

# 2-way flow control valve

## Type 2FRM

**RE 28389**

Edition: 2019-07

Replaces: 2019-02



H5552

- ▶ Sizes 10 and 16
- ▶ Component series 3X
- ▶ Maximum operating pressure 315 bar
- ▶ Maximum flow 160 l/min

### Features

- ▶ For subplate mounting
- ▶ Porting pattern according to DIN 24340 form G and ISO 6263
- ▶ Mechanical actuation
- ▶ Pressure compensator stroke limitation, optional
- ▶ Start-up jump reduction
- ▶ Flow control in both directions by means of rectifier sandwich plate
- ▶ Corrosion-protected design

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**Ordering code:** 2-way flow control valve

01	02	03	04	05	06	07	08	09
<b>2FR</b>	<b>M</b>		<b>-</b>	<b>3X</b>	<b>/</b>			<b>*</b>

01	2-way flow control valve	<b>2FR</b>
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**Type of actuation**

02	Mechanical	<b>M</b>
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03	Size 10	<b>10</b>
	Size 16	<b>16</b>

04	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimension)	<b>3X</b>
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**Flow range A to B**

05	<b>- Size 10, linear</b>	
	up to 10 l/min	<b>10L</b>
	up to 16 l/min	<b>16L</b>
	up to 25 l/min	<b>25L</b>
	up to 50 l/min	<b>50L</b>
	<b>- Size 16, linear</b>	
	up to 60 l/min	<b>60L</b>
	up to 100 l/min	<b>100L</b>
	up to 160 l/min	<b>160L</b>

06	<b>Without</b> pressure compensator stroke limitation	<b>no code</b>
	<b>With</b> pressure compensator stroke limitation	<b>B</b>


**Corrosion resistance** (outside; thick film passivation according to DIN 50979 – Fe//Zn8//Cn//T0)

07	None (valve housing primed)	<b>no code</b>
	Improved corrosion protection	<b>J</b>

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

08	NBR seals	<b>no code</b>
	FKM seals	<b>V</b>

09	Further details in the plain text	
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 **Notice:** Preferred types and standard units are contained in the EPS (standard price list).

**Ordering code:** Rectifier sandwich plate

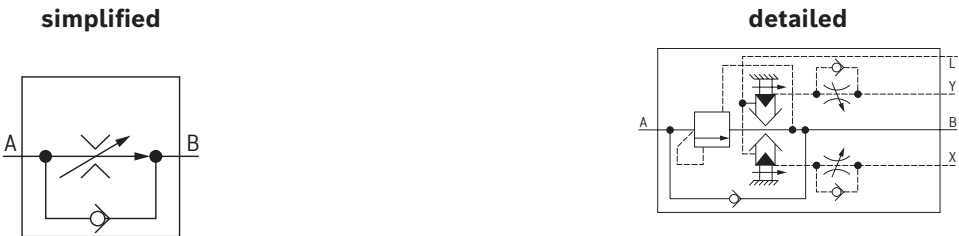
01	02	03	04	05
<b>Z4S</b>		-	/	*

01	Rectifier sandwich plate	<b>Z4S</b>
02	Size 10	<b>10</b>
	Size 16	<b>16</b>
03	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimension) - <b>NG10</b>	<b>3X</b>
	Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimension) - <b>NG16</b>	<b>2X</b>

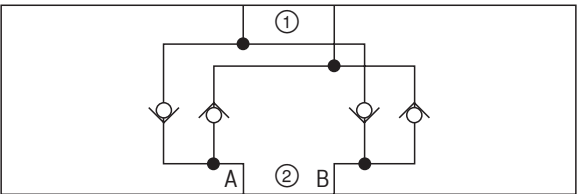
**Seal material** (observe compatibility of seals with hydraulic fluid used, see page 6)

04	NBR seals	<b>no code</b>
	FKM seals	<b>V</b>
05	Further details in the plain text	

**Symbols:** 2-way flow control valve



**Symbols:** Rectifier sandwich plate (① = component side, ② = plate side)



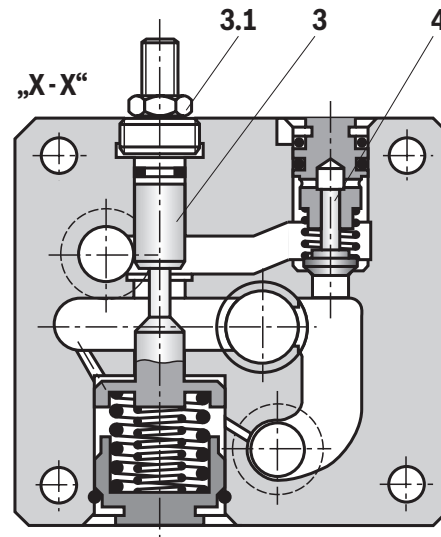
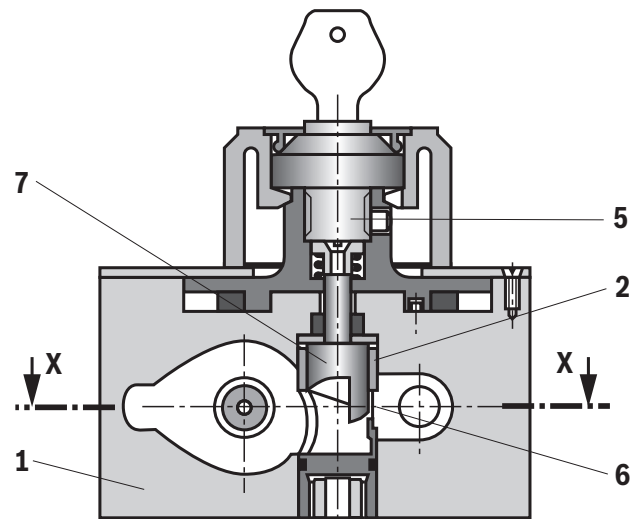
## Function, section

Flow control valves type 2FRM are 2-way flow control valves. They are used to maintain a constant flow, mostly independent of pressure and temperature. Generally, the valves consist of housing (1), orifice bush (2), pressure compensator (3) with optional stroke limitation (3.1), check valve (4) and adjustment element (5). The flow from channel A to channel B is throttled at the throttling point (6). The throttle cross-section is set by mechanically turning the curved bolt (7) over the adjustment element (5). An upstream pressure compensator (3) is included to ensure a pressure-independent and constant flow at throttling point (6).

Temperature independence is achieved thanks to the orifice design of the throttling point.

The free return flow from channel B to channel A is via the check valve (4).

The regulated flow only flows from channel A to B. For oscillating flows (forward and return flow), a rectifier sandwich plate type Z4S can be installed under the flow control valve.



**Technical data**

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

<b>General</b>			
Size		<b>NG10</b>	<b>NG16</b>
Weight	► Type 2FRM	kg	5.6
	► Rectifier sandwich plate	kg	3.0
Installation position	any		
Ambient temperature range	°C	-30 ... +80 (NBR seals) -20 ... +80 (FKM seals)	

hydraulic – 2-way flow control valve type 2FRM								
Size		NG10				NG16		
Maximum flow l/min		10	16	25	50	60	100	160
Maximum operating pressure (port A) bar		315						
Pressure differential with free return flow B to A, $q_V$ dependent bar		2	2.5	3.5	6	2.8	4.3	7.3
Minimum pressure differential bar		3 ... 7				5 ... 12		
Flow control	► Temperature stability (–20 ... +80 °C)	±2% ( $q_{V \max}$ )				±2% ( $q_{V \max}$ )		
	► Pressure stability (up to $\Delta p$ = 315 bar)	±2% ( $q_{V \max}$ )				< ±5% ( $q_{V \max}$ )		
Hydraulic fluid		see table page 6						
Hydraulic fluid temperature range °C		–30 ... +80 (NBR seals) –20 ... +80 (FKM seals)						
Viscosity range mm²/s		10 ... 800						
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 20/18/15 <sup>1)</sup>						

<b>hydraulic – rectifier sandwich plate type Z4S</b>		
Maximum flow	l/min	50
Maximum operating pressure	bar	315
Cracking pressure	bar	1.5

- <sup>1)</sup> The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

For the selection of filters, see [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter).

**Technical data**

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

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

**Important information on hydraulic fluids:**

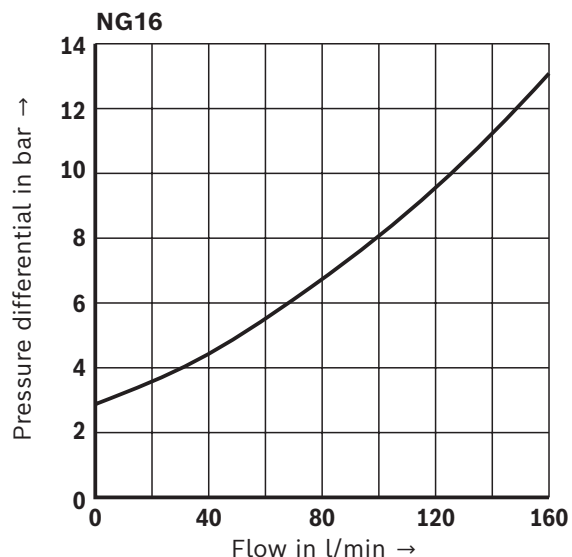
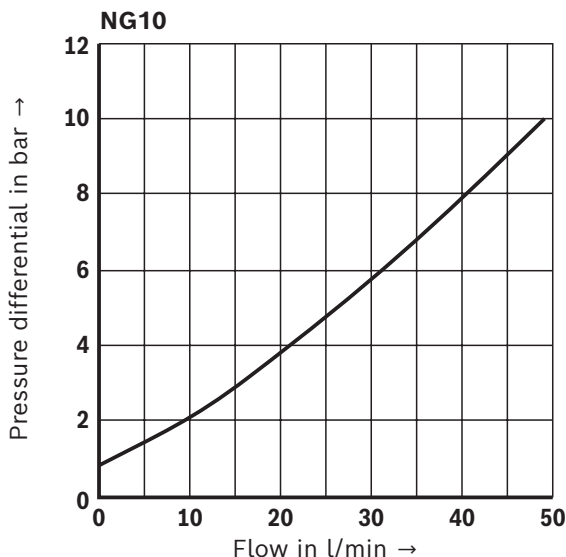
- For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- **Bio-degradable and flame-resistant – containing water:**  
If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.

**► Flame-resistant – containing water:**

Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended - if possible specific to the installation - to back up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.

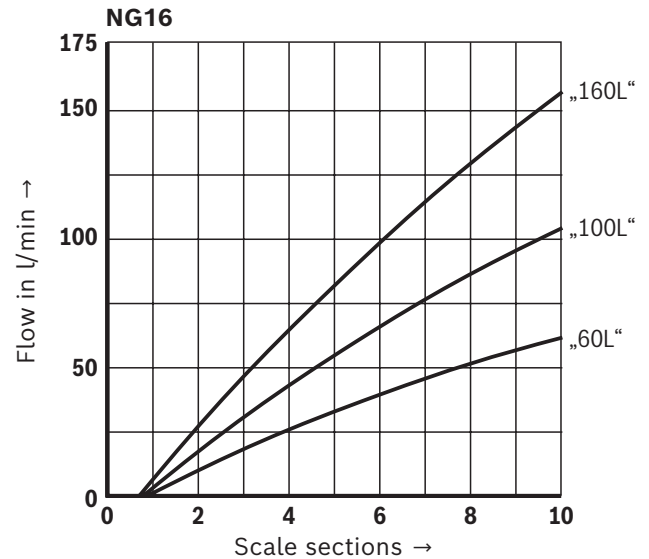
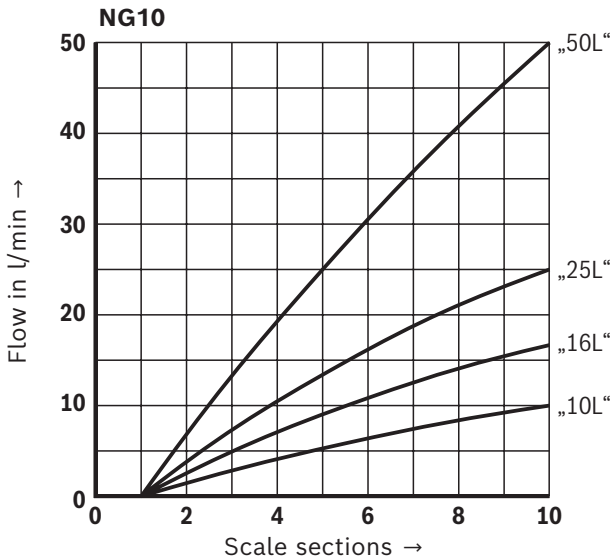
**Characteristic curves: Rectifier sandwich plate**  
 (measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

The pressure differential  $\Delta p$  in both directions of flow is equal; flow  $q_v$  from A → B (B → A)

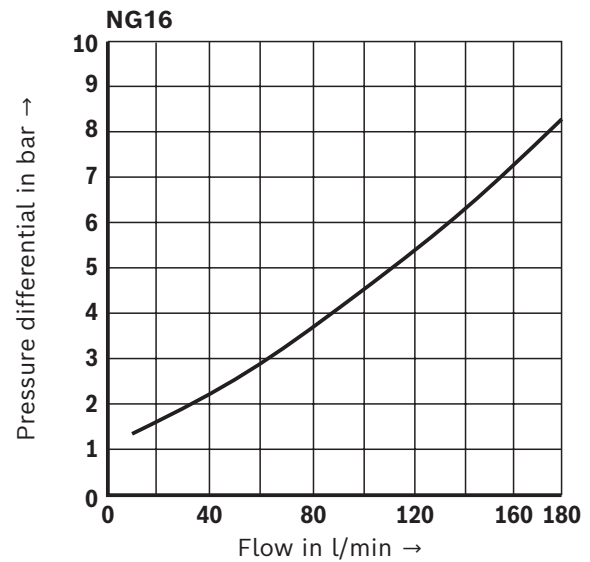
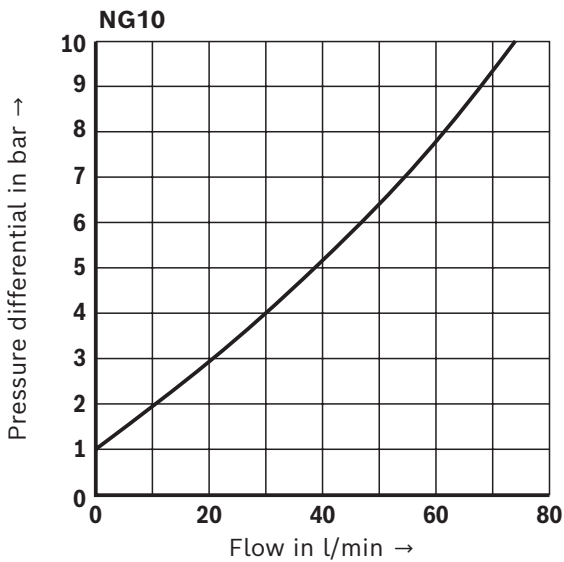


**Characteristic curves:** 2-way flow control valve  
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^{\circ}\text{C}$ )

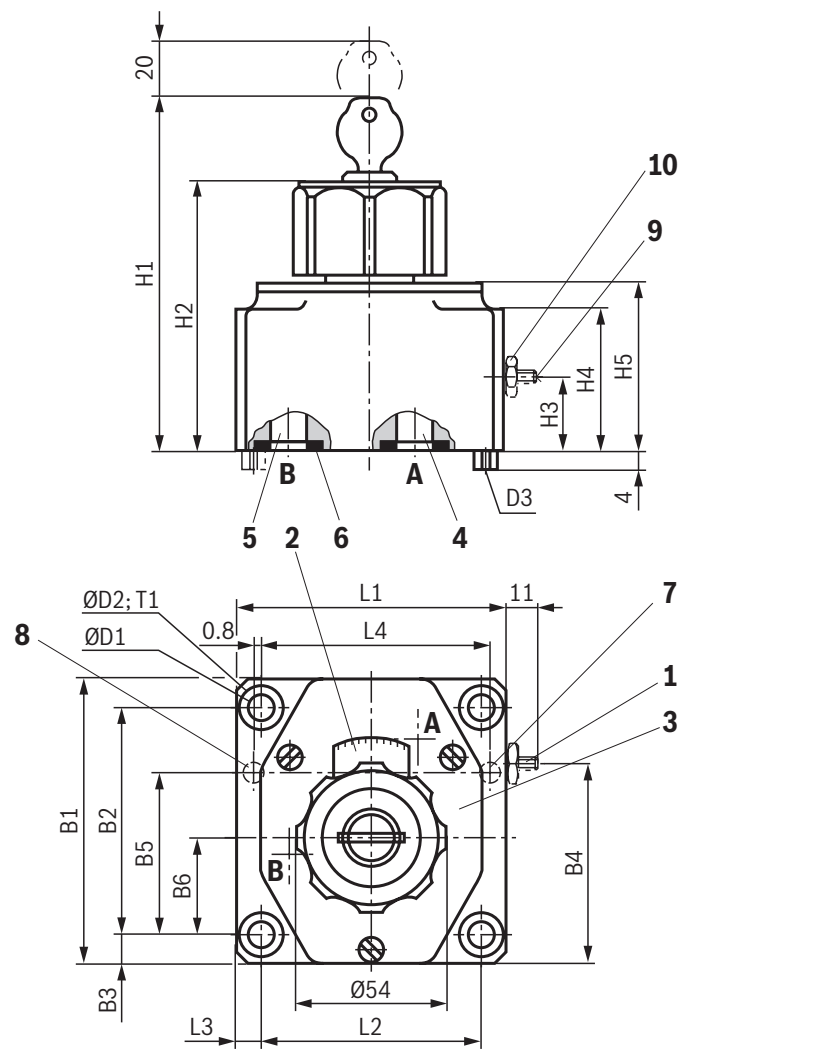
**Flow control (A → B)**



**Free return flow (B → A)**



**Dimensions:** 2-way flow control valve  
(Dimensions in mm)



- 1 Pressure compensator stroke limitation, optional
- 2 Adjustment element, rotary knob security lock (all positions can be locked), rotation range 300° = 10 scale sections,  $M_d \approx 0.7 \text{ Nm}$
- 3 Name plate
- 4 Input A
- 5 Output B
- 6 Seal ring
- 7 Locating pin (NG10 and 16)
- 8 Locating pin (NG16)
- 9 Internal hexagon SW3
- 10 Hexagon wrench size 10

0,01/100

Rz1max 8

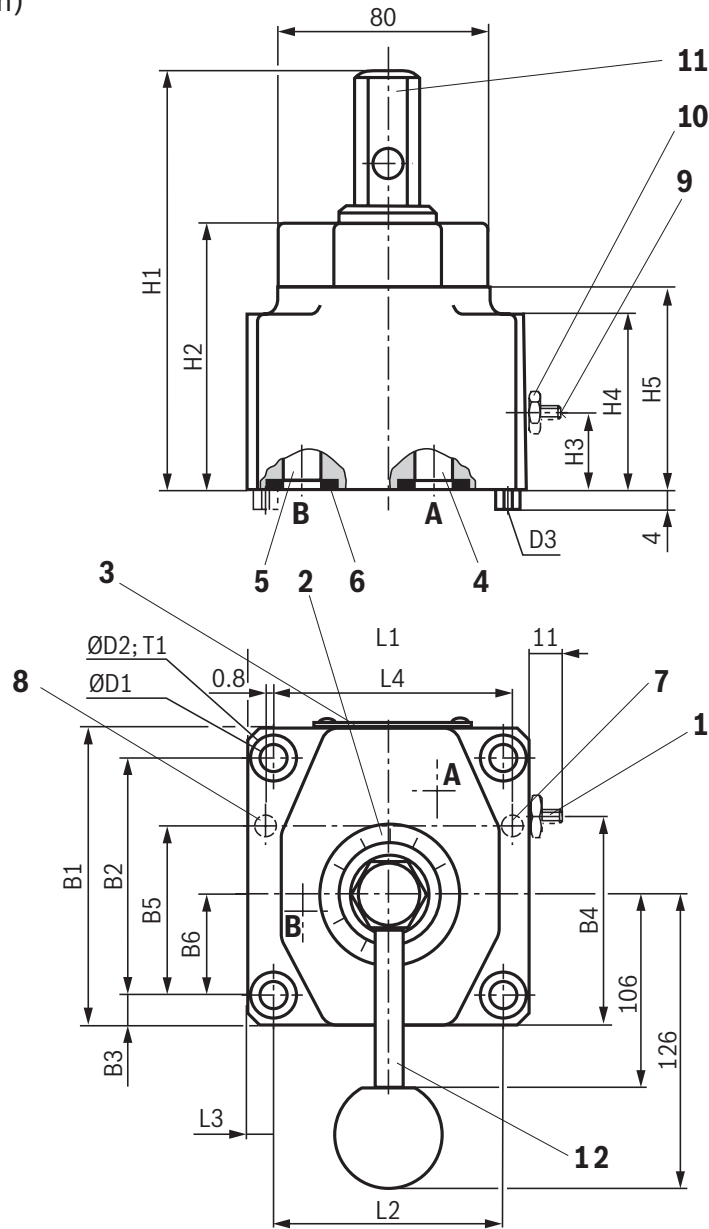
  

Required surface quality  
of the valve contact surface

Valve mounting screws and subplates, see page 11.

NG	B1	B2	B3	B4	B5	B6	ØD1	ØD2	D3	H1	H2	H3	H4	H5	L1	L2	L3	L4	T1
10	101.5	82.5	9.5	68	58.7	35.5	9	15	6	125	95	26	51	60	95	76	9.5	79.4	13
16	123.5	101.5	11	81.5	72.9	41.5	11	18	6	147	117	34	72	82	123.5	101.5	11	102.4	12

**Dimensions:** 2-way flow control valve – version "2FRM...J"  
(Dimensions in mm)



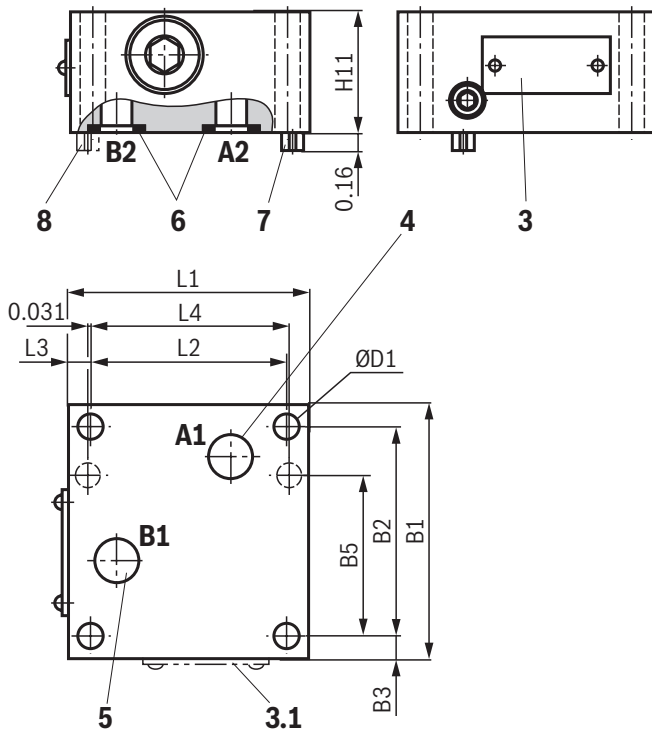
0,01/100  
Rz1max 8  
Required surface quality  
of the valve contact surface

- |   |  |    |                        |
|---|--|----|------------------------|
| 1 | Pressure compensator stroke limitation, optional   | 9  | Internal hexagon SW3   |
| 2 | Adjustment element, rotary knob security lock (all positions can be locked), rotation range 300° = 10 scale sections, $M_d \approx 0.7 \text{ Nm}$ | 10 | Hexagon wrench size 10 |
| 3 | Name plate   | 11 | Lock nut SW24          |
| 4 | Input A  | 12 | Lever                  |
| 5 | Output B   |    |                        |
| 6 | Seal ring  |    |                        |
| 7 | Locating pin (NG10 and 16)   |    |                        |
| 8 | Locating pin (NG16)  |    |                        |

**Valve mounting screws and subplates, see page 11.**

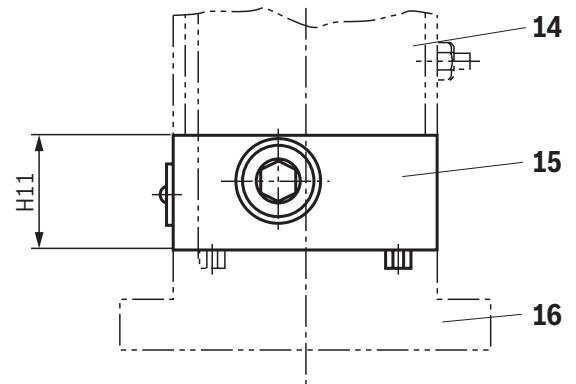
NG	B1	B2	B3	B4	B5	B6	ØD1	ØD2	D3	H1	H2	H3	H4	H5	L1	L2	L3	L4	T1
10	101.5	82.5	9.5	58.8	58.7	35.5	9	15	6	137	81	26	51	58	95	76	9.5	79.4	13
16	123.5	101.5	11	70.5	72.9	41.5	11	18	6	159	103	34	72	80	123.5	101.5	11	102.4	12

### Dimensions: Rectifier sandwich plate (Dimensions in mm)



0,01/100  
Rz1max 8  
Required surface quality  
of the valve contact surface

- 3 Name plate
- 3.1 Name plate NG16
- 4 Input A
- 5 Output B
- 6 Seal ring
- 7 Locating pin (NG10 and 16)
- 8 Locating pin (NG16)



**Valve mounting screws** for the installation of a rectifier sandwich plate between subplate and flow control valve (separate order)

► Size 10:

**4 hexagon socket head cap screws ISO 4762 - M8 x 100 - 10.9-flZn/nc/480h/C**

(friction coefficient  $\mu_{\text{total}} = 0.09 \dots 0.14$ )

Tightening torque  $M_A = 30 \text{ Nm} \pm 10\%$

Material no. **R913014764**

► Size 16:

**4 hexagon socket head cap screws ISO 4762 - M10 x 160 - 10.9-flZn/nc/480h/C**

(friction coefficient  $\mu_{\text{total}} = 0.09 \dots 0.14$ )

Tightening torque  $M_A = 64 \text{ Nm} \pm 10\%$

Material no. **R913015565**

**Subplates** see page 11. **For valve connection dimensions**, see page 8.

NG	B1	B2	B3	B5	Ø D1	H11	L1	L2	L3	L4
10	101.5	82.5	9.5	58.7	9	50	95	76	9.5	79.4
16	123.5	101.5	11	72.9	11	85	123.5	101.5	11	102.4

## Dimensions

### Valve mounting screws (separate order)

Size	Quantity	Hexagon socket head cap screws	Material number
10	4	ISO 4762 - M8 x 50 - 10.9-fZn/nc/480h/C Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$ ; tightening torque $M_A = 30 \text{ Nm} \pm 10\%$	R913015800
16	4	ISO 4762 - 10 x 80 - 10.9-fZn/nc/480h/C Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$ ; tightening torque $M_A = 64 \text{ Nm} \pm 10\%$	R913014560

**Subplates** (separate order) with porting pattern according to ISO 4401, see data sheet 45100.

## Further information

- |  |                                |
|--|--------------------------------|
| ► Subplates  | Data sheet 45100               |
| ► Hydraulic fluids on mineral oil basis  | Data sheet 90220               |
| ► Environmentally compatible hydraulic fluids  | Data sheet 90221               |
| ► Flame-resistant, water-free hydraulic fluids   | Data sheet 90222               |
| ► Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)               | Data sheet 90223               |
| ► Use of non-electrical hydraulic components in a potentially explosive environment (ATEX) | Data sheet 07011               |
| ► Hydraulic valves for industrial applications   | Operating instructions 07600-B |
| ► Selection of filters   |                                |
| ► Information on available spare parts   |                                |