



4.7

# Flow control valve

Type 2FRM5, 10, 16

## Rectifier plate

Type Z4S5, 10, 16

Sizes 5, 10 and 16  
Up to 315 bar  
Up to 160 L/min



### Contents

|                            |       |
|----------------------------|-------|
| Function and configuration | 02    |
| Ordering code              | 03    |
| Technical data             | 04    |
| Characteristic curves      | 05    |
| Unit dimensions            | 06-08 |

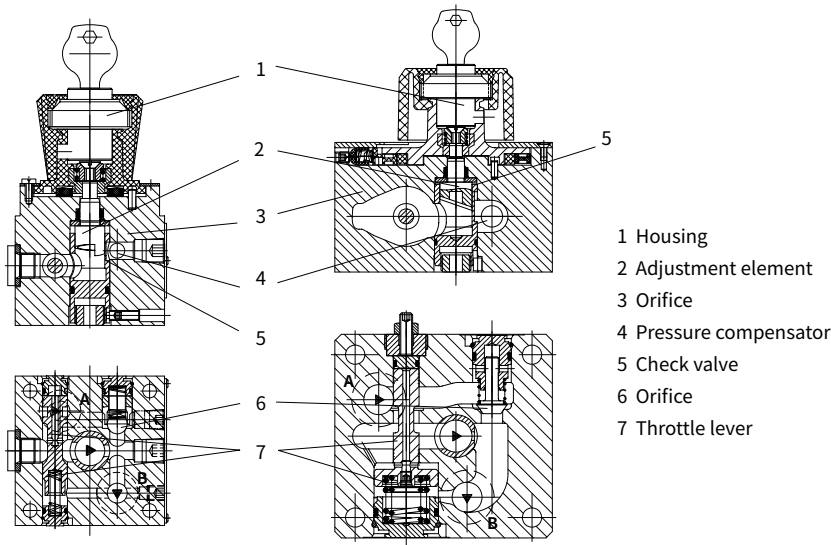
### Features

- For subplates see catalogue
- External closing of the pressure compensator, optional
- Rotary knob with scale, optional lockable

## Function and configurations

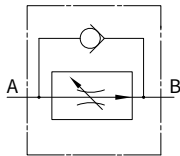
Flow control valve type 2FRM is two-way flow control valve, consisting of pressure compensator and throttle valve in series. When fluid flows into the valve, it is reduced of pressure by the pressure compensator first and then throttled by the throttle valve. The flow in the flow control valve is able to maintain stable independent of any impact from the changing load because of pressure compensation function. Meanwhile the orifice is designed into the shape of a blade, making flow little influenced by variance of temperature. When the flow control valve is connected with a check valve in parallel, fluid can flow back in the opposite direction.

The rectifier plate of type Z4S is installed under the flow control valve to stabilize the flow in both directions of the valve.

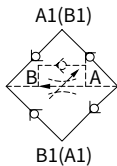


Flow control valve section,  
type 2FRM5-30

Flow control valve section,  
type 2FRM10-20 and 2FRM16-20



Symbol of flow control valve,  
type 2FRM



Symbol of rectifier,  
type Z4S

### Ordering code

- For flow control valve

|                                    |             |               |                                                          |           |           |
|------------------------------------|-------------|---------------|----------------------------------------------------------|-----------|-----------|
| 2FRM                               | —           | /             |                                                          |           | *         |
| Flow control valve                 |             |               | Further details in clear text                            |           |           |
| Nominal size 5                     | = 5         |               |                                                          | No code = | NBR seals |
| Nominal size 10                    | =10         |               |                                                          | V =       | FKM seals |
| Nominal size 16                    | =16         |               |                                                          |           |           |
| 30 Series(Nominal size 5)          |             | =30           |                                                          |           |           |
| 20 Series(Nominal size 10 and 16 ) |             | =20           |                                                          |           |           |
| Flow adjustment range (A → B)      |             |               |                                                          |           |           |
| Size=5                             | Size=10     | Size=16       |                                                          |           |           |
| 0.2L/min=0.2L                      | 10L/min=10L | 60L/min=60L   |                                                          |           |           |
| 0.6L/min=0.6L                      | 16L/min=16L | 100L/min=100L |                                                          |           |           |
| 1.2L/min=1.2L                      | 25L/min=25L | 160L/min=160L |                                                          |           |           |
| 3L/min=3L                          | 50L/min=50L |               |                                                          |           |           |
| 6L/min=6L                          |             |               |                                                          |           |           |
| 10L/min=10L                        |             |               |                                                          |           |           |
| 15L/min=15L                        |             |               |                                                          |           |           |
|                                    |             |               | No code = Pressure compensator, without stroke regulator |           |           |
|                                    |             |               | B = Pressure compensator, with stroke regulator          |           |           |

- For rectifier plate

|           |     |    |           |                               |
|-----------|-----|----|-----------|-------------------------------|
|           | Z4S | 10 | *         |                               |
| Rectifier |     |    |           | Further details in clear text |
| Size 5    | = 5 |    |           |                               |
| Size 10   | =10 |    |           |                               |
| Size1 6   | =16 |    |           |                               |
| 10 Series | =10 |    |           |                               |
|           |     |    | No code = | NBR seals                     |
|           |     |    | V =       | FKM seals                     |

Technical data

• For flow control valve

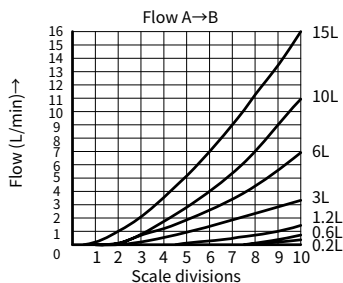
|                                                    |                    |                                                                                              |     |     |     |     |     |     |                |     |     |    |      |     |     |
|----------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|----------------|-----|-----|----|------|-----|-----|
| Fluid                                              |                    | Mineral oil ;Phosphate ester                                                                 |     |     |     |     |     |     |                |     |     |    |      |     |     |
| Fluid temperature range                            | °C                 | -20~+80                                                                                      |     |     |     |     |     |     |                |     |     |    |      |     |     |
| Viscosity range                                    | mm <sup>2</sup> /s | 10~800                                                                                       |     |     |     |     |     |     |                |     |     |    |      |     |     |
| Degree of contamination                            |                    | Maximum permissible degree of fluid contamination:<br>Class 9. NAS 1638 or 20/18/15, ISO4406 |     |     |     |     |     |     |                |     |     |    |      |     |     |
| Item                                               | Size               | 5                                                                                            |     |     |     |     |     |     | 10             |     |     |    | 16   |     |     |
| Max. flow-rate                                     | L/min              | 0.2                                                                                          | 0.6 | 1.2 | 3   | 6   | 10  | 15  | 10             | 16  | 25  | 50 | 60   | 100 | 160 |
| Pressure differential<br>when backward flow B to A | bar                | 0.5                                                                                          | 0.5 | 0.6 | 0.9 | 1.8 | 3.6 | 6.7 | 2              | 2.5 | 3.5 | 6  | 2.8  | 4.3 | 7.3 |
| Flow stability range<br>(-20°C ~+80 °C )%Qmax      |                    | ±5                                                                                           | ±3  | ±2  |     |     |     |     | ±2             |     |     |    |      |     |     |
|                                                    |                    | ±2( P= 210bar)                                                                               |     |     |     |     |     |     | ±2( P= 315bar) |     |     |    |      |     |     |
| Working pressure                                   | bar                | 210                                                                                          |     |     |     |     |     |     | 315            |     |     |    |      |     |     |
| Min. pressure differential                         | bar                | 3~5                                                                                          |     |     |     | 6~8 |     |     | 3~7            |     |     |    | 5~12 |     |     |
| Weight                                             | kg                 | 1.6                                                                                          |     |     |     |     |     |     | 3.4            |     |     |    | 7.4  |     |     |

• For rectifier plate

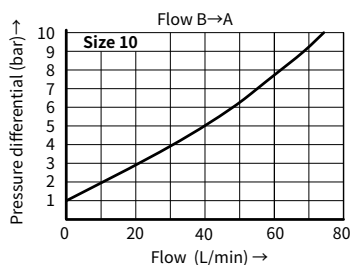
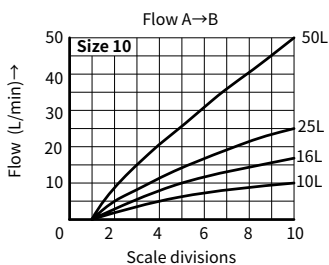
|                         |                    |                                                                                              |     |     |
|-------------------------|--------------------|----------------------------------------------------------------------------------------------|-----|-----|
| Fluid                   |                    | Mineral oil; Phosphate ester                                                                 |     |     |
| Fluid temperature range | °C                 | -20~+80                                                                                      |     |     |
| Viscosity range         | mm <sup>2</sup> /s | 10~800                                                                                       |     |     |
| Degree of contamination |                    | Maximum permissible degree of fluid contamination:<br>Class 9. NAS 1638 or 20/18/15, ISO4406 |     |     |
| Size                    | mm                 | 5                                                                                            | 10  | 16  |
| Max. flow-rate          | L/min              | 15                                                                                           | 50  | 160 |
| Working pressure        | bar                | 210                                                                                          | 315 | 315 |
| Cracking pressure       | bar                | 1                                                                                            | 1.5 | 1.5 |
| Weight                  | kg                 | 0.6                                                                                          | 3.2 | 9.3 |

## Characteristic curves

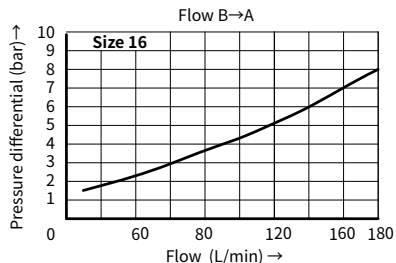
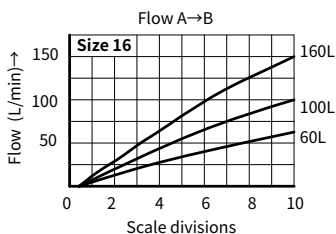
(Measured at  $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , using HLP46)



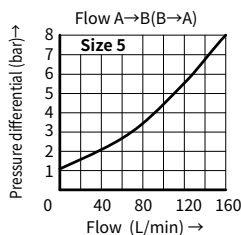
◀ Characteristic curve of flow control valve type 2FRM5



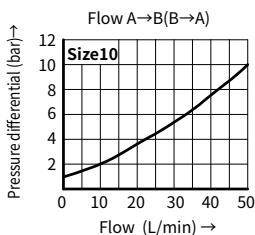
▲ Curve of flow control valve type 2FRM10



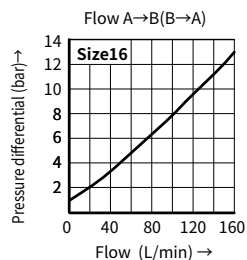
▲ Curve of flow control valve type 2FRM16



▲ Curve of rectifier plate type Z4S5



▲ Curve of rectifier plate type Z4S10

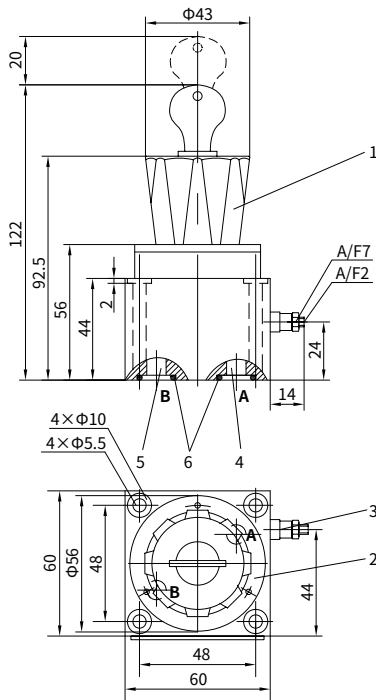


▲ Curve of rectifier plate type Z4S16

Unit dimensions:

(Dimensions in mm)

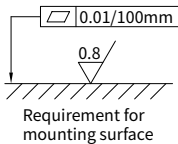
• Outline dimension of flow control valve type 2FRM5



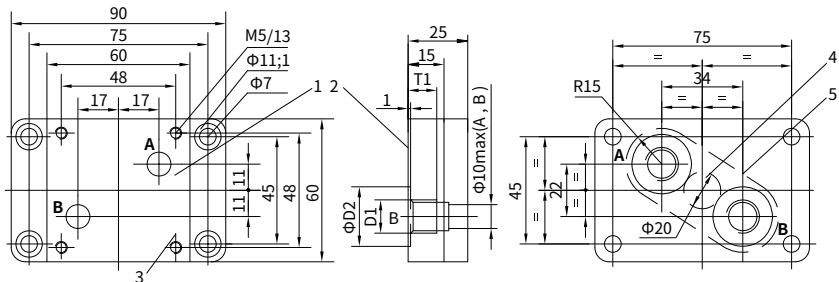
- 1 Lockable rotary knob
- 2 Scale tray
- 3 Stroke regulator of pressure relief valve
- 4 Inlet 'A'
- 5 Outlet 'B'
- 6 O-ring (12×2.5)

**Valve fixing screws:**  
4-M5×50  
GB/T 70.1-10.9,  
Tightening torque  $M_A=75\text{ Nm}$

**It must be ordered separately, if connection plate is needed:**  
**Type:**  
G44/01(02), G45/01(02)



• Connection plate dimension of flow control valve type 2FRM5



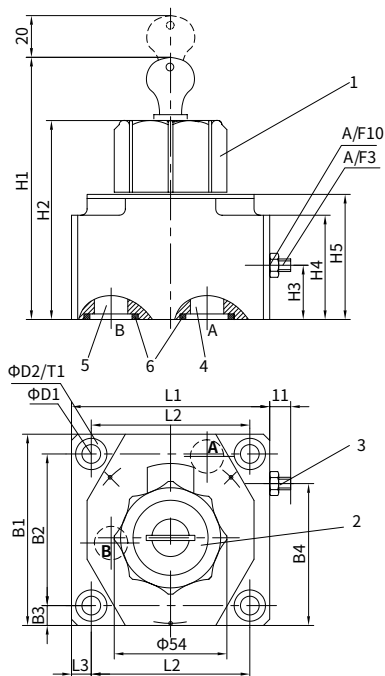
- 1 Mounting surface
- 2 Underside surface
- 3 Fixing holes
- 4 No any holes within the area of  $\Phi 20$
- 5 Panel cut-out for connecting valve

| Type of sub-plate | D1            | D2 | T1 |
|-------------------|---------------|----|----|
| G44/01(02)        | G1/4(M14×1.5) | 25 | 12 |
| G45/01(02)        | G1/2(M22×1.5) | 32 | 15 |

**Unit dimensions:**

(Dimensions in mm)

- **Outline dimension of flow control valve type 2FRM10 and 2FRM16**



- 1 Lockable rotary knob
  - 2 Name plate
  - 3 Stroke regulator of pressure compensator
  - 4 Inlet 'A'
  - 5 Outlet 'B'
  - 6 O-ring
- (Size 10: 18.66×3.53, Size 16: 26.58×3.53)

**Valve mounting screws:**

**Size 10:** 4pcs M8×50 GB/T 70.1-10.9

Tighten torque  $M_A=37\text{Nm}$

**Size 16:** 4pcs M10×80 GB/T 70.1-10.9

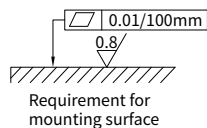
Tighten torque  $M_A=75\text{Nm}$

**It must be ordered separately,  
if connection plate is needed**

**Type:**

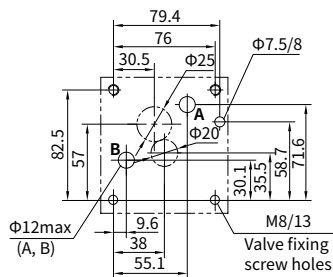
**Size 10:** G279/01(02), G280/01(02)

**Size 16:** G281/01(02), G282/01(02)



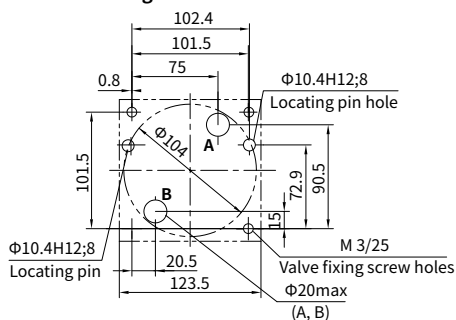
| Szie | B1    | B2    | B3  | B4   | D1 | D2 | H1  | H2  | H3 | H4 | H5 | L1    | L2    | L3  | T1 |
|------|-------|-------|-----|------|----|----|-----|-----|----|----|----|-------|-------|-----|----|
| 10   | 101.5 | 82.5  | 9.5 | 68   | 9  | 15 | 125 | 95  | 26 | 51 | 60 | 95    | 76    | 9.5 | 13 |
| 16   | 123.5 | 101.5 | 11  | 81.5 | 11 | 18 | 147 | 117 | 34 | 72 | 82 | 123.5 | 101.5 | 11  | 12 |

• Type 2FRM10 dimensions of mounting surface



**Note:** No any holes within the area of Ø20 and Ø25.

• Type 2FRM16 dimensions of mounting surface

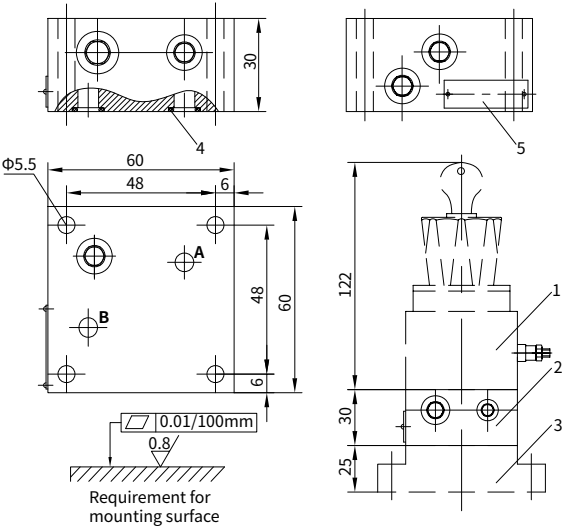


**Note:** No any holes within the area of Ø104.

Unit dimensions:

(Dimensions in mm)

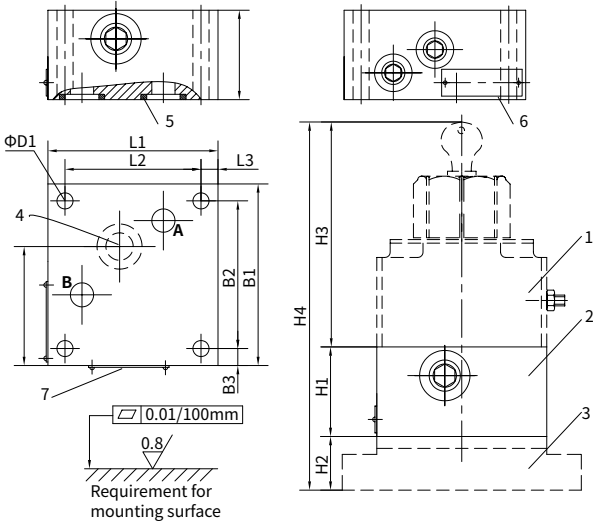
• Outline dimension of rectifier type Z4S5



- 1 Flow control valve
- 2 Rectifier sandwich plate
- 3 Sub-plate
- 4 O-ring 12×2.5
- 5 Nameplate

**Valve mounting screws:**  
4-M5×80 GB/T 70.1-10.9,  
Tighten torque  $M_A=8.9Nm$

• Outline dimension of rectifier Z4S10 and Z4S16



- 1 Flow control valve
- 2 Rectifier sandwich plate
- 3 Sub-plate
- 4 Gage hole
- 5 O-ring  
(Size 10: 18.66×3.53,  
Size 16: 26.58×3.53)
- 6 Nameplate (for size 10)
- 7 Nameplate (for size 16)

**Valve mounting screws:**  
Size 10:  
4pcs M8×100 GB/T 70.1-10.9  
Tightening torque  $M_A = 37Nm$   
Size 16:  
4pcs M10×160 GB/T 70.1-10.9  
Tightening torque  $M_A = 75Nm$

| Size | B1    | B2    | B3  | D1 | H1 | H2 | H3  | H4  | L1    | L2    | L3  |
|------|-------|-------|-----|----|----|----|-----|-----|-------|-------|-----|
| 10   | 101.5 | 82.5  | 9.5 | 9  | 50 | 30 | 125 | 205 | 95    | 76    | 9.5 |
| 16   | 123.5 | 101.5 | 11  | 11 | 85 | 40 | 147 | 272 | 123.5 | 101.5 | 11  |