

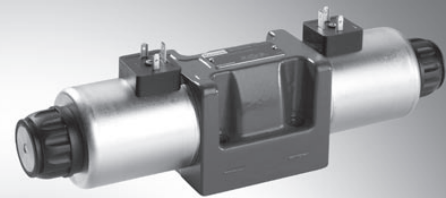
4/3, 4/2 and 3/2 directional valve with wet-pin DC solenoids

RE 23340/04.11

1/16

Type WE

Size 10
 Component series 5X
 Maximum operating pressure 350 bar [5076 psi]
 Maximum flow 150 l/min [39.6 US gpm]



H7832

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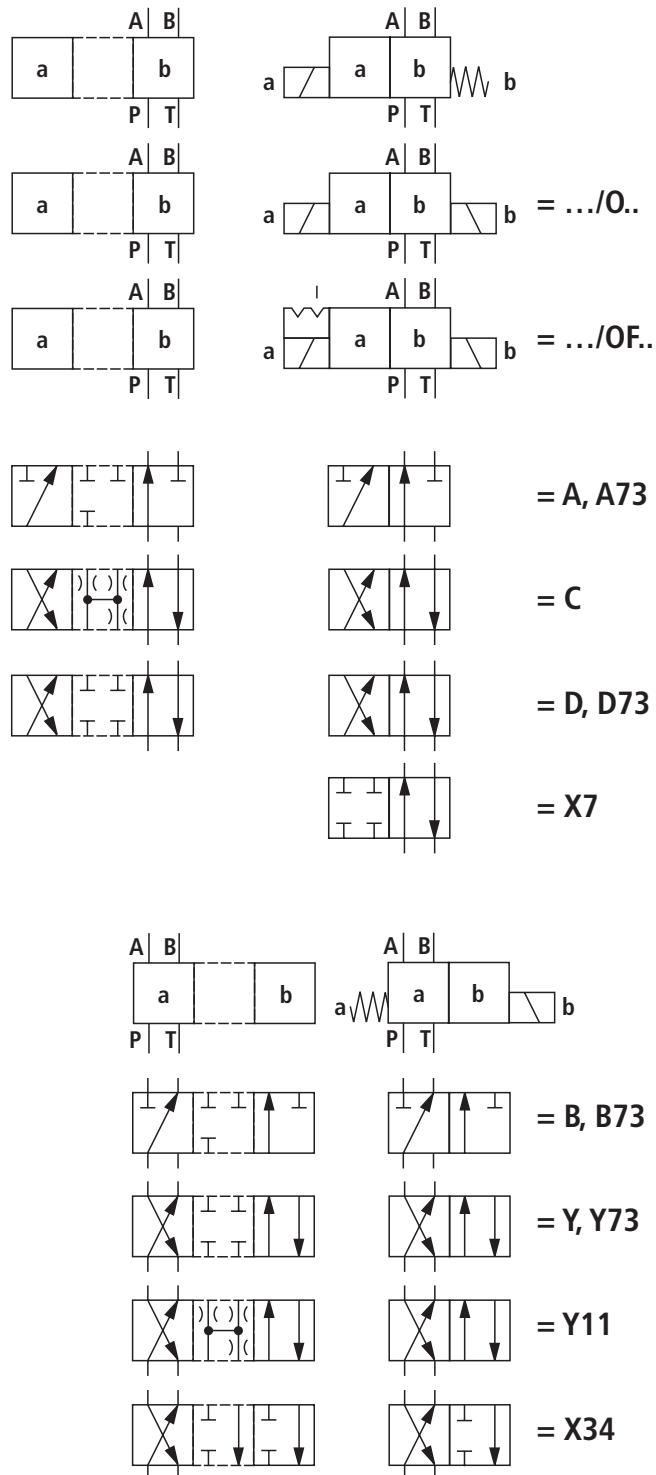
Features

- Direct operated directional spool valve with solenoid actuation in high-performance design
- 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 or central connection
- Central connection possible via double valve mating connector
- Manual override, optional

- More information:
 - Subplates Data sheet 45054
 - Hydraulic fluid on mineral oil basis Data sheet 90220
 - Reliability characteristics according to EN ISO 13849 Data sheet 08012

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

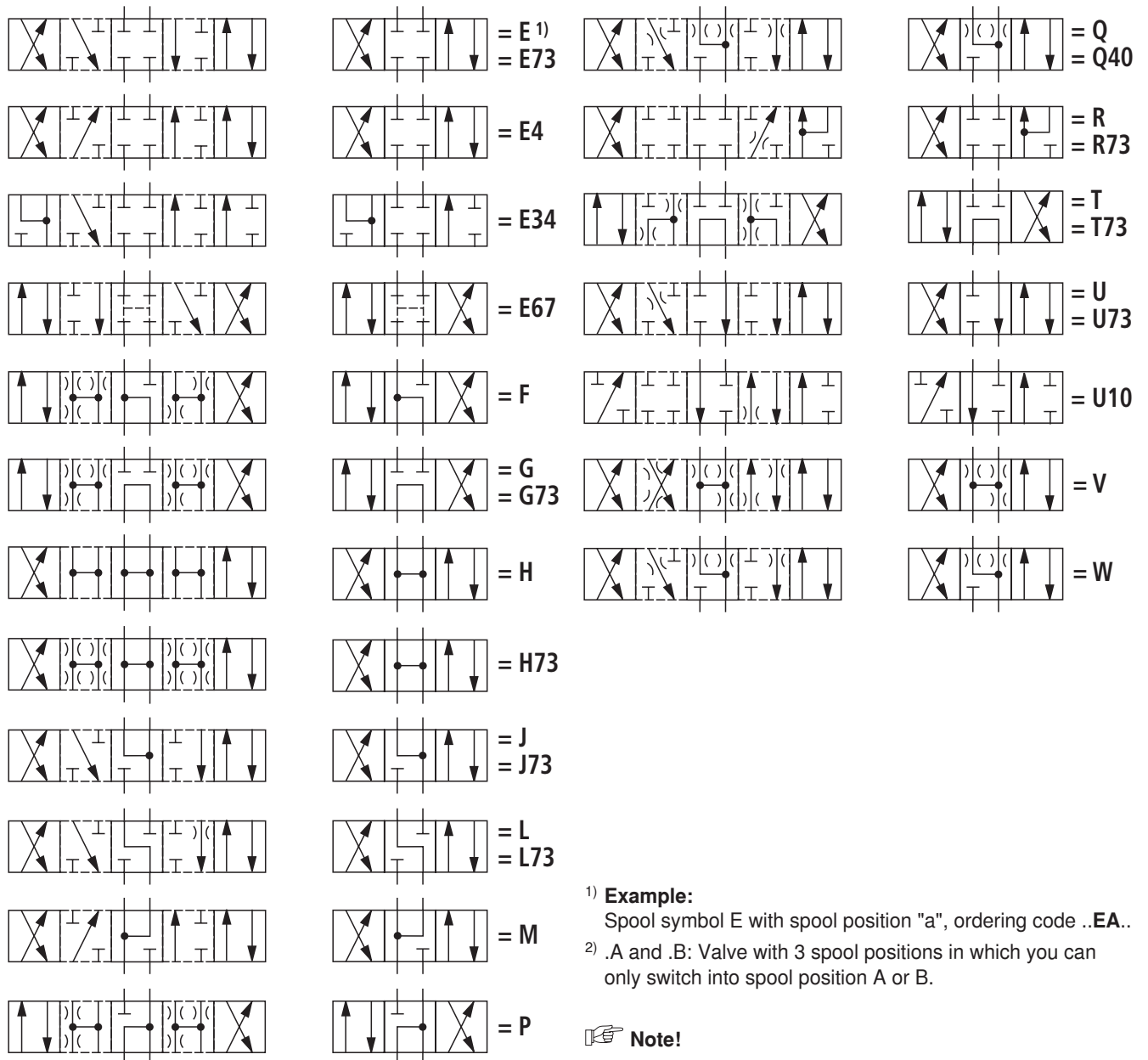
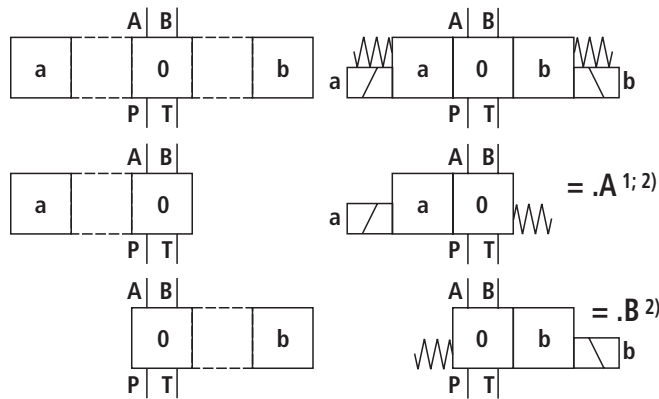
Spool symbols: 2 spool positions



Note!

Presentation according to DIN ISO 1219-1.
Hydraulic interim positions are shown by dashes.

Spool symbols: 3 spool positions



- 1) **Example:**
Spool symbol E with spool position "a", ordering code ..EA..
- 2) .A and .B: Valve with 3 spool positions in which you can only switch into spool position A or B.

Note!
Presentation according to DIN ISO 1219-1.
Hydraulic interim positions are shown by dashes.

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, control spool (3) is held in the central position or in the rest position by the return springs (4) (except for version "O" and "OF"). The 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 initial 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 spring (4) pushes control spool (3) again back to its initial position.

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

Version "O"

(only with spool symbols A, C, D, .A and .B)

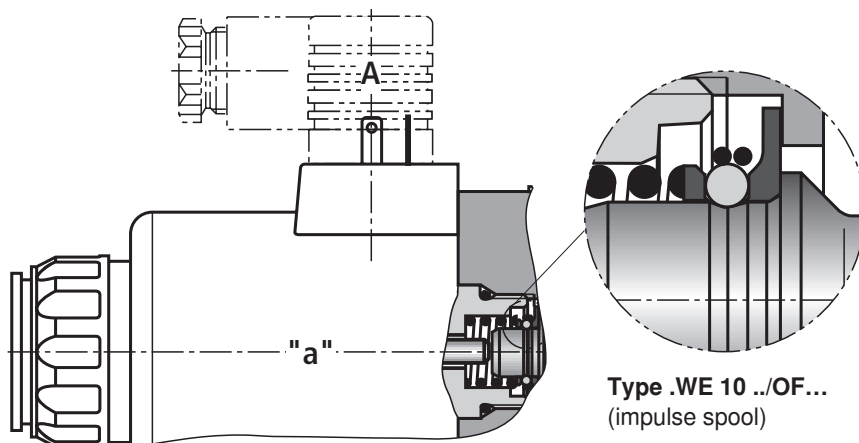
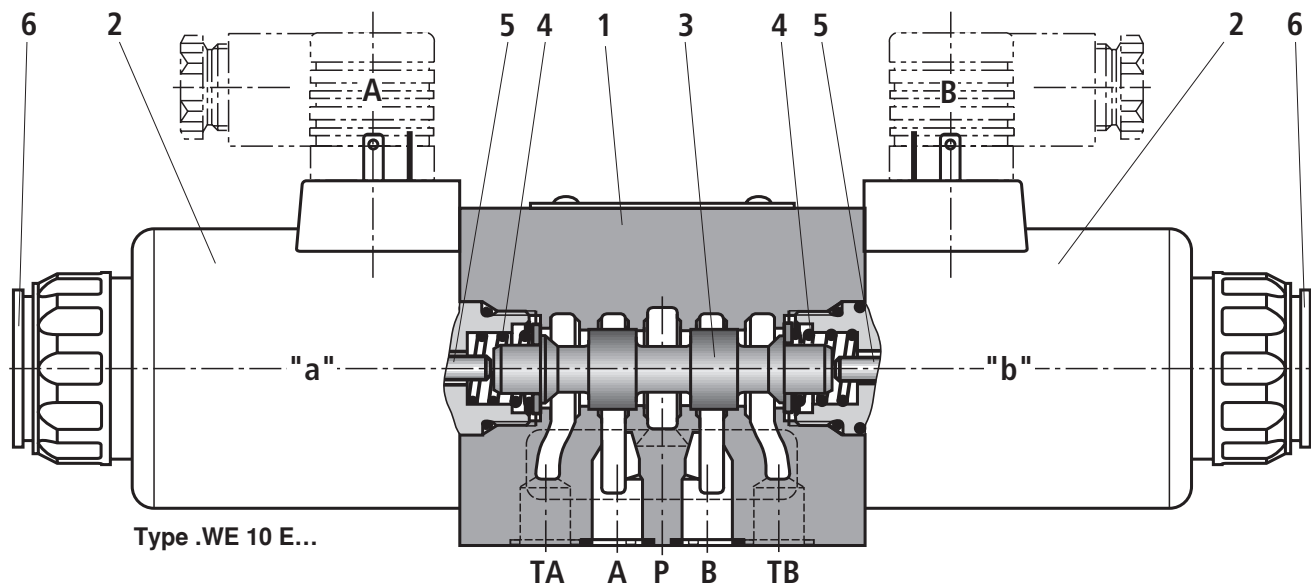
This version is a directional valve with two spool positions and two solenoids without detent. In the de-energized condition, there is no defined spool position.

Version "OF" (Impulse spool, only with spool symbols A, C, D, .A and .B)

This version is a directional valve with two spool positions, two solenoids and two detent spool positions. Thanks to the two detents, it alternately locks the two spools in position and the solenoid therefore needs not to be permanently energized.

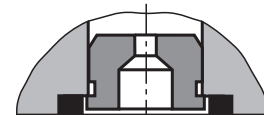
 **Note!**

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.



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			Individual connection	Central connection
	- Valve with one solenoid	kg [lbs]	3.9 [8.6]	4.0 [8.8]
	- Valve with two solenoids	kg [lbs]	5.5 [12.1]	5.6 [12.3]
Installation position			Any ¹⁾	
Ambient temperature range	- Default seals	°C [°F]	-20 to +70 [-4 to +122] (NBR seals) -15 to +70 [+5 to +122] (FKM seals)	
	- Low-temperature seals ²⁾	°C [°F]	-40 to +50 [-40 to +122] (NBR seals)	
Storage temperature range		°C [°F]	-20 to +80 [-4 to +176]	
MTTF _d values according to EN ISO 13849		Years	150 (for further details see data sheet 08012)	

hydraulic

Maximum operating pressure ²⁾	- Port A, B, P	bar [psi]	350 [5076]	
	- Port T	bar [psi]	210 [3050] Tank pressure (standard) With spool symbols A and B, port T must be used as leakage port if the operating pressure exceeds the maximum admissible tank pressure.	
Maximum flow		l/min [US gpm]	150 [39.6]	
Flow cross-section (spool position 0)	- Spool symbol V	mm ² [inch ²]	10 [0.016] (A/B to T); 10.3 [0.016] (P to A/B)	
	- Spool symbol W	mm ² [inch ²]	2.5 [0.004] (A/B to T)	
	- Spool symbol Q	mm ² [inch ²]	5.0 [0.008] (A/B to T)	
Hydraulic fluid			See table page 8	
Hydraulic fluid temperature range (at the valve working ports)		°C [°F]	-20 to +80 [-4 to +176] (NBR seals) -15 to +80 [+5 to +176] (FKM seals) -20 to +50 [-4 to +122] (HFC hydraulic fluid)	
Viscosity range		mm ² /s [SUS]	2.8 to 500 [35 to 2320]	
Maximum permitted degree of contamination of the hydraulic fluid – cleanliness class according to ISO 4406 (c)			Class 20/18/15 ³⁾	

¹⁾ With suspended installation, higher sensitivity to contamination. Horizontal installation is recommended.

²⁾ In case of use at low temperatures, see project planning information page 16.


³⁾ The cleanliness classes stated for the components need to be maintained in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components.

For the selection of the filters see
www.boschrexroth.com/filter.

Technical Data (For applications outside these parameters, please consult us!)

hydraulic

Hydraulic fluid		Classification	Suitable sealing materials	Standards
Mineral oils and related hydrocarbons		HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524
Environmentally friendly	– Insoluble in water	HEES	NBR, FKM	ISO 15380
		HEPR	FKM	
	– Soluble in water	HEPG	FKM	ISO 15380
Flame-resistant	– Water-free	HFDU, HFDR	FKM	ISO 12922
	– Water-containing	HFAS	NBR, FKM	ISO 12922
		HFC	NBR	

 **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, service life, maintenance intervals, etc.)!
- The flash point of the process and operating medium used must be 40 K higher than the maximum solenoid surface temperature.

- **Flame-resistant – water-containing:** Maximum pressure difference per control edge 50 bar, otherwise, increased cavitation erosion!
- **Environmentally friendly:** When using environmentally friendly hydraulic fluids that are simultaneously zinc-soluble, zinc may accumulate in the medium (700 mg zinc per pole tube).

electric

Voltage type		Direct voltage	Alternating voltage	
Nominal voltage according to VDE 0580 (ordering code see pages 2 and 9)	V	12, 24, 26, 96, 110, 180, 205, 220	Only possible with rectifier ⁴⁾	
Voltage tolerance (nominal voltage)	%	±10		
Rated power according to VDE 0580	W	40		
Duty cycle (ED)	%	100 (S1 according to VDE 0580)		
Switching time according to ISO 6403 ⁵⁾	– ON	Pressure change 5 %	ms	60 to 104 ⁶⁾
		Pressure change 95 %	ms	90 to 165 ⁶⁾
	– OFF	Pressure change 5 %	ms	12 to 50
		Pressure change 95 %	ms	48 to 104
Maximum switching frequency	1/h	15000	7200	
Protection class according to DIN EN 60529		See page 9		
Protection class according to VDE 0580		See page 9		
Maximum surface temperatures of the coil ⁷⁾	°C [°F]	120 [248]		
Insulation class VDE 0580		F		
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 potential equalization.		

- ⁴⁾ – Mating connectors with rectifier see page 16
- Possible voltages see page 3
 - Rectifiers must comply with the relevant standards as well as the coil performance data!
 - With a central connection, the rectifier is on the printed-circuit board

⁵⁾ Switching time is measured in horizontal position

⁶⁾ Not with spool symbols A, B and .73

⁷⁾ Surface temperature > 50 °C possible, provide contact protection!

 **Electrical connections and notes** see page 9.

Technical Data (For applications outside these parameters, please consult us!)

Notes!

- The solenoid coils must not be painted.
- Actuation of the manual override is only possible up to a tank pressure of ca. 50 bar [725 psi]. Avoid damage to the bore of the manual override! (Special tool for actuation, separate order, Material no. **R900024943**). When the manual override is blocked, actuation of the opposite solenoid must be ruled out!
- The simultaneous actuation of 2 solenoids of one valve must be ruled out!
- Use cables that are approved for an operation temperature above 105 °C [221°F].
- When solenoid coils are switched off, voltage peaks result which may cause failures or damage in the connected control electronics. The user has to provide for a suitable circuit for limiting the voltage peaks. It must be noted that a diode switched in an anti-parallel form extends the switch-off time.
- Valves with individual connection can be operated with twice the voltage for reducing the switching time. For this purpose, the voltage has to be reduced to the nominal valve voltage after 100 ms by means of pulse width modulation. The maximum admissible switching frequency is 5 1/s.
- Due to possible overloads of the printed-circuit board, valves with central connection must not be operated with twice the voltage.

Electrical connections and coil-connection combinations

Ordering code connector	Ordering code (voltage)								Type of protection according to DIN EN 60529	Protection class according to VDE 0580
	G12	G24	G26	G96	G110	G180	G205	G220		
Without mating connector, individual connection with connector according to DIN EN 175301-803	K4	✓ ₈₎	✓ ₈₎	✓ ₉₎	✓ ₈₎	–	✓ ₈₎	✓ ₈₎	IP65	I
	K4K¹⁰⁾	✓	✓	✓ ₉₎	–	–	✓ ₉₎	✓ ₉₎	IP67	I
Without mating connector, individual connection 4-pin with connector M12x1, integrated interference protection circuit, operating display LED	K72L	–	✓	–	–	–	–	–	IP65	II ¹¹⁾
Without mating connector, with connector AMP Junior-Timer	C4Z	–	–	✓	✓	–	–	–	IP66	II ¹¹⁾
Without mating connector, with threaded connection 1/2"-14 NPT	DAL	✓ ₈₎	✓ ₈₎	–	✓ ₈₎	–	–	✓ ₈₎	IP65	I
Central plug-in connection at the cover, with indicator light (without mating connector) with connector according to DIN EN 175301-803	DK6L	✓ ₈₎	✓ ₈₎	–	✓ ₈₎	–	–	✓ ₈₎	IP65	I
Cable fitting at the cover, with indicator light	DL¹⁰⁾	✓ ₈₎	✓ ₈₎	–	✓ ₈₎	–	–	✓ ₈₎	IP65	I
Cable fitting at the cover, with indicator light and cable bridge at the ground connection	DJL1	–	✓ ₈₎	–	–	✓	–	–	IP65	I
Mini-change connector, 5-pin	DK25L	–	✓ ₈₎	–	✓ ₈₎	–	–	–	IP65	I

⁸⁾ Coil with approval according to UL 429

⁹⁾ On request

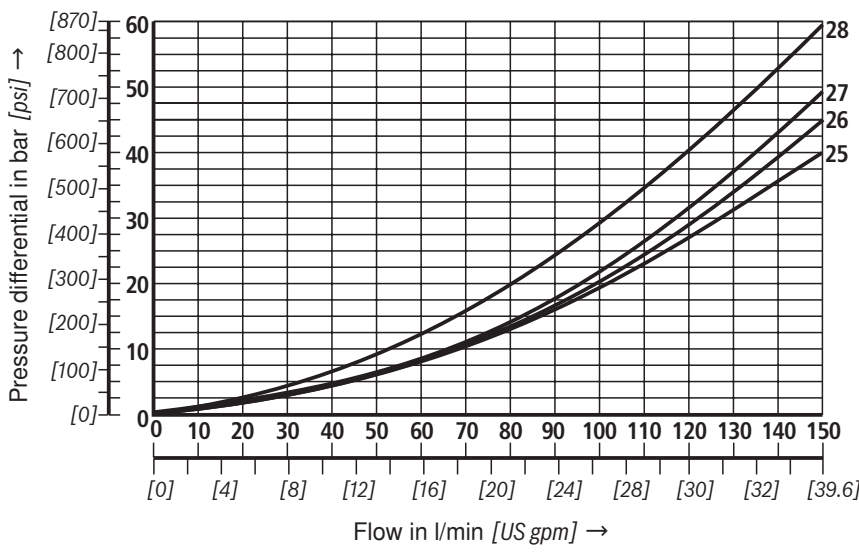
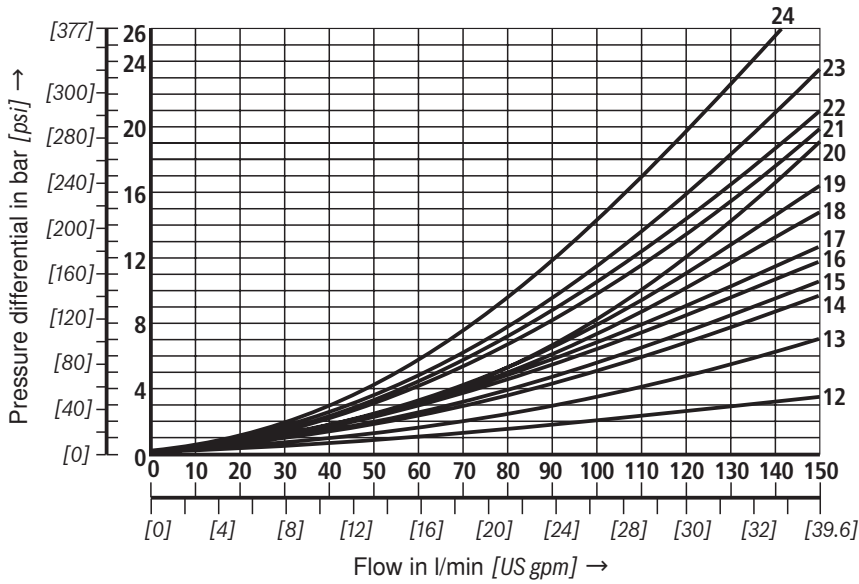
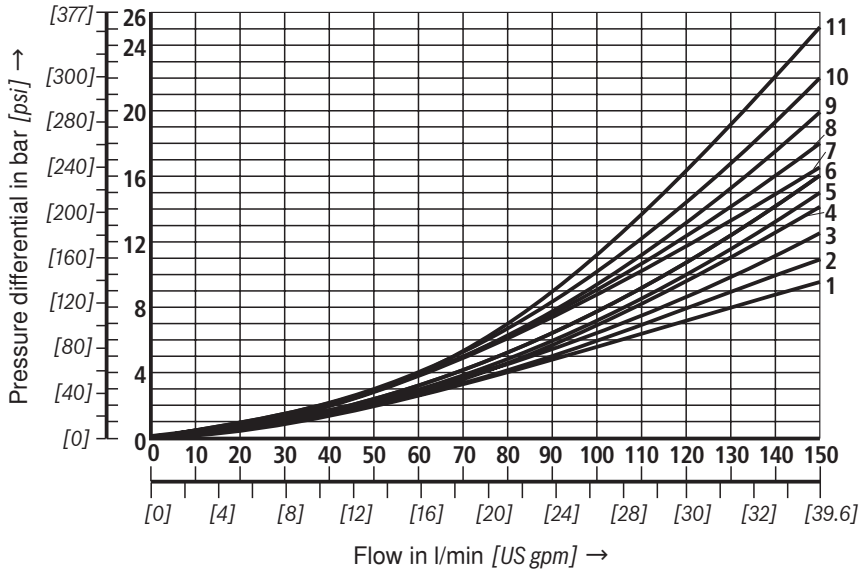
¹⁰⁾ Possible with version "J50".

¹¹⁾ With protection class II, a protective extra-low voltage with isolation transformer (PELV, SELV) is to be provided.

When establishing the electrical connection, the protective earthing conductor (PE $\frac{1}{2}$) has to be connected properly.

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

Δp - q_v characteristic curves



Spool symbol	Direction of flow			
	P - A	P - B	A - T	B - T
A; B	6	6	-	-
A73, B73	23	23	-	-
C	1	2	5	7
D	2	2	5	7
D73	25	26	26	27
E	17	16	19	21
E4	17	16	19	22
E67	4	4	11	24
E73	17	18	21	21
F	2	3	22	23
G	4	4	24	24
G73	18	18	24	24
H	14	14	20	21
H73	14	14	6	9
J	3	3	9	11
J73	22	21	23	24
L	3	3	9	9
L73	22	10	11	24
M	14	14	6	8
P	17	14	20	23
Q	16	17	4	8
Q40	On request			
R	18	21	18	24
R73	24	24	23	24
T	18	4	10	24
T73	6	6	11	24
U	3	3	6	11
U10	On request			
U73	22	22	23	24
V	17	17	18	20
W	On request			
X7	On request			
X34	On request			
Y	17	16	18	21
Y11	3	2	4	9
Y73	26	26	26	28

Central position:

Spool symbol	Direction of flow				
	P - A	P - B	B - T	A - T	P - T
H	12	12	13	13	15

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

Attention!

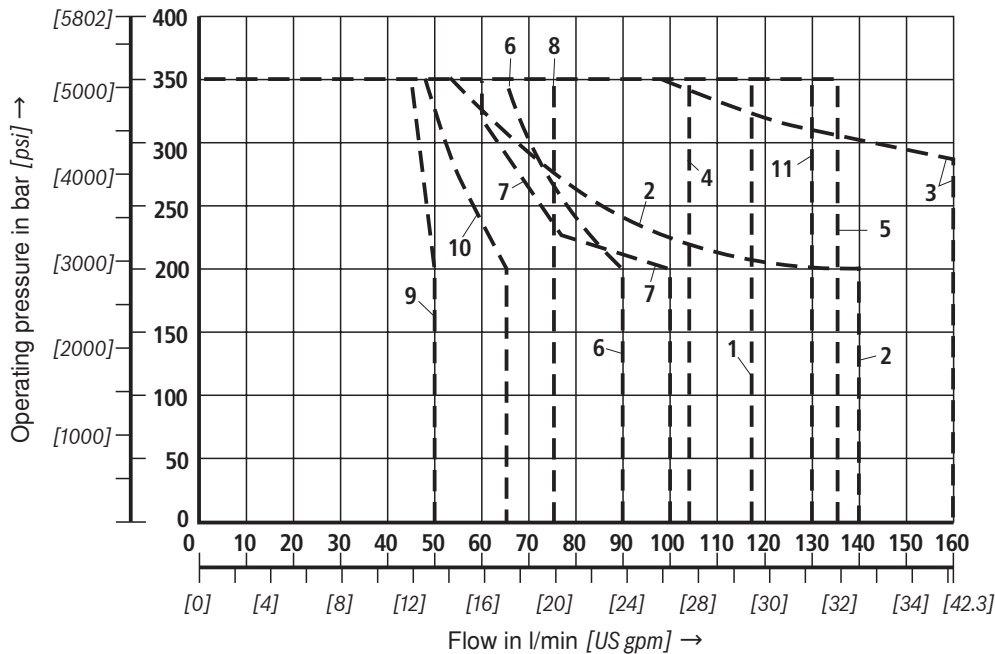
The specified switching power limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

Due to the flow forces acting within the valves, the permissible switching power limits may be considerably lower

with only one direction of flow (e.g. from P to A while port B is blocked)!

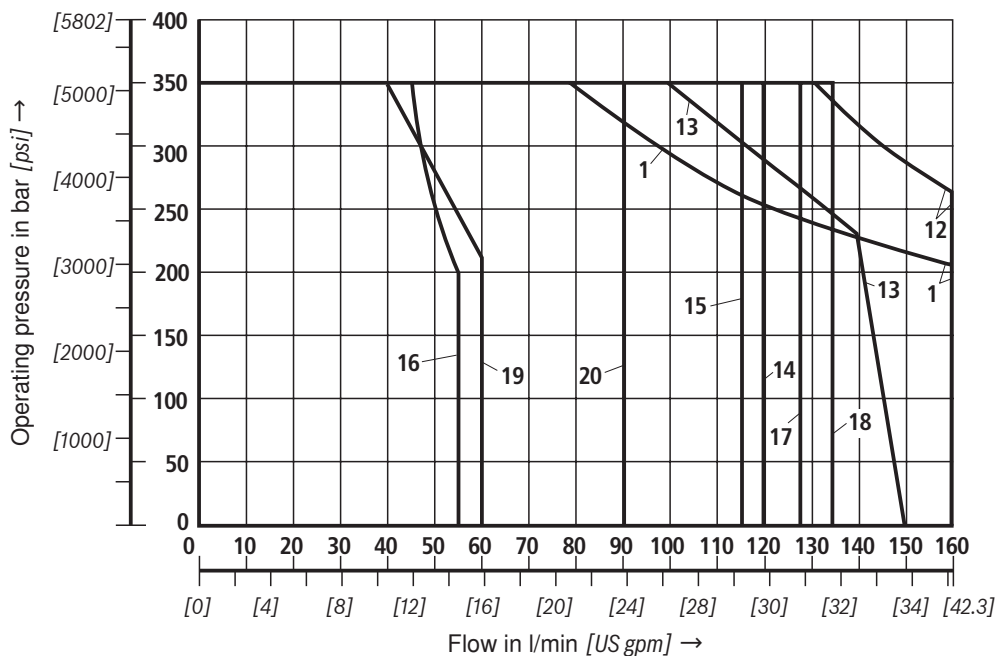
In such cases, please consult us!

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



Characteristic curve	Spool symbol
1	L
2	A
3	B
4	Y
5	E73, Q
6	F
7	G73
8	M; V
9	P
10	A73
11	H73

--- Spring-side



Characteristic curve	Spool symbol
1	L
12	A/O
13	J
14	H
15	D73
16	B73
17	Y11
18	C; D; E73
19	E67
20	G

— Solenoid-side

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

Attention!

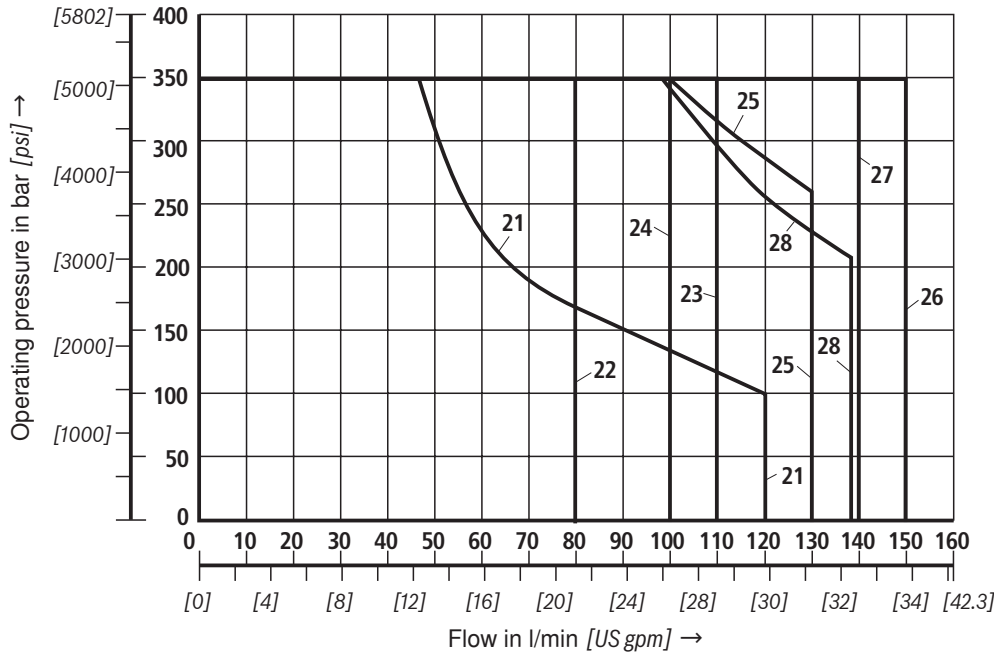
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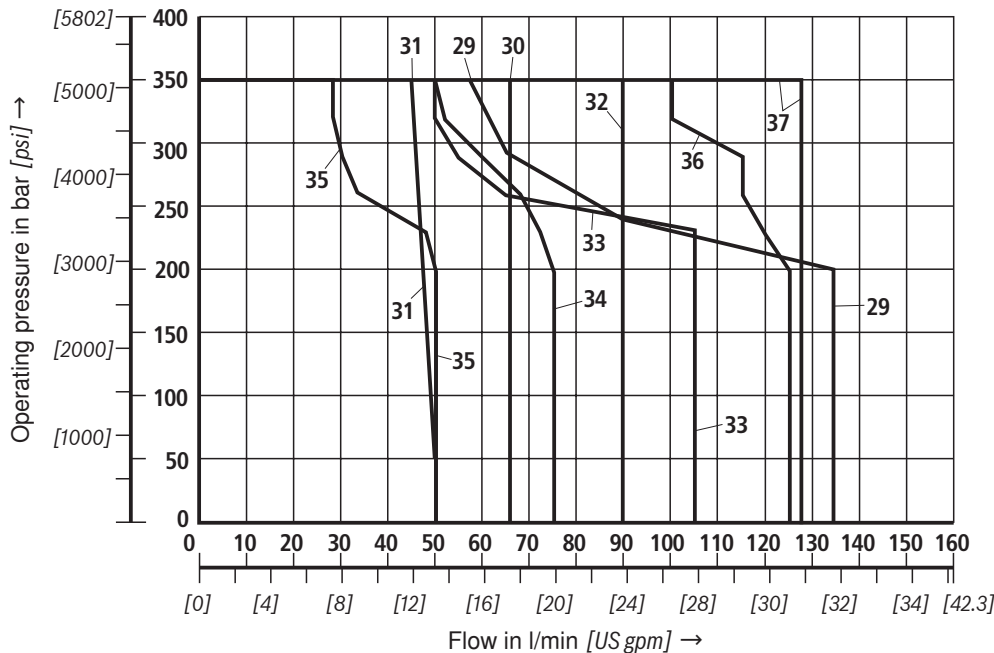
In such cases, please consult us!

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



Character-istic curve	Spool symbol
21	A; B
22	E4
23	G73
24	F; L73
25	E
26	C/O; D/O
27	J73
28	U

— Solenoid-side

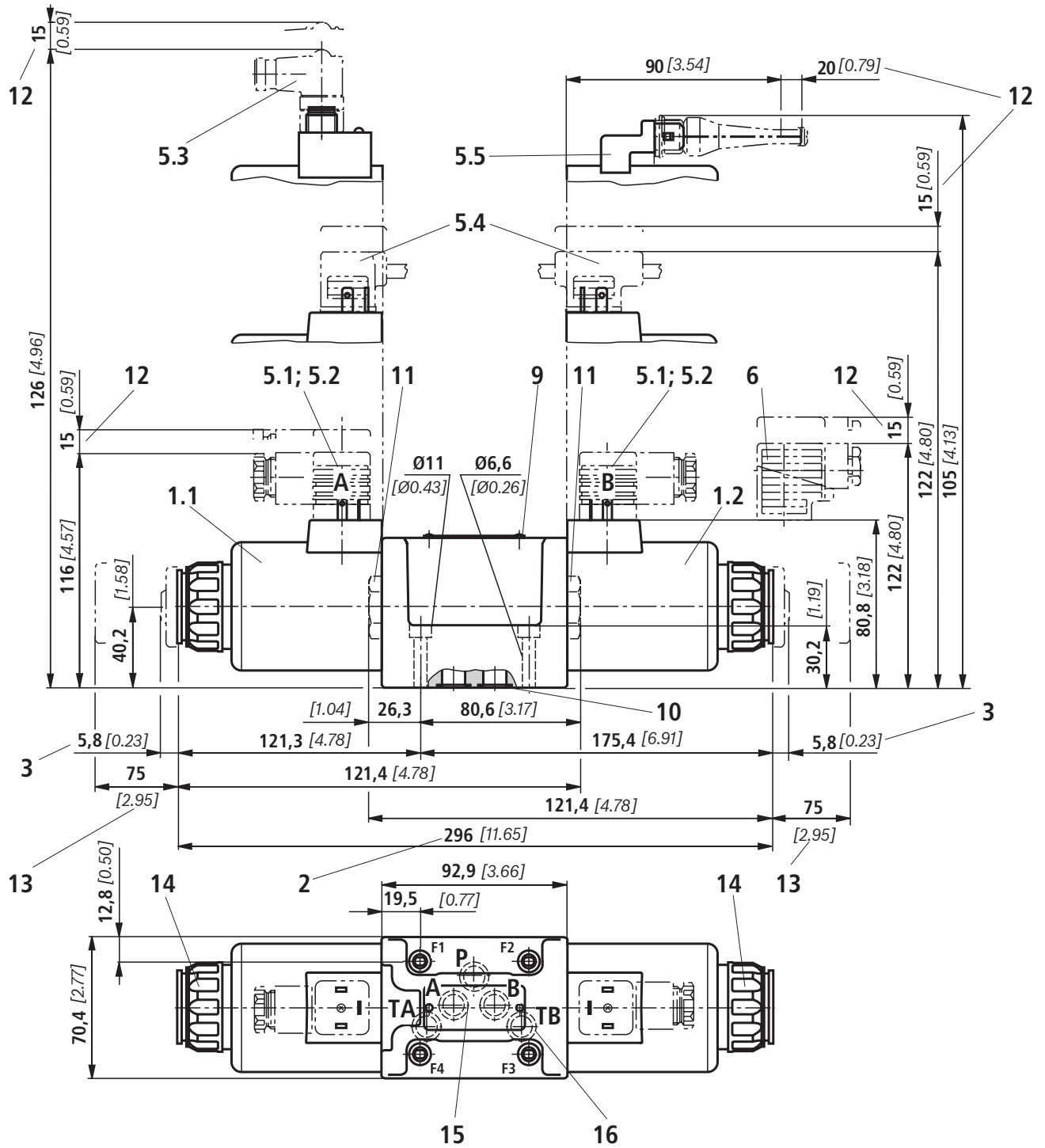


Character-istic curve	Spool symbol
29	Q
30	V
31	T73
32	P
33	R
34	R73
35	T
36	U73
37	Y73

— Solenoid-side

Spool symbols E34, Q40, U10, W, X7 and X34 on request.

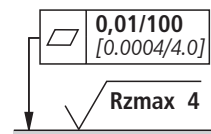
Unit dimensions: Individual connection (dimensions in mm [inch])



Note!

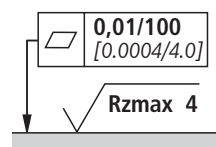
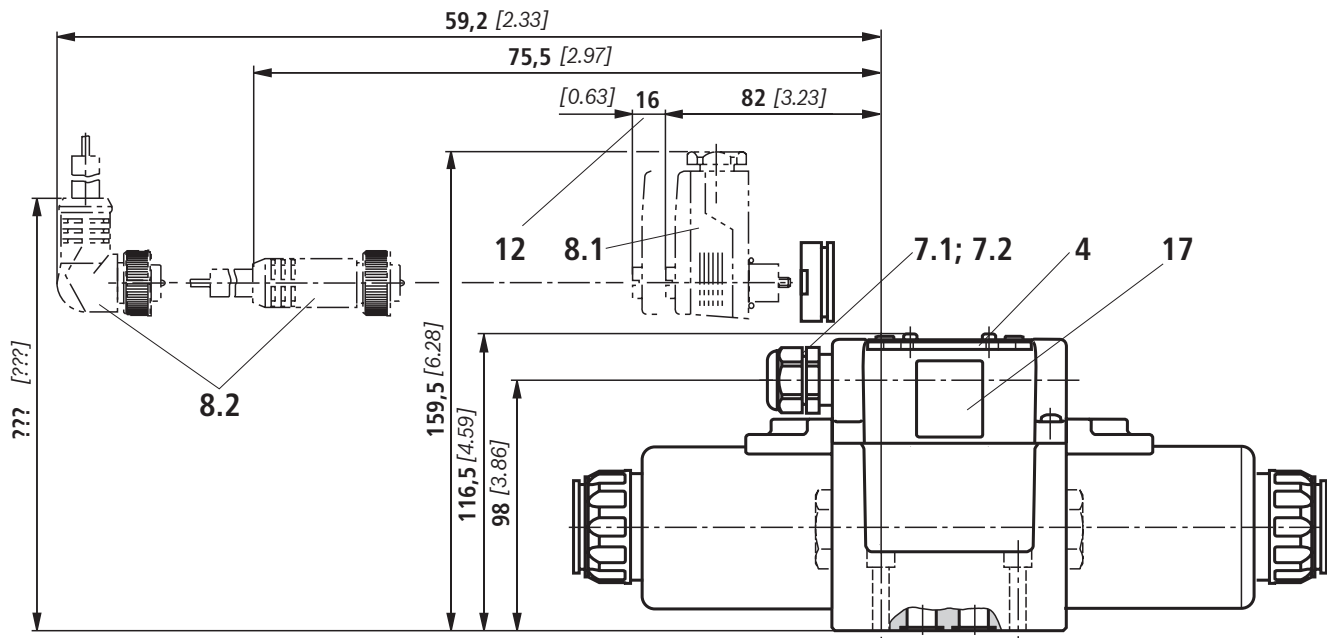
All dimensions are maximum values.

Explanations of items, valve mounting screws and sub-plates see page 15.



Required surface quality of the valve mounting face

Unit dimensions: Central connection (dimensions in mm [inch])



Required surface quality of the valve mounting face

Special points with version "DAL" and "DL"

- Provide for pull relief of the cables by means of suitable cable guiding!
- Default line cross-section 0.75 mm² [0.00116 inch²]
- With larger line cross-sections, the wire end sleeves have to be crimped to a maximum cross-section of 1.5 x 2 mm² [0.00233 x 0.00310 inch²] using a suitable tool so that they fit into the printed-circuit board terminals.
- Before crimping, at least 11 mm [0.43 inch] of the cables has to be insulated.
- Depending on the line cross-section, wire end sleeves according to DIN 46228-1 with a minimum length of 10 mm [0.39 inch] are to be used.
- For the earthing connection, ring cable lugs according to DIN 46234-4-1 are to be used. Tightening torque PE conductor at terminal ⊕ PE: $M_A = 1.2 \text{ Nm} [0.89 \text{ ft-lbs}] \pm 10 \%$

Note!

All dimensions are maximum values.

Explanations of items, valve mounting screws and sub-plates see page 15.

Unit dimensions

- 1.1 Solenoid "a"
- 1.2 Solenoid "b"
- 2 Dimension for solenoid **without** and **with concealed** manual override "**N9**" (standard)
- 3 Dimension for solenoid **with** manual override "**N9**"
- 4 Cover

Attention!
The valve may only be operated with properly mounted cover! Tightening torque of the cover screws
 $M_A = 1.2 \text{ Nm } [0.89 \text{ ft-lbs}] \pm 10 \%$.
Before opening the frame, ensure that the valve is de-energized!
- 5.1 Mating connector **without** circuitry for connector "K4" (separate order, see page 16 and data sheet 08006)
- 5.2 Mating connector **without** circuitry for connector "K4K" (separate order, see data sheet 08006)
- 5.3 Mating connector angled with M12x1 plug-in connection and operating display LED for connector "K72L" (separate order, see data sheet 08006)
- 5.4 Double valve mating connector **without/with** circuitry for connector "K4" (separate order, see data sheet 08006)
- 5.5 Mating connector (AMP Junior Timer) for connector "C4Z" (separate order, see data sheet 08006)
- 6 Mating connector **with** circuitry for connector "K4" (separate order, see page 16 and data sheet 08006)
- 7.1 Cable fitting Pg 16 "DL" (terminals' connection area 10 to 14 mm [0.39 to 0.55 inch]); lock nut, tightening torque $M_A = 3.3 \text{ Nm } [2.43 \text{ ft-lbs}] \pm 10 \%$
- 7.2 Central connection box "DAL" 1/2" NPT
- 8.1 Mating connector for connector "DK6L" (separate order, see data sheet 08006)
- 8.2 Mini-change connector, 5-pin for connector "DK25L" (separate order, Material no. **R900057631**)
- 9 Name plate
- 10 Identical seal rings for ports A, B, P, TA, TB
- 11 Plug screw for valves with one solenoid
- 12 Space required to remove the mating connector/angled socket
- 13 Space required to remove the coil
- 14 Fixing nut, tightening torque $M_A = 14.5 \pm 1.5 \text{ Nm } [10.69 \pm 1.1 \text{ ft-lbs}]$
- 15 Porting pattern according to ISO 4401-05-04-0-05 and NFPA T3.5.1 R2-2002 D05
- 16 Connection TB can only be used in connection with separately produced bore.

Subplates according to data sheet 45054 (separate order)

G 66/01 (G3/8)
G 67/01 (G1/2)
G 534/01 (G3/4)
G 66/12 (SAE-6; 9/16-18)¹⁾
G 67/12 (SAE-8; 3/4-16)¹⁾
G 534/12 (SAE-12; 1-1/16-12)¹⁾

¹⁾ On request

Valve mounting screws (separate order)

4 socket head cap screws metric

ISO 4762 - M6 x 40 - 10.9-fIZn-240h-L

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

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

Material no. **R913000058**

or

4 socket head cap screws

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

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

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

4 socket head cap screws UNC

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

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

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

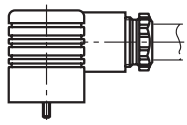
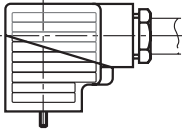
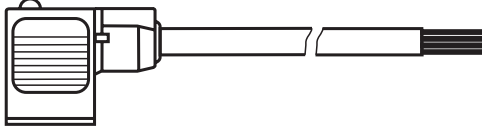
(friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17);

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!

Mating connectors according to DIN EN 175301-803

Details and more mating connectors see data sheet 08006							
Connection	Valve side	Color	Material number				
			without circuitry	with indicator light 12 ... 240 V	with indicator light and rectifier 12 ... 240 V	with rectifier 12 ... 240 V	with indicator light and Zener diode suppression circuit 24 V
M16 x 1.5	a	Gray	R901017010	–	–	–	–
	b	Black	R901017011	–	–	–	–
	a/b	Black	–	R901017022	R901017029	R901017025	R901017026
1/2" NPT (Pg 16)	a	Red/ Brown	R900004823	–	–	–	–
	b	Black	R900011039	–	–	–	–
	a/b	Black	–	R900057453	R900057455	R900842566	–
Details on request							
			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	R901265633		R901290194		

Project planning information: Temperature range and maximum operating pressure in case of use at low temperatures

Connection	Pressure	Temperature range °C [°F]
– P, A, B, T	Static 100 bar [1450 psi]	–40 to –35 [–40 to –31] (NBR seals) –30 to –25 [–22 to –13] (FKM seals)
– P, A, B	Dynamic from 100 bar [1450 psi] to 350 bar [5076 psi] increasing in linear form as function of the temperature	–35 to –30 [–31 to –22] (NBR seals) –25 to –20 [–13 to –4] (FKM seals)
– T	Dynamic from 100 bar [1450 psi] to 210 bar [3050 psi] increasing in linear form as function of the temperature	–35 to –30 [–31 to –22] (NBR seals) –25 to –20 [–13 to –4] (FKM seals)
– P, A, B, T	Maximum operating pressure	–30 to +50 [–22 to 122] (NBR seals) –20 to +50 [–4 to 122] (FKM seals)

 **Note!** With valves for low temperatures, the "T12" control spool play is to be preferably selected.

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