4/3, 4/2 and 3/2 directional valve with wet-pin DC or AC voltage solenoids

RE 23178/08.08 Replaces: 12.05

1/16

Type WE

Size 6 Component series 6X

Maximum operating pressure 350 bar [5076 psi]
Maximum flow: 80 l/min [21 US gpm] – DC
60 l/min [15.8 US gpm] – AC



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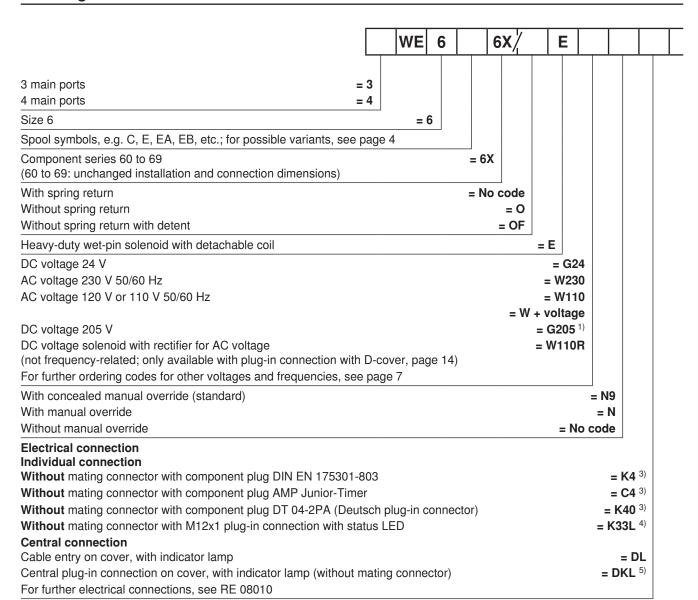
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Features

- Direct operated directional spool valve with solenoid actuation in high-performance version
- Porting pattern to DIN 24340 Form A (without locating bore)
- Porting pattern to ISO 4401-03-02-0-05 and NFPA T3.5.1 R2 D03 (with locating bore)
- Subplates, see data sheet RE 45052 (separate order)
- Wet-pin DC or AC voltage solenoids with detachable coil
- Solenoid coil can be rotated 90°
- The coil can be changed without having to open the pressure-tight chamber
- Electrical connection as individual or central connection
- Manual override, optional
- For smoothly switching variant, see RE 23183
- Inductive position switches and proximity sensors (contactless), see RE 24830
- For further electrical connections, see RE 08010

Information on available spare parts: www.boschrexroth.com/spc

Ordering code

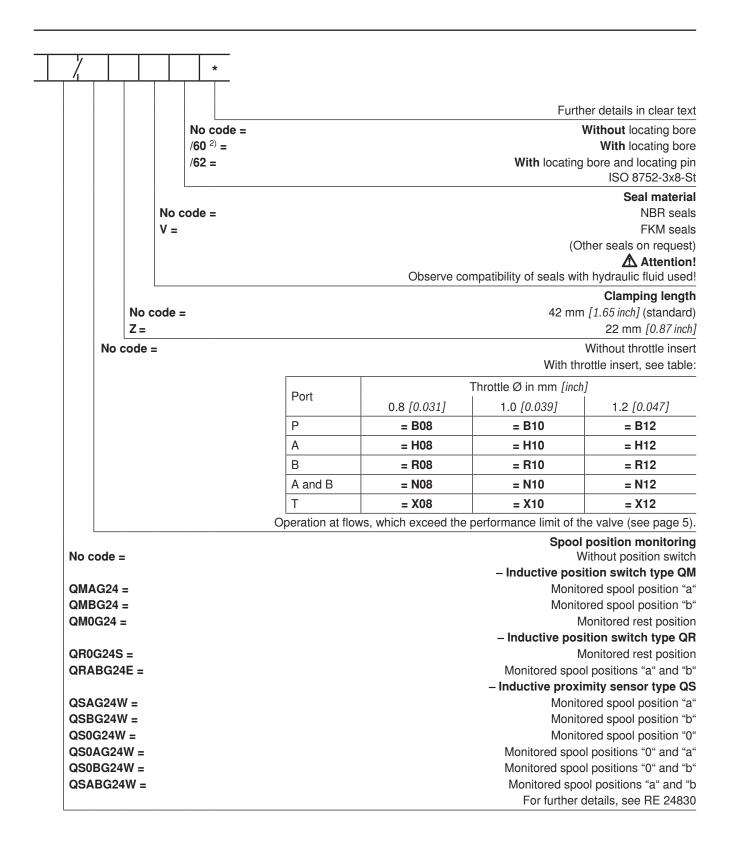


- 1) For the connection to AC voltage mains, a DC voltage solenoid **must** be used, which is controlled via a rectifier (see table below).
 - In the case of individual connection, a large mating connector with integrated rectifier can be used (separate order).
- ²⁾ Locating pin ISO 8752-3x8-St, Material no. **R900005694** (separate order)

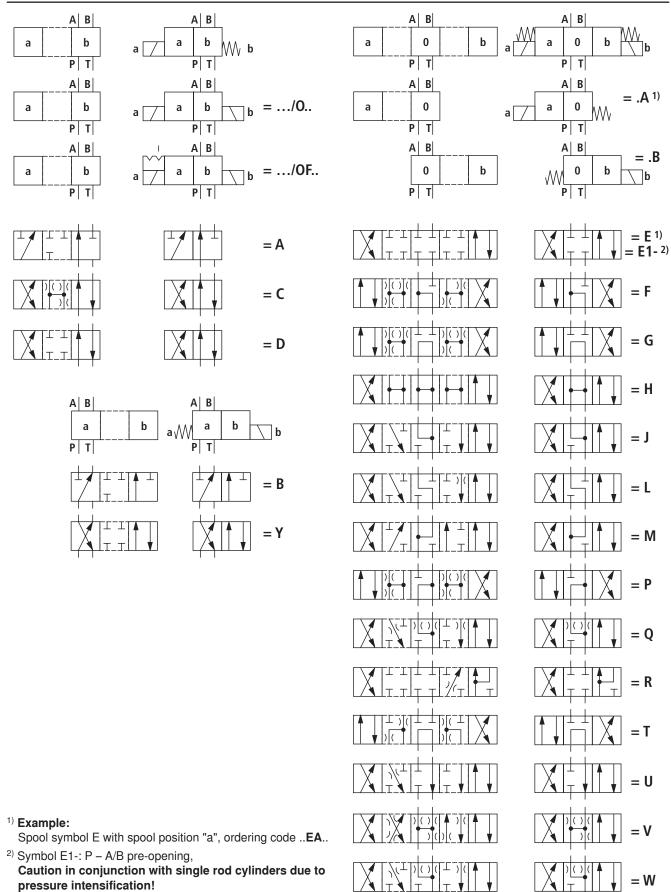
- ³⁾ Mating connectors, separate order, see page 16 and RE 08006.
- 4) Only version "G24", see RE 08010
- Mating connector, separate order, Material no. **R900005538**

AC voltage mains (permissible voltage tolerance ± 10%)	Nominal voltage of DC sole- noids when operated with AC voltage	Order- ing code
110 V - 50/60 Hz	96 V	G96
230 V - 50/60 Hz	205 V	G205

Standard types and components can be found in the EPS (standard price list).



Spool symbols



Function, section

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

These 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 by return springs (4) in the central position or in the initial position (except for impulse spool). Control spool (3) is actuated by wet-pin solenoids (2).

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

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 to A and B to T or P to B and A to T.

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

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

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

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

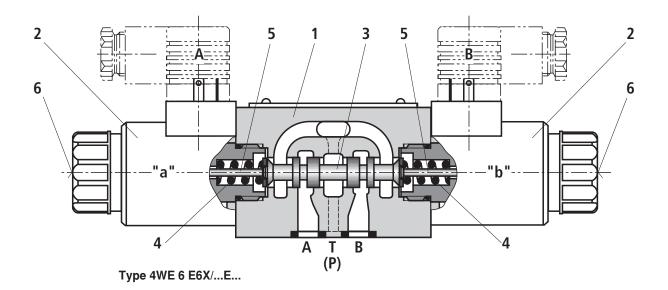
Type .WE 6 .6X/OF... (impulse spool, only possible with symbols A, C and D)

This variant 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.

■ Note!

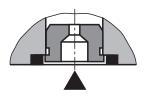
Pressure peaks in the tank line to two or several valves can result in unwanted spool movements in the case of valves with detent! We therefore recommend that separate return lines be provided or a check valve installed in the tank line.

Internal leakage of a directional spool valve changes in the course of time for component-inherent reasons.



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 parameters, please consult us!)

General

Weight	- Valve with one solenoid	kg [lbs]	1.45 [3.2]
	- Valve with two solenoids	kg [lbs]	1.95 [4.3]
Installation position		Optional	
Ambient temperature range °C		°C [°F]	-30 to +50 [-22 to +122] (NBR seals) -20 to +50 [-4 to +122] (FKM seals)

Hydraulic

,			
Maximum operating pressure	- Ports A, B, P	bar [psi]	350 [5076]
	– Port T	bar [psi]	210 [3050] (DC); 160 [2320] (AC) With symbol A and B, port T must be used as leakage port, if the operating pressure is higher than the tank pressure.
Maximum flow		l/min [US gpm]	80 [21] (DC); 60 [15.8] (AC)
Flow cross-section	Spool symbol Q	mm ²	ca. 6 % of nominal cross-section
(spool position 0)	– Spool symbol W	mm ²	ca. 3 % of nominal cross-section
Hydraulic fluid 1)			Mineral oil (HL, HLP) to DIN 51524 ²⁾ ; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) ²⁾ ; HEPG (polyglycols) ³⁾ ; HEES (synthetic esters) ³⁾ ; other hydraulic fluids on request
Hydraulic fluid temperature range		°C [°F]	-30 to +80 [-22 to +176] (NBR seals) -15 to +80 [-4 to +176] (FKM seals)
Viscosity range		mm²/s [SUS]	2.8 to 500 [35 to 2320]
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)		Class 20/18/15 ⁴⁾	

The ignition temperature of the process and operating medium used must be higher than the maximum solenoid surface temperature.

For maintenance requirements of the hydraulic fluid and contamination limit values, see data sheet RE 07300.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

 $^{^{2)}}$ Suitable for NBR- and FKM seals

³⁾ Suitable only for FKM seals

⁴⁾ The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

Technical data (for applications outside these parameters, please consult us!)

Electrical

Type of voltage			DC voltage	AC voltage 50/60 Hz
Available voltages ⁵⁾ V (For ordering code for AC voltage solenoids, see below)			12, 24, 96, 205	110, 230
Voltage tolerance (non	ninal voltage)	%	±10	
Power consumption		W	30	_
Holding power		VA	_	50
Making capacity		VA	_	220
Duty cycle		%	100	
Switching time	– ON	ms	25 to 45	10 to 20
ISO 6403 ⁶⁾	– OFF	ms	10 to 25	15 to 40
Maximum switching frequency		1/h	15000	7200
Maximum coil temperature 7)		°C [°F]	150 [302]	180 [356]
Type of protection to — With component plug "K4"			IP 65 (with mating connector mounted and locked)	
DIN EN 60529	– With component plug "C4"		IP 66A (with mating connector mounted and locked)	
	– With component plug "K40"		IP 69K (with mating conr	nector mounted and locked)
- With component plug "K33L"			IP 65 (with mating connector mounted and locked)	

⁵⁾ Special voltages on request

- ⁶⁾ The switching times were established at a hydraulic fluid temperature of 40 °C [140 °F]. Deviating hydraulic fluid temperatures can result in different switching times! Switching times change in dependence on the operating time and operating conditions.
- ⁷⁾ Due to the surface temperatures of solenoid coils, observe standards ISO 13732-1 and EN 982!

■ Notes!

- Operation of the manual override is only possible up to a tank pressure of ca. 50 bar [725 psi]. Avoid damage to the bore for the manual override! (Special tool for actuation, separate order, Material no. R900024943). When the manual override is blocked, the operation of the solenoid must be ruled out!
- The simultaneous operation of solenoids must be ruled out!

Note!

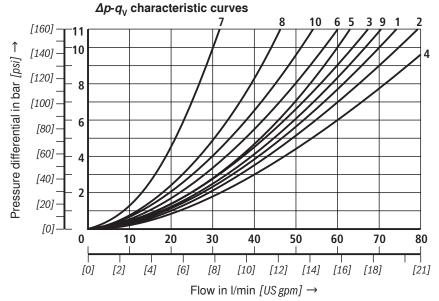
AC voltage soienoids can be used for 2 or 3 mains; e.g. solenoid type **W110** for:

110 V, 50 Hz; 110 V, 60 Hz; 120 V, 60 Hz

Ordering code	Mains
W110	110 V, 50 Hz
	110 V, 60 Hz
	120 V, 60 Hz
W230	230 V, 50 Hz
	230 V, 60 Hz

When establishing the electrical connection, properly connect the protective earth conductor (PE $\frac{1}{2}$).

Characteristic curves (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C [104 °F ±9 °F])



Spool		Direction	n of flow	'
symbol	P-A	P-B	A – T	B – T
A; B	3	3	-	-
С	1	1	3	1
D; Y	5	5	3	3
E	3	3	1	1
F	1	3	1	1
Т	10	10	9	9
Н	2	4	2	2
J; Q	1	1	2	1
L	3	3	4	9
М	2	4	3	3
Р	3	1	1	1
R	5	5	4	-
V	1	2	1	1
W	1	1	2	2
U	3	3	9	4
G	6	6	9	9

- 7 Spool symbol "R" in spool position B A
- 8 Spool symbol "G" and "T" in central position P T
- 9 Spool symbol "H" in central position P T

Performance limits (measured with HLP46, $\vartheta_{oil} = 40 \, ^{\circ}\text{C} \, \pm 5 \, ^{\circ}\text{C} \, [104 \, ^{\circ}\text{F} \, \pm 9 \, ^{\circ}\text{F}])$

▲ Attention!

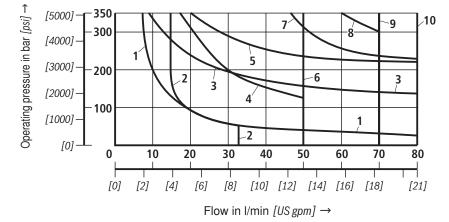
The specified switching performance limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

Due to the flow forces acting within the valves, the permissible switching 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 cases, please consult us!

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



DC solenoid Solenoid voltage
12; 24; 48; 96; 125; 205 V

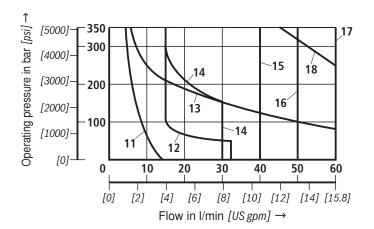
(For other voltages, see page 10)

	DC solenoid
Curve	Spool symbol
1	A; B ¹⁾
2	V
3	A; B
4	F; P
5	J
6	G; H; T
7	A/O; A/OF; L; U
8	C; D; Y
9	M
10	E; E1- ²⁾ ; R ³⁾ ; C/O; C/OF D/O; D/OF; Q; W

- 1) With manual override
- ²⁾ P A/B pre-opening
- 3) Return flow from actuator to tank

Performance limits (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C [104 °F ±9 °F])

See note on page 8.

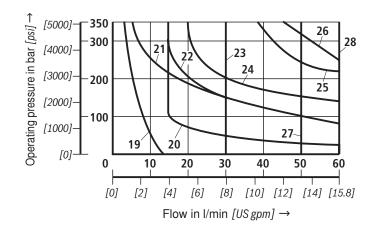


AC voltage solenoid Solenoid voltage		
W110	110 V; 50 Hz	
	120 V; 60 Hz	
W230	230 V; 50 Hz	

(Other voltages on request)

	AC voltage solenoid – 50 Hz		
Curve	Spool symbol		
11	A; B ¹⁾		
12	V		
13 A; B			
14	F; P		
15	G; T		
16	Н		
17	A/O; A/OF; C/O; C/OF; D/O; D/OF; E; E1- ²⁾ ; J; L; M; Q; R ³⁾ ; U; W		
18	C; D; Y		

¹⁾ With manual override



AC voltage solenoid Solenoid voltage	
W110	110 V; 60 Hz
W230	230 V; 60 Hz

(Other voltages on request)

AC voltage solenoid – 60 Hz		
Curve Spool symbol		
19	A; B ¹⁾	
20	V	
21	A; B	
22	F; P	
23	G; T	
24	J; L; U	
25	A/O; A/OF; Q; W	
26	C; D; Y	
27	Н	
28	C/O; C/OF; D/O; D/OF; E E1-2); M; R ³⁾	

¹⁾ With manual override

 $^{^{2)}}$ P – A/B pre-opening

³⁾ Return flow from actuator to tank

²⁾ P – A/B pre-opening

³⁾ Return flow from actuator to tank

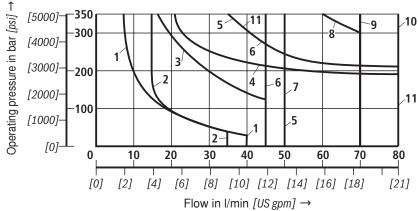
DC voltage solenoid

Spool symbol

A; B

Performance limits (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C [104 °F ±9 °F])

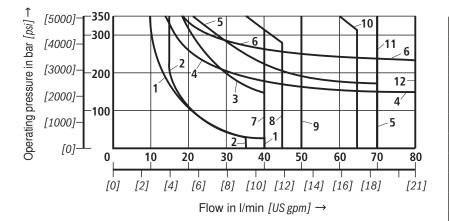
See note on page 8.



		V
11	3	F; P
	4	J; L; U
	5	G
60 70 80	6	Т
[16] [18] [21]	7	Н
,	8	D; C
	9	M
	10	C/O; C/OF; D/O; D/OF; E; E1-; R, Q; W
_	11	A/O; A/OF

Curve

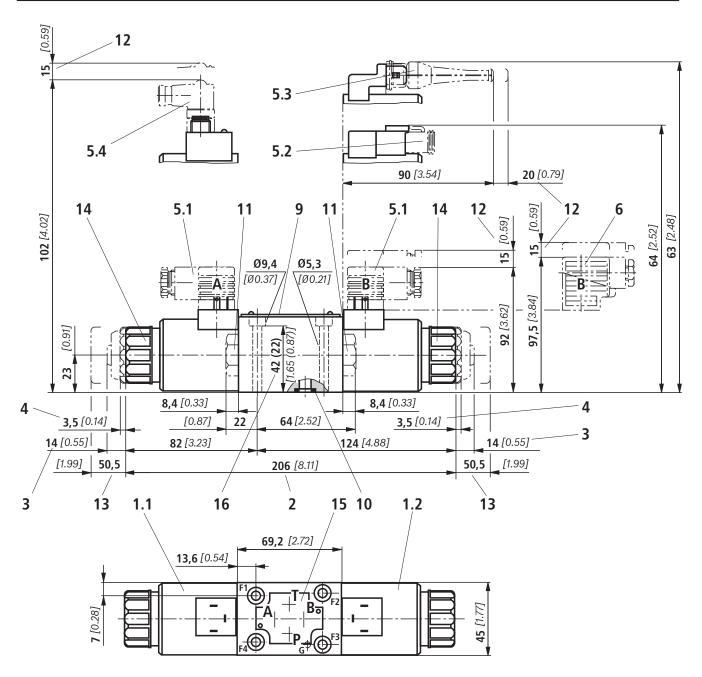
DC voltage solenoid Solenoid voltage		
110; 180 V	'	

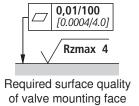


DC voltage solenoid Solenoid voltage		
42; 80; 220 V		

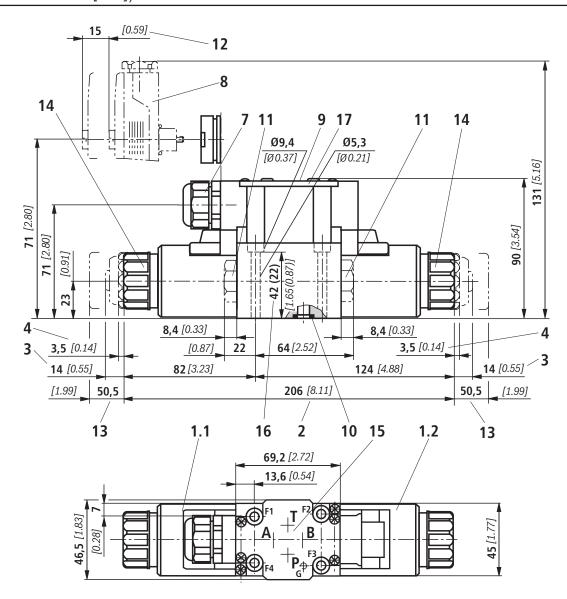
DC voltage solenoid					
Curve	Spool symbol				
1	A; B				
2	V				
3	F; P				
4	J; L; U				
5	A/O; A/OF				
6	E				
7	Т				
8	G				
9	Н				
10	D; C				
11	M				
12	C/O; C/OF; D/O; D/OF; E1-; R, Q; W				

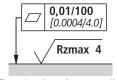
Unit dimensions: Valve with DC voltage solenoid – **individual connection** (dimensions in mm [inch])





Unit dimensions: Valve with DC voltage solenoid – **central connection** (dimensions in mm [inch])





Required surface quality of valve mounting face

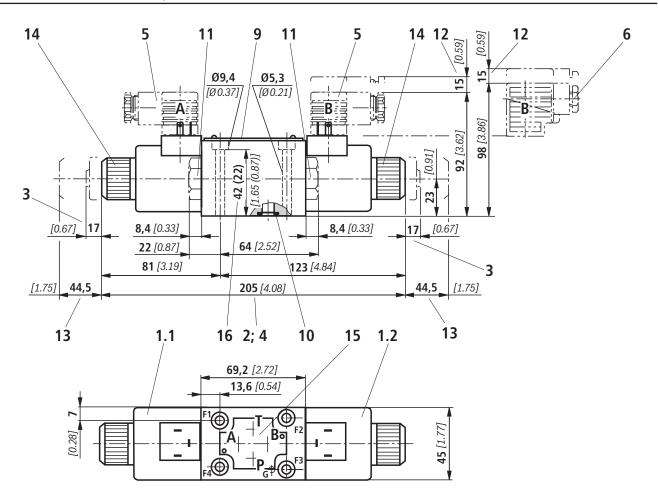
Terminal assignment for central connection:

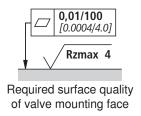
- 1 solenoid:

Solenoid always to terminals 1 and 2, Protective earth conductor to terminal (PE

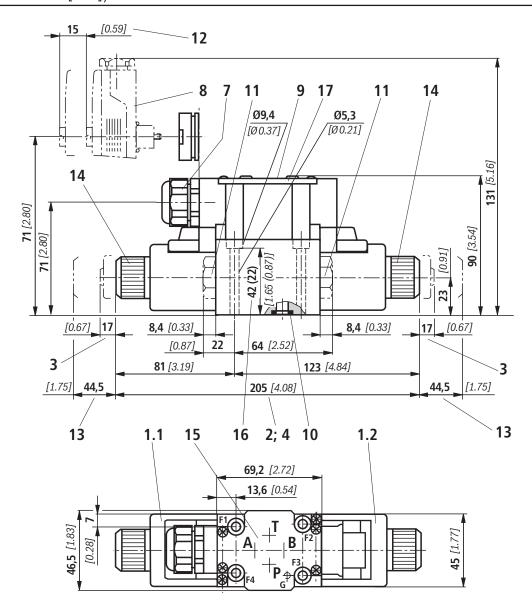
- 2 solenoids:

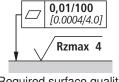
Solenoid "a" to terminals 1 and 2, Solenoid "b" to terminals 3 and 4, Protective earth conductor to terminal PE





Unit dimensions: Valve with AC voltage solenoid – **central connection** (dimensions in mm [inch])





Required surface quality of valve mounting face

Terminal assignment for central connection:

- 1 solenoid:

Solenoid always to terminals 1 and 2, Protective earth conductor to terminal (PE

- 2 solenoids:

Solenoid "a" to terminals 1 and 2, Solenoid "b" to terminals 3 and 4, Protective earth conductor to terminal PE

- 1.1 Solenoid "a"
- 1.2 Solenoid "b"
- 2 Dimension for solenoid with concealed manual override "N9" (standard)
- 3 Dimension for solenoid with manual override "N"
- 4 Dimension for solenoid without manual override
- 5.1 Mating connector without circuitry for component plug "K4" (separate order, see page 16 and RE 08006)
- **5.2** Mating connector (AMP Junior-Timer) with component plug "C4" (separate order, see RE 08006)
- 5.3 Mating connector DT 04-2PA (Deutsch plug-in connector) with component plug "K40" (separate order, see RE 08006)
- **5.4** Mating connector, angled, with M12x1 plug-in connection with status LED "K33L" (separate order, see RE 08006)
 - 6 Mating connector with circuitry for component plug "K4" (separate order, see page 16 and RE 08006)
 - 7 Cable gland Pg 16 [1/2"NPT] "DL"
 - 8 Angled mating connector (color: red, separate order) Material no. R900005538)
 - 9 Nameplate
- 10 Identical seal rings for ports A, B, P, T
- 11 Plug screw for valves with one solenoid
- 12 Space required to remove mating connector/angled mating connector
- 13 Space required to remove coil
- **14** Locknut, tightening torque $M_T = 4 \text{ Nm } [2.95 \text{ ft-lbs}]$
- 15 Porting pattern to DIN 24340 Form A (without locating bore), or ISO 4401-03-02-0-05 and NFPA T3.5.1 R2 D03 (with locating bore for locating pin ISO 8752-3x8-St, Material no. R900005694, separate order)
- **16** Alternative clamping length (): 22 mm [0.87 inch]
- 17 Cover

⚠ Attention!

The valve may only be operated with properly mounted cover!

Subplates to data sheet RE 45052

(separate order)

(Without locating bore) G 341/01 (G1/4)

G 342/01 (G3/8)

G 502/01 (G1/2)

(With locating bore) G 341/60 (G1/4)

G 342/60 (G3/8) G 502/60 (G1/2) G 341/12 (SAE-6)¹⁾ G 342/12 (SAE-8)¹⁾ G 502/12 (SAE-10)¹⁾

Valve mounting screws (separate order)

- Clamping length 42 mm:

4 hexagon socket head cap screws metric ISO 4762 - M5 x 50 - 10.9-flZn-240h-L

(Friction coefficient $\mu_{\rm total}$ = 0.09 to 0,14); tightening torque $M_{\rm T}$ = 7 Nm [5.2 ft-lbs] ±10%, Material no. **R913000064**

Or

4 hexagon socket head cap screws ISO 4762 - M5 x 50 - 10.9 (own procurement) (Friction coefficient $\mu_{\rm total}$ = 0.12 to 0.17); tightening torque $M_{\rm T}$ = 8.1 Nm [6 ft-lbs] ±10%

4 hexagon socket head cap screws UNC 10-24 UNC x 2" ASTM-A574

(Friction coefficient $\mu_{\rm total}$ = 0.19 to 0.24); tightening torque $\textit{M}_{\rm T}$ = 11 Nm [8.2 ft-lbs] ±15%, (Friction coefficient $\mu_{\rm total}$ = 0.12 to 0.17); tightening torque $\textit{M}_{\rm T}$ = 8 Nm [5.9 ft-lbs] ±10%, Material no. **R978800693**

Clamping length 22 mm:

4 hexagon socket head cap screws metric ISO 4762 - M5 x 30 - 10.9-flZn-240h-L

(Friction coefficient $\mu_{\rm total}$ = 0.09 to 0,14); tightening torque $M_{\rm T}$ = 7 Nm [5.2 ft-lbs] ±10%, Material no. **R913000316**

4 hexagon socket head cap screws ISO 4762 - M5 x 30 - 10.9 (own procurement) (Friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17); tightening torque $M_{\text{T}} = 8.1$ Nm $[6 \text{ ft-lbs}] \pm 10\%$

4 hexagon socket head cap screws UNC 10-24 UNC x 1 1/4"

(Friction coefficient $\mu_{\text{total}} = 0.19 \text{ to } 0.24$); tightening torque $M_T = 11 \text{ Nm } [8.2 \text{ ft-lbs}] \pm 15\%$, (Friction coefficient $\mu_{\text{total}} = 0.12 \text{ to } 0.17$); tightening torque $M_T = 8 \text{ Nm } [5.9 \text{ ft-lbs}] \pm 10\%$, Material no. **R978802879**

¹⁾ on request

Mating connectors to DIN EN 175301-803

For details and further mating connectors, see RE 08006							
				Material number			
Connec-	Valve side	Color	Without circuitry	With indicator lamp 12 240 V	With indicator lamp and rectifier 12 240 V	With rectifier 12 240 V	With indicator lamp and Zener-diode suppressor circuit 24 V
	а	Gray	R901017010	_	_	_	_
M16 x 1.5	b	Black	R901017011	_	_	_	_
	a/b	Black	_	R901017022	R901017029	R901017025	R901017026
1/2" NPT (Pg 16)	а	Red/brown	R900004823	_	_	_	_
	b	Black	R900011039	_	_	_	_
(1 9 10)	a/b	Black	-	R900057453	R900057455	R900842566	_

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