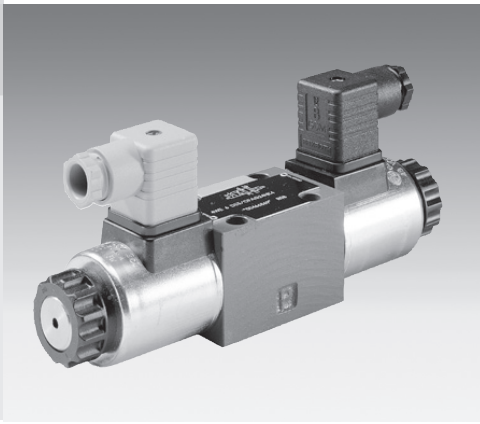
4/3, 4/2 and 3/2 directional valves with wet pin DC or AC solenoids

RA 23178/04.04 **1**/12
Replaces 08.99

Model WE 6 ../.E



Nominal size 6
Series 6X
Maximum operating pressure 350 bar (5100 PSI)
Maximum flow 80 L/min (21 GPM) – DC
Maximum flow 60 L/min (16 GPM) – AC

List of contents

Features

- Direct solenoid operated directional spool valve, high performance version
- Porting pattern to DIN 24340 form A, **without** locating pin hole (standard); NFPA T3.5.1 MR1 and ANSI B93.7 D03
- Porting pattern to ISO 4401, **with** locating pin hole, (ordering code .../**60** at the end of the valve type code); NFPA T3.5.1 MR1 and ANSI B93.7 D03
- For subplates see catalogue sheet RE 45052 (separate order)
- Wet pin DC or AC solenoids with removable coil
- Solenoid coil can be rotated through 90°
- It is not necessary to open the pressure tight chamber when changing the coil
- Electrical connections either as individual or central connections
- Hand override, optional
- Soft switching version, see RE 23183
- Inductive limit switch (contact or inductive), see RE 24830

Ordering details

	WE	6		6X	/	E			/			*

3 service ports = **3**
4 service ports = **4**

Series 6 = **6**

Symbol e.g. C, E, EA, EB etc.
for possible designs see page 3

Series 60 to 69 = **6X**
(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 = **E**
Wet pin (oil immersed) with removable coil

24 V DC = **G24**
230 V AC 50/60 Hz = **W230**
205 V DC = **G205** [1]
For the ordering details of other voltages
and frequencies see page 6

With protected hand override (standard) = **N9**
With hand override = **N**
Without hand override = **No code**

AC supply voltage (permissible voltage tolerance ± 10%)	**Nominal voltage of DC solenoids when used with an AC supply**	**Ordering details**
110 V – 50/60 Hz	96 V	**G96**
230 V – 50/60 Hz	205 V	**G205**

Further in clear text

No code = **Without** locating pin hole
/60 5) = **With** locating pin hole

No code = NBR-seals
V = FKM-seals
(other seals on request)

⚠ Attention!
The compatibility of the seals and pressure fluid has to be taken into account!

No code = Without cartridge throttle
B08 = Throttle Ø 0.8 mm (0.031 in.)
B10 = Throttle Ø 1.0 mm (0.039 in.)
B12 = Throttle Ø 1.2 mm (0.047 in.)
Used where the flow > than the performance limit of the valve, active in the P linel

Electrical connections [2]

Individual connetions

K4 [3] **=** **Without** plug-in connector with component plug DIN EN 175 301-803

Central connections

DA = Terminal box with 2-1/2" NPT conduit conn.
DAL = Terminal box with two 1/2" NPT conduit connections and light(s)

ANSI B 93.55 M plug-in type connectors (without femal end)

DK23 = Terminal box with 3-pin conn. (single solenoid)
DK25 = Terminal box with 5-pin conn. (dbl. solenoid)
DK23L = Terminal w/ 3-pin conn. & light(s) (sgl. sol.)
DK25L = Terminal w/ 5-pin conn. & light(s) (dbl. sol.)
DK...L2 = Terminal box w/surge suppression [4]

[1] When connecting to an AC supply a DC solenoid **must** be used which is controlled via a rectifier (see table on the left).
With an individual connection a large plug-in connectorwith built-in rectifier can be used (separate order).

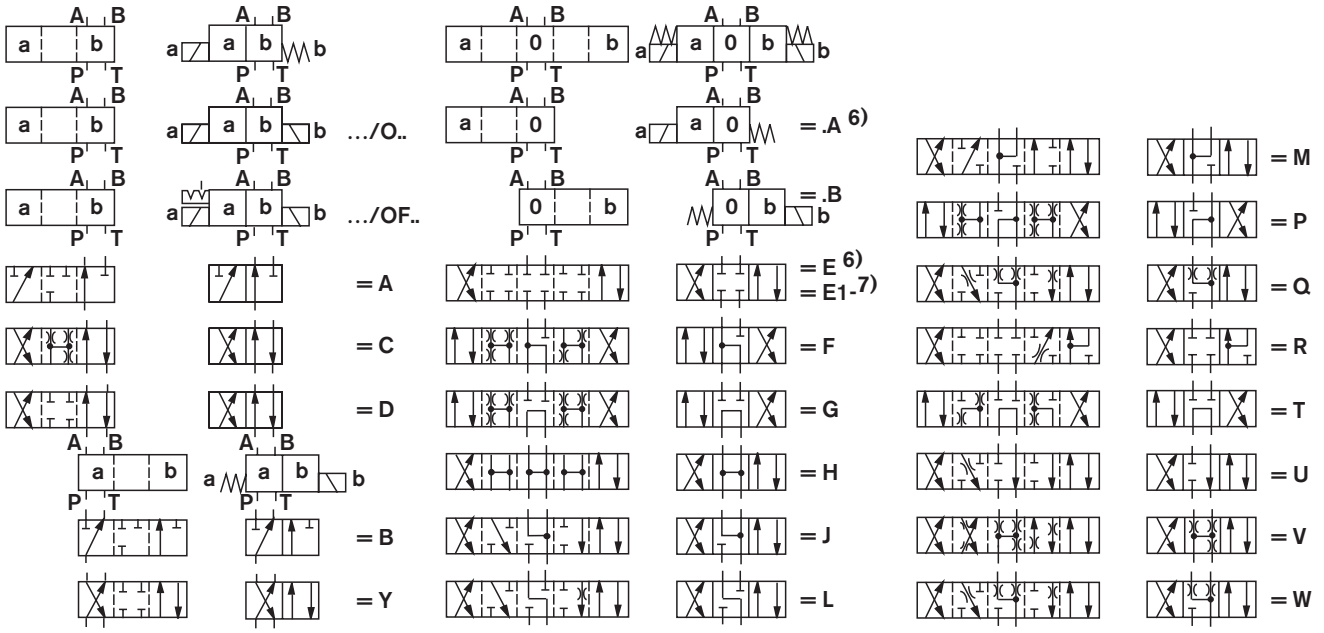
[2] Also available with M12 x 1 plug connection (only version „...G24...“), ordering details and plug-in connector see RE 08010

[3] Plug-in connectors must be ordered separately (see page 4).

[4] Angled plug-in connector Mat. No. **R900005538** (separate order)

[5] Locating pin 3 x 8 DIN EN ISO 8752, Mat. No. **R900005694** (separate order)

Symbols



[6] **Example**: Spool E with switched position "a"ordering code ..**EA**..

[7] Symbol E1-: P – A/B pre-opening, **Attention: Take pressure intensification with differential cylinders into account!**

Standard types

Type	Material number
4WE 6 J6X/EG12N9K4	**R900567496**
3WE 6 A6X/EG24N9K4	**R900561180**
3WE 6 B6X/EG24N9K4	**R900561270**
4WE 6 C6X/EG24N9K4	**R900561272**
4WE 6 C6X/OFEG24N9K4	**R900564107**
4WE 6 D6X/EG24N9K4	**R900561274**
4WE 6 D6X/0FEG24N9K4	**R900567512**
4WE 6 E6X/EG24N9K4	**R900561278**
4WE 6 EA6X/EG24N9K4	**R900561280**
4WE 6 EB6X/EG24N9K4	**R900561281**
4WE 6 G6X/EG24N9K4	**R900561282**
4WE 6 H6X/EG24N9K4	**R900561286**
4WE 6 HA6X/EG24N9K4	**R900549534**
4WE 6 J6X/EG24N9K4	**R900561288**
4WE 6 M6X/EG24N9K4	**R900577475**
4WE 6 Q6X/EG24N9K4	**R900561292**
4WE 6 R6X/EG24N9K4	**R900571012**
4WE 6 T6X/EG24N9K4	**R900934414**
4WE 6 U6X/EG24N9K4	**R900572785**
4WE 6 W6X/EG24N9K4	**R900568233**
4WE 6 Y6X/EG24N9K4	**R900561276**

Type	Material number
4WE 6 D6X/EW110N9K4	**R900551704**
4WE 6 D6X/OFEW110N9K4	**R900552321**
4WE 6 E6X/EW110N9K4	**R900558641**
4WE 6 J6X/EW110N9K4	**R900551703**
3WE 6 A6X/EW230N9K4	**R900915672**
4WE 6 C6X/EW230N9K4	**R900913132**
4WE 6 D6X/EW230N9K4	**R900909559**
4WE 6 D6X/OFEW230N9K4	**R900915095**
4WE 6 E6X/EW230N9K4	**R900912492**
4WE 6 H6X/EW230N9K4	**R900912494**
4WE 6 J6X/EW230N9K4	**R900911762**
4WE 6 Y6X/EW230N9K4	**R900909415**

Function, section

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

Essentially the directional control valves consist of housing (1), one or two solenoids (2), the control spool (3), and one or two return springs (4).

In the de-energised condition the control spool (3) is held in the neutral or initial position by means of return springs (4) (except for impulse spools). The control spool (3) is operated via wet pin solenoids (2).

To guarantee satisfactory operation care should be taken to ensure that the solenoid pressure chamber is filled with oil.

The force of the solenoids (2) acts via the plunger (5) on the control spool (3) and pushes this from its neutral position into the required end position. This permits flow from P to A and B to T or P to B and A to T.

When solenoid (2) is de-energised, the control spool (3) is returned to its neutral position by means of the return springs (4).

An optional hand override (6), allows movement of the control spool (3) without energising the solenoid.

Type 4WE 6.. 6X/O.. (only possible for symbols A, C and D)

This version is for directional control valves with two switched positions and two solenoids without detent. There is no definable switched position when the solenoids are de-energised.

Type 4WE 6.. 6X/OF.. (impulse spool, only for symbols A, C and D)

This version is for directional control valves with two switched positions, two solenoids and a detent. Both swtiched positions are thus fixed alternately and there is no need to continually energise the solenoid.

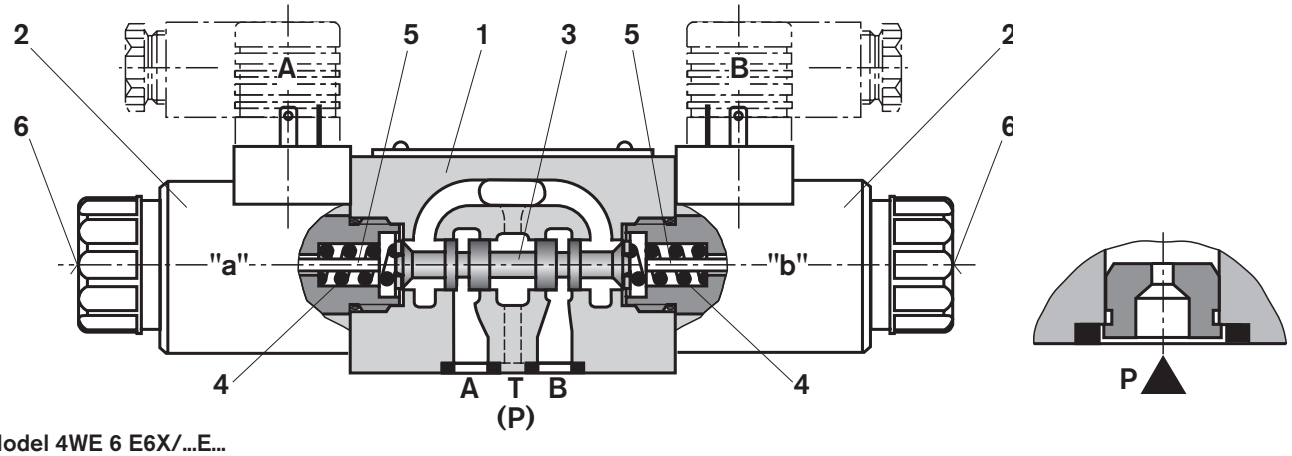
Note:

Pressure peaks in the tank line to two or more valves can, with valves with detents, lead to unintended spool movements! It is therefore, recommended that a separate tank line is used or that a check valve is fitted into the tank line.

Cartridge throttle (type 4WE 6..6X/…/**B**..)

If, due to particular operating conditions during the switching sequences, flows can occur which are larger that the valve performance curves allow, then it is necessary to fit a cartridge throttle.

This is inserted in the P channel of the directional control valve.



Model 4WE 6 E6X/...E...

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

General			
Installation			Optional
Ambient temperature		°C (°F)	–30 to +50 (–22 to +122) – NBR seals –20 to +50 (–4 to +122) – FKM seals
Weight	Valve with 1 solenoid	kg (lbs.)	1.45 (3.2)
	Valve with 2 solenoids	kg (lbs.)	1.95 (4.3)
Hydraulic			
Max. operating pressure	Ports A, B, P	bar (PSI)	350 (5100)
	Ports T	bar (PSI)	210 (3050) – DC; 160 (2320) – AC With symbols A and B, port T must be used as a drain port if the operating pressure is above the permitted tank pressure.
Max. flow		L/min (GPM)	80 (21) – DC; 60 (15.8) – AC
Flow cross-section (switched position 0)	For symbol Q	mm^2 (in^2)	Approx. 6% of the nominal cross-section
	For symbol W	mm^2 (in^2)	Approx. 3% of the nominal cross-section
Pressure fluid			Mineral oil (HL, HLP) to DIN 51524 [1]; Fast bio-degradable pressure fluids to VDMA 24568 (also see RE 90221); HETG (rape seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic ester) [2]; Other pressure fluids on request
Pressure fluid temperature range		°C °F)	–30 to +80 (–22 to +176) – NBR seals –20 to +80 (–4 to +176) – FKM seals
iscosity range		mm^2/s (SUS)	2.8 to 500 (35 to 2320)
ISO code cleanliness class			Maximum permissible degree of contamination of fluid to ISO 4406 (c) class 20/18/15 [3]

Electrical				
Voltage type			DC	AC 50/60 Hz
Available voltages [4] (for ordering details of AC solenoids see below)		V	12, 24, 96, 205	110, 230
Voltage tolerance (nominal voltage)		%	± 10	± 10
Power consumption		W	30	–
Holding power		VA	–	50
Switch-on power		VA	–	220
Duty			Continuous	Continuous
Switching time to ISO 6403	ON	ms	25 to 45	10 to 20
	OFF	ms	10 to 2	15 to 40
Switching frequencies		Cycles/h	UP to 15000	UP to 7200
Protection to DIN EN 60529 [5]			IP 65	IP 65
Max. coil temperature [6]		°C (°F)	150 (302)	180 (356)

[1] Suitable for NBR and FKM seals

[2] Only suitable for FKM seals

[3] Adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, increases the service life of components.
For the selection of filters, see data sheets: RE 50070, RE 50076 and RE 50081.

[4] Other voltages on request

[5] With fitted and locked plug-in connector

[6] Due to the occuring surface temperatures of the solenoid coils, the European standards EN563 and EN982 must be taken into account!

Note:

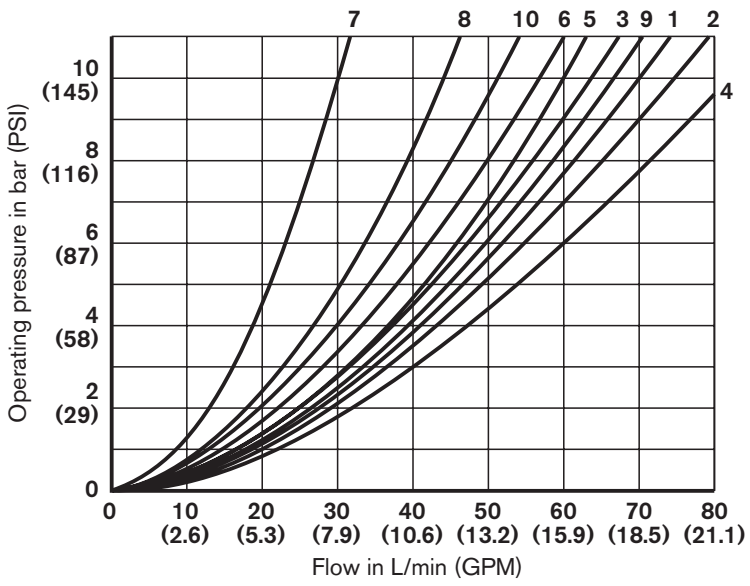
AC solenoids may be used for 2 or 3 types of supply; e.g. solenoid type **W110** for: 110 V, 50 Hz; 110 V, 60 Hz; 120 V, 60 Hz

Ordering details	
W110	110 V, 50 Hz 110 V, 60 Hz 120 V, 60 Hz
W230	230 V, 50 Hz 230 V, 60 Hz

With electrical connections the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Characteristic curves – measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$ (104 °F ± 41 °F)

Δp-q_V-characteristic curves



7 Symbol “R” in switched position B – A

8 Symbol “G” and “T” in mid position P – T

9 Symbol “H” in mid position P – T

Symbols	Flow direction			
	P – A	P – B	A – T	B – T
A; B	3	3	–	–
C	1	1	3	1
D; Y	5	5	3	3
E	3	3	1	1
F	1	3	1	1
T	10	10	9	9
H	2	4	2	2
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	–
V	1	2	1	1
W	1	1	2	2
U	3	3	9	4
G	6	6	9	9

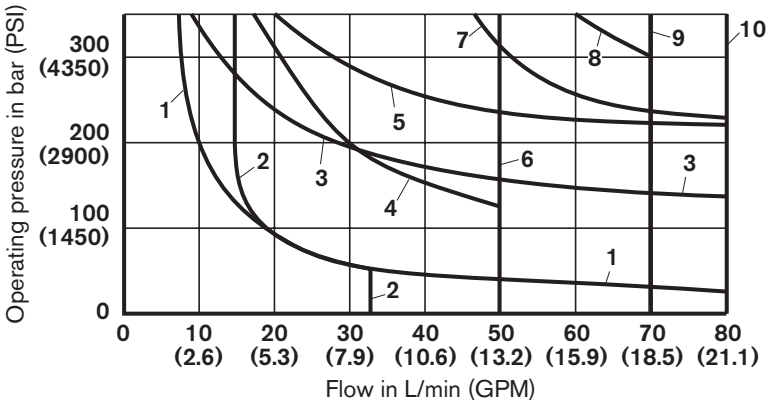
Performance limits – measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$ (104 °F ± 41°F)

⚠ Attention!

The given switching power limits are for applications with two flow directions (e.g. from P to A and simultaneous return flow from B to T).

Due to the flow forces active within the valves the permissible switching power limit may be significantly less if there is only one direction of flow (e.g. from P to A and port B blocked)! (Please consult us for applications of this kind.)

The switching power limits were measured with the solenoids at operating temperature, 10% under voltage and without tank back pressure.



DC solenoid	
Characteristic curve	**Solenoid voltage**
1 to 10	12; 24; 48; 96; 125; 205 V

(for other voltages, see pages 9)

DC solenoid	
Characteristic curve	**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 hand 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 ± 41 °F)

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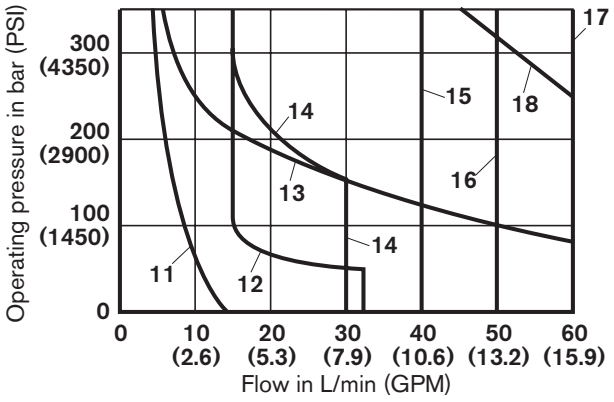
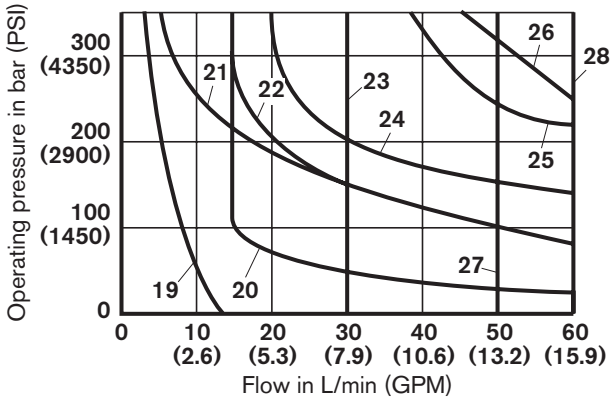


AC solenoid		
Characteristic curve	Solenoid voltage	
11 to 18	W110	110 V; 50 Hz 120 V; 60 Hz
	W230	230 V; 50 Hz

(other voltages on request)

AC solenoid – 50 Hz	
Characteristic curve	**Symbol**
11	A; B1)
12	V
13	A; B
14	F; P
15	G; T
16	H
17	A/O; A/OF; C/O; C/OF D/O; D/OF; E; E1–2); J; L; M; Q; R3); U; W
18	C; D; Y

[1] With hand override
[2] P – A/B pre-opening
[3] Return flow from actuator to tank



AC solenoid		
Characteristic curve	**Solenoid voltage**	
19 to 28	W110	110 V; 60 Hz
	W230	230 V; 60 Hz

(other voltages on request)

AC solenoid – **60Hz**	
Characteristic curve	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	H
28	C/O; C/OF; D/O; D/OF; E E1–[2]; M; R[3]

[1] With hand override
[2] P – A/B pre-opening
[3] Return flow from actuator to tank

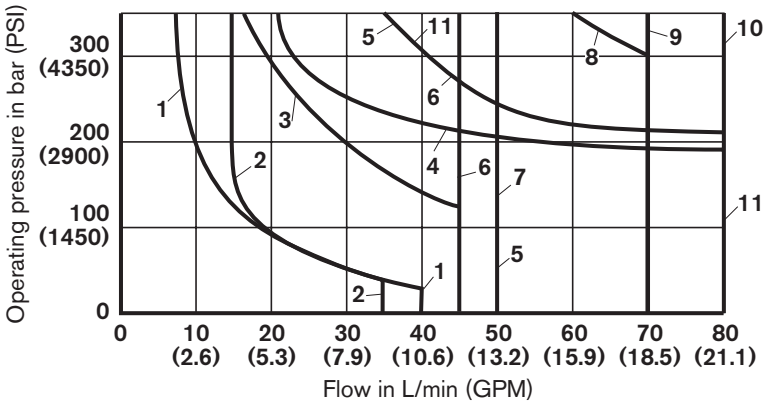
Performance limits – measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C (104 °F ± 41 °F)

⚠ Attention!

The given switching power limits are for applications with two flow directions (e.g. from P to A and simultaneous return flow from B to T).

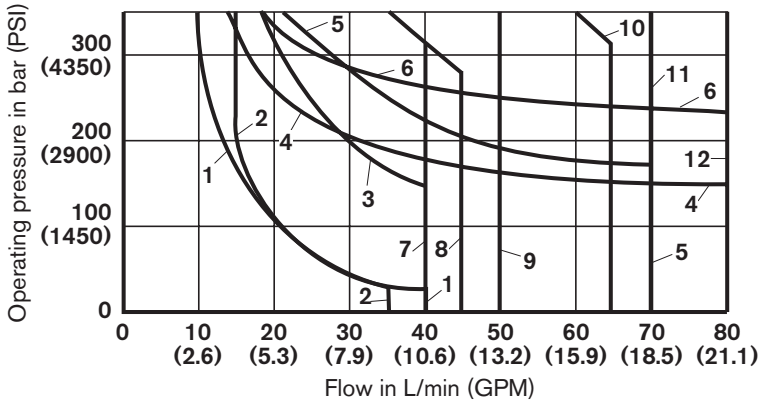
Due to the flow forces active within the valves the permissible switching power limit may be significantly less if there is only one direction of flow (e.g. from P to A and port B blocked)! (Please consult us for applications of this kind.)

The switching power limits were measured with the solenoids at operating temperature, 10% under voltage and without tank back pressure.



DC solenoid	
Characteristic curve	Solenoid voltage
1 to 11	110; 180 V

DC solenoid	
Characteristic curve	Symbol
1	A; B
2	V
3	F; P
4	J; L; U
5	G
6	T
7	H
8	D; C
9	M
10	C/O; C/OF; D/O; D/OF; E; E1–; R, Q; W
11	A/O; A/OF

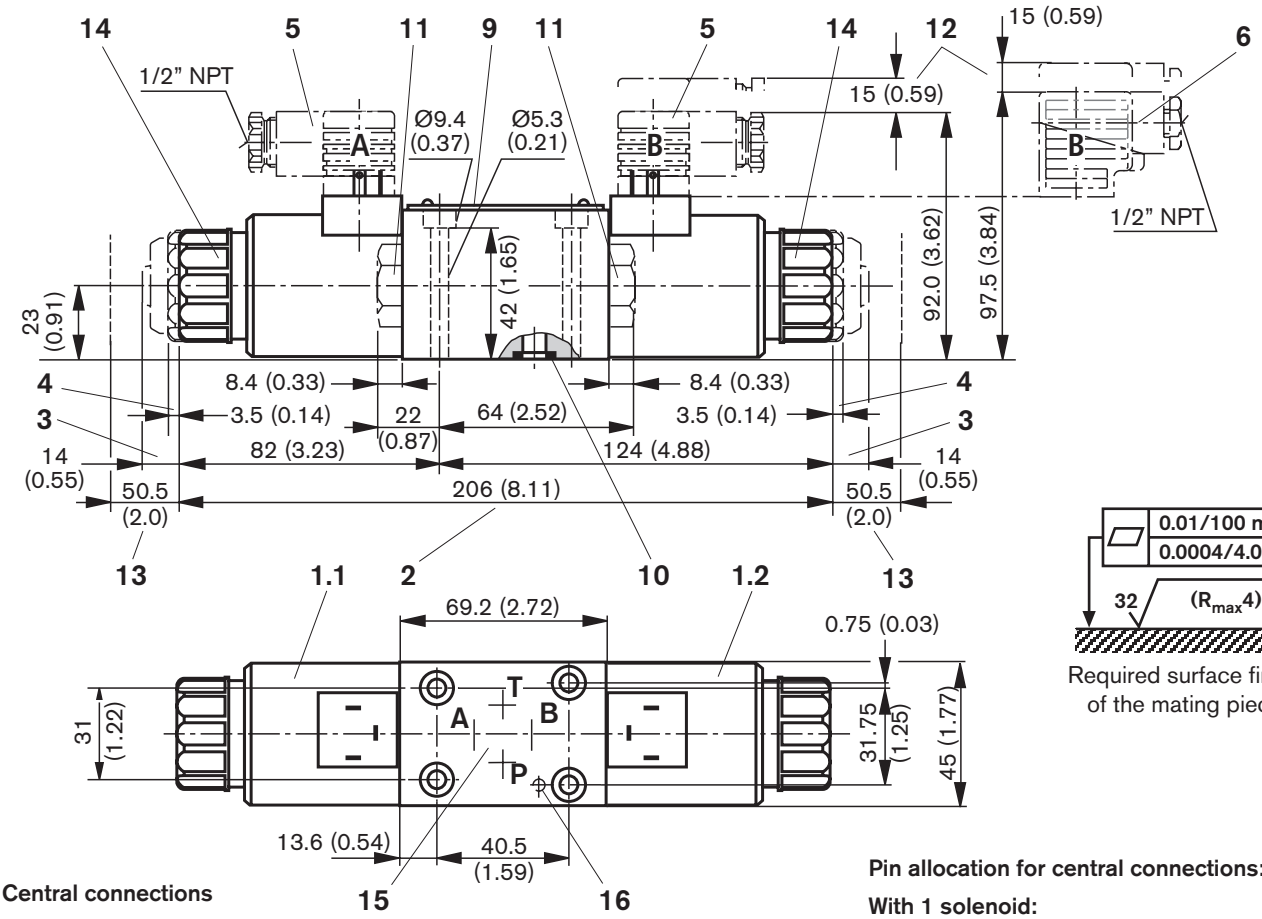


DC solenoid	
Characteristic curve	Solenoid voltage
1 to 12	42; 80; 220 V

DC solenoid	
Characteristic curve	Symbol
1	A; B
2	V
3	F; P
4	J; L; U
5	A/O; A/OF
6	E
7	T
8	G
9	H
10	D; C
11	M
12	C/O; C/OF; D/O; D/OF; E1–; R, Q; W

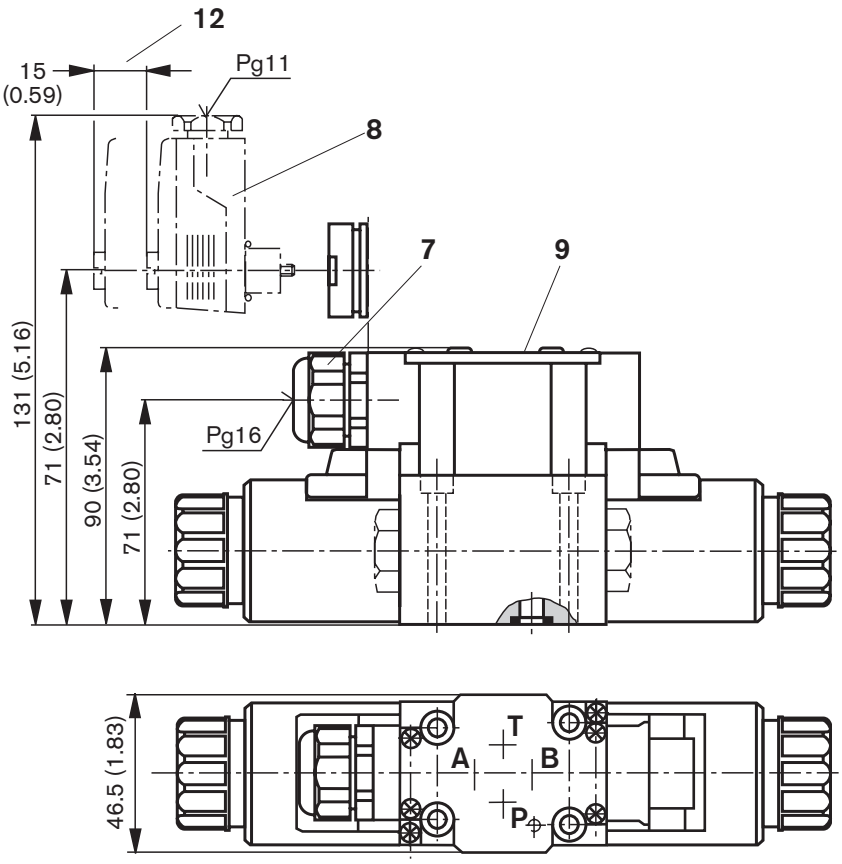
Unit dimensions: valve with a DC solenoid – dimensions in millimeters (inches)

Individual connections



Required surface finish of the mating piece

Central connections



Pin allocation for central connections:

With 1 solenoid:

Solenoid always to termainals 1 and 2 Earth to terminal ⏚ PE

With 2 solenoids:

Solenoid "a" to terminals 1 and 2
solenoid "b" to terminals 3 and 4
Earth to terminal ⏚ PE

1.1 Solenoid "a" (plug-in connector color grey)

1.2 Solenoid "b" (plug-in connector color black)

2 Dim. for solenoid **with protected** hand override "**N9**" (standard) – The hand override can only be actuated up to a tank pressure of approx. 50 bar (725 PSI).

Avoid damage to hand override pin bore!

3 Dim. for solenoid **with** hand override "**N**"

4 Dim. for solenoid **without** hand override

5 Plug-in connector **without** circuitry [1)]

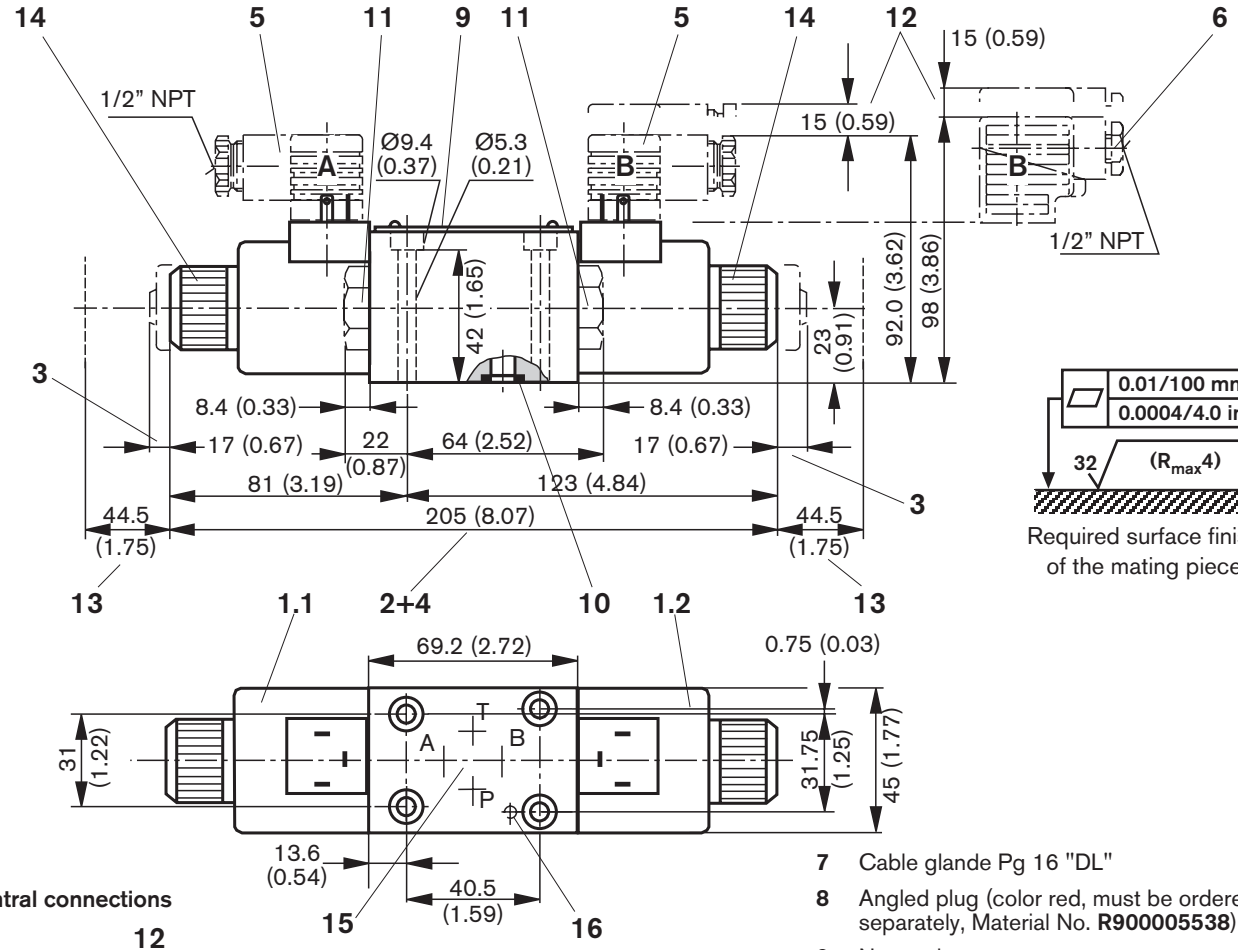
6 Plug-in connector **with** circuitry [1)]

[1)] Must be ordered separately, see page 4

Item no. explanation continued on page 11

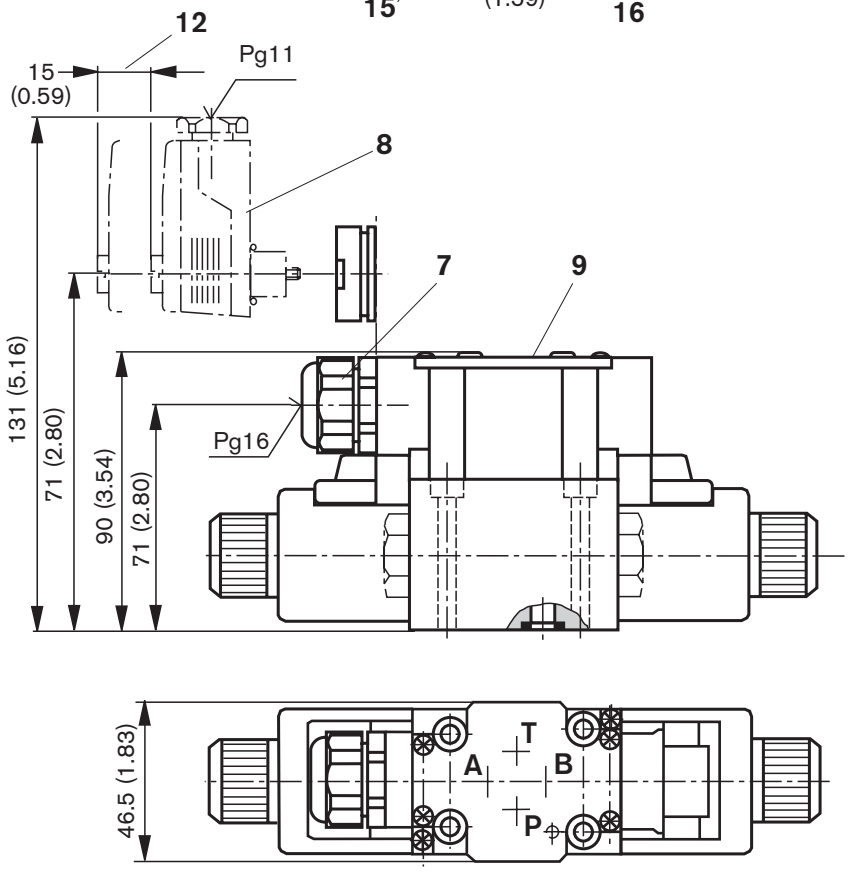
Unit dimensions: valve with a AC solenoid – dimension in millimeters (inches)

Individual connections



Required surface finish of the mating piece

Central connections



7 Cable glande Pg 16 "DL"

8 Angled plug (color red, must be ordered separately, Material No. **R900005538**)

9 Name plate

10 Same sealing rings for ports A, B, P. T

11 Plug for valves with one solenoid

12 Space required to remove the plug-in connector

13 Space required to remove the coil

14 Securing nut, tightening torque $M_A = 4$ Nm (2.95 lb-ft)

15 Porting pattern to DIN 24340 form A, **without** locating pin hole

16 Porting pattern to ISO 4401 **with** locating pin hole

Subplates

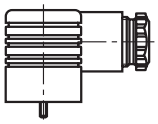
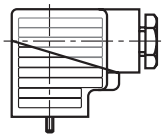
(**without** locating pin hole)	G 341/01(/12), G 1/4 (SAE-4; 7/16-20) G 342/01(/12), G 3/8 (SAE-6; 9/16-18) G 502/01(/12), G 1/2 (SAE-8; 3/4-16)
(**with** locating pin hole)	G 341/60, G 1/4 G 342/60, G 3/8 G 502/60, G 1/2

to catalog sheet RE 45052 and

Valve fixing screws

4 screws DIN EN ISO 4762 – M5 x 50 - 10.9
(10 -24 UNC x 2");
Surface coating to DIN EN ISO 10683 aflZn - 240h - L
(friction value 0.09–0.14 to VDA 235-102)
must be ordered separately.
$M_A = 7$ Nm (5.16 lb-ft), tighten using a torque wrench with an accuracy of ± 10 %.
Note: The tightening torque relates to the maximum operating pressure.

Plug-in connectors to DIN EN 175 301-803 for component plug "K4"

For further plug-in connectors see RE 08006					
		Material No.			
Valve side	Color	Without circuitry	With indicator light 12 … 240 V	With rectifier 12 … 240 V	With indicator light and Z-diode protective circuit 24 V
a	grey	**R901017010**	–	–	–
b	black	**R901017011**	–	–	–
a/b	black	–	**R901017022**	**R901017025**	**R901017026**

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Industrial Hydraulics
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Bethlehem, PA 18017-2131
USA
Telephone (610) 684-8300
Facsimile (610) 694-8467
www.boschrexroth-us.com