by turning the rotary knob (2).

In order to keep the flow constant, independent of pressure, a pressure compensator (4) is fitted in port B downstream of the throttle position (5).

The compression spring (6) presses the orifice bush (3) and the pressure compensator (4) outwards against their respective stops and thus keeps the pressure compensator (4) in the open position when there is no flow through the valve. When fluid flows through the valve, the pressure acting in port A applies a force to the pressure compensator (4) via orifice (7).

The pressure compensator (4) moves into the compensating position until the forces balance. If the pressure in port A rises, then the pressure compensator (4) moves in the closing direction, until a balance of forces is once more attained. Due to this continuous compensating action of the pressure compensator, a constant flow is obtained.

Free-flow from port B to port A is via the check valve (8).



Type 2FRM 6 SB76-3X/..RV

Function, section, circuit example: type 2FRM 6 A...

Flow control valve type 2FRM 6 A...-3X/..RV

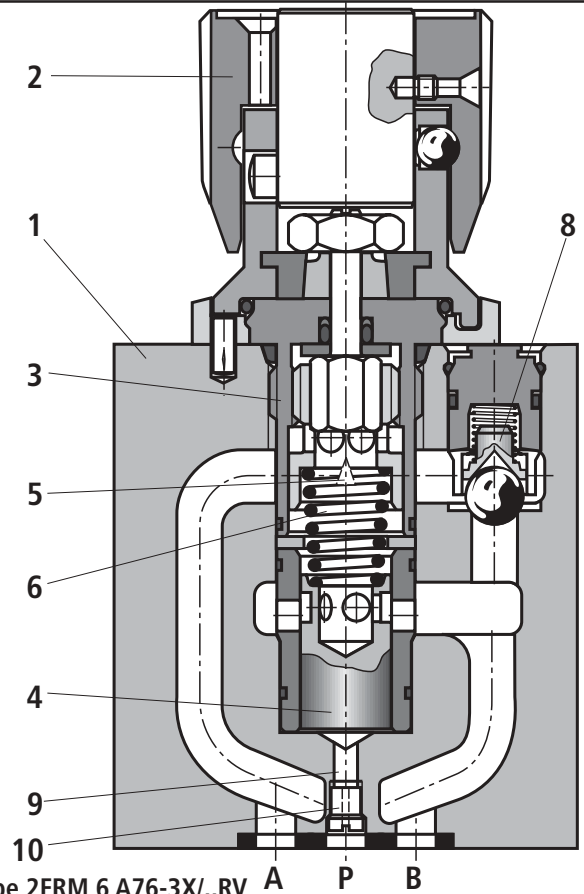
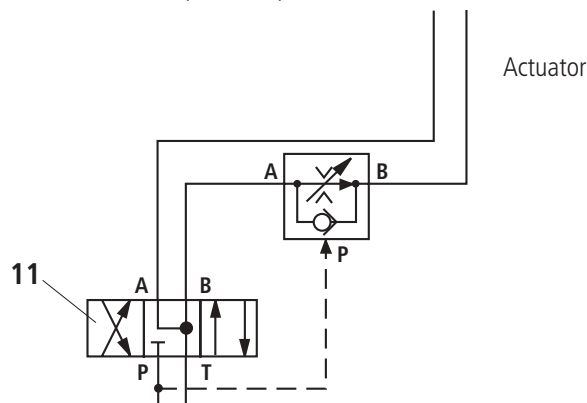
(with external closing, with check valve)

The function of this valve is basically the same as that of valve type 2FRM 6 B...-3X/..MV.

However, this type of flow control valve is provided with an external port permitting the pressure compensator (4) to be pressurised via port P (9). The external pressure acting in port P (9), via orifice (10), holds the pressure compensator (4) closed against the force of compression spring (6). When the connected directional valve (11) is actuated to permit flow from P to B, control is achieved as with type 2FRM 6 B. Thus a jump on start-up is avoided.

This version with external closing of the compensator may only be used for meter-in control.

Free return flow from port B to port A is via check valve (8).



Type 2FRM 6 A76-3X/..RV A P B

Technical data: 2-way flow control valve (for applications outside these parameters, please consult us!)

General													
Installation		Optional											
Ambient temperature range	°C	- 20 to + 50											
Weight	2FRM 6 A...; 2FRM 6 B...	kg	Approx. 1.3										
	2FRM 6 SB	kg	Approx. 1.5										
Hydraulic													
Maximum operating pressure in port A	bar	315											
Pressure differential Δp for free return flow B → A		See characteristic curves on page 6											
Minimum pressure differential	bar	6 to 14											
Pressure stability up to $\Delta p = 315$ bar	%	$\pm 2 (q_{Vmax})$											
Flow	q_{Vmax}	L/min	0.2	0.6	1.5	3.0	6.0	10.0	16.0	25.0	32.0		
	q_{Vmin} up to 100 bar	cm ³ /min	15	15	15	15	25	50	70	100	250		
	q_{Vmin} up to 315 bar	cm ³ /min	25	25	25	25	25	50	70	100	250		
Pressure fluid		Mineral oil (HL, HLP) to DIN 51 524; Fast bio-degradable pressure fluids to VDMA 24 568 (also see RE 90 221); HETG (rape seed oil); HEPG (polyglycols); HEES (synthetic ester); Other pressure fluids on request											
Pressure fluid temperature range	°C	- 20 to + 80											
Viscosity range	mm ² /s	10 to 800											
Cleanliness class to ISO code		Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15 ¹⁾											

¹⁾ The cleanliness class stated for the components must be adhered to in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life.

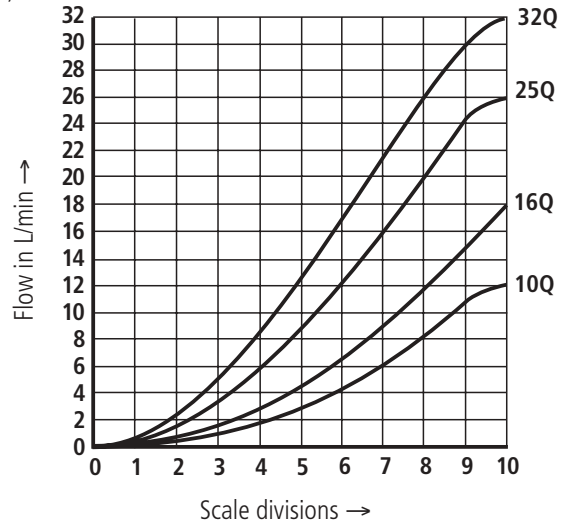
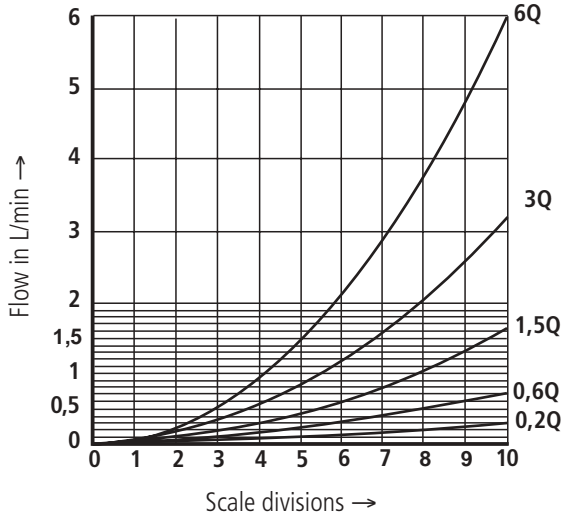
⚠ Attention! The pressure loss from P at the inlet of the directional valve to A at the inlet of the flow control valve is noticeable at low flows.

Technical data: rectifier sandwich plate (for applications outside these parameters, please consult us!)

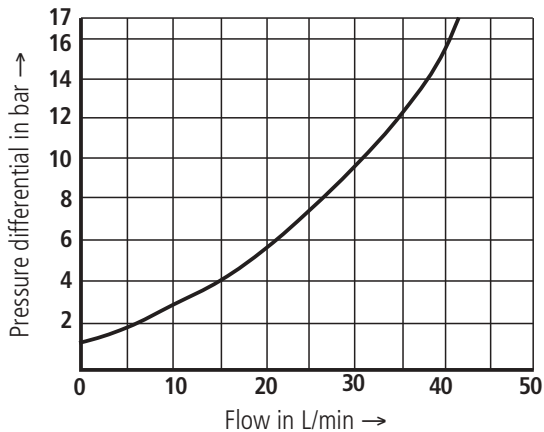
Nominal flow	L/min	32
Maximum operating pressure	bar	210
Opening pressure	bar	0.7
Weight	kg	Approx. 0.9

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

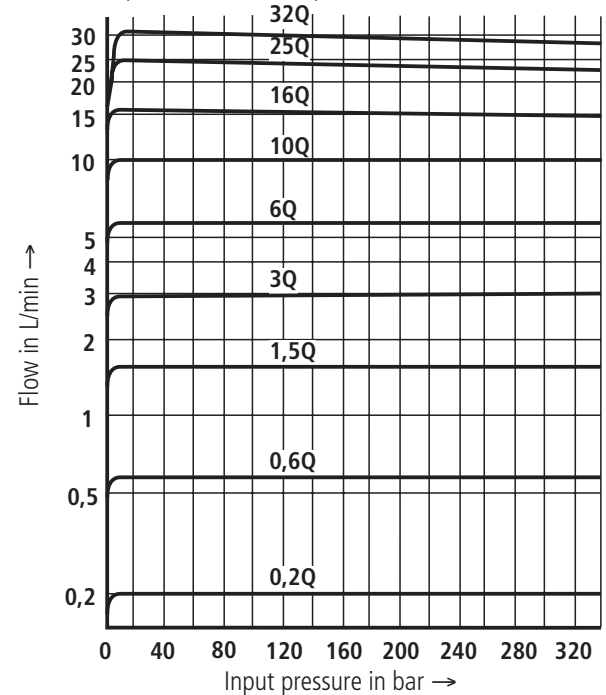
Flow in relationship to the scale setting (flow control from A to B)



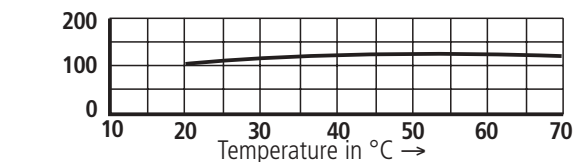
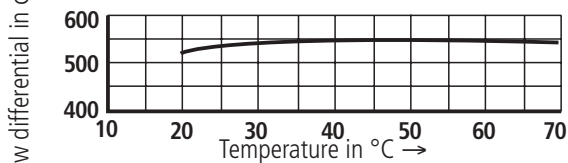
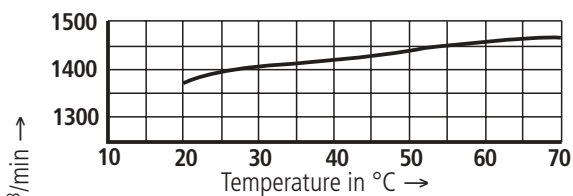
Δp - q_v -characteristic curve via check valve B to A; orifice closed



Flow-pressure relationship

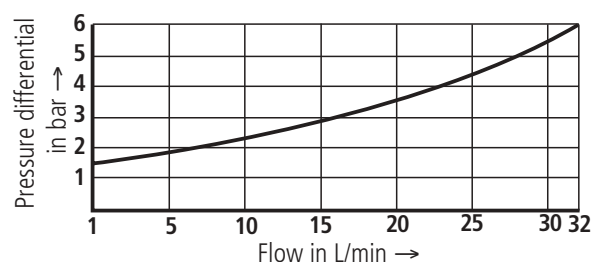


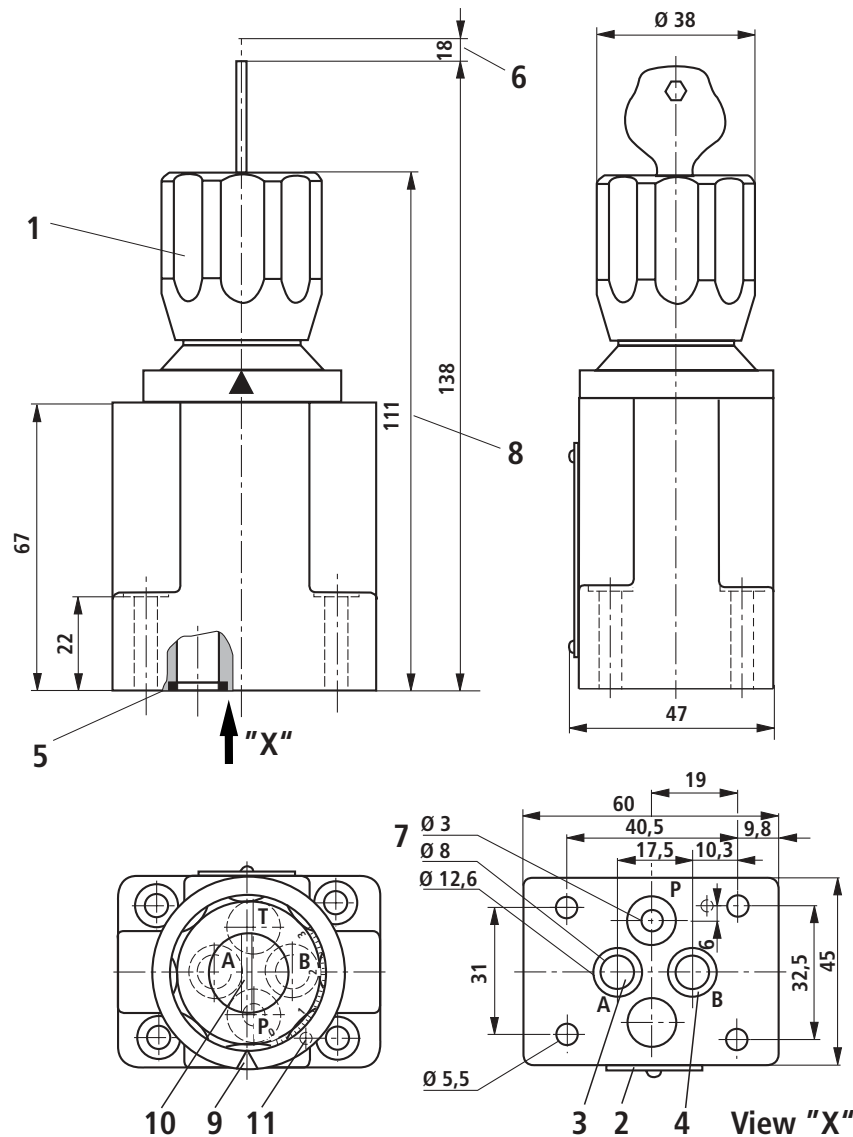
Temperature relationship at $\Delta p = 20$ bar



Rectifier sandwich plate type Z4S 6

Δp - q_v -characteristic curve





- 1 Lockable rotary knob with scale (adjustment element "3")
- 2 Name plate
- 3 Inlet "A"
- 4 Outlet "B"
- 5 Identical seal rings for ports A, B, P and T
- 6 Space required to remove the key
- 7 Ø 3 hole for version 2FRM 6 B is not drilled. (without external closing)
- 8 Rotary knob with scale (adjustment element "7")
- 9 Position of marking at port P
- 10 Porting pattern to DIN 24 340 Form A, **without** locating pin hole
- 11 Porting pattern to ISO 4401 and CETOP-RP 121 H **with** locating pin hole

Subplates to catalogue sheet RE 45 052 and valve fixing screws must be ordered separately.

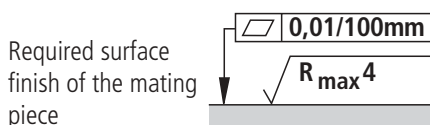
Subplates:

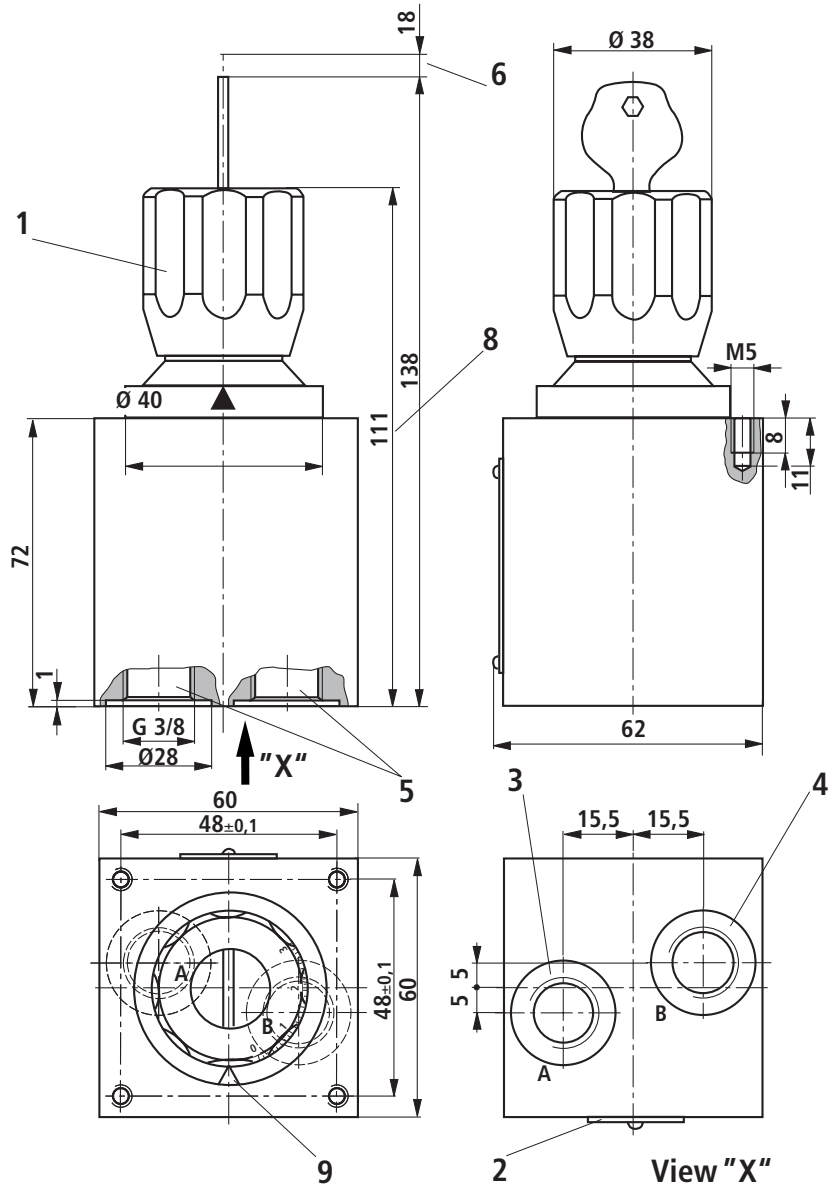
Without locating pin hole	Type G 341/01 (G 1/4)
	Type G 342/01 (G 3/8)
	Type G 502/01 (G 1/2)
With locating pin hole	Type G 341/60 (G 1/4)
	Type G 342/60 (G 3/8)
	Type G 502/60 (G 1/2)

to catalogue sheet RE 45 052 and

Valve fixing screws:

Without rectifier sandwich plate	M5 x 30 DIN 912-10.9; $M_A = 8.9$ Nm
With rectifier sandwich plate	M5 x 70 DIN 912-10.9; $M_A = 8.9$ Nm



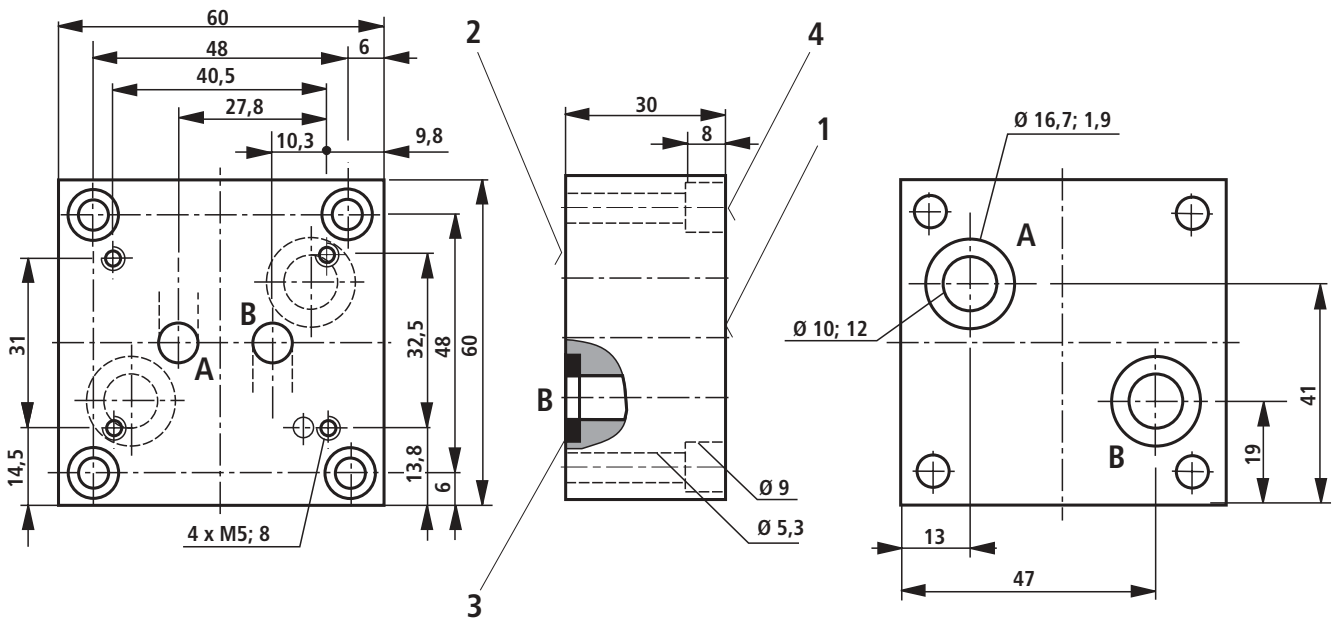


- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Lockable rotary knob with scale (adjustment element "3") 2 Name plate 3 Inlet "A" 4 Outlet "B" | <ul style="list-style-type: none"> 5 Connection thread G 3/8 to ISO 228/1 6 Space required to remove the key 8 Rotary knob with scale (adjustment element "7") 9 Position of marking is opposite the name plate |
|---|---|

Unit dimensions: adaptor plate HSE 05 G06A001-3X/V00 (dimensions in mm)

Note:

The adaptor plate (**Material No. R900496121**) is designed for mounting a flow control valve type 2FRM 6 B..-3X/.. onto an existing porting pattern of a flow control valve type 2FRM 5 -3X/...

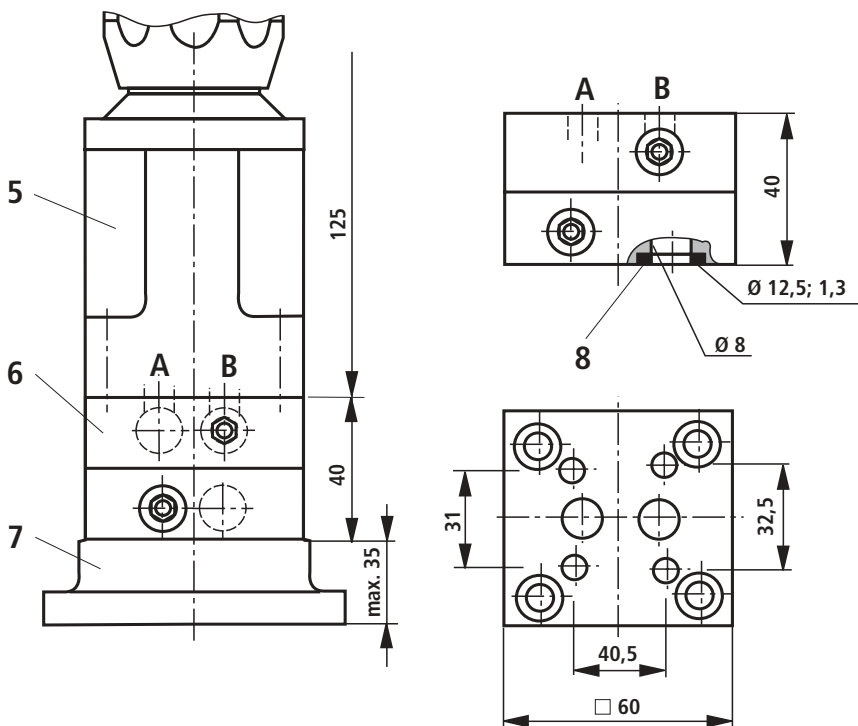


- 1 Mounting surface for a flow control valve type 2FRM 6
- 2 Mounting surface for the porting pattern of a flow control valve type 2FRM 5

- 3 Seal ring
- 4 S.H.C.S. M5 x 30 DIN 912-10.9, $M_A = 8.9 \text{ Nm}$ is included within the scope of supply

Valve fixing screws must be ordered separately.

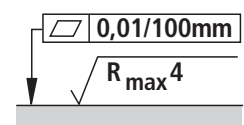
Unit dimensions: rectifier sandwich plate type Z4S 6-1X/V (dimensions in mm)



⚠ Attention!

Rectifier sandwich plate type Z4S 6-1X/V may not be used in conjunction with a flow control valve type 2FRM 6 A..-3X/.. with external closing of the pressure compensator.

- 5 2-way flow control valve
- 6 Rectifier sandwich plate
- 7 **Subplates** to catalogue sheet RE 45 052 and **valve fixing screws**, see page 7.
- 8 Seal ring



Required surface finish of the mating piece

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