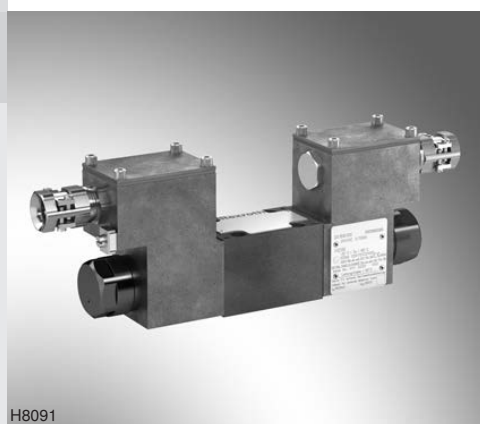


Proportional directional valve, direct operated, without electrical position feedback

RE 29055-XE/04.16
Replaces: 09.13

Type 4WRA ...XE

Size 6
Component series 2X
Maximum operating pressure 315 bar
Maximum flow 22 l/min



H8091

ATEX units – For potentially explosive atmospheres



Information on explosion protection:

- ▶ Area of application in accordance with the Explosion Protection Directive 2014/34/EU: **II 2G**
- ▶ Type of protection of the valve solenoids:
Ex eb mb IIC T4 Gb according to EN 60079-7 / EN 60079-18

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Features

- 4/2- or 4/3-way version
- For intended use in potentially explosive atmosphere
- Seawater-resistant
- Spring-centered control spool
- For subplate mounting
- Porting pattern according to ISO 4401-03-02-05 (but without locating hole)
- Wet-pin DC solenoids
- Solenoid coil rotatable by 90°
- Electrical connection as individual connection with cable gland

Function, section

The 4/2 and 4/3 proportional directional valves are designed as direct operated valves in plate design. Operation is effected by means of proportional solenoids for potentially explosive areas. The solenoids are actuated by external control electronics.

Set-up:

The valve basically consists of:

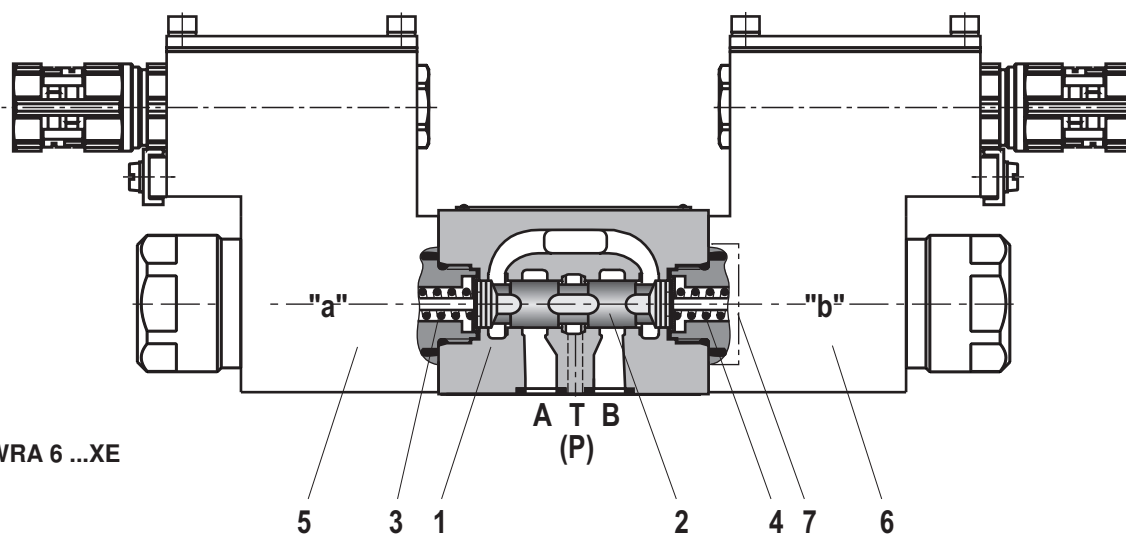
- Housing (1) with connection surface
- Control spool (2) with compression springs (3 and 4)
- Solenoids (5 and 6) with central thread

Functional description:

- With de-energized solenoids (5 and 6), central position of the control spool (2) by compression springs (3 and 4)
- Direct actuation of the control spool (2) by energization of a proportional solenoid
e. g. control of solenoid "b" (6)
 - Movement of the control spool (2) to the left proportionally to the electrical input signal
 - Connection from P → A and B → T via orifice-type cross-sections with progressive flow characteristics
- De-excitation of the solenoid (6)
 - The compression spring (3) brings the control spool (2) back into the central position

Notice:

Regarding the 4/3 version of the valves, only one solenoid may be actuated at a time.



Type 4WRA 6 ...XE

Valve with 2 spool positions (type 4WRA 6 .A...XEJ...):

The function of this valve version basically corresponds to the valve with three spool positions. The 2 spool position valves are, however, only equipped with solenoid "a" (5). Instead of the 2nd proportional solenoid, there is a plug screw (7).

Notice:

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.

Technical data

general

Installation position	Any; preferably horizontal		
Storage temperature range	°C	+5... +40	
Maximum storage time	Years	1 (see operating instructions 29055-XE-B)	
Ambient temperature range	°C	-20 ... +60	
Weight	4WRA 6...XE	kg	4.4
	4WRA 6...A...XE	kg	2.7
Surface protection	galvanized		

hydraulics

Maximum operating pressure	Ports P, A, B	bar	315
	Port T	bar	210
Rated flows $q_{v, rated}$ with $\Delta p = 10$ bar		l/min	6; 10; 18
Maximum flow		l/min	22
Hydraulic fluid	See table below		
Hydraulic fluid temperature range		°C	-20 ... +80 (NBR seals)
			-15 ... +80 (FKM seals)
Viscosity range		mm ² /s	20 ... 380 (preferably 30 ... 46)
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)	Class 17/15/12 ¹⁾		
Hysteresis		%	≤ 6
Response sensitivity		%	≤ 1
Range of inversion		%	≤ 2
Maximum surface temperature		°C	120

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable ²⁾	▶ Insoluble in water	HETG HEES	ISO 15380	90221
	▶ Soluble in water	HEPG		
Flame-resistant ²⁾	▶ Water-free	HFDU, HFDR	ISO 12922	90222
	▶ Containing water	HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620)	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 solenoid surface temperature.

▶ Flame-resistant – containing water:

- Maximum operating pressure 210 bar
- Maximum pressure differential per control edge 175 bar
- Pressure pre-loading at the tank port > 20% of the pressure differential, otherwise increased cavitation erosion
- Life cycle as compared to operation with mineral oil HL, HLP 50 ... 100%
- Maximum hydraulic fluid temperature 50 °C

- ▶ **Bio-degradable and flame-resistant:** If these hydraulic fluids are used which are also zinc-solvent, an accumulation of zinc may occur.

²⁾ Not recommended for version "J" with corrosion protection

Technical data

electric

Voltage type		Direct current or pulse-width modulated signal with a pulse voltage ≤ 28 V and a frequency ≥ 160 Hz up to max. 500 Hz
Type of signal		Analog
Maximum current per solenoid	A	1.03
Duty cycle	%	100
Maximum coil temperature	$^{\circ}\text{C}$	120

Information on explosion protection

Area of application according to directive 2014/34/EU		II 2G
Type of protection of valve according to EN 13463-1 / EN 13463-5		c T4 X
Type of protection valve solenoid according to EN 60079-7 / EN 60079-18		Ex eb mb IIC T4 Gb ¹⁾
Type examination certificate solenoid		KEMA 02ATEX2240 X
"IECEX Certificate of Conformity" solenoid		IECEX DEK 12.0068X
Special application conditions for safe application		<ul style="list-style-type: none"> - 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. - Only direct current or a pulse-width modulated signal with a pulse voltage ≤ 28 V and a frequency ≥ 160 Hz up to max. 500 Hz may be used for operation.

Control electronics ²⁾

Amplifier module for the control of explosion-proof proportional directional valves 4WRA...XE, 3DREP 6...XE and 4WRZ...XE		VT-MSPA2-200-1X/V0/0 according to data sheet 30228-200
Module for monitoring and limiting the solenoid currents with proportional valves		VT-MUXA2-2-1X/V0/1A according to data sheet 30290

¹⁾ Surface temperature > 50 $^{\circ}\text{C}$, provide contact protection.

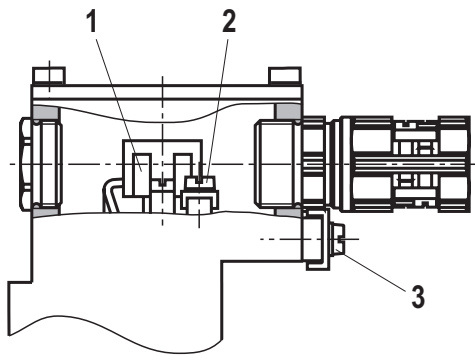
²⁾ **Notice:**

A monitoring circuit is to be provided for the monitoring of the solenoid current. We recommend operating the valves with the assemblies described herein.

Electrical connection

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

The connection is polarity-independent.



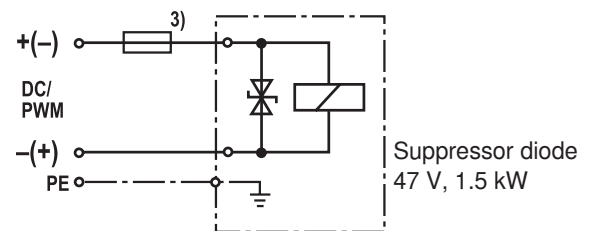
Notice:

A fuse which corresponds to the rated current according to DIN 41571 and EN / IEC 60127 has to be connected upstream of every valve solenoid (max. $3 \times I_{rated}$).

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 atmosphere or must be of an explosion-proof design.



³⁾ Recommended pre-fuse characteristics: medium time-lag according to DIN 41571, 1.25 A

Properties of the connection terminals

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 earthing conductor	Single-wire max. 2.5 mm ² Finely stranded max. 1.5 mm ²
3	Connection for potential equalization conductor	Single-wire 4 ... 6 mm ² Finely stranded 4 mm ²

Cable gland

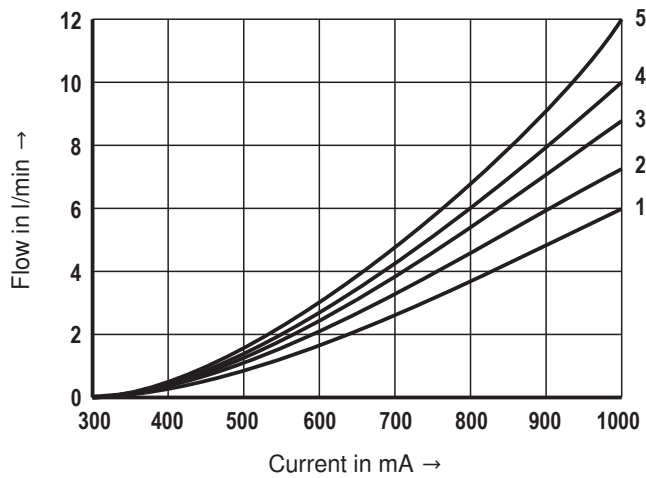
Type approval	II 2G Ex e IIC Gb
Threaded connection	M20 x 1.5
Protection class according to EN 60529	IP66 (With correctly installed electrical connection)
Line diameter	mm 7 ... 10.5
Sealing	Outer sheath sealing

Connection line

Line type	Non-armored cables and lines (outer sheath sealing)
Temperature range	°C -30 ... > +110

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

Ordering code 07: 6 l/min with 10 bar valve pressure differential

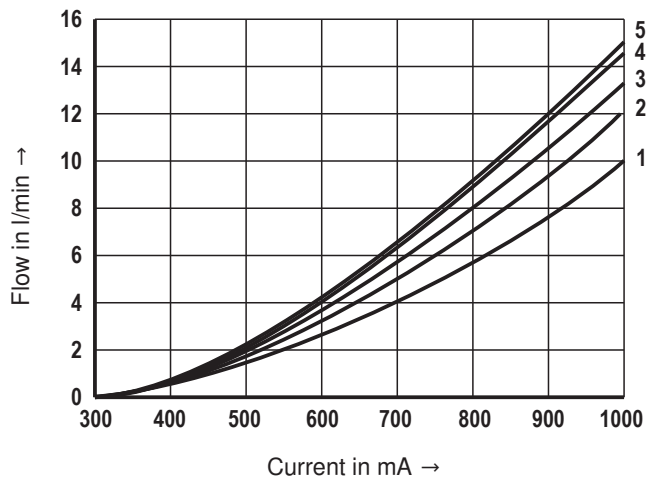


The following applies to all figures on this page:

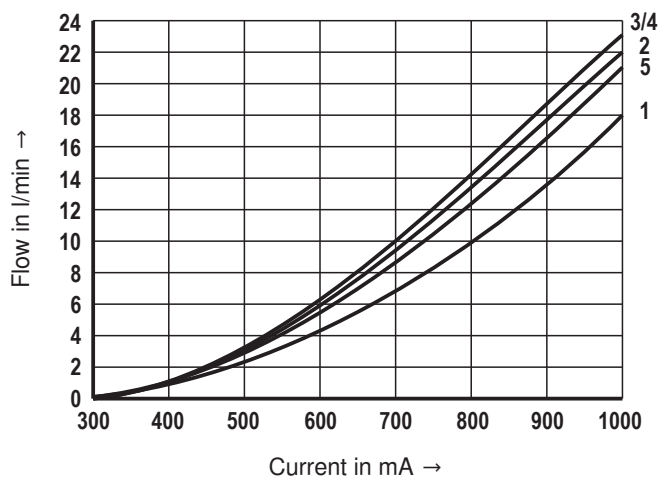
- 1 $\Delta p = 10$ bar constant
- 2 $\Delta p = 20$ bar constant
- 3 $\Delta p = 30$ bar constant
- 4 $\Delta p = 50$ bar constant
- 5 $\Delta p = 100$ bar constant

Δp = valve pressure differential according to DIN 24311 (inlet pressure minus load pressure and minus return flow pressure)

Ordering code 15: 10 l/min at a valve pressure differential of 10 bar



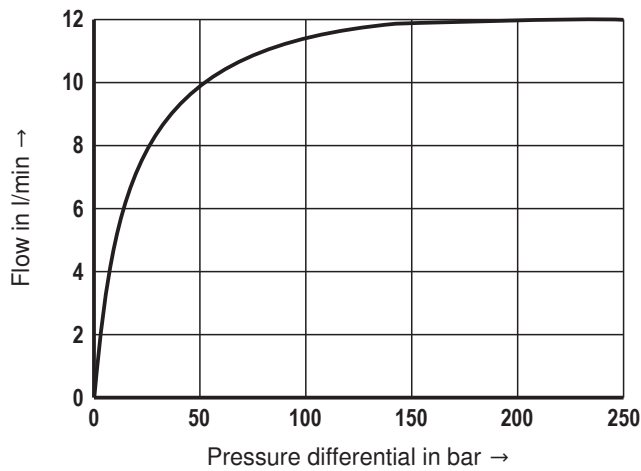
Ordering code 30: 18 l/min at a valve pressure differential of 10 bar



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

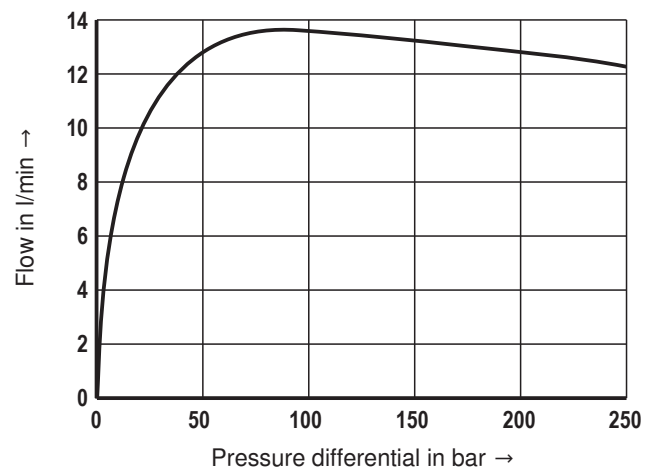
Performance limit

6 l/min rated flow



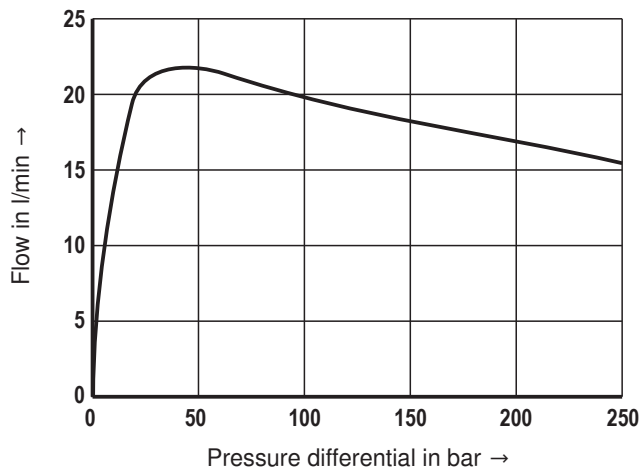
Performance limit

10 l/min rated flow

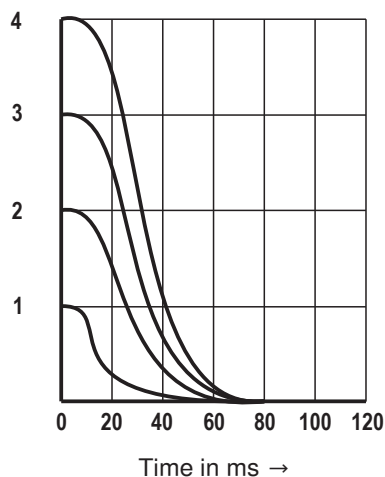
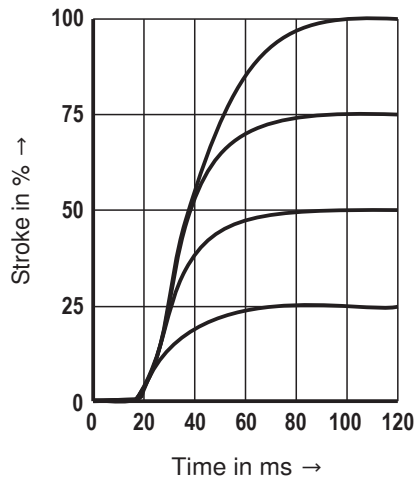


Performance limit

18 l/min rated flow



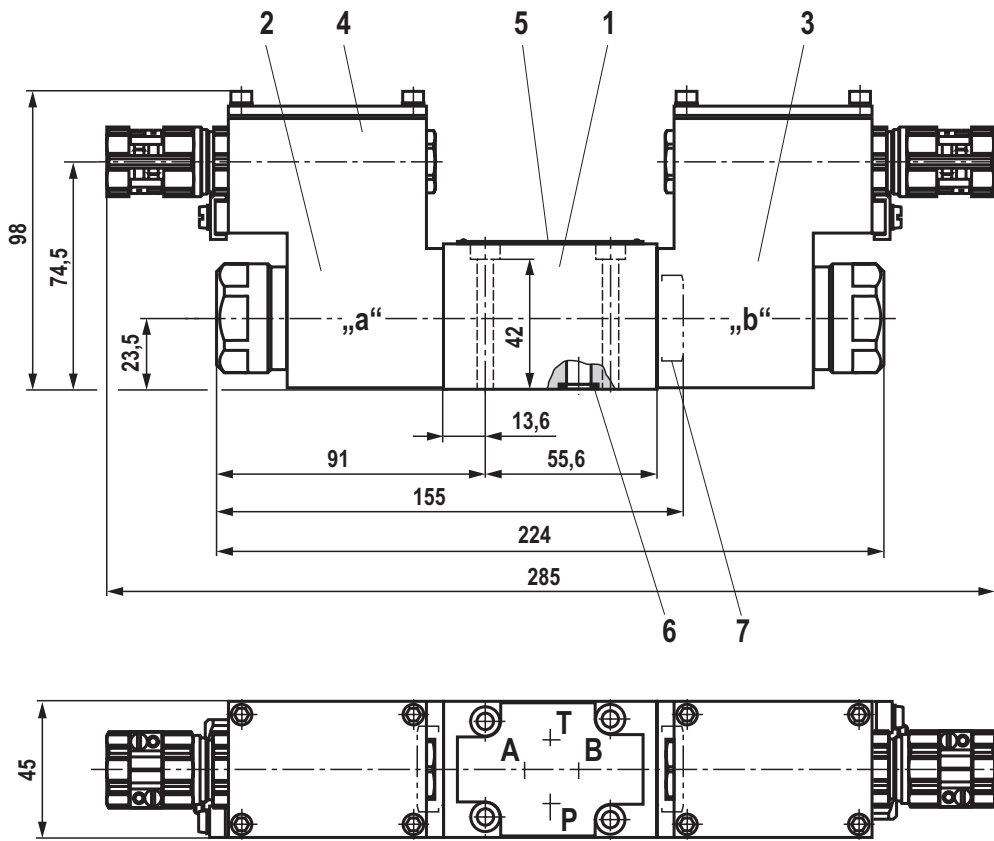
Transition function with stepped electric input signals



	Change of input signal [%]
1	0 → 25 → 0
2	0 → 50 → 0
3	0 → 75 → 0
4	0 → 100 → 0

measured with
pilot pressure $p_{ST} = 10 \text{ bar}$

Dimensions (dimensions in mm)



Required surface quality of the valve contact surface

- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4 Terminal box
- 5 Name plate
- 6 Identical seal rings for A, B, P and T
- 7 Plug screw for valve with one solenoid (2 spool positions, version EA or WA)
- 8 Porting pattern according to ISO 4401-03-02-0-05 (but without locating hole)

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

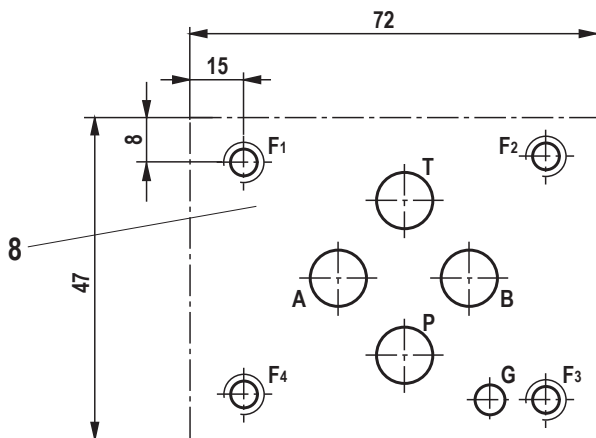
ISO 4762-M5x50-10.9-fIZn-240h-L

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

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

Material no. **R913000064**

Subplates (separate order) with porting pattern according to ISO 4401-03-02-0-05, see data sheet 45100.



Notice:

Subplates are no components in the sense of directive 2014/34/EU and can be used after the manufacturer of the overall system has conducted an assessment of the risk of ignition.

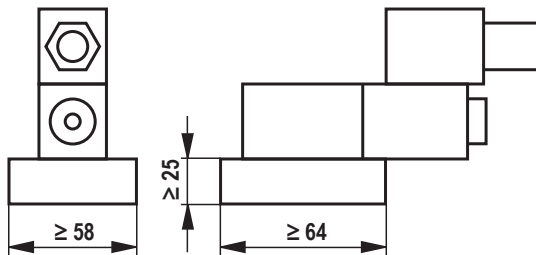
The "G...J3" versions are free from aluminum and/or magnesium and galvanized.

Installation conditions (dimensions in mm)

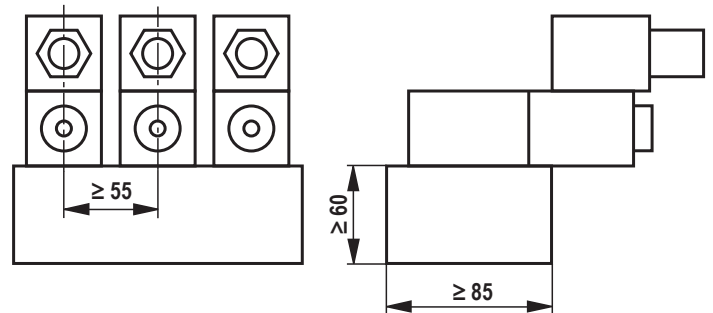
	Individual assembly	Bank assembly
Subplate dimensions	Minimum dimensions Length ≥ 64 , width ≥ 58 , height ≥ 25	Minimum cross-section Height ≥ 60 , width ≥ 85
Thermal conductivity of the subplate	≥ 38 W/mK (EN-GJS-500-7)	
Minimum distance between the longitudinal valve axes	≥ 55 mm	

Schematic diagram

Individual assembly



Bank assembly

**Notice:**

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