

Directional spool valves, direct operated, with solenoid actuation

Type WE

RE 23178

Edition: 2019-01

 Replaces: 2013-06,
 23183, 23208
 and 23178-00


H7564

- ▶ 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



Features

- ▶ 4/3-, 4/2- or 3/2-way version
- ▶ Porting pattern according to ISO 4401-03-02-0-05 (with or without locating hole) and NFPA T3.5.1 R2-2002 D03
- ▶ High-power solenoid, optionally rotatable by 90°
- ▶ Electrical connection as individual or central connection
- ▶ Manual override, optional
- ▶ Spool position monitoring, optional
- ▶ CE conformity according to the Low-Voltage Directive 2014/35/EU for electrical voltages > 50 VAC or > 75 VDC
- ▶ Solenoid coil as approved component with UR marking according to UL 906, edition 1982, optional
- ▶ Approval according to CSA C22.2 No. 139-1982, optional

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
	WE	6		6X	/		E				/									*

01	3 main ports	3
	4 main ports	4
02	Directional valve	WE
03	Size 6	6
04	Symbols; possible version see page 9	
05	Component series 60 ... 69 (60 ... 69: unchanged installation and connection dimensions)	6X
06	With spring return	no code
	Without spring return	O
	Without spring return with detent	OF
07	High-power wet-pin solenoid with detachable coil	E

Electrical voltages

08	For ordering code see page 5 ... 8	e.g. G24
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Manual override ¹⁾ (see page 20)

09	Without manual override	no code
	With manual override	N ³⁾
	With manual override "mushroom button" (small)	N2 ³⁾
	With lockable manual override "mushroom button" (small)	N4 ^{2; 3)}
	With lockable manual override "mushroom button" (large)	N5 ^{2; 3; 4)}
	With manual override "mushroom button" (large), not lockable	N6 ^{3; 4)}
	With lockable manual override "nut"	N7 ^{2; 3)}
	With concealed manual override (standard)	N9

Corrosion resistance (outside) (for the availability, refer to the following table)

10	None (valve housing primed)	no code
	Improved corrosion protection (240 h salt spray test according to EN ISO 9227)	J3
	High corrosion protection (720 h salt spray test according to EN ISO 9227)	J5

Electrical connection

11	Individual connection or central connection	
	For ordering code see page 5 ... 8	e.g. K4

¹⁾ Operation of the manual override only possible up to 50 bar [725 psi] tank pressure. Avoid damage to the bore of the manual override. (Special tool for the operation, separate order, material no. **R900024943**). If the manual override is blocked, operation of the opposite solenoid is to be excluded. The manual override cannot be allocated a safety function.

²⁾ With tank pressures higher than 50 bar, it is not guaranteed that the valve remains in the position into which it was switched by the lockable manual override ("N4", "N5", "N7").

³⁾ Only direct voltage; not for version "= UR"

⁴⁾ Only direct voltage; not for version "SO407"

Available corrosion resistance

	Electrical connection							Manual override	
	"K4"		"DL"		"K40", "C4"			Without	"N"
	"G12"	"G24"	"G24"	"G48"	"G12"	"G24"	"G26"		
"J3"	✓	✓	✓	✓	-	-	-	✓	✓
"J5"	-	-	-	-	✓	✓	✓	✓	✓

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	
	WE	6		6X	/		E					/									*

Spool position monitoring (For more information, see data sheet 24830)

12	Without position switch	no code
	- Inductive position switch type QM (valves with 2 spool positions)	
	Monitored spool position "a"	QMAG24
	Monitored spool position "b"	QMBG24
	Monitored rest position	QM0G24
	- Inductive position switch type QR (valves with 3 spool positions)	
	Monitored rest position	QR0G24S
	Monitored spool position "a" and "b"	QRABG24E
	- Inductive position switch type QS	
	Monitored spool position "a"	QSAG24W
	Monitored spool position "b"	QSBG24W
	Monitored spool position "0"	QS0G24W
	Monitored spool position "0" and "a"	QS0AG24W
	Monitored spool position "0" and "b"	QS0BG24W
	Monitored spool position "a" and "b"	QSABG24W

Switching time increase

13	Without switching time increase	no code
	With switching time increase (only with direct voltage and only with version "N9" and symbol "73")	A12

Throttle insert

14	Without throttle insert (standard)	no code
	With throttle insert (when the admissible valve performance limit is exceeded, refer to page 15 ... 17):	
	Port	Throttle \varnothing in mm [inch]
		0.6 [0.024] 0.8 [0.031] 1.0 [0.039] 1.2 [0.047] 1.5 [0.059] 2.0 [0.079] 2.5 [0.098] 3.0 [0.120] 4.0 [0.160]
	P	= B06 = B08 = B10 = B12 = B15 = B20 = B25 = B30 = B40
	A	= H06 = H08 = H10 = H12 = H15 = H20 = H25 = H30 = H40
	B	= R06 = R08 = R10 = R12 = R15 = R20 = R25 = R30 = R40
	A and B	= N06 = N08 = N10 = N12 = N15 = N20 = N25 = N30 = N40
	T	= X06 = X08 = X10 = X12 = X15 = X20 = X25 = X30 = X40

Clamping length

15	42 mm [1.65 inch] (standard)	no code
	22 mm [0.87 inch]	Z

Control spool play

16	Standard (recommended)	no code
	Minimum (selection for reduced leakage values; higher oil cleanliness required)	T06
	Increased (selection with high temperature difference hydraulic fluid/environment; leads to higher internal leakage values)	T12

Seal material (observe compatibility of seals with hydraulic fluid used, see page 12)

17	NBR seals	no code
	FKM seals	V
	Recommended for operation with HFC hydraulic fluids together with high temperatures	MH
	Low-temperature version (only with version "Without manual override")	MT

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
	WE	6		6X	/		E					/								*

18	Standard	no code
	Solenoid coil as approved component with UR marking according to UL 906, edition 1982 ⁵⁾	= UR
	Approval according to CSA C22.2 No. 139-1982	= CSA
	Porting pattern according to ANSI B93.9 ⁶⁾	= AN
19	Without locating hole	no code
	With locating hole and locking pin ISO 8752-3x8-St	/62
20	Standard	no code
	With reduced electric power consumption (only versions "G24" as well as "K4", "DL" and "DKL")	SO407
21	Further details in the plain text	*

⁵⁾ Only for version "K4" with "G12", "G24" and "W110"

⁶⁾ With power supply to

- ▶ solenoid "a", channel P is connected to a
- ▶ solenoid "b", channel P is connected to B


Ordering code: DC voltage – individual connection

Electrical connections and available voltages

(special voltages upon request)

Connector	Ordering code	Electrical voltages									Protection class according to DIN EN 60529 ¹⁾	Protection class according to VDE 0580	
		12 V	24 V	26 V	48 V	96 V	110 V	125 V	205 V	220 V			
Connector 3-pole (2 + PE) according to DIN EN 175301-803	▶ Standard ▶ With potted-in plug base and sealing element	K4	✓	✓	-	✓	✓	✓	✓	✓	✓	IP65	I ²⁾
Connector 2-pole, DT04-2PA (Deutsch type)		K4K	✓	✓	✓	-	-	-	-	-	-	IP65	I ²⁾
Connector 2-pole, DT04-2PA (Deutsch type)		K40	✓	✓	✓	-	-	-	-	-	-	IP69K	III ³⁾
Connector, 4-pole, M12x1 according to DIN EN 61076-2-101 with suppressor diode, coding A	▶ Pin assignment according to DESINA	K72L	-	✓	-	-	-	-	-	-	-	IP65	III ³⁾
	▶ Standard	K73L	-	✓	-	-	-	-	-	-	-	IP65	III ³⁾
Connector 2-pole (Junior-Timer type)	▶ Connector parallel to the valve axis	C4	✓	✓	✓	-	-	-	-	-	-	IP66	III ³⁾
Maximum admissible overvoltages according to DIN EN 60664-1:2008-01 (VDE 0110-1) (overvoltage category II):													
Nominal voltage U_{Nom}	in V		12	24	26	48	96	110	125	205	220		
Rated current I_{Nom}	in A		2.5	1.25	1.17	0.66	0.33	0.25	0.17	0.16	0.14		
Maximum admissible switch-off overvoltage according to VDE 0580	in V		500	500	500	500	500	500	500	500	500		
Recommended interference protection circuit with 2 x mains voltage	in V		24	48	52	96	192	220	250	410	440		

- 1) Only with correctly mounted valve with a mating connector suitable for the protection class.
- 2) Protection class I with properly connected protective grounding conductor (PE) and valve mounting surface connected to the protective grounding conductor system.
- 3) With protection class III, a protective extra-low voltage with isolation transformer (PELV, SELV) is to be provided.

 **Notice:**

Solenoid valves induce voltage peaks during switch-off. In order to prevent electro-magnetic interference at the system and damage to the valve control, an interference protection circuit has to be provided on the system side. Alternatively, you can also select a connector with integrated interference protection circuit.

Ordering code: Direct voltage – central connection**Electrical connections and available voltages**

(special voltages upon request)

Connector		Ordering code	Electrical voltages							Protection class according to DIN EN 60529 ¹⁾	Protection class according to VDE 0580
			12 V	24 V	48 V	96 V	110 V	125 V	220 V		
			G12	G24	G48	G96	G110	G125	G220		
Cable gland, terminal area 6 ... 12 mm [0.23... 0.47 inch]	▶ With indicator light	DL	✓	✓	✓	✓	✓	✓	✓	IP65	I ²⁾
	▶ With indicator light and interference protection circuit	DL1	✓	✓	✓	✓	✓	✓	✓	IP65	I ²⁾
Cable gland, threaded connection 1/2"-14 NPT	▶ With indicator light	DAL	✓	✓	-	-	-	✓	-	IP65	I ²⁾
	▶ With indicator light and interference protection circuit	DAL1	✓	✓	-	-	-	✓	-	IP65	I ²⁾
Connector 7-pole (6 + PE) according to DIN EN 175201-804	▶ With indicator light	DK6L	-	✓	✓	-	✓	✓	✓	IP65	I ²⁾
	▶ With indicator light and interference protection circuit	DK6L1	-	✓	✓	-	✓	✓	✓	IP65	I ²⁾
Connector according to ANSI/B93.55M-1981 (Brad Harrison Mini-Change)	▶ With indicator light, 3-pole	DK23L	-	✓	-	-	-	-	-	IP65	I ²⁾
	▶ With indicator light, 5-pole	DK25L	-	✓	-	-	-	-	-	IP65	I ²⁾
Connector, 4-pole, M12x1 according to DIN EN 61076-2-101	▶ With indicator light	DK24L	-	✓	-	-	-	-	-	IP65	III ³⁾
	▶ With indicator light and interference protection circuit	DK24L1	-	✓	-	-	-	-	-	IP65	III ³⁾
	▶ With indicator light and interference protection circuit	DK35L	-	✓	-	-	-	-	-	IP65	III ³⁾
Maximum admissible overvoltages according to DIN EN 60664-1:2008-01 (VDE 0110-1) (overvoltage category II):											
Nominal voltage U_{Nom}	in V		12	24	48	96	110	125	220		
Rated current I_{Nom}	in A		2.5	1.25	0.66	0.33	0.25	0.17	0.14		
Maximum admissible switch-off overvoltage according to VDE 0580	in V		500	500	500	500	500	500	500		
Recommended interference protection circuit with 2 x mains voltage	in V		24	48	96	192	220	250	440		

- 1) Only with correctly mounted valve with a mating connector suitable for the protection class or suitable Conduit system.
- 2) Protection class I with properly connected protective grounding conductor (PE) and valve mounting surface connected to the protective grounding conductor system.
- 3) With protection class III, a protective extra-low voltage with isolation transformer (PELV, SELV) is to be provided.

Notice:

Solenoid valves induce voltage peaks during switch-off. In order to prevent electro-magnetic interference at the system and damage to the valve control, an interference protection circuit has to be provided on the system side. Alternatively, you can also select a connector with integrated interference protection circuit.

Ordering code: Alternating voltage – individual connection

Electrical connections and available voltages

(special voltages upon request)

Connector	Ordering code	Electrical voltages										Protection class according to DIN EN 60529 ¹⁾	Protection class according to VDE 0580
		100 V 50/60 Hz	100 V 50/60 Hz	110 V 50/60 Hz	110 V 50/60 Hz	120 V 60 Hz	120 V 60 Hz	200 V 50 Hz	200 V 50 Hz	230 V 50/60 Hz	230 V 50/60 Hz		
		Ordering code											
		G96	W100	G96	W110	G110	W110	G180	W200	G205	W230		
Connector 3-pole (2 + PE) according to DIN EN 175301-803	K4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	IP65	I ²⁾
Rectifier required (see page 27)		✓	-	✓	-	✓	-	✓	-	✓	-		
Maximum admissible overvoltages according to DIN EN 60664-1:2008-01 (VDE 0110-1) (overvoltage category II):													
Nominal voltage U_{Nom}	in V	100	100	110	110	120	120	200	200	230	230		
Rated current I_{Nom}	▶ 50 Hz	in A	0.31	0.56	0.34	0.52	-	-	0.18	0.29	0.16	023	
	▶ 60 Hz	in A	0.31	0.44	0.34	0.39	0.30	0.45	-	-	0.16	017	
Lower rated current I_1	▶ 50 Hz	in A	-	0.65	-	0.6	-	-	-	0.33	-	0.27	
	▶ 60 Hz	in A	-	0.51	-	0.45	-	0.52	-	-	-	0.2	
Upper rated current I_2	▶ 50 Hz	in A	-	0.9	-	0.9	-	-	-	0.6	-	0.36	
	▶ 60 Hz	in A	-	0.9	-	0.6	-	0.9	-	-	-	0.36	
Maximum admissible switch-off overvoltage according to VDE 0580	in V	500	500	500	500	500	500	500	500	500	500		
Recommended interference protection circuit with 2 x mains voltage	in V	200	200	220	220	240	240	400	400	460	460		

- 1) Only with correctly mounted valve with a mating connector suitable for the protection class.
- 2) Protection class I with properly connected protective grounding conductor (PE) and valve mounting surface connected to the protective grounding conductor system.

 **Notes:**

- ▶ Solenoid valves induce voltage peaks during switch-off. In order to prevent electro-magnetic interference at the system and damage to the valve control, an interference protection circuit has to be provided on the system side. Alternatively, you can also select a connector with integrated interference protection circuit.
- ▶ Depending on the rated current I_{Nom} , circuit breakers according to tripping characteristic "K" are to be provided. The tripping current must lie within a time interval of 0.6 s with 8 to 10 times the nominal power supply. The required non-tripping current of the fuse must not fall below the "lower rated current" value I_1 (see preceding table). The maximum tripping current must not exceed the "upper rated current" value I_2 (see preceding table). The temperature dependence of the tripping behavior of the circuit breakers has to be considered according to the manufacturer's specifications.

Ordering code: Alternating voltage – central connection**Electrical connections and available voltages**

(special voltages upon request)

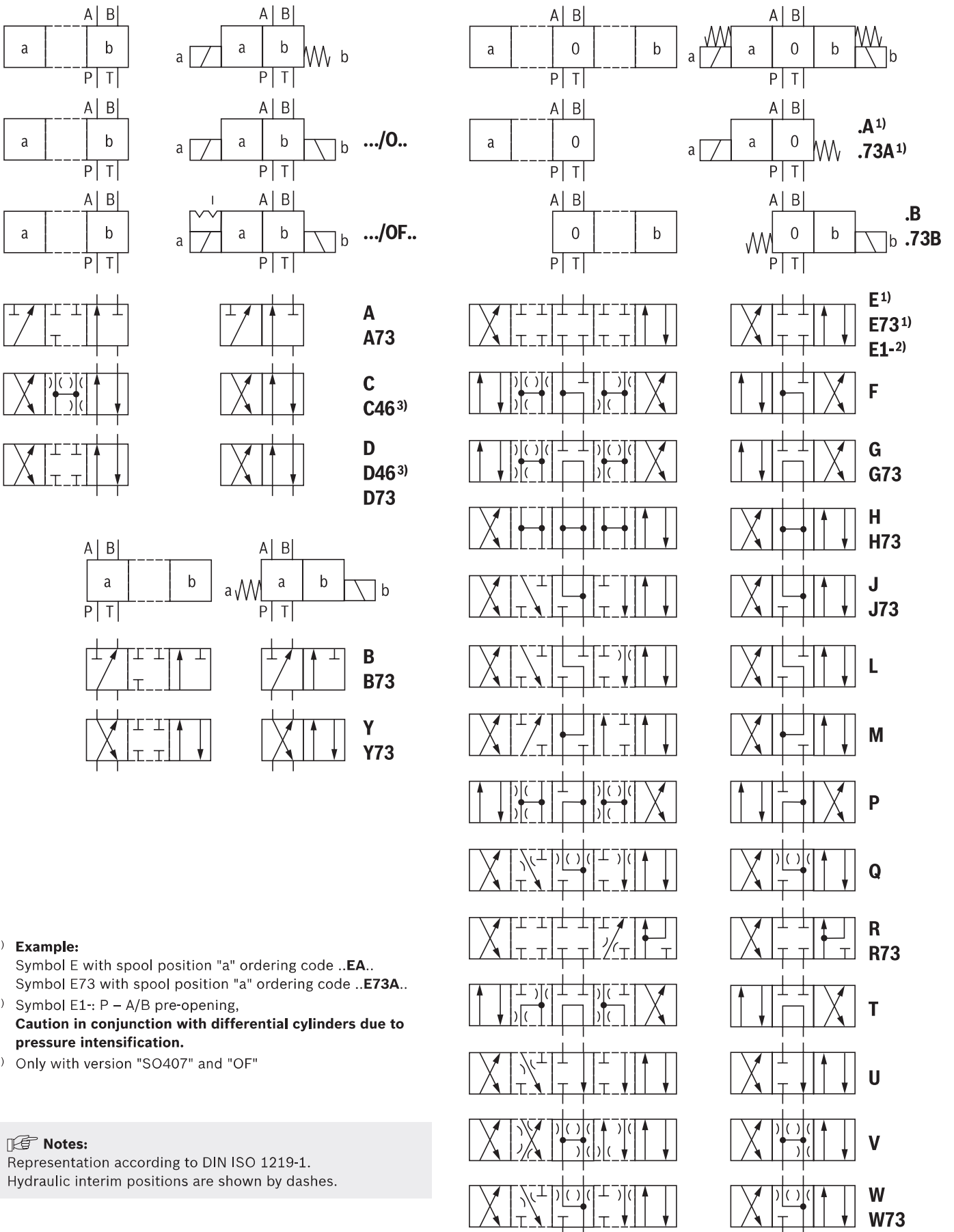
Connector		Ordering code	Electrical voltages								Protection class according to DIN EN 60529 ¹⁾	Protection class according to VDE 0580
			100 V 50/60 Hz	110 V 50/60 Hz	110 V 50/60 Hz	120 V 60 Hz	120 V 60 Hz	200 V 50 Hz	230 V 50/60 Hz	230 V 50/60 Hz		
			W100	W110R	W110	W120R	W110	W200	W230R	W230		
Cable gland, terminal area 6 ... 12 mm	▶ With indicator light	DL	✓	✓	✓	✓	✓	✓	✓	✓	IP65	I ²⁾
	▶ With indicator light and interference protection circuit	DL1	✓	✓	✓	✓	✓	✓	✓	✓	IP65	I ²⁾
	▶ With indicator light and interference protection circuit ³⁾	DJL	✓	-	-	-	-	✓	-	-	IP65	I ²⁾
Cable gland, threaded connection 1/2"-14 NPT	▶ With indicator light	DAL	✓	✓	✓	✓	✓	-	✓	✓	IP65	I ²⁾
	▶ With indicator light and interference protection circuit	DAL1	-	✓	✓	✓	✓	-	✓	✓	IP65	I ²⁾
Connector 7-pole (6 + PE) according to DIN EN 175201-804	▶ With indicator light	DK6L	-	✓	✓	✓	✓	-	-	-	IP65	I ²⁾
	▶ With indicator light and interference protection circuit	DK6L1	-	✓	✓	✓	✓	-	-	-	IP65	I ²⁾
Connector according to ANSI/B93.55M-1981 (Brad Harrison Mini-Change)	▶ With indicator light, 3-pole	DK23L	-	✓	✓	✓	✓	-	-	-	IP65	I ²⁾
	▶ With indicator light, 5-pole	DK25L	-	✓	✓	✓	✓	-	-	-	IP65	I ²⁾
Maximum admissible overvoltages according to DIN EN 60664-1:2008-01 (VDE 0110-1) (overvoltage category II):												
Nominal voltage U_{Nom}	in V		100	110	110	120	120	200	230	230		
Rated current I_{Nom}	▶ 50 Hz	in A	0.56	0.34	0.52	-	-	0.29	0.16	0.23		
	▶ 60 Hz	in A	0.44	0.34	0.39	0.30	0.45	-	0.16	0.17		
Lower rated current I_1	▶ 50 Hz	in A	0.65	-	0.6	-	-	0.33	-	0.27		
	▶ 60 Hz	in A	0.51	-	0.45	-	0.52	-	-	0.2		
Upper rated current I_2	▶ 50 Hz	in A	0.9	-	0.9	-	-	0.6	-	0.36		
	▶ 60 Hz	in A	0.9	-	0.6	-	0.9	-	-	0.36		
Maximum admissible switch-off overvoltage according to VDE 0580	in V		500	500	500	500	500	500	500	500		
Recommended interference protection circuit with 2 x mains voltage	in V		200	220	220	220	240	400	460	460		

- 1) Only with correctly mounted valve with a mating connector suitable for the protection class or suitable Conduit system.
- 2) Protection class I with properly connected protective grounding conductor (PE) and valve mounting surface connected to the protective grounding conductor system.
- 3) Wire bridge between pin 2- and 4-.

Notice:

- ▶ Solenoid valves induce voltage peaks during switch-off. In order to prevent electro-magnetic interference at the system and damage to the valve control, an interference protection circuit has to be provided on the system side. Alternatively, you can also select a connector with integrated interference protection circuit.
- ▶ Depending on the rated current I_{Nom} , circuit breakers according to tripping characteristic "K" are to be provided. The tripping current must lie within a time interval of 0.6 s with 8 to 10 times the nominal power supply. The required non-tripping current of the fuse must not fall below the "lower rated current" value I_1 (see preceding table). The maximum tripping current must not exceed the "upper rated current" value I_2 (see preceding table). The temperature dependence of the tripping behavior of the circuit breakers has to be considered according to the manufacturer's specifications.

Symbols



- 1) **Example:**
Symbol E with spool position "a" ordering code **..EA..**
Symbol E73 with spool position "a" ordering code **..E73A..**
- 2) Symbol E1-: P – A/B pre-opening,
Caution in conjunction with differential cylinders due to pressure intensification.
- 3) Only with version "SO407" and "OF"

Notes:
Representation according to DIN ISO 1219-1.
Hydraulic interim positions are shown by dashes.

Function, section

The directional valves of type WE are solenoid-actuated directional spool valves that can be used as electro-magnetic component. They control start, stop and direction of a flow.

The directional valves basically consist of the 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) (except for version "O").

If the wet-pin electronic solenoid (2) is supplied with power, 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 its central position or into its initial position (except for valves with "OF" detent and valves without type "O" spring).

A manual override (5) allows for the manual switching of the valve without solenoid energization.

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

Without spring return "O" (only possible with symbols A, C and D)

This version is a directional valve with two spool positions and two electronic solenoids **without** detent. The valve without spring return at the control spool (3) has no defined basic position in the de-energized condition.

Without spring return with "OF" detent (only possible with symbols A, C and D)

This version is a directional valve with two spool positions and two electronic solenoids **with** detent. The detents are used to fix the control spool (3) in the relevant spool position. During operation, continuous application of current to the electronic solenoid can thus be omitted which contributes to energy-efficient operation.

Version ".73...A12" (smooth switching behavior)

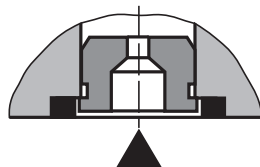
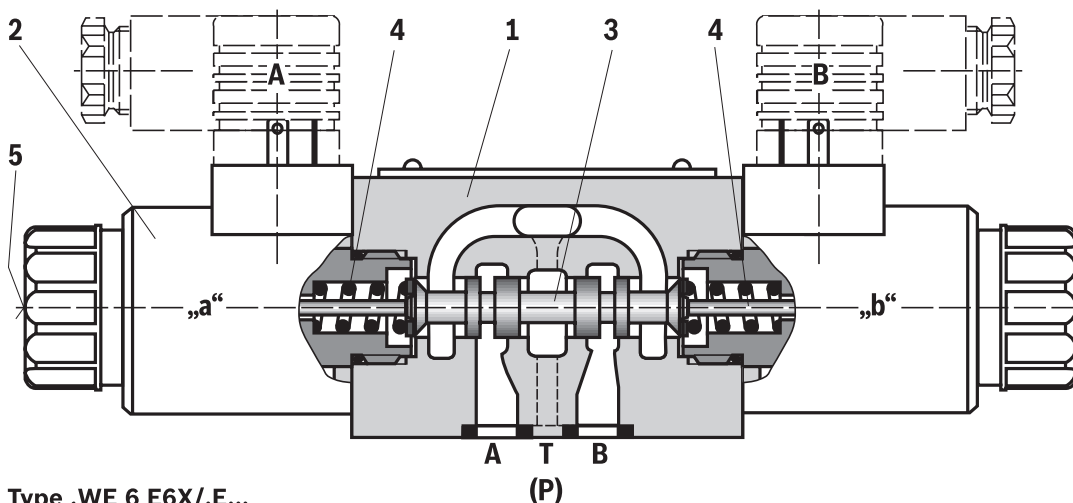
By means of structural design of the control spools and solenoids, switching shocks occurring when activating and deactivating the valves are significantly reduced.

The switching shocks, measured as acceleration values **a**, can be reduced by up to approx. 85% when compared to the standard valve depending on the design of the control spool (for this, see "Acceleration values" on page 13).

Notes:

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

Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.



Throttle insert

The use of a throttle insert is required when, due to prevailing operating conditions, flows occur during the switching processes which exceed the performance limit of the valve.