

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

Contents

Features	1
Ordering code	2, 3
Symbols	3
Function, section	4
Technical data	5, 6
Characteristic curves	6, 7
Dimensions	8 ... 11
Further information	11

Ordering code: 2-way flow control valve

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

01	2-way flow control valve	2FR
----	--------------------------	------------

Type of actuation

02	Mechanical	M
----	------------	----------

03	Size 10	10
	Size 16	16

04	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimension)	3X
----	---	-----------

Flow range A to B

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

06	Without pressure compensator stroke limitation	no code
	With pressure compensator stroke limitation	B


Corrosion resistance (outside; thick film passivation according to DIN 50979 - Fe//Zn8//Cr//T0)

07	None (valve housing primed)	no code
	Improved corrosion protection	J

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

08	NBR seals	no code
	FKM seals	V

09	Further details in the plain text	
----	-----------------------------------	--

 **Notice:** Preferred types and standard units are contained in the EPS (standard price list).

Ordering code: Rectifier sandwich plate

01	02	03	04	05
Z4S		-	/	*

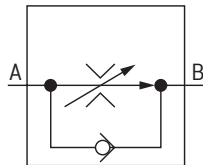
01	Rectifier sandwich plate	Z4S
02	Size 10	10
	Size 16	16
03	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimension) - NG10	3X
	Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimension) - NG16	2X

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

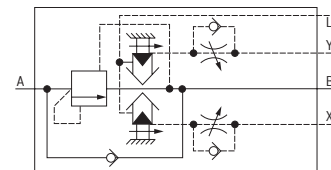
04	NBR seals	no code
	FKM seals	V
05	Further details in the plain text	

Symbols: 2-way flow control valve

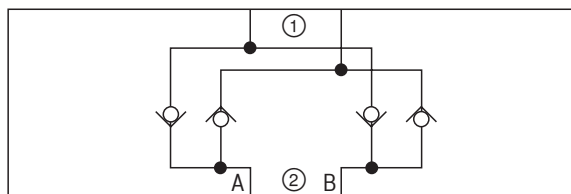
simplified



detailed



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



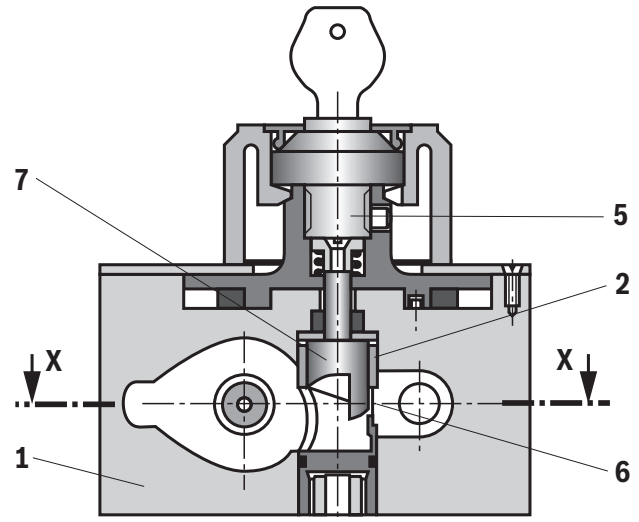
Function, section

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).

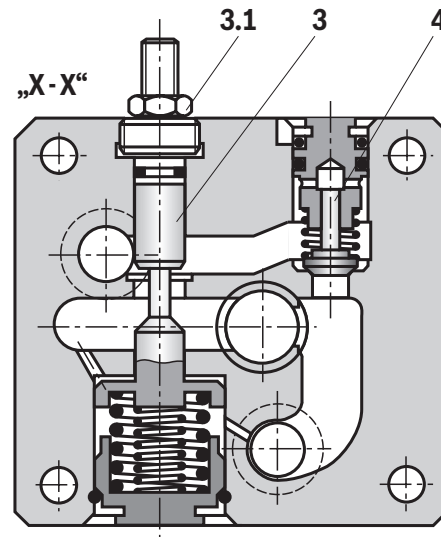
Temperature independence is achieved thanks to the orifice design of the throttling point.

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.



Type 2 FRM...



Technical data

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

General		
Size		
Weight	► Type 2FRM	kg
	► Rectifier sandwich plate	kg
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	mm ² /s	10 ... 800						
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 20/18/15 ¹⁾						

hydraulic – rectifier sandwich plate type Z4S			
Maximum flow	l/min	50	160
Maximum operating pressure	bar	315	
Cracking pressure	bar	1.5	

¹⁾ 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.

Technical data

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

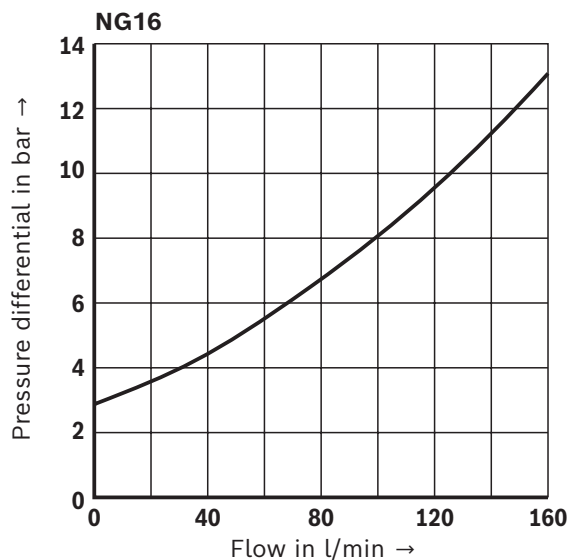
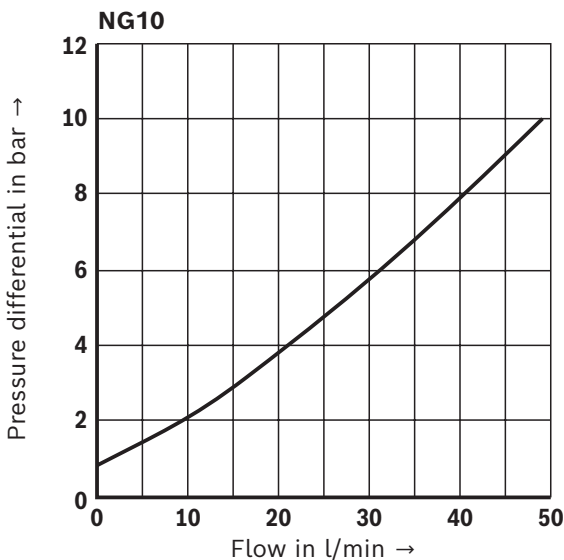
Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	ISO 15380	90221
		HEES		
	▶ Soluble in water	HEPG	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	ISO 12922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

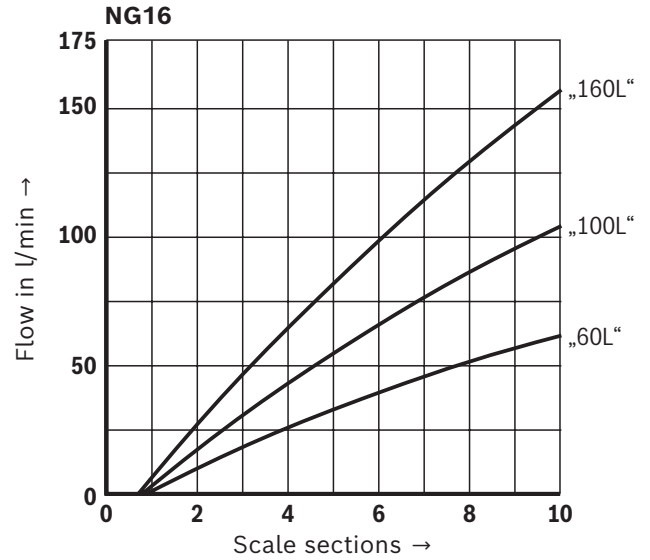
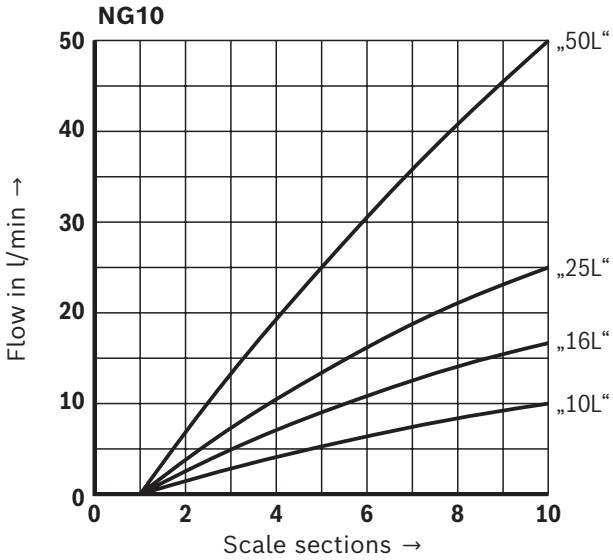
▶ Flame-resistant – containing water:

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.

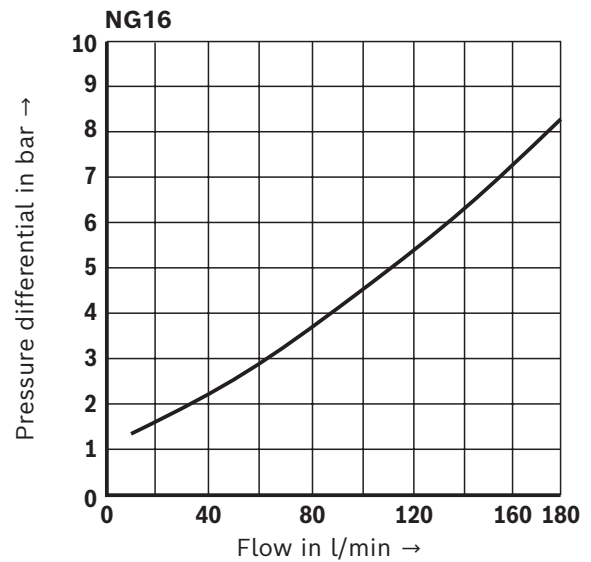
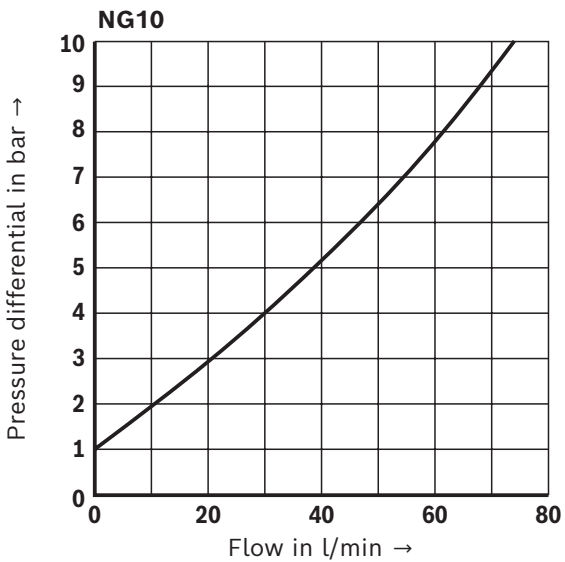
Characteristic curves: Rectifier sandwich plate
(measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)**The pressure differential Δp in both directions of flow is equal; flow q_v from A → B (B → A)**

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

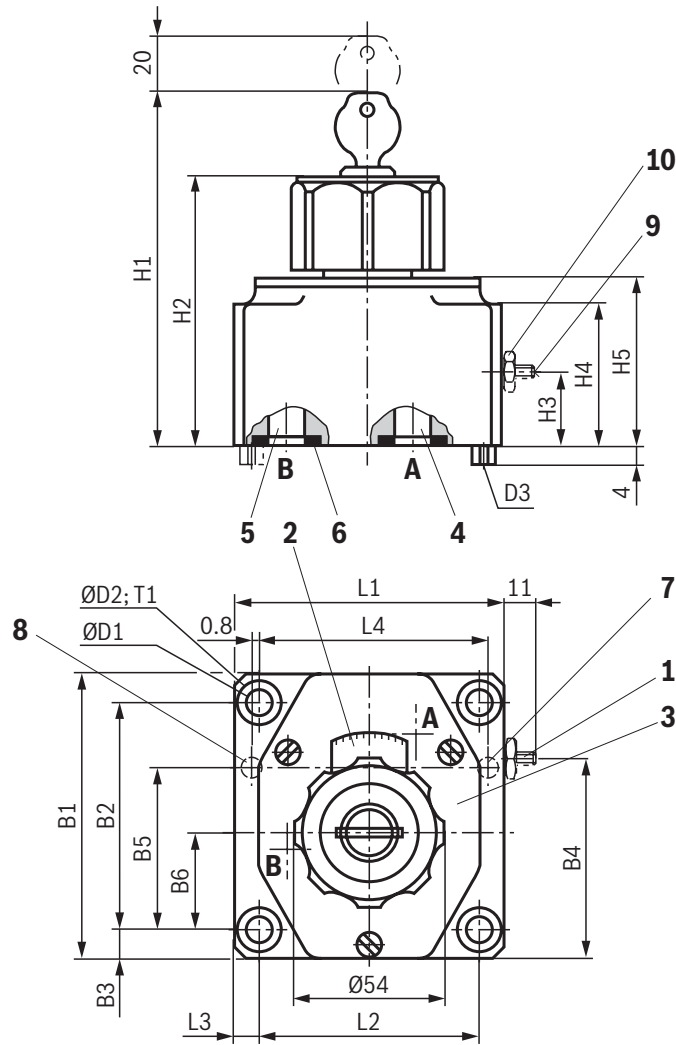
Flow control (A → B)



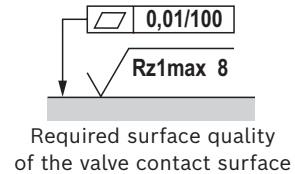
Free return flow (B → A)



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



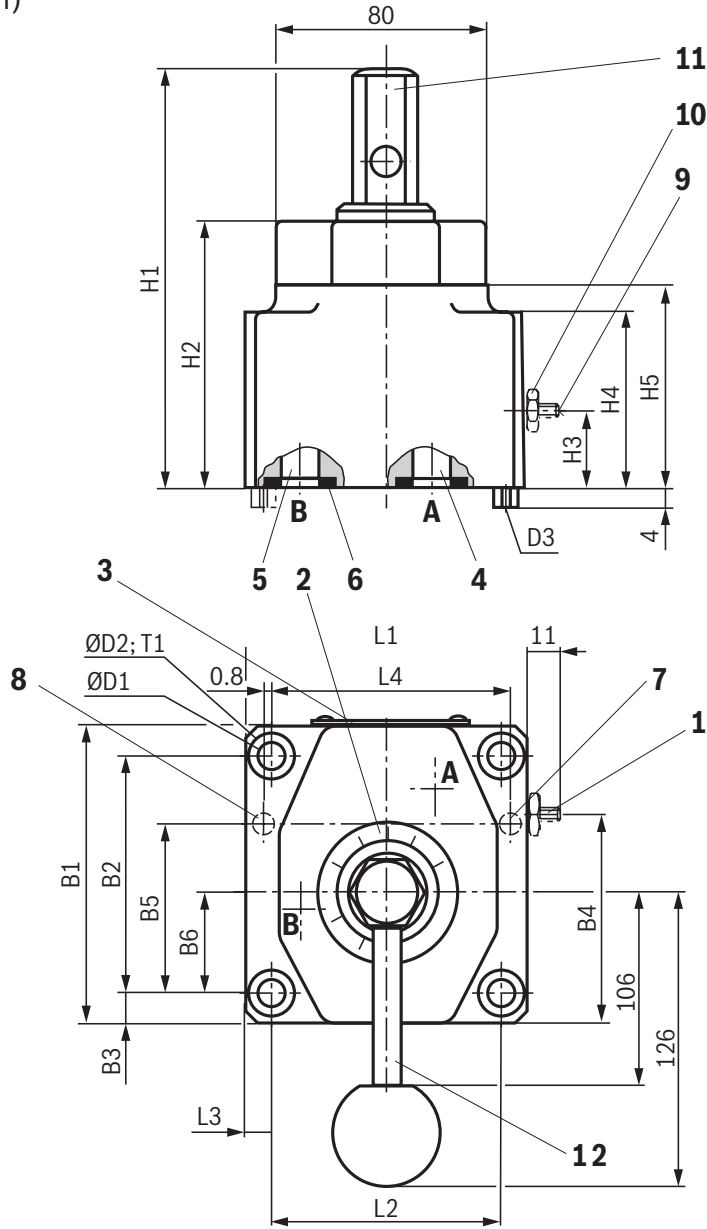
- 1 Pressure compensator stroke limitation, optional
- 2 Adjustment element, rotary knob security lock (all positions can be locked), rotation range 300° = 10 scale sections, $M_d \approx 0.7 \text{ Nm}$
- 3 Name plate
- 4 Input A
- 5 Output B
- 6 Seal ring
- 7 Locating pin (NG10 and 16)
- 8 Locating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



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)



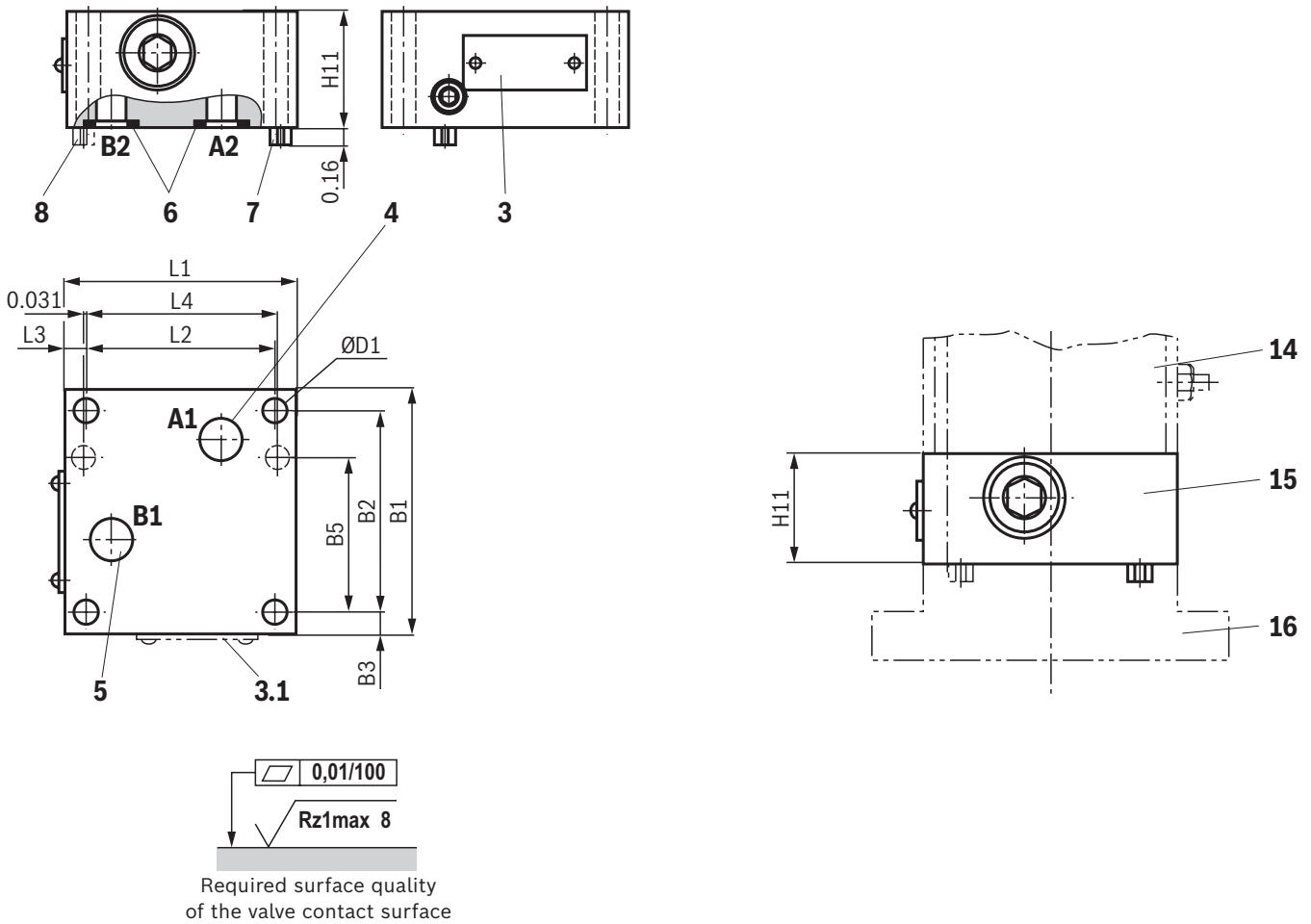
Required surface quality
 of the valve contact surface

- 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
- 11 Lock nut SW24
- 12 Lever

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)



- 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-fLZn/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-fLZn/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 | www.boschrexroth.com/filter |
| ▶ Information on available spare parts | www.boschrexroth.com/spc |

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

© All rights reserved to Bosch Rexroth AG, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.
The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification.
It must be remembered that our products are subject to a natural process of wear and aging.

Notes

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

© All rights reserved to Bosch Rexroth AG, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.
The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification.
It must be remembered that our products are subject to a natural process of wear and aging.