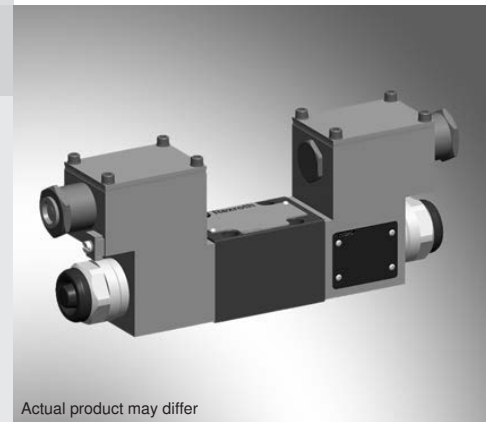


# Directional spool valves, direct operated, with solenoid actuation

**RE 23178-VE1-B1/03.15****Type WE ...VE1...**

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



Actual product may differ

**For explosive areas****Part I Data sheet****Information on explosion protection:**

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

**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 two parts:

Part I	Data sheet 23178-VE1-B1	<b>Operating instructions 23178-VE1-B0</b>
Part II	Product-specific instructions 23178-VE1-B2	

For further information on the correct handling of Rexroth hydraulic products, refer to Data sheet 07800 "General product information on hydraulic products".

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## Features

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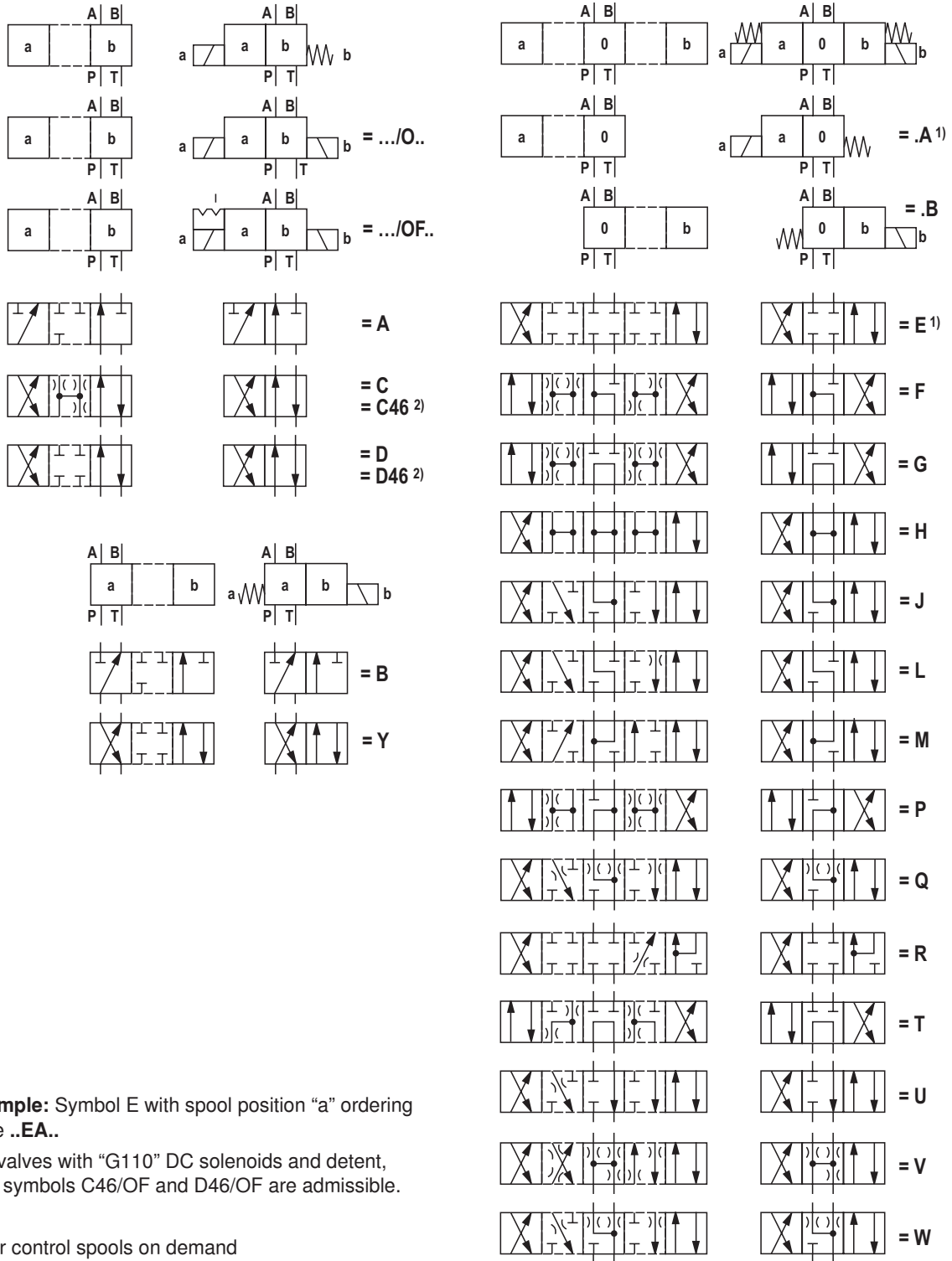
- 4/3-, 4/2- or 3/2-way version
- For proper use in explosive atmospheres
- Porting pattern according to ISO 3/2/4401-0-05
- Subplates available in FE/ZN version (see page 12)
- Wet-pin DC solenoids
- Solenoid coil can be rotated by 90°
- Electrical connection as a single connection with pipe thread NPT 1/2"
- Manual override, optional

## Ordering code and scope of delivery

	WE	6	6X /	E	VE1	Z2 /	
3 main ports							<b>No code =</b> NBR seals <b>V =</b> FKM seals <b>Note:</b> Observe compatibility of seals with hydraulic fluid used.
= 3							
4 main ports							<b>No code =</b> Without throttle insert <b>B08 =</b> Throttle Ø 0.8 mm <b>B10 =</b> Throttle Ø 1.0 mm <b>B12 =</b> Throttle Ø 1.2 mm Use if flow > performance limit of the valve, effective in channel P
= 4							
Size 6							<b>Electrical connection</b> <b>Z2 =</b> Solenoid with terminal box and cable gland, For details see chapter Electrical connection
= 6							
Symbols e.g. C, E, EA, EB, etc; possible versions, see page 4							<b>VE1 =</b> "Increased Safety" explosion protection, For details, see information on explosion protection page 7
Component series 60 to 69 (60 to 69: unchanged installation and connection dimensions)							
Spring return							
= no code							
Without spring return							
= O							
without spring return with detent							
= OF							
High-power solenoid wet-pin, with detachable solenoid coil							
= E							
Direct voltage 24 V							
= G24							
Direct voltage 110 V							
= G110							
<b>With</b> manual override (standard)							
= N							
<b>without</b> manual override							
= no code							

**Note:** Valve operating instructions included in the scope of delivery.

# Symbols



1) **Example:** Symbol E with spool position "a" ordering code **..EA..**  
 2) For valves with "G110" DC solenoids and detent, only symbols C46/OF and D46/OF are admissible.

Further control spools on demand

## Function, section

Directional valves of type WE are solenoid operated 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, the 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 (2).

**To ensure proper functioning, make sure that the pressure chamber of the solenoid is filled with oil.**

The force of the solenoid (2) acts via the plunger (5) on the control spool (3) and pushes the latter from its rest position to the required end position. This enables the required 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 the control spool (3) back to its rest position.

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

**Type 4WE 6.. 6X/O...VE1...** (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... VE1...** (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 positions and the solenoid therefore does not need to be permanently energized.

### Note:

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

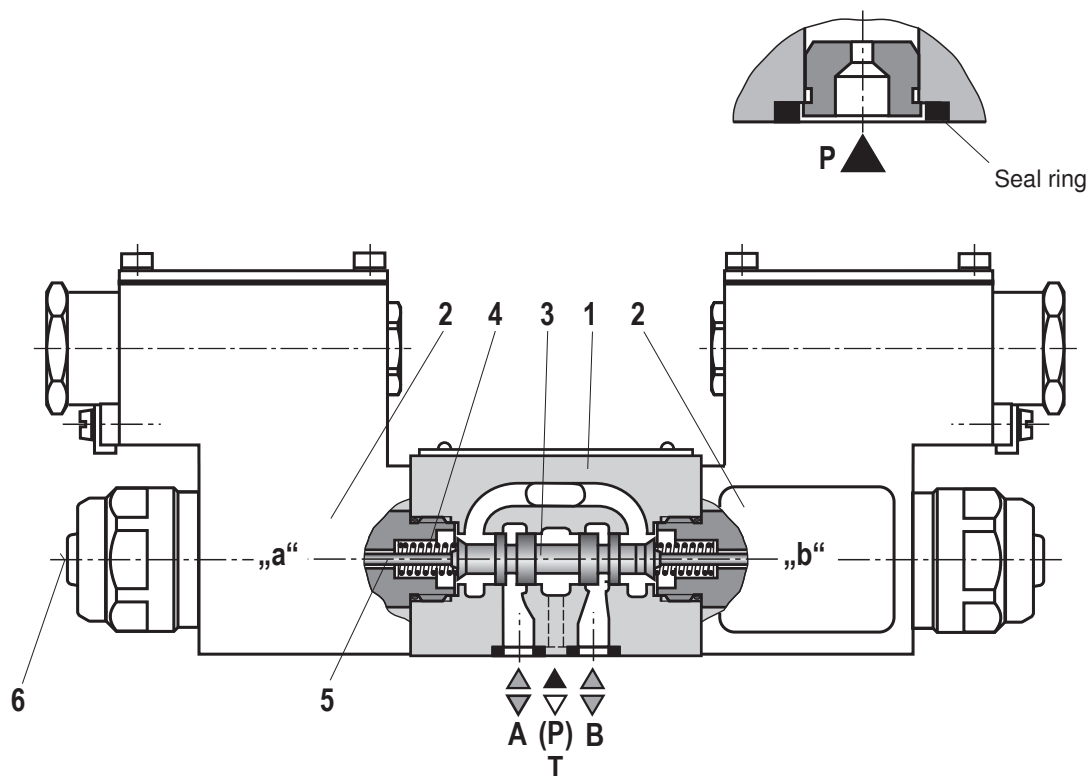
**Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.**

**Prevent the tank pipe from running dry. With corresponding installation conditions, a preload valve (preload pressure approx. 2 bar) must be installed.**

**Throttle insert** (type 4WE 6..6X/...VE1../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..NVE1Z2...

## Technical data

### General

Installation position	any
Ambient temperature range	-20 ... +60
Storage temperature range	+15 ... +30
Admissible vibration load	20 ... 2000 Hz amplitude 0.05 g <sup>2</sup> /Hz (10 g RMS)
Weight	2.6 (with 1 solenoid); 4.0 (with 2 solenoids)
Surface protection	Galvanic coating

### Hydraulic

Maximum operating pressure	Port A, B, P	bar	350	With symbols A and B, port T must be used as the leakage oil connection if the operating pressure exceeds the admissible tank pressure.
	Port T	bar	210	
Maximum flow		l/min	70	
Flow cross-section (Spool position 0)	with symbol Q		approx. 6% of nominal cross-section	
	with symbol W		approx. 3 % of nominal cross-section	
Hydraulic fluid	See table below			
Hydraulic fluid temperature range		°C	-20 ... +80 (NBR seals)	
			-15 ... +80 (FKM seals)	
Viscosity range		mm <sup>2</sup> /s	2.8 ... 500	
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)	Class 20/18/15 <sup>1)</sup>			

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	FKM	

#### Important information on hydraulic fluids:

– For more information and data about the use of other hydraulic fluids, 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.)!
- Ignition temperature of the hydraulic fluid used > 180 °C

<sup>1)</sup> 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](http://www.boschrexroth.com/filter).

## Technical data

<b>Electric</b>			
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	30 ... 55
	OFF	ms	10 ... 15
Maximum switching frequency	1/h		15000
Nominal power at ambient temperature 20 °C	W		17
Maximum power at 1.1 x nominal voltage and ambient temperature 20 °C	W		20.6
Protection class according to NEMA 250			NEMA TYPE 4 <sup>2)</sup>

<sup>2)</sup> If the electrical connection is correctly installed

## Information on explosion protection

Area of application according to NEC 505			Class I, Zone 1
Maximum surface temperature <sup>3)</sup>	°C		135
Temperature class			T4
Type of protection of the valve solenoid according to ANSI / ISA 60079-7 ANSI / ISA 60079-18			AEx e mb IIC T4 Gb
FM certificate			3044741
Ambient temperature range	°C		-20 ... +60
Special conditions for safe use			The maximum temperature of the valve casing surface is 125 °C. This must be considered when selecting the connection cable or to prevent the connection cable from coming into contact with the casing surface.

<sup>3)</sup> Surface temperature > 50 °C, provide contact protection

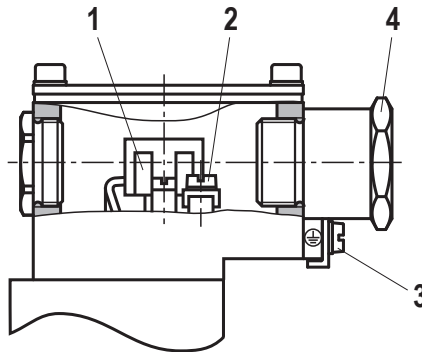
## Electrical connection

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

The connection is polarity-independent.

### Note

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



### Properties of the connection terminals and mounting elements

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

### Connection line

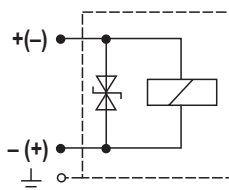
Line type	<b>non-armored</b> cables and lines (outer sheath sealing)
Temperature range	°C -20 ... > +100



## Electrical connection

### Circuit diagram

Direct voltage, polarity-independent



### Overcurrent fuse and switch-off voltage peaks

#### Note:

Corresponding to the rated current, a fuse according to IEC 60127 and/or UL 248-14 has to be connected upstream of every solenoid coil (max. 3 x Inom). 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 explosive area 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 valve solenoids contain an interference protection circuit which dampens this voltage peak to the voltage value shown in the table.

#### Prescribed external miniature fuses according to IEC 60127

Voltage data in the valve type code	Nominal voltage of valve solenoid	Rated current valve solenoid	Rated current (fuse)	Rated voltage (fuse)	Maximum voltage value upon switch-off	Interference protection circuit
G24	24 V DC	0.708 A DC	800 mA	250 V	-90 V	Suppressor diode bi-directional
G110	110 V DC	0.155 A DC	200 mA	250 V	-390 V	

**Note:** Time current characteristic of the external miniature fuse: Quick-acting (F) according to IEC 60127

#### Prescribed external miniature fuses according to UL 248-14

Voltage data in the valve type code	Nominal voltage of valve solenoid	Rated current valve solenoid	Rated current (fuse)	Rated voltage (fuse)	Maximum voltage value upon switch-off	Interference protection circuit
G24	24 V DC	0.708 A DC	1 A	250 V	-90 V	Suppressor diode bi-directional
G110	110 V DC	0.155 A DC	200 mA	250 V	-390 V	

**Note:** Time current characteristic of the external miniature fuse: Quick-acting (F) according to UL 248-14

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

**Note:**

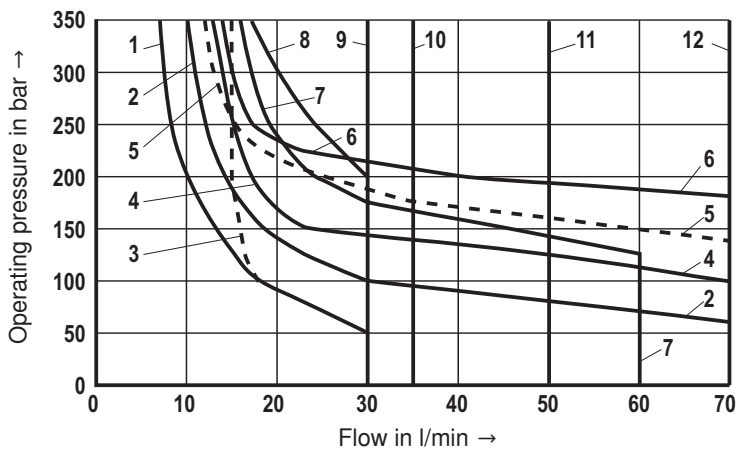
The stated switching power limits apply to operation with two directions of flow (e.g. from P → A and simultaneous return flow from B → T).

Due to the flow forces acting within the valves, the permissible switching power limits 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.)

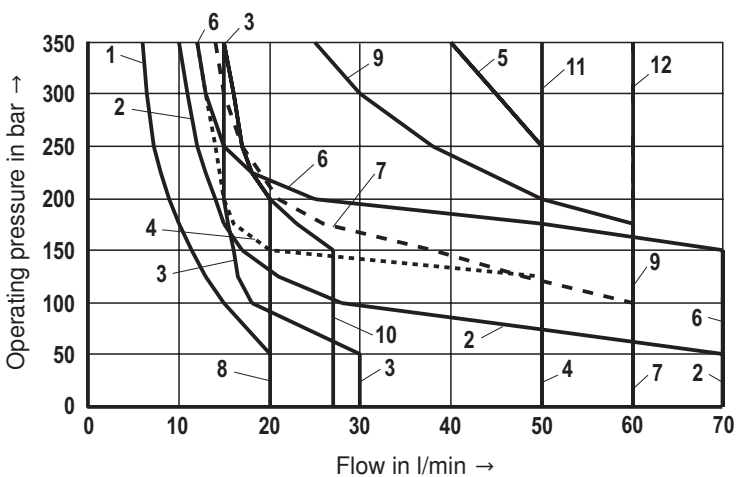
**The switching power limits were determined while the solenoids were at operating temperature, at 10% undervoltage and without tank pre-loading.**

**Valves with “G24” DC solenoids**



Characteristic curve	Symbol
1	A, B
2	J, L, U
3	V
4	D, C, Y
5	Q, W
6	E
7	A/O, A/OF
8	F, P
9	T
10	G
11	H, D/O
12	R <sup>1)</sup> , M

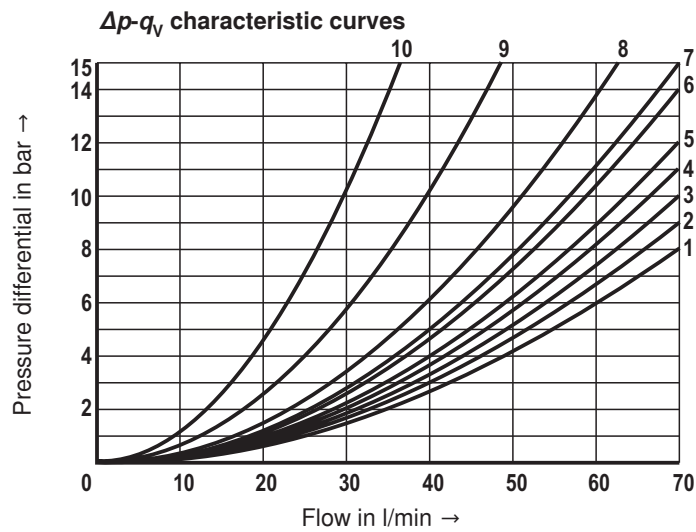
**Valves with “G110” DC solenoids**



Characteristic curve	Symbol
1	A, B
2	J, L, U, Q, W
3	V
4	D, C, Y
5	C46/OF, D46/OF
6	E
7	A/O
8	F, P, T
9	R <sup>1)</sup>
10	G
11	H
12	M, D/O, C/O

<sup>1)</sup> Return flow from actuator to tank

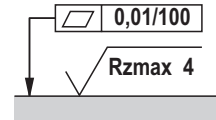
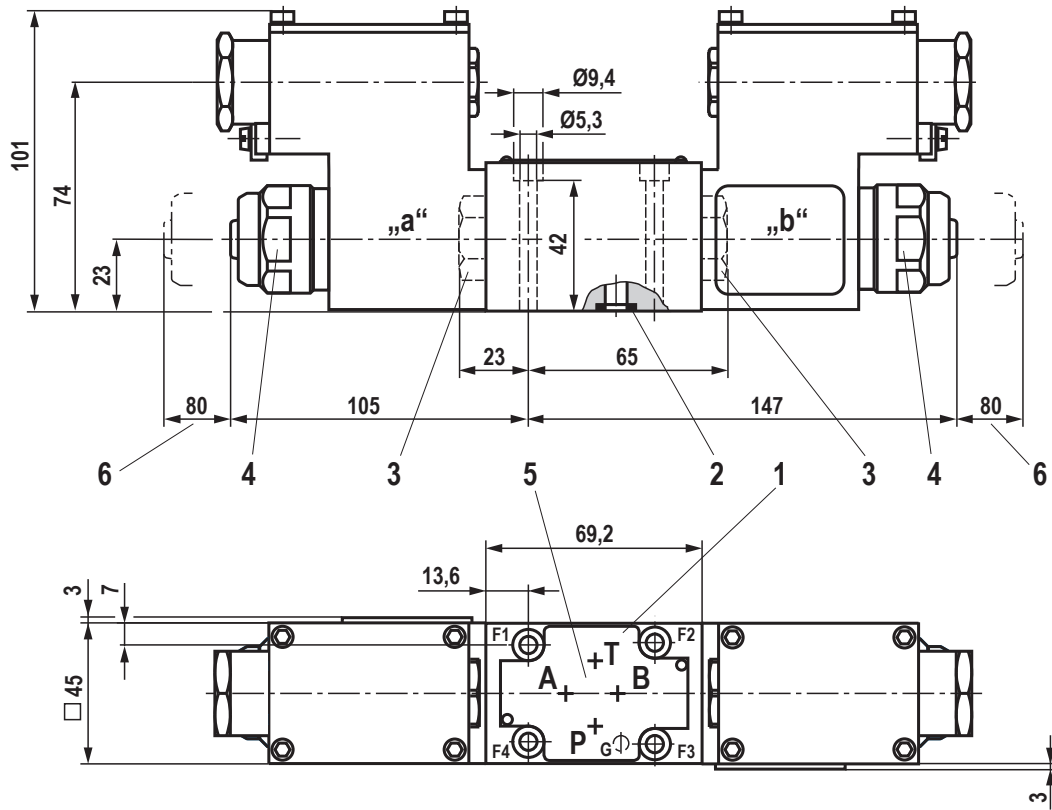
## Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ )



- 4 Symbol "H" in central position P – T
- 9 Symbols "G" and "T" in central position P – T
- 10 Symbol "R" in spool position B – A

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
F	3	5	3	3
T	8	8	4	4
H	2	1	2	2
J, Q	3	3	2	3
L	5	5	1	4
M	2	1	5	5
P	5	3	3	3
R	6	6	1	–
V	3	2	3	3
W	3	3	2	2
U	5	5	4	1
G	7	7	4	4

**Dimensions** (dimensions in mm)



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  
tightening torque  $M_A = 4+1 \text{ Nm}$
- 5 Porting pattern according to ISO 4401-03-02-0-05  
(with locating hole for locating pin ISO 8752-3x8-St,  
material no. **R900005694**, separate order)
- 6 Space required to remove the coil

**Subplates** (dimensions according to data sheet 45052 separate order)

<b>(Without</b> locating hole)	G 341/01 FE/ZN (G1/4)
	G 342/01 FE/ZN (G3/8)
	G 502/01 FE/ZN (G1/2)
<b>(With</b> locating hole)	G 341/60 FE/ZN (G1/4)
	G 342/60 FE/ZN (G3/8)
	G 502/60 FE/ZN (G1/2)

**Note:**

Subplates are not 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** (separate order)

For reasons of stability, exclusively the following valve mounting screws are to be used:

**4 hexagon socket head cap screws**

**ISO 4762-M5x50-10.9-fZn-240h-L**

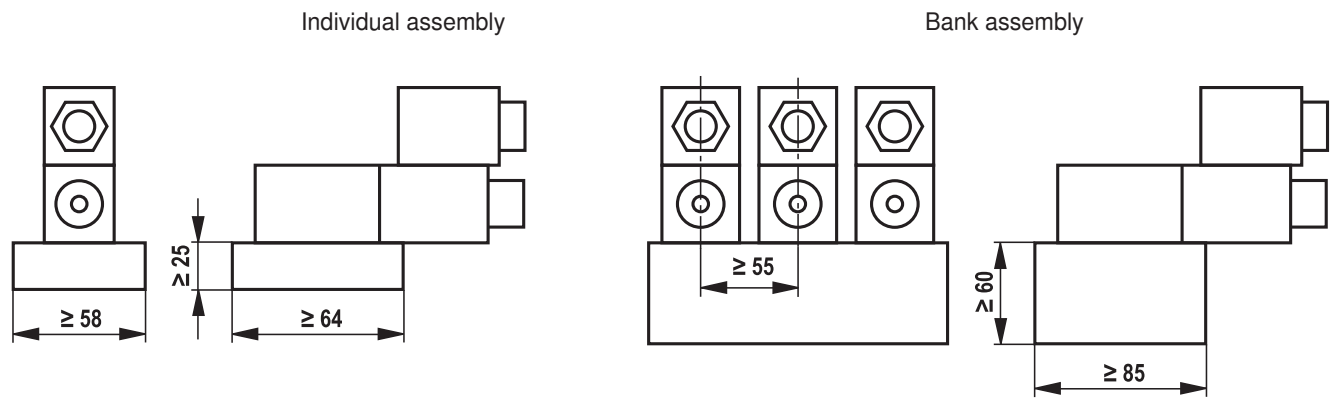
(friction coefficient 0.09 - 0.14 according to VDA 235-101)

Material no. **R913000064**

### Installation conditions (dimensions in mm)

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

### Schematic diagram



## Notes

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