

Electric Drives
and Controls

Hydraulics

Linear Motion and
Assembly Technologies

Pneumatics

Service

Rexroth
Bosch Group

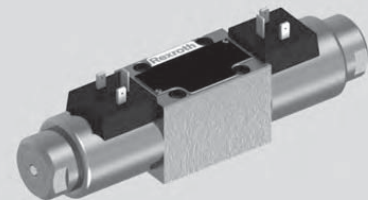
1/12

4/3, 4/2 and 3/2 directional valves with wet-pin DC solenoids

RE 23178-XN-B2/08.12
Replaces: 04.10

Type WE 6 ../E..XN...

Size 6
Component series 6X
Maximum operating pressure 350 bar
Maximum flow 80 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: **II 3G; II 3D**
- Type of protection of the valve solenoid
Ex nA IIC T3 Gc according to EN 60079-15:2010 and
Ex tc IIIC T140°C Dc IP65 according to EN 60079-31:2009

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-XN-B2
- Part III Product-specific instructions 23178-XN-B3

Operating instructions 23178-XN-B0

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

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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 10)
- Wet-pin DC solenoids
- Solenoid coil rotatable by 90 °
- Electrical connection as individual connection with connector according to EN 175301-803, design A
- With manual override, optional

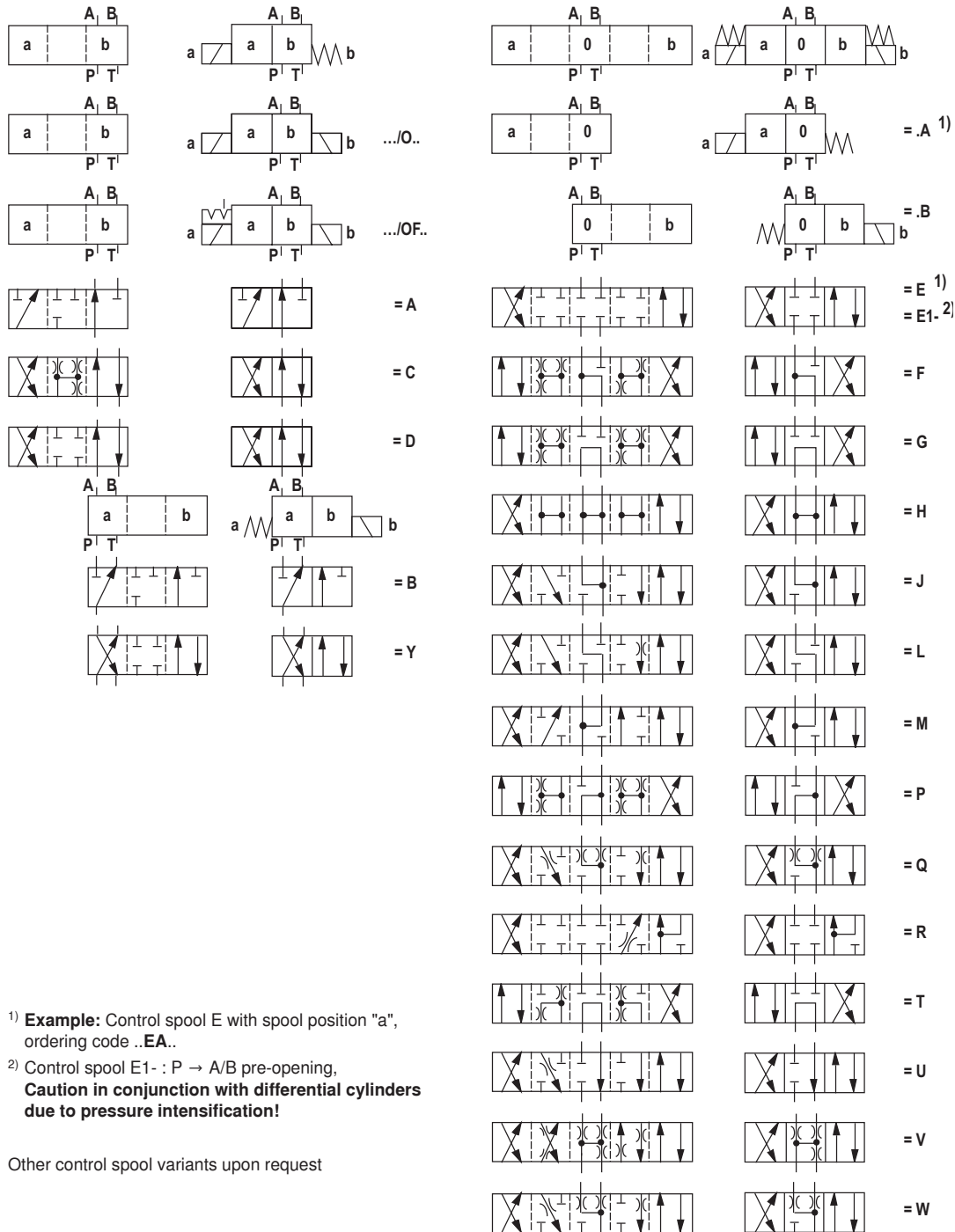
Ordering code and scope of delivery

	WE	6	6X/	E	G24	XN	K4/	
3 main ports	= 3							
4 main ports	= 4							
Size		= 6						
Control spool symbol e.g. C, E, EA, EB etc. possible version 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, wet-pin, with detachable valve solenoid				= E				
Direct voltage 24 V					= G24			
With manual override (standard)						= N9		
Without manual override						= no code		
								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
								K4 = Solenoid without mating connector For details see chapter Electrical connection
								XN = Explosion protection "Non-sparking", 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) Control spool E1- : P → A/B pre-opening, **Caution in conjunction with differential cylinders due to pressure intensification!**

Other control spool variants upon request

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...XN... (only possible with control spool 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... XN... (impulse spool, only possible with control spool 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.

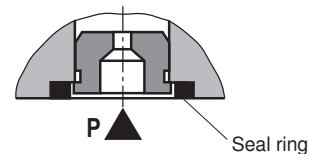
Important:

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.

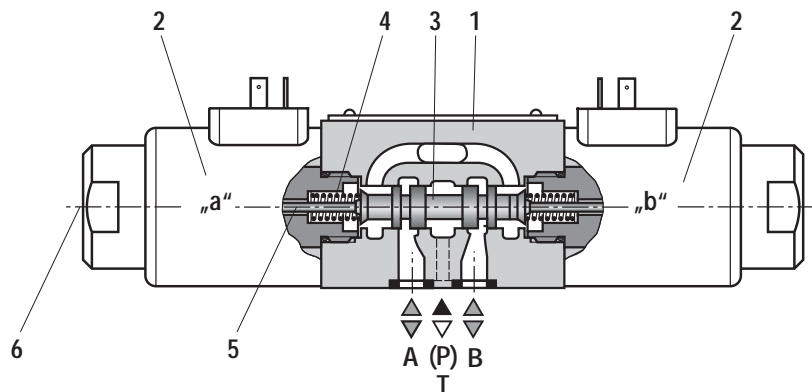
The tank line must not be allowed to run empty. With corresponding installation conditions, a preload valve (preload pressure approx. 2 bar) must be installed.

Throttle insert (valve type 4WE 6 ..6X/...XN../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/...E..XNK4...



Technical data

general

Installation position		Any
Ambient temperature range	°C	-20... +50
Storage temperature range	°C	+15... +30
Admissible vibration load		20 ... 2000 Hz amplitude 0.05 g ² /Hz (10 g RMS)
Weight	with 1 solenoid	kg 2.3
	with 2 solenoids	kg 2.85
Surface protection		Galvanically coated

hydraulic

Maximum operating pressure	Port A, B, P	bar	350
	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	80
Flow cross-section (spool position 0)	Control spool Q		Approx. 6 % of the nominal cross-section
	Control spool 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 RE 90221); HETG (rape seed oil) ¹⁾ ; HEPG (polyglycols) ²⁾ ; HEES (synthetic esters) ²⁾ ; Flame-resistant hydraulic fluid HFC according to ISO 12922 ³⁾ ; other hydraulic fluids on request, ignition temperature > 190 °C
Hydraulic fluid temperature range		°C	-20 ... +80 (for NBR seals) ⁴⁾
			-15 ... +80 (for FKM seals) ⁴⁾
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 ⁵⁾

¹⁾ Suitable for NBR **and** FKM seals

²⁾ Suitable **only** for FKM seals

³⁾ Only in connection with NBR seals, max. admissible pressure 210 bar, $\Delta p < 15$ bar, hydraulic fluid temperature max. 60 °C
More information is available from our sales staff.

⁴⁾ Observe the "Special conditions for safe use" on page 7.

⁵⁾ 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 life cycle of the components. For the selection of the filters see www.boschrexroth.com/filter.

Technical data

electric

Voltage type		Direct voltage (DC)
Nominal voltage	V	24
Voltage tolerance	%	±10
Admissible residual ripple	%	< 5
Duty cycle / operating mode according to VDE 0580		100 % / S1 (continuous operation)
Switching times according to ISO 6403	On	ms 25 ... 45
	Off	ms 10 ... 25
Switching frequency	1/h	up to 15000
Nominal power at ambient temperature 20 °C	W	23
Maximum power with 1.1 x nominal voltage and ambient temperature 20 °C	W	28.8
Protection class according to EN 60529		IP 65 ¹⁾

¹⁾ If suitable mating connectors are used (protection class at least IP 65) and in case of appropriate assembly.

Information on the explosion protection

Area of application as per directive 94/9/EC	II 3G	II 3D
Type of protection of the valve solenoid according to EN 60079-15: 2006 / EN 61241-1: 2007	Ex nA IIC T3 Gc	Ex tc IIIC T140 °C Dc IP65
Maximum surface temperature ¹⁾	°C 140	140
Type examination certificate Solenoid	BVS 12 ATEX E 062 X	
Type of protection Valve	c (EN 13463-5:2011)	
Special conditions for safe use	<ul style="list-style-type: none"> - Connection lines must be passed in a pull-relieved way. - The valve is to be installed so that no impact stresses > 4 J can take effect. - In order to avoid dangers caused by static charging, the base and/or subplate on which the valve is to be fitted must be electrically conductive and included in the equipotential bonding. - The valve solenoid must not be installed close to charge-generating processes. - Dust layers with a thickness > 50 mm are not admissible. - In case of valves with two solenoids, maximally one of the solenoids may be energized at a time. - Maximum hydraulic fluid temperature: In case of bank assembly, as long as only one solenoid is energized at a time, and in case of individual assembly: +80 °C In case of bank assembly when more than one solenoid is energized at a time: +65 °C - The maximum temperature of the valve casing surface is 110 °C. This has to be considered when selecting the connection cable and/or contact of the connection cable with the casing surface is to be prevented. 	
Ambient temperature range	°C -20 ... +50	
Requirements on the mating connector		
Temperature at the connector of the valve solenoid	°C ≥ 100	
Area of application as per directive 94/9/EC	II 3G; II 3D	
Protection class in plugged condition	IP 65	

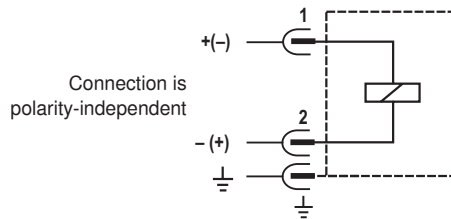
¹⁾ Surface temperature > 50 °C, provide contact protection

Electrical connection

The valves are equipped with a plug-in connector according to EN 175301-803, design A.

Information on the suitability of mating connectors is available on page 7.

Circuit diagram



For protection of the valve solenoids, suitable measures are to be taken which limit the switch-off overvoltages to a maximum of 500 V.

Over-current 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 the fuse must match or exceed the short-circuit current of the supply source.

This fuse or protective motor switch may only be fitted outside the explosive area or must be of an explosion-proof design.

When an inductivity is switched off, a voltage peak results which may cause failures or damage in the connected control electronics.

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 EN 60127-1: 2011
G24	24 V DC	0.95 A DC	1 A

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

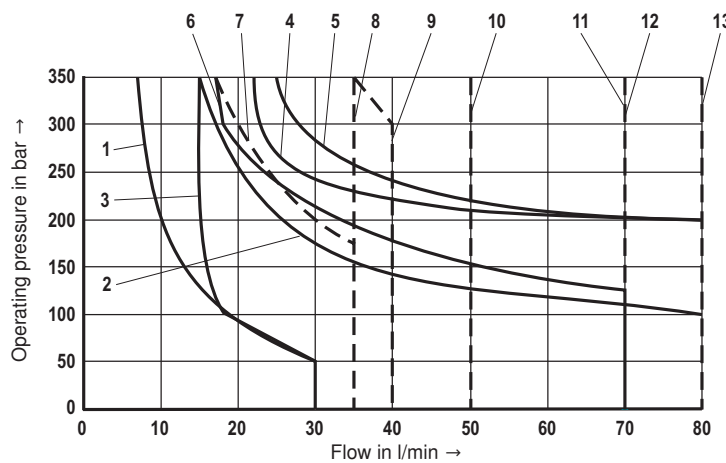
Important:

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

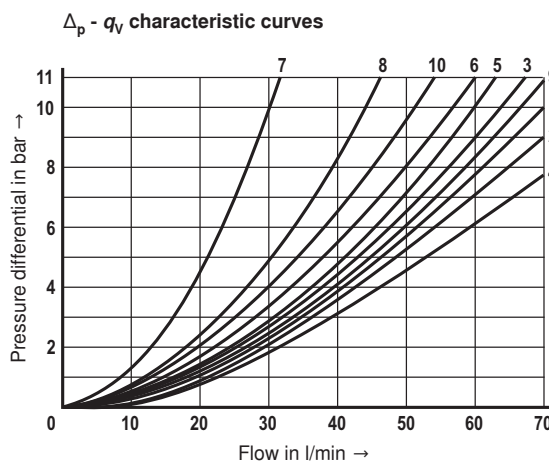
direction of flow (e.g. from P → A while port B is blocked)! (In such cases, please consult us.)

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



Control spool symbol	Characteristic curve
A,B	1
J,L,U	2
V	3
D,C,Y	4
Q,W	5
A/O, A/OF	6
F,P	7
T	8
G	9
H	10
D/OF, C/OF	11
M, D/O, C/O	12
E1, R, E	13

Characteristic curve (measured with HLP46, $\dot{v}_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$)

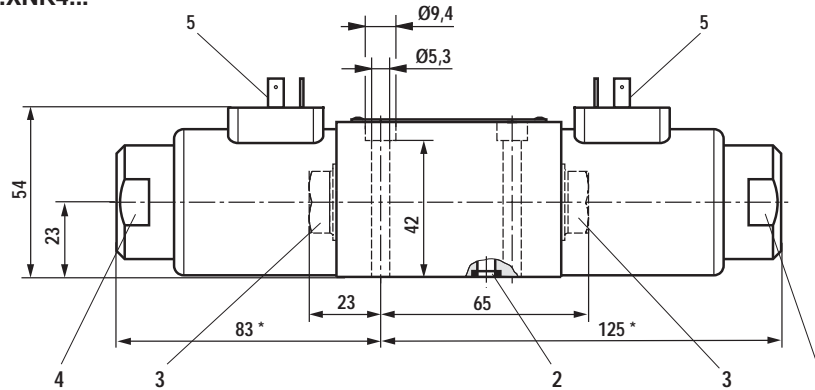


Characteristic curve selection

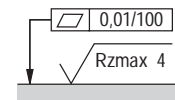
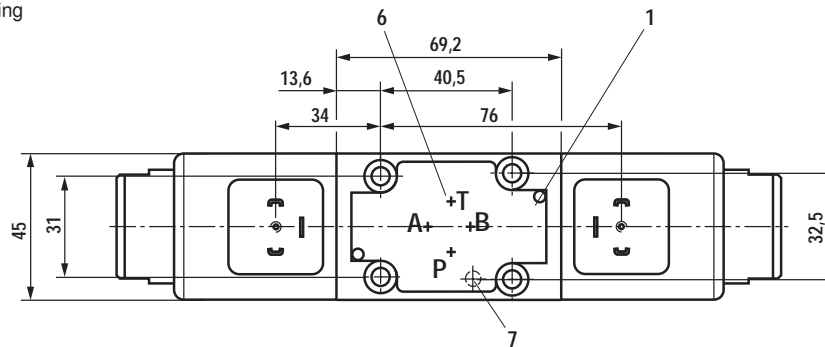
Control spool symbol	Direction of flow					
	P - A	P - B	A - T	B - T	B - A	P - T
A, B	3	3	-	-	-	-
C46, C	1	1	3	1	-	-
D46, D, Y	5	5	3	3	-	-
E	3	3	1	1	-	-
F	1	3	1	1	-	-
T	10	10	9	9	-	8
H	2	4	2	2	-	9
J, Q	1	1	2	1	-	-
L	3	3	4	9	-	-
M	2	4	3	3	-	-
P	3	1	1	1	-	-
R	5	5	4	-	7	-
V	1	2	1	1	-	-
W	1	1	2	2	-	-
U	3	3	9	4	-	-
G	6	6	9	9	-	8

Device dimensions (dimensions in mm)

Type 4WE 6 ...6X/...E..XNK4...



* Plus 50.5 mm for detaching the solenoid coil



Required surface quality of the valve contact surface

- 1 Name plate
- 2 Identical seal rings for ports A, B, P, T
- 3 Plug screw for valves with one solenoid
- 4 Mounting nut with double edge SW32
Tightening torque $M_A = 8 + 1 \text{ Nm}$
- 5 Plug-in connector according to EN 175301-803, design A
- 6 Porting pattern according to ISO 4401-03-02-0-05
- 7 Receiving hole for locating pin according to ISO 4401-03-02-0-05, (locating pin must be ordered separately, mat. no. **R900005694**)

Valve mounting screws

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

4 hexagon 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)

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.

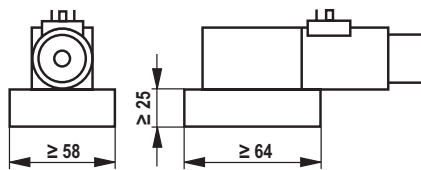
The G...FE/ZN versions are free from aluminum and/or magnesium and galvanized.

Installation conditions (dimensions in mm)

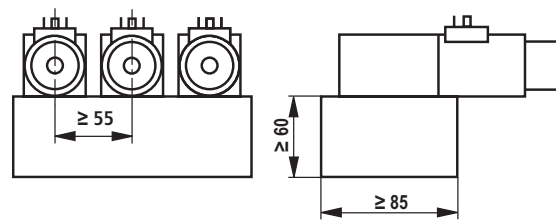
	Individual assembly	Bank assembly
Subplate dimensions	Minimum dimensions Length ≥ 64 , width ≥ 58 , height ≥ 25	Minimum cross-section Height ≥ 60 , width ≥ 85
Thermal conductivity of the subplate	≥ 38 W/mK (EN-GJS-500-7)	
Minimum distance between the longitudinal valve axes	≥ 55 mm	

Schematic diagram

Individual assembly



Bank assembly



Important:

With regard to the hydraulic fluid temperature, observe the "Special conditions for safe use" on page 7.

Notes

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