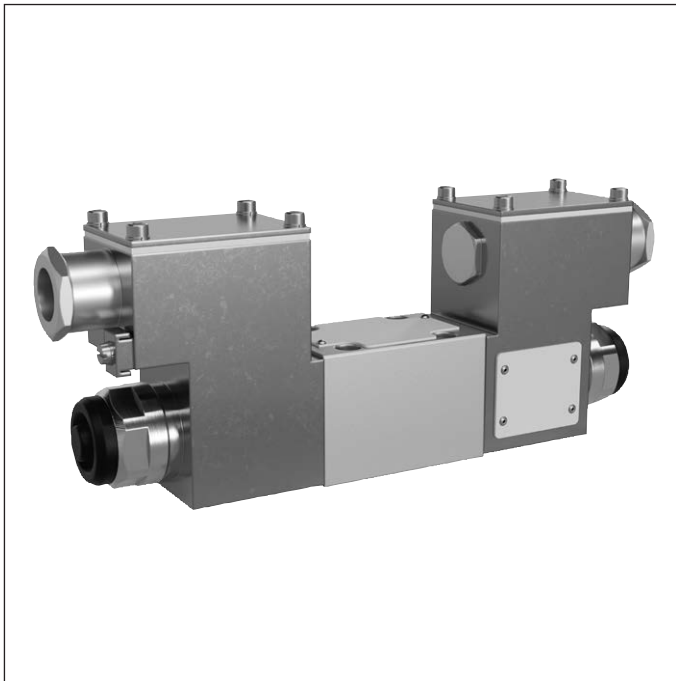


Directional spool valves, direct operated, with solenoid actuation

Type WE...VE1



- ▶ Size 6
- ▶ Component series 6X
- ▶ Maximum operating pressure 350 bar
- ▶ Maximum flow 70 l/min

Information on explosion protection


- ▶ Area of application of solenoid coil according to NEC 505: Class I, Zone 1
- ▶ Type of protection solenoid coil:
 - AEx e mb IIC T4 Gb according to ANSI/ISA 60079-7 and ANSI/ISA 60079-18

Features

- ▶ 4/3-, 4/2- or 3/2-way version
- ▶ For the intended use in potentially explosive atmosphere
- ▶ Porting pattern according to ISO 4401-03-02-0-05
- ▶ Wet-pin DC solenoids
- ▶ Solenoid coil is rotatable by 90°
- ▶ Electrical connection as single connection with pipe thread NPT 1/2"
- ▶ Manual override, optional

Contents

Features	1
Ordering code	2
Symbols	3
Function, section	4
Technical data	5, 6
Characteristic curves	7
Performance limits	8
Dimensions	9
Installation conditions	10
Electrical connection	11
Over-current fuse and switch-off voltage peaks	12
Further information	12

 **Notice:** The documentation version with which the product was supplied is valid.

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13
	WE	6		6X	/		E		VE1	Z2	/	

01	3 main ports	3
	4 main ports	4
02	Directional valve	WE
03	Size 6	6
04	Symbols; possible versions, see page 3	
05	Component series 60 ... 69 (60 ... 69: unchanged installation and connection dimensions)	6X
06	With spring return	no code
	Without spring return	O
	Without spring return with detent	OF
07	High-power solenoid, wet (wet-pin) with detachable coil	E
08	Direct voltage 24 V	G24
	Direct voltage 110 V	G110
09	With manual override	N
	Without manual override	no code

Explosion protection

10	"Increased safety"	VE1
	For details, see information on explosion protection, page 6	

Electrical connection

11	Individual connection	
	Solenoid with terminal box and adapter thread	Z2
	For details of electrical connections, see page 11	
12	Without throttle insert	no code
	Throttle Ø 0.8 mm	B08
	Throttle Ø 1.0 mm	B10
	Throttle Ø 1.2 mm	B12
	Use with flows which exceed the performance limit of the valve (see page 8)	

Seal material (observe compatibility of seals with hydraulic fluid used, see page 5)

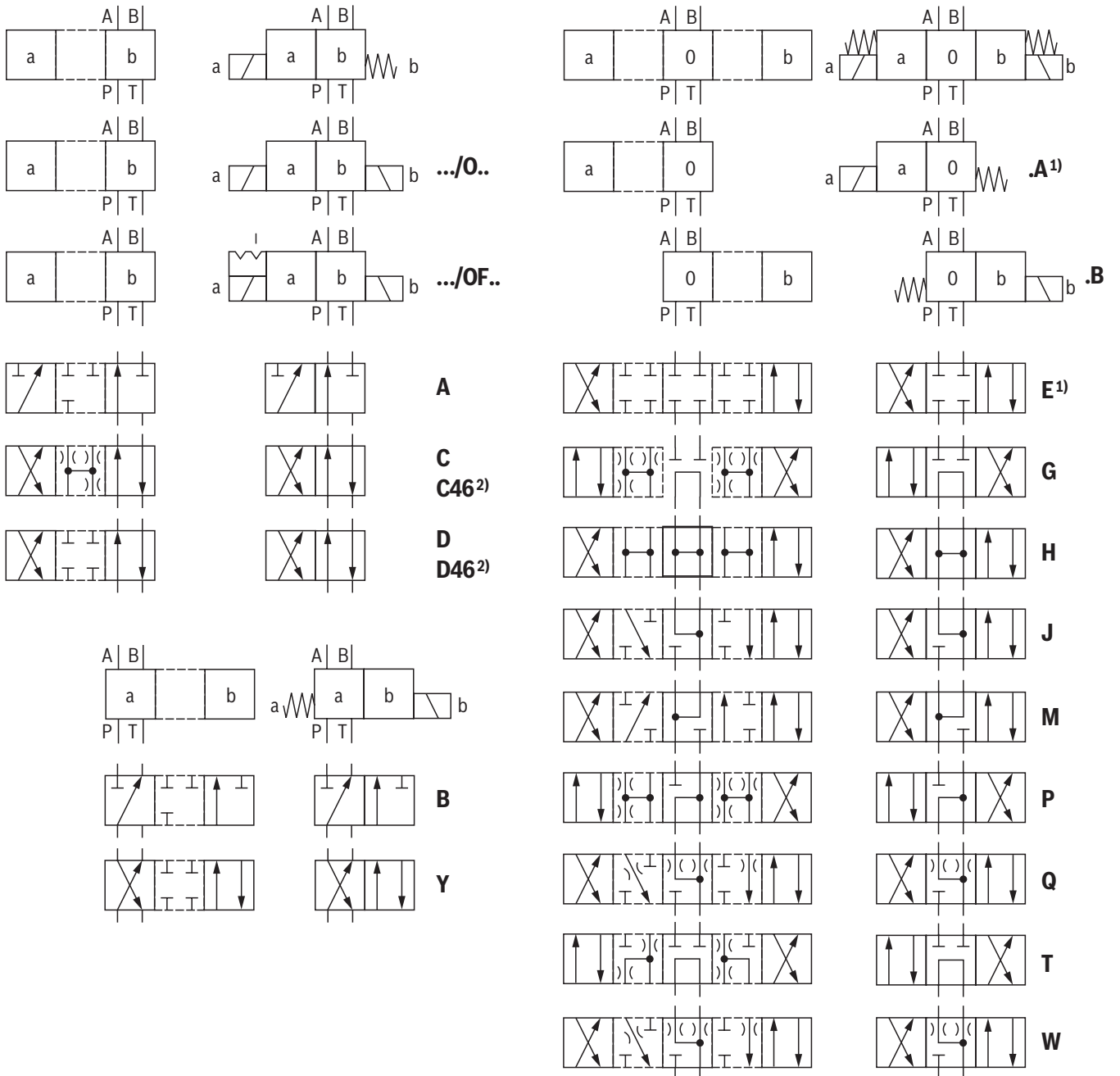
13	NBR seals	no code
	FKM seals	V




Notice:

The manual override cannot be allocated a safety function and may only be actuated up to a tank pressure of 50 bar.

Symbols



- 1) **Example:**
Symbol E with spool position "a" → ordering code **..EA..**
- 2) With version "OF.G110", only symbols C46 and D46 are possible.

 **Notice:**
Representation according to DIN ISO 1219-1.
Hydraulic interim positions are shown by dashes.

Function, section

The directional valves of type WE are solenoid-actuated directional spool valves. They control the start, stop and direction of a 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 spool). The control spool (3) is actuated by wet-pin solenoids (2).

For unobjectionable functioning, the hydraulic system has to be bled properly.

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-excited, the return spring (4) pushes control spool (3) back to its rest position.

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

Without spring return "O"

(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.

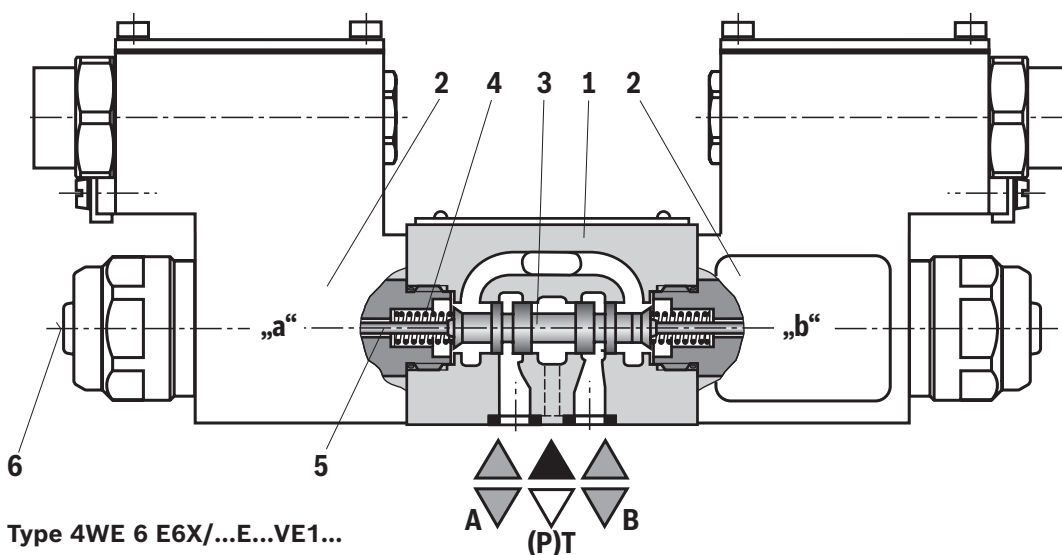
Without spring return, with detent "OF"

(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 spool positions and the solenoid therefore does not need to be permanently energized.

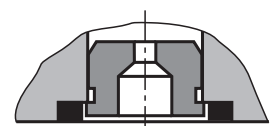
Notice:

- ▶ Pressure peaks in the tank line to two or several valves can result in unintended movements of the control spool in the case of version with detent. We therefore recommend that separate return lines be provided or a check valve installed in the tank line.
- ▶ Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.
- ▶ Please observe possible pressure conversion in the event of a differential cylinder. If pressure is led to the chamber on the piston side and the outflow of hydraulic fluid is blocked from the chamber on the rod side, it might lead to a pressure intensification and inadmissible high pressure on the rod side. It can damage cylinders, supply lines and connected valves.



Throttle insert

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.



Technical data

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

General	
Type of connection	Subplate mounting
Porting pattern	ISO 4401-03-02-0-05
Weight	▶ Valve with one solenoid kg 2.6
	▶ Valve with two solenoids kg 4.0
Installation position	any, preferably horizontal
Ambient temperature range	°C –20 ... +60 (NBR seals) –15 ... +60 (FKM seals)
Storage temperature range	°C 0 ... +40
Maximum storage time	Years 1
Protection class according to NEMA 250	NEMA TYPE 4 (if using a suitable and correctly mounted cable entry)
Maximum admissible acceleration a_{max}	g 10
Surface protection	galvanized

Hydraulic	
Maximum operating pressure	▶ Port P, A, B bar 350
	▶ Port T bar 210 With symbols A and B, port T must be used as a leakage oil connection.
Hydraulic fluid	see table below
Hydraulic fluid temperature range (at the working ports of the valve)	°C –20 ... +80 (NBR seals) –15 ... +80 (FKM seals)
Viscosity range	mm ² /s 2.8 ... 500
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)	Class 20/18/15 ¹⁾
Maximum flow	l/min 70
Flow cross-section (spool position 0)	▶ Symbol Q mm ² Approx. 6% of nominal cross-section
	▶ Symbol W mm ² approx. 3% of nominal cross-section

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP, HLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	ISO 15380	90221
		HEES		
	▶ Soluble in water	HEPG	ISO 15380	



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.

¹⁾ 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.

Technical data

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

Electrical			
Supply voltage	▶ Nominal value	VDC	24, 110
	▶ Voltage tolerance (nominal value)	%	±10
	▶ Maximum residual ripple	%	<5
Maximum power consumption		W	20.6
Nominal power according to VDE 0580		W	17
Relative duty cycle according to VDE 0580		%	S1 (continuous operation)
Switching time according to ISO 6403 ²⁾	▶ ON	ms	30 ... 55
	▶ OFF	ms	10 ... 15
Maximum switching frequency		1/h	15000

²⁾ The switching times were determined at a hydraulic fluid temperature of 40 °C and a viscosity of 46 cSt. Deviating hydraulic fluid temperatures can result in different switching times. Switching times change dependent on operating time and application conditions.

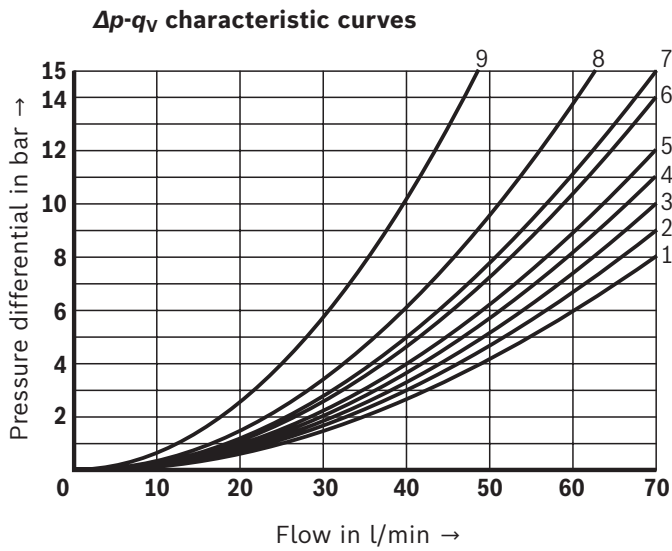
Information on explosion protection	
Area of application of solenoid coil according to NEC 505	Class I, Zone 1
Maximum surface temperature	°C 115
Temperature class	T4
Type of protection of solenoid coil according to ANSI / ISA 60079-7 and ANSI / ISA 60079-18	AEx e mb IIC T4 Gb
FM certificate of solenoid coil	3044741

**Special application conditions for safe application:**

- ▶ Connection lines must be installed in a way which does not subject them to strain. The first mounting point must be within 150 mm of the cable and line entry.
- ▶ In case of valves with two solenoids, maximally one of the solenoids may be energized at a time.
- ▶ The maximum temperature of the valve casing surface is 115 °C. This has to be considered when selecting the connection cable and/or contact of the connection cable with the surface of the jacket is to be prevented.
- ▶ A rigid pipe connection (RMC "Rigid metal conduit") is not admissible directly on the valve. A flexible pipe system (LFMC "Liquid-tight flexible metal conduit") must be used to prevent any transverse or longitudinal forces acting on the valve.

Characteristic curves

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



Symbol	Direction of flow			
	P - A	P - B	A - T	B - T
A, B	5	5	-	-
C, C46	3	3	5	3
D, D46, Y	6	6	5	5
E	5	5	3	3
G	7	7	4	4
H	2	1	2	2
J, Q	3	3	2	3
M	2	1	5	5
P	5	3	3	3
T	8	8	4	4
W	3	3	2	2

4 Symbol "H" in central position P - T

9 Symbol "G" and "T" in central position P - T

Performance limits

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

Notice:

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

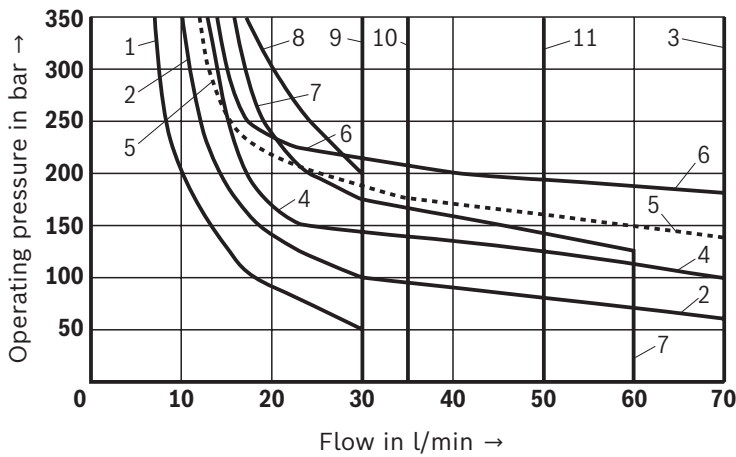
Due to the flow forces acting within the valves, the admissible performance limit may be considerably

lower with only one direction of flow (e.g. from P to A while port B is blocked).

In such use cases, please consult us!

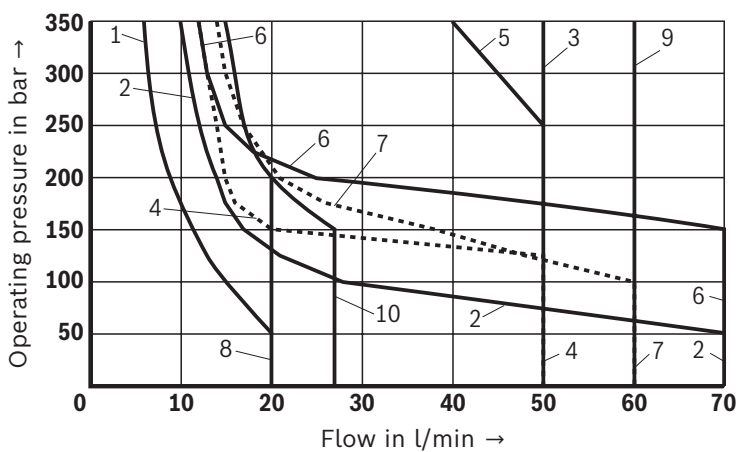
The performance limits were determined when the solenoids were at operating temperature, at 10% undervoltage and without tank preloading.

Version "G24"



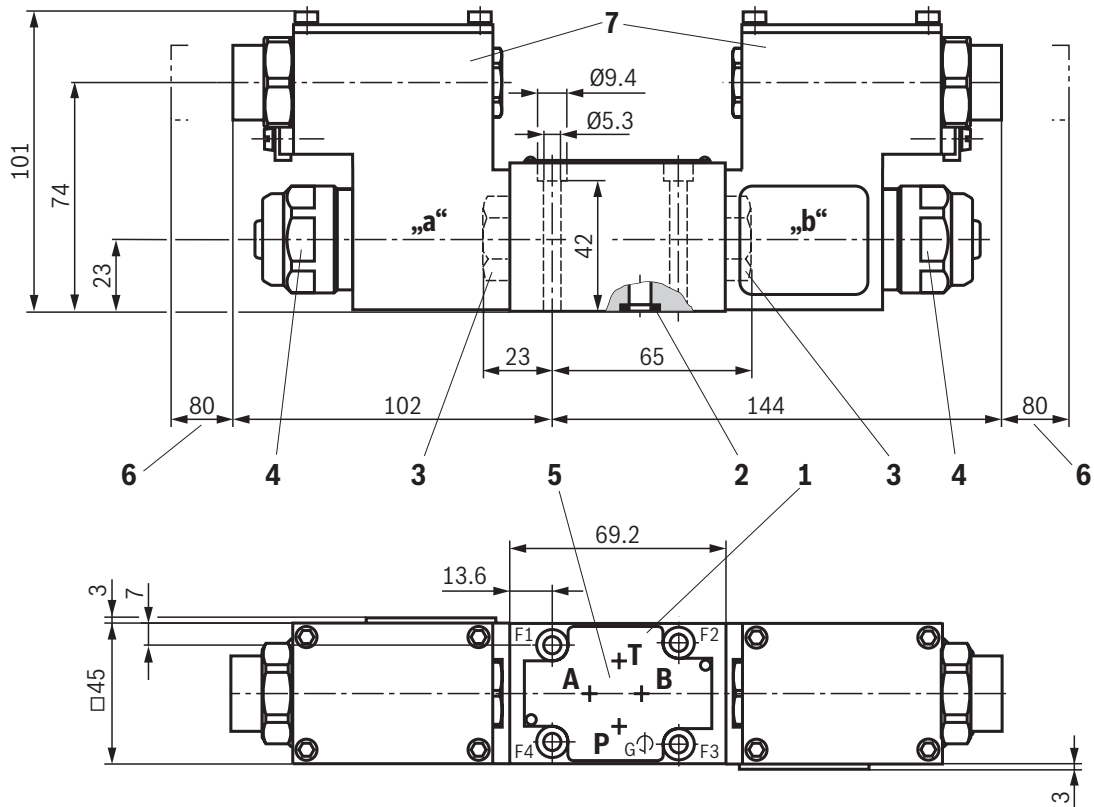
Characteristic curve	Symbol
1	A, B
2	J
3	M
4	D, C, Y
5	Q, W
6	E, C/O, C/OF, D/OF
7	A/O, A/OF
8	P
9	T
10	G
11	H, D/O

Version "G110"



Characteristic curve	Symbol
1	A, B
2	J, Q, W
3	H
4	D, C, Y
5	C46/OF, D46/OF
6	E
7	A/O
8	P, T
9	M, D/O, C/O
10	G

Dimensions (dimensions in mm)



0.01/100

Rz1max 8

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 hexagon SW32
- 5 Porting pattern according to ISO 4401-03-02-0-05
- 6 Space required to remove the solenoid coil
- 7 Terminal box

Valve mounting screws (separate order)

Only use valve mounting screws with the subsequently listed thread diameters and strength properties. Observe the screw-in depth.

4 hexagon socket head cap screws

ISO 4762 - M5 x 50 - 10.9

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

Tightening torque $M_A = 7 \text{ Nm} \pm 10\%$,

Material no. **R913043758**

Subplates (separate order) with porting pattern according to

ISO 4401-03-02-0-05, see data sheet 45100.



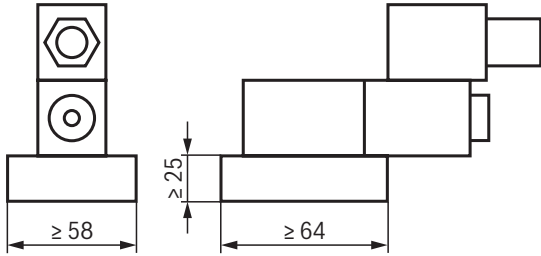
Notice:

The dimensions are nominal dimensions which are subject to tolerances.

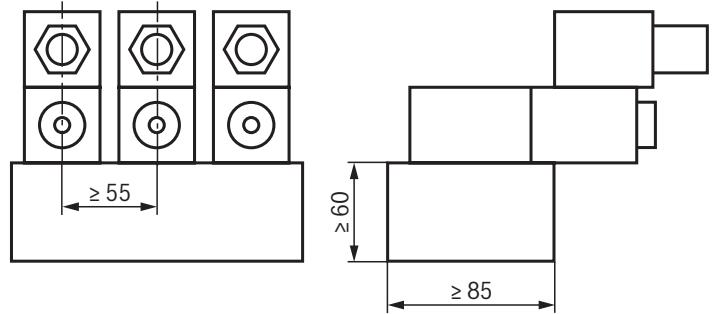
Installation conditions (dimensions in mm)


	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	≥ 36.2 W/mK	
Minimum distance between the longitudinal valve axes	≥ 55	

Individual assembly



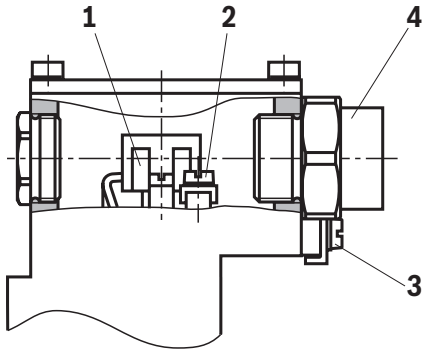
Bank assembly



 **Notice:**

Observe the "Special application conditions for safe application" on page 6.

Electrical connection



Notice:

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

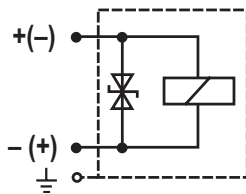
Properties of the connection terminals and mounting elements

Position	Function	Connectable line cross-section
1	Operating voltage connection	single-wire 0.75 ... 2.5 mm ² finely stranded 0.75 ... 1.5 mm ²
2	Connection for protective grounding conductor	single-wire max. 2.5 mm ² finely stranded max. 1.5 mm ²
3	Connection for potential equalization conductor	single-wire max. 6 mm ² finely stranded max. 4 mm ²
4	Adapter with internal thread NPT1/2"	

Connection line

Line type	non-armored and non-shielded connection lines
Temperature rating	°C ≤-20 ... ≥+100

Direct voltage, polarity-independent



Notice:

Only use finely stranded conductors if they have pressed-on wire end ferrules.

Over-current fuse and switch-off voltage peaks

Voltage data in the valve type code	Nominal voltage valve solenoid	Rated current valve solenoid	Rated current for external miniature fuse: Quick-acting (F) according to		Rated voltage of external miniature fuse: Quick-acting (F) according to		Maximum voltage value when switching off	Interference protection circuit
			IEC 60127	UL 248-14	IEC 60127	UL 248-14		
G24	24 VDC	0.708 ADC	800 mA	1 A	250 V	250 V	-90 V	Suppressor diode bi-directional
G110	110 VDC	0.155 ADC	200 mA	200 mA	250 V	250 V	-390 V	



Notice:

Time current characteristic of the external miniature fuse: Quick-acting (F) according to IEC 60127 and UL 248-14.



Notice:

Corresponding to the rated current, a fuse according to IEC 60127 and UL 248-14 has to be connected upstream of every solenoid coil (6.3 x 32 mm). The shut-off threshold of the fuse has to match the prospective short-circuit current of the supply source. The prospective short-circuit current of the supply source may amount to a maximum of 1500 A.

This fuse may only be installed outside the potentially explosive atmospheres or must be of an explosion-proof design. When inductivities are switched off, voltage peaks result which may cause faults in the connected control electronics. For this reason, the solenoid coils comprise an interference protection circuit which dampens this voltage peak to the voltage value shown in the table.

Further information

- ▶ Subplates
- ▶ Hydraulic fluids on mineral oil basis
- ▶ Environmentally compatible hydraulic fluids
- ▶ Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)
- ▶ Directional spool valves, direct operated, with solenoid actuation
- ▶ Information on available spare parts

Data sheet 45100
 Data sheet 90220
 Data sheet 90221
 Data sheet 90223
 Operating instructions 23178-VE1-B
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.