

Electric Drives
and Controls

Hydraulics

Linear Motion and
Assembly Technologies

Pneumatics

Service

Rexroth
Bosch Group

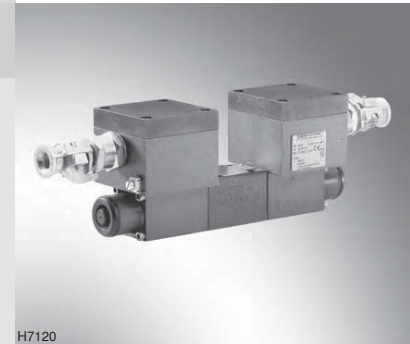
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4/3, 4/2 and 3/2 directional valves with DC solenoids

RE 23178-XD-B2/05.12
Replaces: 11.09

Type WE 6 ../B..XD...

Size 6
Component series 6X
Maximum operating pressure 315 bar
Maximum flow 60 l/min



ATEX units
For explosive areas

Part II Data sheet



Information on the explosion protection:

- Area of application in accordance with the Explosion Protection Directive 94/9/EC: **I M2; II 2G**
- Types of protection of the valve solenoid:
Ex d I Mb / Ex d IIC T4 Gb
according to EN 60079-0:2009 / EN 60079-1:2007

What you need to know about these operating instructions

These operating instructions apply to the explosion-proof version of Rexroth valves and consist of the following three parts:

- Part I General information 07010-X-B1
- Part II Data sheet 23178-XD-B2
- Part III Product-specific instructions 23178-XD-B3

Operating instructions 23178-XD-B0

You can find further information on the correct handling of Rexroth hydraulic products in our publication "General product information on hydraulic products" 07008.

Table of contents

Contents	Page
Features	2
Ordering code and scope of delivery	3
Control spool symbols	4
Function, section	5
Technical data	6
Information on the explosion protection	7
Electrical connection	8
Performance limits	10
Characteristic curves	11
Unit dimensions	12
Installation conditions	13

Features

- Direct operated directional spool valve with solenoid actuation for proper use in explosive atmospheres
- Porting pattern according to ISO 4401-03-02-0-05
- Subplates available in FE/ZN version (see page 12)
- Wet-pin DC solenoids in hydraulic fluid
- Electrical connection with individual connection and cable gland
- With manual override, optional

Ordering code and scope of delivery

	WE	6	6X	B	N	XD	Z2	
3 main ports	= 3							
4 main ports	= 4							
Size 6		= 6						
Control spool symbol e.g. C, E, EA, EB etc. possible versions see page 4								
Component series 60 to 69 (60 to 69: Unchanged installation and connection dimensions)			= 6X					
Spring return				= no code				
Without spring return				= O				
Without spring return with detent				= OF				
High-power solenoid (switching in hydraulic fluid)					= B			
Direct voltage 24 V						= G24		
Direct voltage 110 V						= G110		
With manual override (standard)								= N

no code = NBR seals
V = FKM seals
Important:
 Observe compatibility of seals
 with hydraulic fluid used!

no code = Without throttle insert
B08 = Throttle Ø 0.8 mm
B10 = Throttle Ø 1.0 mm
B12 = Throttle Ø 1.2 mm
 Use if flow > performance limit of the
 valve, effective in channel P

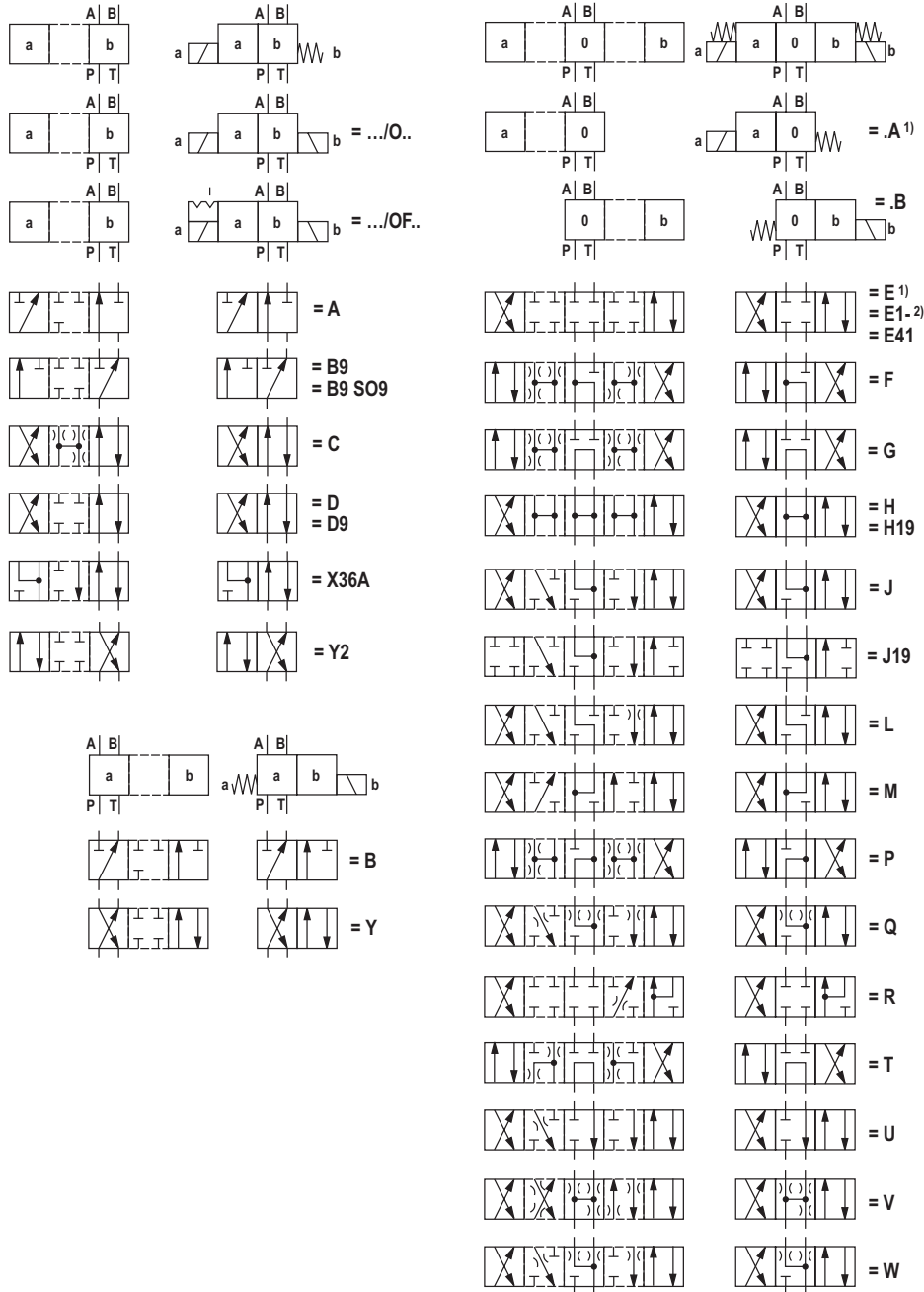
Electrical connection
Z2 = Solenoid with terminal box
 and cable gland,
 For details see chapter Electrical connection

XD = Explosion protection
 "pressure-resistant encapsulation",
 details see information on the explosion protection
 page 7

Included in the scope of delivery:

Valve operating instructions with declaration of conformity in
part III

Control spool symbols



1) **Example:** Control spool E with spool position "a", ordering code ..EA..

2) Symbol E1-: P – A/B pre-opening, **Caution in conjunction with single-rod cylinders due to pressure intensification!**

Function, section

Directional valves of type WE are solenoid operated directional spool valves. They control the start, stop and direction of a fluid flow.

The directional valves basically consist of housing (1), one or two solenoids (2), control spool (3), and one or two return springs (4).

In the de-energized condition, control spool (3) is held in the central position or in the initial position by the return springs (4) (except for impulse spools). The control spool (3) is actuated by wet-pin solenoids in hydraulic fluid (2).

To ensure proper functioning, care must be taken that the pressure chamber of the solenoid is filled with hydraulic fluid.

The force of solenoid (2) acts via plunger (5) on control spool (3) and pushes the latter from its rest position to the required end position. This enables the necessary direction of flow from P → A and B → T or P → B and A → T.

After solenoid (2) was de-energized, return spring (4) pushes control spool (3) back to its rest position.

An optional manual override (6) allows control spool (3) to be moved without solenoid energization.

Type 4WE 6.. 6X/O...XD (only possible with symbols A, C and D)

This version is a directional valve with two spool positions and two solenoids without detent. In the de-energized condition, there is no defined spool position.

Type 4WE 6.. 6X/OF... XD (impulse spool, only possible with symbols A, C and D)

This version is a directional valve with two spool positions, two solenoids and one detent. It alternately locks the two spools in position and the solenoid therefore needs not to be permanently energized.

Important:

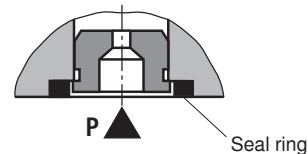
Pressure peaks in the tank line to two or several valves can result in unintended spool movements in case of valves with detent! We therefore recommend that separate return lines be provided or a check valve installed in the tank line.

The tank line must not be allowed to run empty. With corresponding installation conditions, a pre-charge valve (pre-charging pressure approx. 2 bar) must be installed.

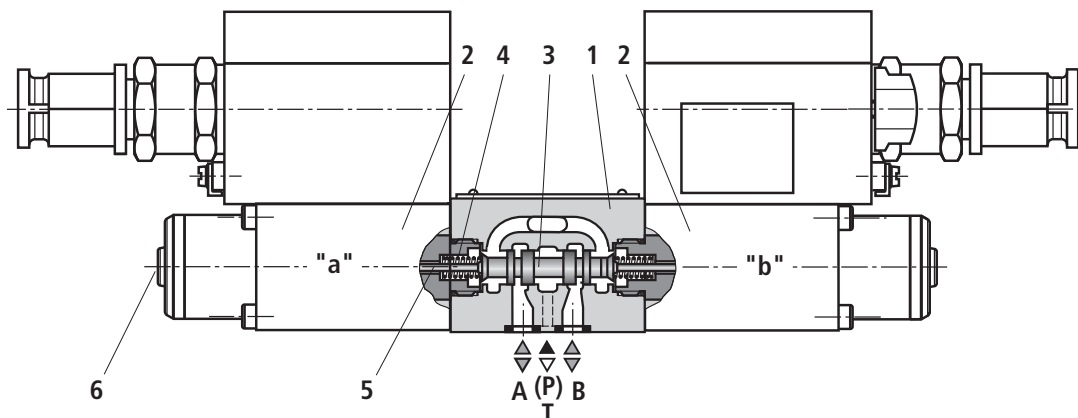
Throttle insert (type 4WE 6..6X/...XD../B..)

The use of a throttle insert is required when due to prevailing operating conditions, flows can occur during the switching processes, which exceed the performance limit of the valve.

It is inserted in channel P of the directional valve.



Type 4WE 6 E6X/.B..NXDZ2/V



Technical data

general

Installation position		Any
Ambient temperature range	°C	-20 ... +80
Storage temperature range	°C	+15... +30
Admissible vibration load		20 ... 2000 Hz amplitude 0.05 g ² /Hz (10 g RMS)
Weight	kg	5.3 (with 1 solenoid); 9.4 (with 2 solenoids)
Surface protection	Valve body	Fe//ZnNi8//Cn//T0
	Solenoid	Fe//ZnNi8//An//T0

hydraulic

Maximum surface temperature	°C	See information on the explosion protection on page 7	
Maximum operating pressure	Port P, A, B	bar	315
	Port T	bar	210 With symbols A and B, port T must be used as leakage oil connection if the operating pressure exceeds the admissible tank pressure.
Maximum flow		l/min	60
Flow cross-section (spool position 0)	with symbol Q	Approx. 6 % of the nominal cross-section	
	with symbol W	Approx. 3 % of the nominal cross-section	
Hydraulic fluid	Mineral oil (HL, HLP) according to DIN 51524 ¹⁾ ; fast bio-degradable hydraulic fluids according to VDMA 24568 (see also data sheet 90221); HETG (rape seed oil) ¹⁾ ; HEPG (polyglycols) ²⁾ ; HEES (synthetic esters) ²⁾ ; flame-resistant hydraulic fluid HFC according to ISO 12922 ³⁾ Ignition temperature > 180 °C		
Hydraulic fluid temperature range	°C		-20 ... +80 (NBR seals)
	°C		-15 ... +80 (FKM seals)
Viscosity range		mm ² /s	2.8 ... 500
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)	Class 20/18/15 ⁴⁾		

¹⁾ Suitable for NBR **and** FKM seals

²⁾ Suitable **only** for FKM seals

³⁾ If HFC hydraulic fluid is used, the following parameters have to be complied with:
Pressure at P, A, B max. 160 bar, at T max. 3 bar
Ambient temperature 0 ... 36 °C
Hydraulic fluid temperature max. 55 °C
Duty cycle 60 %
Only NBR seals are admissible.
More information is available from our sales staff.

⁴⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components. For the selection of the filters see www.boschrexroth.com/filter.

Technical data

electric

Voltage type		Direct voltage
Available voltages	V	24, 110
Voltage tolerance (nominal voltage)	%	±10
Admissible residual ripple	%	< 5
Duty cycle / operating mode according to VDE 0580		S1 (continuous operation)
Switching time according to ISO 6403	ON	ms
	OFF	ms
Switching frequency	1/h	up to 15000
Nominal power at ambient temperature 20 °C	W	13
Maximum power with 1.1 x nominal voltage and ambient temperature 20 °C	W	15.8
Protection class according to EN 60529 ¹⁾		IP 65

Information on the explosion protection

Area of application as per directive 94/9/EC		I M2; II 2G
Type of protection Valve		c (EN 13463-5:2011)
Maximum surface temperature ²⁾ Temperature class	°C	130
		T4
Type of protection Solenoid according to EN 60079-0:2009 / EN 60079-1:2007		Ex d I Mb Ex d IIC T4 Gb
Type examination certificate Solenoid		BVS 03 ATEX E 300 X
Special operating conditions for a safe application		– In case of bank assembly, only one solenoid of all valves may be energized at a time. – In case of valves with two solenoids, maximally one of the solenoids may be energized at a time.
Ambient temperature range	°C	–20 ... +80

¹⁾ With correctly installed electrical connection

²⁾ Surface temperature > 50 °C, provide contact protection

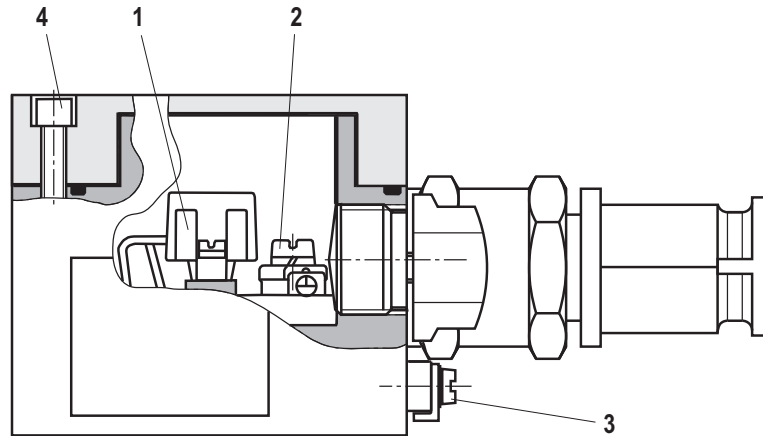
Electrical connection

The type-examination tested valve solenoid of the valve is equipped with one terminal box and a type-examination tested cable entry.

The connection is polarity-independent.

Important

When establishing the electrical connection, the protective earthing conductor (PE \perp) has to be connected properly.



Properties of the connection terminals and mounting elements

Item	Function	Connectable line cross-section
1	Operating voltage connection	Single-wire max. 2.5 mm ² Finely stranded max. 2.5 mm ²
2	Connection for protective earthing conductor	Single-wire 0.75 ... 2.5 mm ² Finely stranded 0.75 ... 1.5 mm ²
3	Connection for potential equalization conductor	Single-wire 4 ... 6 mm ² Finely stranded min. 4 mm ²
4	Screws for cover	-

Cable gland

Line diameter	mm	9...12
Sealing		Outer sheath sealing

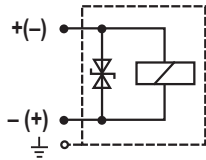
Connection line

Line type		Non-armored cables and lines (outer sheath sealing)
Temperature range	°C	-20 ... > +110

Electrical connection

Circuit diagram

Direct voltage, polarity-independent



Overcurrent fuse and switch-off voltage peak

Important

A fuse appropriate for the solenoid's rated current (max. $3 \times I_{\text{rated}}$ according to DIN 41571 and/or IEC 60127) or a protective motor switch with short-circuit and thermal instantaneous tripping must be connected to each valve solenoid as short-circuit protection. The cut-off capacity of this fuse must match or exceed the short-circuit current of the supply source. This fuse or motor protection switch may only be fitted outside the explosive area or must be of an explosion-proof design.

When inductivities are switched off, voltage peaks result which may cause failures in the connected control electronics. For this reason, the valve solenoids comprise a suppressor circuit which dampens this voltage peak to the voltage value shown in the table.

Voltage data in the valve type code	Nominal voltage valve solenoid	Rated current valve solenoid	Recommended pre-fuse characteristics medium time-lag according to DIN 41571	Maximum voltage value upon switch-off	Suppressor circuit
G24	24 V DC	0.542 A DC	630 mA	-90 V	Suppressor diode bi-directional
G110	110 V DC	0.118 A DC	125 mA	-390 V	

Performance limits (measured with HLP46, $\vartheta_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$)

Important

The specified switching power limits are valid for operation with two directions of flow (e.g. from P → A and simultaneous return flow from B → T).

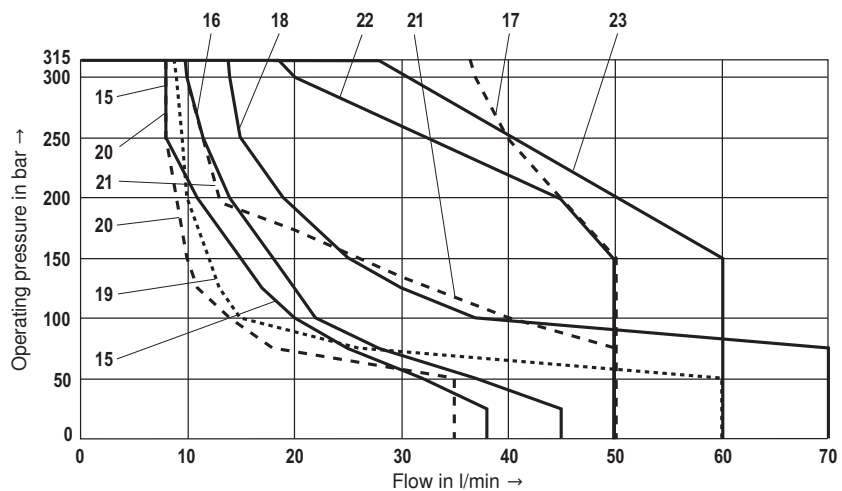
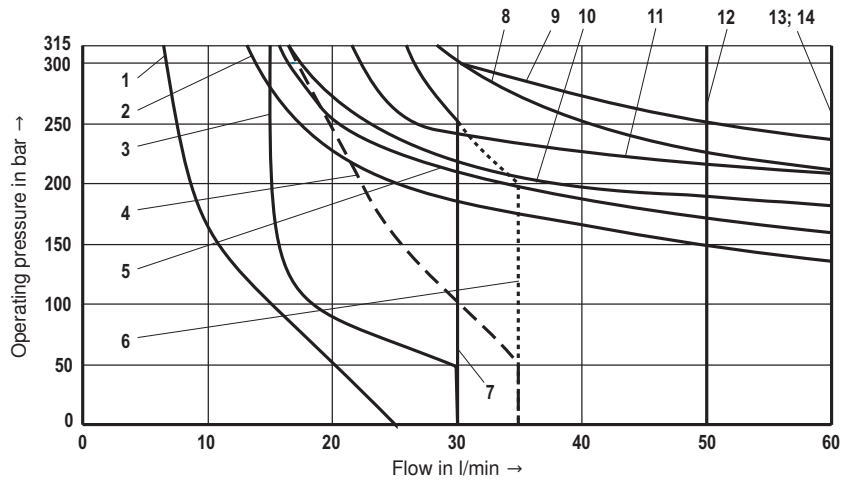
Due to the flow forces acting within the valves, the admissible switching power limit may be considerably lower with only one direction of flow (e.g. from P → A while port B is blocked)!

(In such cases, please consult us.)

The switching power limits were established while the solenoids were at operating temperature, at 10 % undervoltage and without tank pre-loading.

Performance limits of the valves with DC solenoids

Characteristic curve	Control spool symbol
1	A, B
2	J, L, U
3	V
4	F, P
5	A/O, A/OF
6	G
7	T
8	R ²⁾
9	E
10	Q, W
11	D, C, Y, Y2
12	H
13	M
14	E1 ¹⁾ , D/OF, C/OF, D/O, C/O
15	B9
16	B9 SO9
17	H19
18	J19, P-A
19	J19, A-T
20	J19, B-T
21	X36A
22	D9
23	E41



¹⁾ P-A/B pre-opening

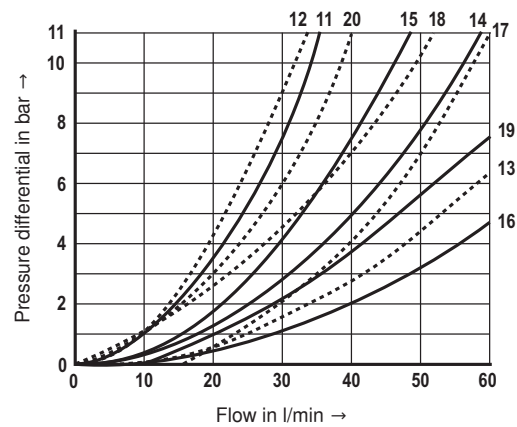
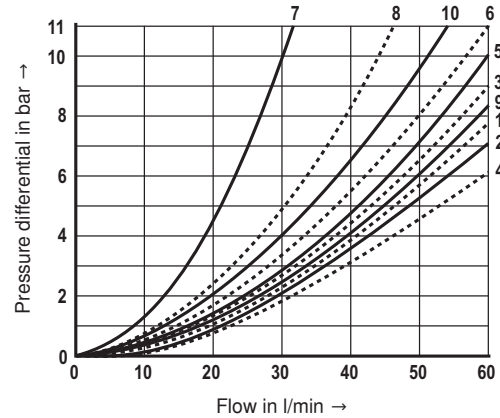
²⁾ Return flow from actuator to tank

Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ and $p = 100 \text{ bar}$)

Δp - q_v characteristic curves

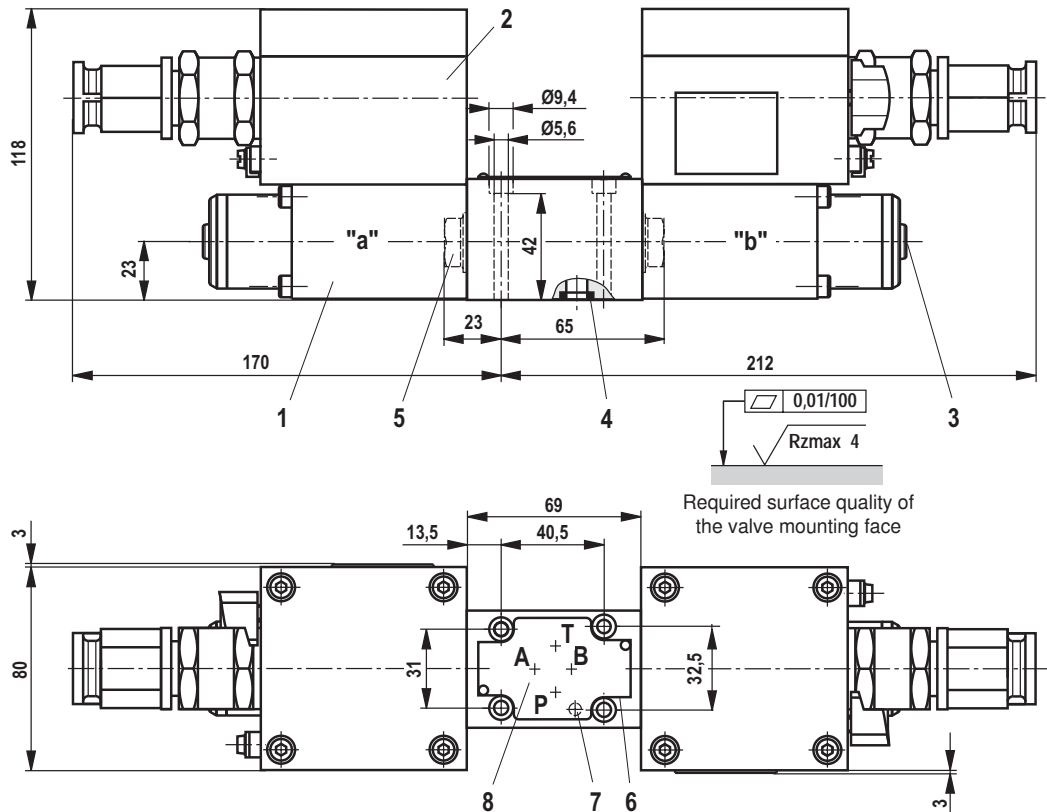
Characteristic curve selection

Control spool symbol	Direction of flow					
	P - A	P - B	A - T	B - T	B - A	P - T
A, B	3	3	-	-	-	-
C	1	1	3	1	-	-
D, Y, Y2	5	5	3	3	-	-
E	3	3	1	1	-	-
F	1	3	1	1	-	-
T	10	10	9	9	-	8
H	2	4	2	2	-	9
J, Q	1	1	2	1	-	-
L	3	3	4	9	-	-
M	2	4	3	3	-	-
P	3	1	1	1	-	-
R	5	5	4	-	7	-
V	1	2	1	1	-	-
W	1	1	2	2	-	-
U	3	3	9	4	-	-
G	6	6	9	9	-	8
B9	11	11	-	-	-	-
B9 SO9	12	11	-	-	-	-
H19	14	14	13	13	15	-
J19	14	-	16	13	-	-
X36A	17	-	18	19	-	-
D9	8	20	8	15	-	-
E41	20	20	8	8	-	-



Unit dimensions (dimensions in mm)

Valve with manual override "N"



- 1 Solenoid
- 2 Terminal box
- 3 Manual override "N"
- 4 Identical seal rings for ports P, A, B, T
- 5 Plug screw for valves with one solenoid
- 6 Name plate
- 7 Receiving hole for locating pin according to ISO 4401-03-02-0-05, locating pin, mat. no. **R900005694** (must be ordered separately)
- 8 Porting pattern according to ISO 4401-03-02-0-05

Subplates

- | | |
|-------------------------|-----------------------|
| (without locating hole) | G 341/01 FE/ZN (G1/4) |
| | G 342/01 FE/ZN (G3/8) |
| | G 502/01 FE/ZN (G1/2) |
| (with locating hole) | G 341/60 FE/ZN (G1/4) |
| | G 342/60 FE/ZN (G3/8) |
| | G 502/60 FE/ZN (G1/2) |

with dimensions as in the data sheet 45052 (must be ordered separately)

Important:

Subplates are no components in the sense of directive 94/9/EC and can be used after the manufacturer of the overall system has assessed the risk of ignition.

The G...FE/ZN versions are free from aluminum and/or magnesium and galvanized.

Valve mounting screws

For reasons of stability, exclusively use the following valve mounting screws:

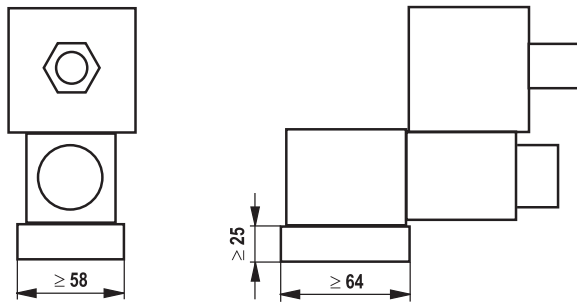
4 hexagonal socket head cap screws
ISO 4762-M5x50-10.9-fZn-240h-L
(friction coefficient 0.09 – 0.14 according to VDA 235-101)
Material no. **R913000064** (must be ordered separately)

Installation conditions (dimensions in mm)

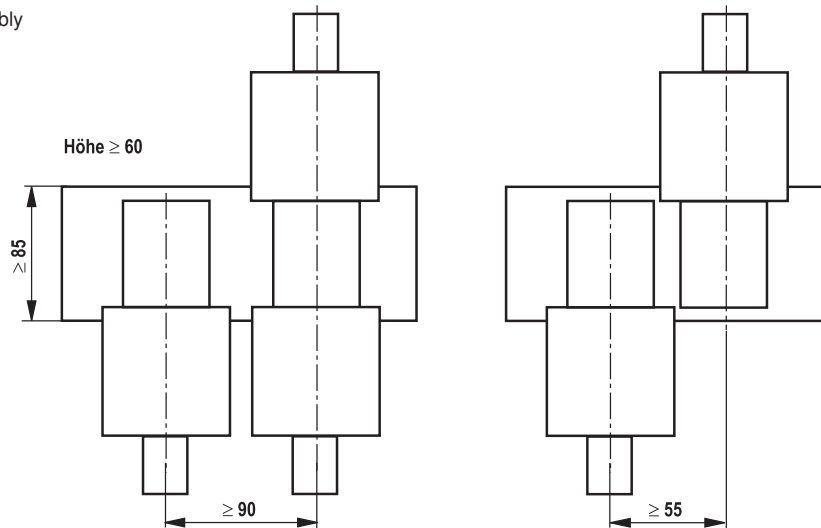
	Individual assembly	Bank assembly
Subplate dimensions	Minimum dimensions Length ≥ 64 , width ≥ 58 , height ≥ 25	Minimum cross-section Height ≥ 60 , width ≥ 85
Heat conductivity of the subplate	≥ 38 W/mK (EN-GJS-500-7)	
Minimum distance between the longitudinal valve axes	See schematic diagram below	

Schematic diagram

Individual assembly



Bank assembly



Important:

In case of bank assembly, only one solenoid of all valves may be energized at a time.

Notes

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