

# Directional spool valves, direct operated, with solenoid actuation

## Type WE.../H



- ▶ Size 10
- ▶ Component series 5X
- ▶ Maximum operating pressure 315 bar [4568 psi]
- ▶ Maximum flow 135 l/min [35.7 US gpm]

### Features

- ▶ 4/3, 4/2 or 3/2 directional design
- ▶ Standard solenoid
- ▶ Porting pattern according to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- ▶ Wet-pin DC solenoids with detachable coil
- ▶ Solenoid coil can be rotated by 90°
- ▶ The coil can be changed without having to open the pressure-tight chamber
- ▶ Electrical connection as individual connection
- ▶ Manual override
- ▶ Spool position monitoring, optional

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## Ordering code

01	02	03	04	05	06	07	08	09	10	11	12		
4	WE	10		5X	/	H	G24	N9	K4		/	M	*

01	4 main ports	4
02	Directional valve	WE
03	Size 10	10
04	Symbols; for the possible version, see page 3	e.g. C
05	Component series 50 ... 59 (50 ... 59: Unchanged installation and connection dimensions)	5X
06	Wet-pin solenoid with detachable coil	H
07	Direct voltage 24 V Connection to AC voltage mains via control with rectifier (see page 11)	G24
08	With concealed manual override (standard)	N9 <sup>1)</sup>

### Electrical connection

09	Individual connection	
	Without mating connector; connector according to DIN EN 175301-803	K4 <sup>2)</sup>

### Spool position monitoring

10	Without position switch	no code
	– Inductive position switch type QY	
	Monitored spool position "b"	QYBG24
	For more information, see data sheet 24836	

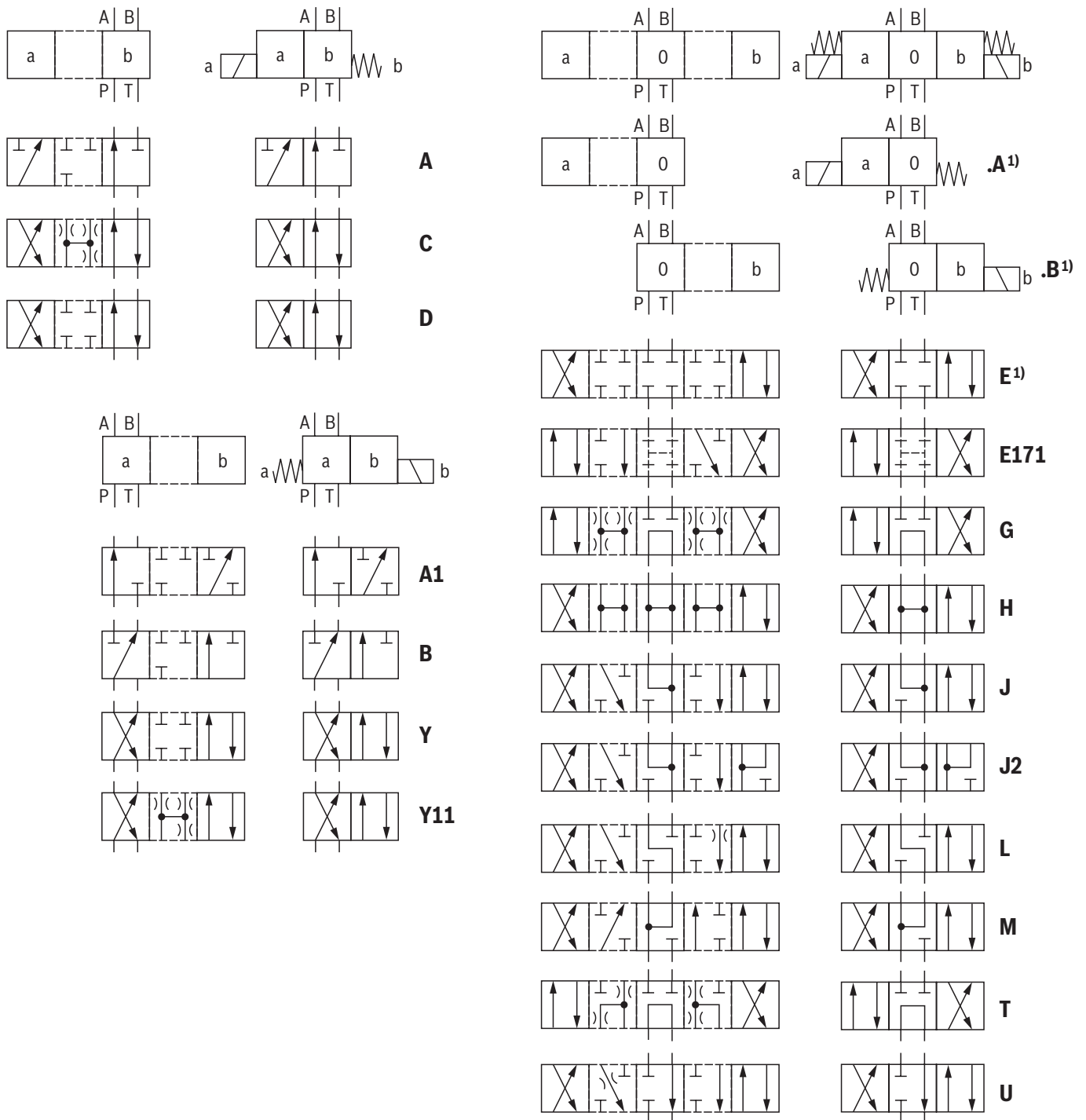
### Seal material

11	NBR seals	M
12	Further details in the plain text	*

<sup>1)</sup> The manual override cannot be allocated a safety function.  
The manual override units may only be used up to a tank pressure of 50 bar.

<sup>2)</sup> Mating connector, separate order, see page 11 and data sheet 08006.

## Symbols



### 1) Example:

- Spool E with spool position "a" ordering code **..EA..**
- Spool E with spool position "b" ordering code **..EB..**



### Notice:

- Representation according to DIN ISO 1219-1.  
Hydraulic interim positions are shown by dashes.
- Other symbols upon request.

## Function, section

The directional valve type WE is a solenoid-actuated directional spool valve that can be used as electro-magnetic component. It controls the start, stop and direction of a flow.

The directional valve basically consists of housing (1), one or two electronic solenoids (2), the control spool (3), and the return springs (4).

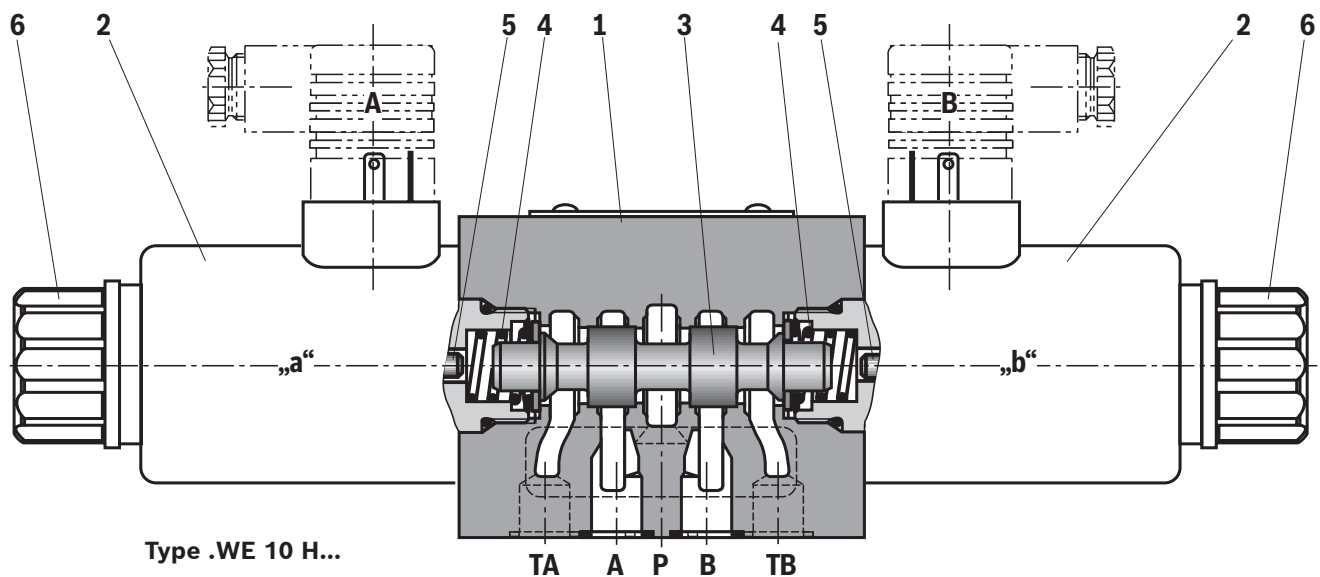
In the de-energized condition, the control spool (3) is held in the central position or in the initial position by the return springs (4).

In case of energization of the wet-pin electronic solenoid (2), the control spool (3) moves out of its rest position into the required end position. In this way, the required direction of flow according to the selected symbol is released.

After the electronic solenoid (2) has been switched off, the control spool (3) is pushed back into the central position or in the initial position.

A manual override (6) allows the valve to be switched manually without solenoid energization.

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



## Technical data

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

general			
Weight	► Valve with one solenoid	kg [lbs]	3,6 [7.9]
	► Valve with two solenoids	kg [lbs]	4,7 [10.4]
Installation position			any <sup>1)</sup>
Ambient temperature range		°C [°F]	-20 ... +50 [-4 ... +122]
Storage temperature range		°C [°F]	-20 ... +50 [-4 ... +122]
hydraulic			
Maximum operating pressure	► Port A, B, P	bar [psi]	315 [4568]
	► Port T	bar [psi]	210 [3050] Tank pressure (standard)
Maximum flow		l/min [US gpm]	135 [35.7]
Hydraulic fluid			See table below
Hydraulic fluid temperature range (at the valve working ports)		°C [°F]	-20 ... +80 [-4 ... +176]
Viscosity range		mm <sup>2</sup> /s [cSt]	2.8 ... 500 [35 ... 2320]
Maximum admissible degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)			Class 20/18/15 <sup>2)</sup>

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oils	HL, HLP, HLPD, HVLP, HVLDP	NBR	DIN 51524



### Important information on hydraulic fluids:

- For more information and data on the use of other hydraulic fluids, refer to data sheet 90220 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 40 K higher than the maximum surface temperature

<sup>1)</sup> With suspended installation, higher sensitivity to contamination. Horizontal installation is recommended.

<sup>2)</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 service life of the components.

**Technical data**

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

<b>electric</b>				
Voltage type			Direct voltage	
Nominal voltage according to VDE 0580			V	24
Voltage tolerance (nominal voltage)			%	±10
Nominal power according to VDE 0580			W	38
Duty cycle			%	100 (S1 according to VDE 0580)
Switching time <sup>3)</sup>	► ON	Pressure change 5%	ms	65 ... 150
		Pressure change 95%	ms	100 ... 220
	► OFF	Pressure change 5%	ms	12 ... 50
		Pressure change 95%	ms	48 ... 104
Switching time according to ISO 6403 <sup>4)</sup>	► ON		ms	45 ... 60
	► OFF		ms	20 ... 30
Maximum switching frequency			1/h	15000
Protection class according to DIN EN 60529			IP65	
Maximum surface temperature of the coil <sup>5)</sup>			°C [°F]	120 [248]
Insulation class VDE 0580			F	
Protection class according to VDE 0580			I	
Electrical protection			Every solenoid must be protected individually, using a suitable fuse with tripping characteristic K (inductive loads). The valve must be installed on a surface that is included in the equipotential bonding.	

<sup>3)</sup> Measured with flow, 80% performance limit and horizontal installation position.

<sup>4)</sup> Measured without flow

<sup>5)</sup> Surface temperature >50 °C, provide contact protection.

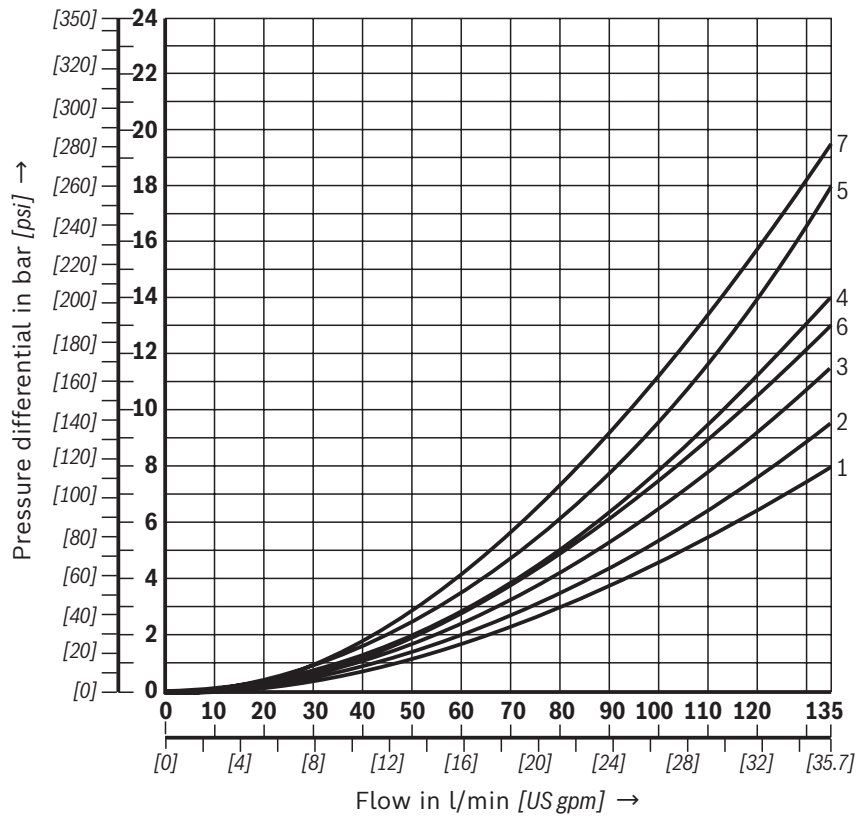
**Notice:**

- The solenoid coils must not be painted.
- Actuation of the manual override is only possible up to a tank pressure of approx. 50 bar [725 psi]. Avoid damage to the bore of the manual override. (Special tool for the operation, separate order, material no. **R900024943**). When the manual override is blocked, the operation of the solenoid must be prevented.
- The simultaneous actuation of 2 solenoids of one valve must be ruled out.
- Use cables that are approved for a working temperature above 105 °C [221 °F].
- If the standard environmental conditions according to VDE 0580 cannot be provided, the valve must be especially protected.

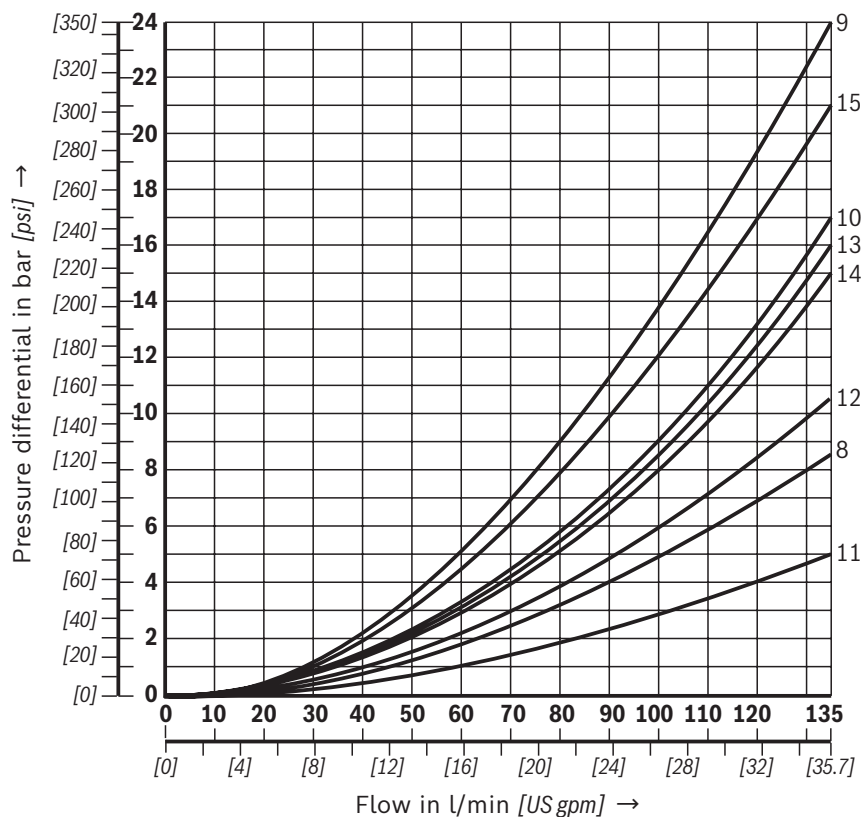
## Characteristic curves

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

### $\Delta p$ - $q_V$ characteristic curves



Symbol	Direction of flow			
	P-A	P-B	A-T	B-T
A	4	4	–	–
A1	5	10	–	–
B	4	4	–	–
C	1	2	3	3
D	1	3	3	3
E	2	2	4	5
E171	14	14	5	15
G	6	6	5	7
H	8	8	3	4
J	2	2	4	5
L	2	2	4	5
M	1	1	3	5
T	4	4	7	9
U	2	2	4	5
Y	2	1	1	4
Y11	2	1	1	4



Symbol	Direction of flow					
	P-A	P-B	A-T	B-T	A-P	B-P
J2	11	11	12	12	1	1

Performance limits

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



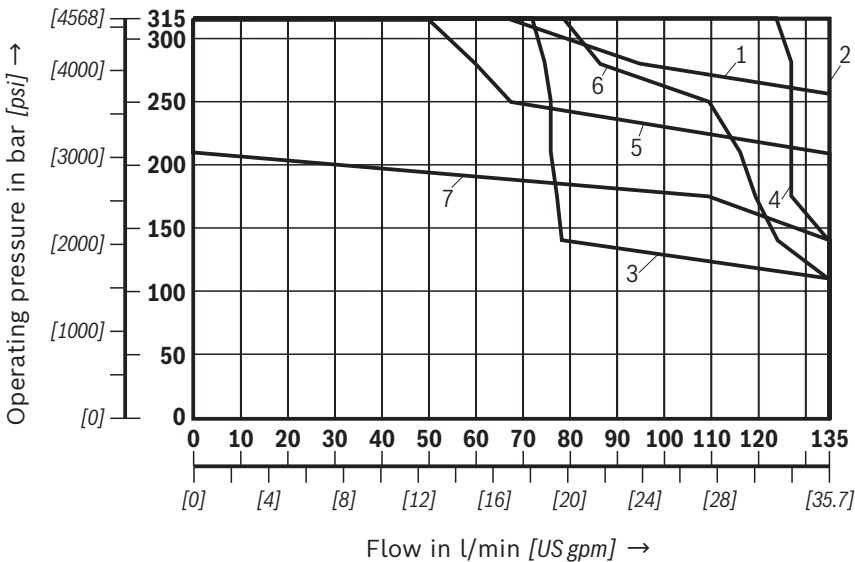
Notice:

The specified performance limits are valid for use 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

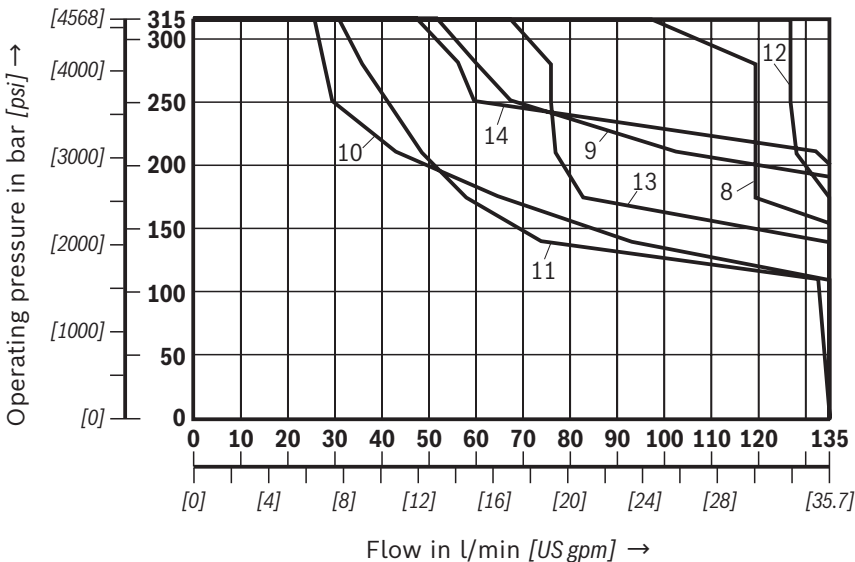
lower with only one direction of flow (e.g. from P to A while port B is blocked).  
In such cases, please consult us.

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

Solenoid side

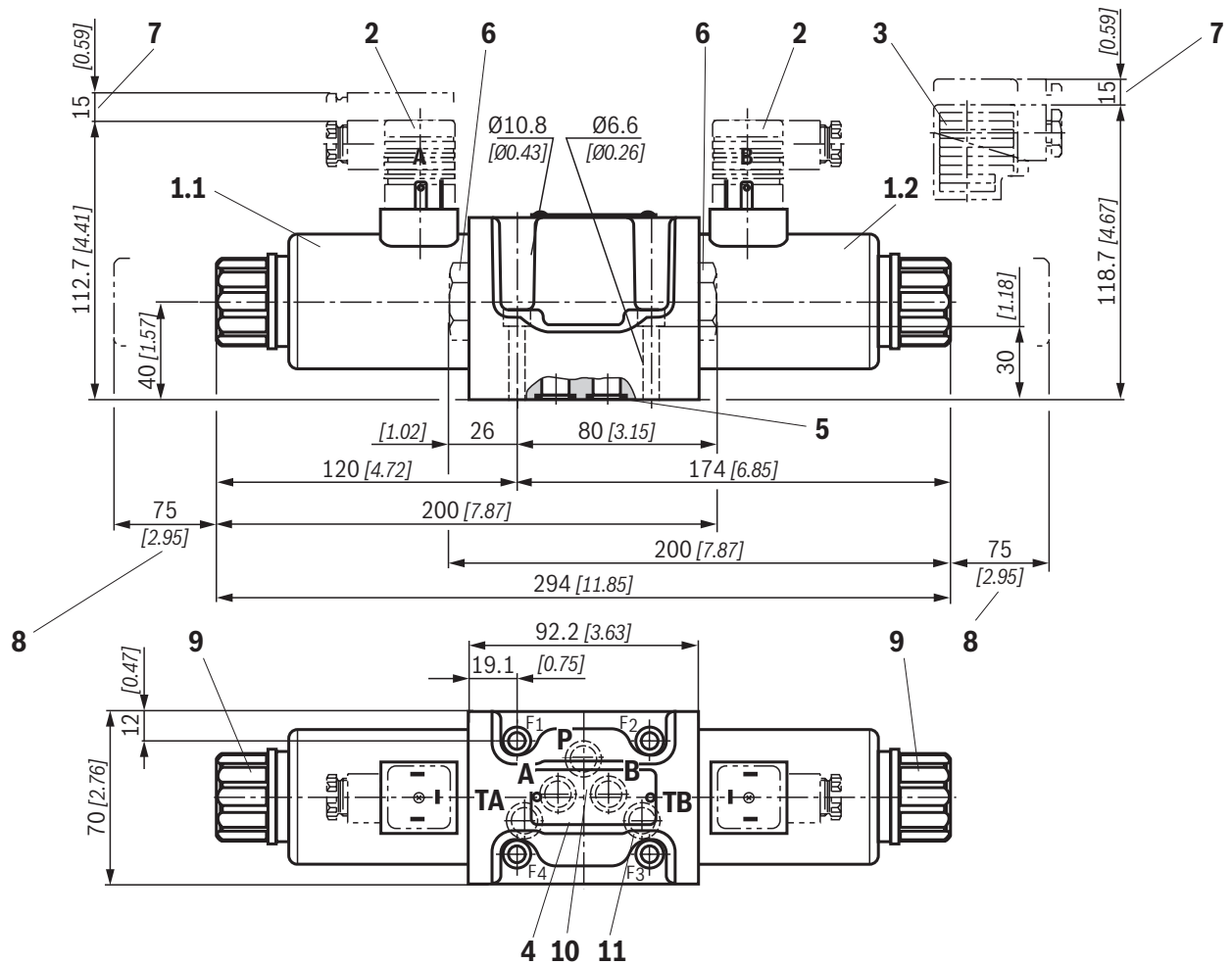


Symbol	Characteristic curve
U	1
C, D, Y, Y11	2
G	3
M	4
L	5
H	6
J2	7
E	8
J	9
T	10
A	11
A1	12
B	13
E171	14





**Dimensions:** Individual connection  
(dimensions in mm [inch])



0,01/100  
[0.0004/4.0]

Rzmax 4

Required surface quality of the valve  
contact surface



**Notice:**

- Deviating from ISO 4401, port T is in this data sheet called TA, port T1 is called TB.
- The dimensions are nominal dimensions which are subject to tolerances.

**Item explanations, valve mounting screws and subplates**  
see page 10.

## Dimensions

- 1.1** Solenoid "a"
- 1.2** Solenoid "b"
- 2** Mating connector **without** circuitry (separate order, see page 11 and data sheet 08006)
- 3** Mating connector **with** circuitry (separate order, see page 11 and data sheet 08006)
- 4** Name plate
- 5** Identical seal rings for ports A, B, P, TA, TB
- 6** Plug screw for valves with one solenoid
- 7** Space required to remove mating connector/angled mating connector
- 8** Space required to remove coil
- 9** Mounting nut, tightening torque  $M_A = 9 \pm 1 \text{ Nm}$   $[6.64 \pm 0.74 \text{ ft-lbs}]$
- 10** Porting pattern according to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- 11** Connection TB can only be used in connection with separately produced bore.

### Valve mounting screws (separate order)

#### 4 metric hexagon socket head cap screws

##### ISO 4762 - M6 x 40 - 10.9-fLZn-240h-L

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

tightening torque  $M_A = 12.5 \text{ Nm}$   $[9.2 \text{ ft-lbs}] \pm 10\%$ ,

material no. **R913000058**

or

#### 4 hexagon socket head cap screws

##### ISO 4762 - M6 x 40 - 10.9 (self procurement)

(friction coefficient  $\mu_{\text{total}} = 0.12 \dots 0.17$ );

tightening torque  $M_A = 15.5 \text{ Nm}$   $[11.4 \text{ ft-lbs}] \pm 10\%$

#### 4 UNC hexagon socket head cap screws

##### 1/4-20 UNC x 1-1/2" ASTM-A574

(friction coefficient)  $\mu_{\text{total}} = 0.19 \dots 0.24$ );

tightening torque  $M_A = 25 \text{ Nm}$   $[18.4 \text{ ft-lbs}] \pm 15\%$ ,

(friction coefficient  $\mu_{\text{total}} = 0.12 \dots 0.17$ );

tightening torque  $M_A = 19 \text{ Nm}$   $[14.0 \text{ ft-lbs}] \pm 10\%$ ,

material no. **R978800710**

With different friction coefficients, the tightening torques are to be adjusted accordingly.


## Over-current fuse and switch-off voltage peaks

Electrical connection	Voltage data in the valve type code	Nominal voltage valve solenoid in VDC	Rated current valve solenoid in A	Rated current external miniature fuse: Medium time-lag (M) according to DIN 41571 and EN/IEC 60127 in mA
K4	G24	24	1.6	1600

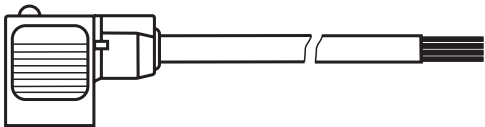
### Notice:

Corresponding to the rated current, a fuse 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 short-circuit current of the supply source to be expected may amount to a maximum of 1500 A.

## Mating connectors according to DIN EN 175301-803

For details and more mating connectors see data sheet 08006					
Port	Valve side	Color	Material no.		
			Without circuitry	With indicator light 24 V	With indicator light and Zener diode suppression circuit 24 V
M16 x 1.5	a	Gray	<b>R901017010</b>	-	-
	a/b	Black	<b>R901017011</b>	<b>R901017022</b>	<b>R901017026</b>
1/2" NPT (Pg16)	a	Red/brown	<b>R900004823</b>	-	-
	a/b	Black	<b>R900011039</b>	<b>R900057453</b>	-

Details see data sheet 30362					
			Material number		
			Type VT-SSBA1-PWM-1X/V001/5,00 as fast switching amplifier	Type VT-SSBA1-PWM-1X/V002/5,00 for energy reduction	
M16 x 1.5	a/b	Black	<b>R901265633</b>	<b>R901290194</b>	

## More information

- ▶ Subplates
- ▶ Inductive position switch and proximity sensors (contactless)
- ▶ Mineral oil-based hydraulic fluids
- ▶ Reliability characteristics according to EN ISO 13849
- ▶ Hex socket head cap screws metric/UNC
- ▶ Hydraulic valves for industrial applications

Data sheet 45100  
Data sheet 24836  
Data sheet 90220  
Data sheet 08012  
Data sheet 08936  
Data sheet 07600-B

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