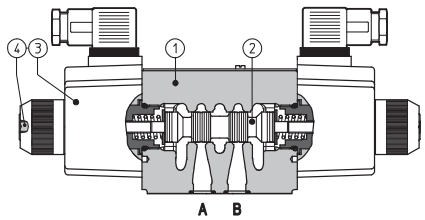
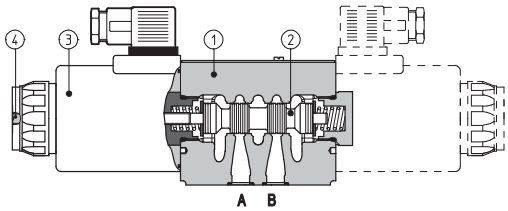
Solenoid directional valves type SDKE

direct operated, ISO 4401 size 10



SDKER - AC



SDKE - DC

Spool type, direct operated solenoid valves size 10 available in three or four way configurations and with two or three spool positions, see section 2.

Configurations and construction

The spools ② are interchangeable and they are available in a wide range of hydraulic configurations, see section 3.

The solenoids ③ have two different executions for AC or DC power supply and they are composed by:

- wet type screwed tube with integrated manual override pin ④ (the tube are different for AC and DC power supply).
- AC and DC coils see section 6

The valve body ① is 3 chambers type for all DC and AC versions

The coils are interchangeable for the same type of power supply AC or DC and they can be easily replaced without tools The coils are fully encapsulated with the following temperature classes:

- class H for DC coils
- class F for AC coils

The optimized internal flow paths, largely cored with extrawide channels to the tank port, ensure low pressure drops.

Options

The following optional devices are available:

- prolonged manual override protected with rubber cap for easy hand operation
- control devices of the valve switching time

Surface mounting ISO 4401 size 10
Max flow up to 120 l/min
Max pressure: 315 bar

1 MODEL CODE

SDKE	–	1	63	1/2	/A	-	X	24 DC	**	/*

Directional control valves ISO 4401 size 10
SDKE

Valve configuration, see section 2
61 = single solenoid, center plus external position, spring centered
63 = single solenoid, 2 external positions, spring offset
67 = single solenoid, center plus external position, spring offset
71 = double solenoid, 3 positions, spring centered
75 = double solenoid, 2 external positions, with detent
Other configurations are available on request.

Spool type, see section 3

Options, see note 1 at section 5

X = without connector
See note 2 at section 5 for available connectors, to be ordered separately
Coils with special connectors, see section 7
XJ = AMP junior Timer connector
XK = Deutsch connector
XS = Lead Wire connection

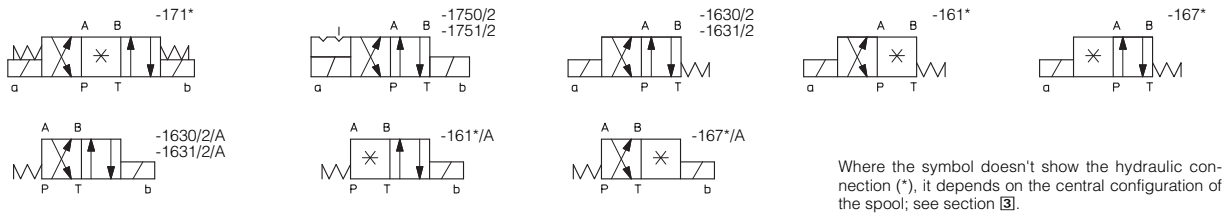
Voltage code, see section 6

Series number

Synthetic fluids
WG =water glycol
PE= phosphate ester

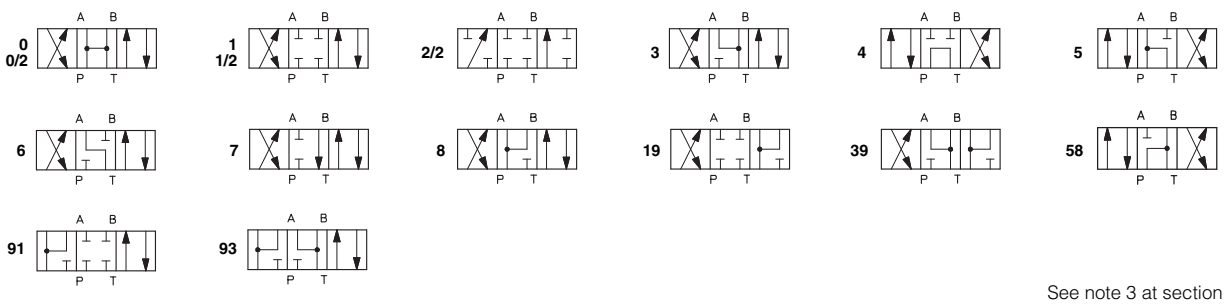
Note: configuration 63, 70 and 75 are available only with spools type 0/2, 1/2, 2/2

2 CONFIGURATION



Where the symbol doesn't show the hydraulic connection (*), it depends on the central configuration of the spool; see section 3.

3 SPOOLS - for intermediate passages, see tab. E001.



See note 3 at section 5.

4 MAIN CHARACTERISTICS OF SDKE DIRECTIONAL VALVES

Assembly position / location	Any position for all valves except for type - 170* (without springs) that must be installed with horizontal axis if operated by impulses
Subplate surface finishing	Roughness index $\sqrt{}^{0.4}$ flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	from -20°C to +70°C.
Fluid	Hydraulic oil as per DIN 51524 .... 535; for other fluids see section 1
Recommended viscosity	15 ÷ 100 mm²/s at 40°C (ISO VG 15 ÷ 100)
Fluid contamination class	ISO 19/16, achieved with in line filters at 25 μm value to $\beta_{25} \geq 75$ (recommended)
Fluid temperature	-20°C +60°C (standard and /WG seals) -20°C +80°C (/PE seals)
Flow direction	As shown in the symbols of tables 2 and 3
Operating pressure	Ports P, A, B: **315 bar**
must be drained	Port T: **120 bar** for AC solenoid; **210 bar** for DC solenoids;
Rated flow	See diagrams Q/Δp at section 8
Maximum flow	**120 l/min**, see operating limits at section 9

4.1 Coils characteristics

Insulation class	**H** (180°C) for DC coils **F** (155°C) for AC coils Due to the occuring surface temperatures of the solenoid coils, the European standards EN563 and EN982 must be taken into account
Connector protection degree	IP 65
Relative duty factor	100%
Supply voltage and frequency	See electric feature 6
Supply voltage tolerance	± 10%
Certification	**C UR US**

5 NOTES

1 Options

A = Solenoid mounted at side of port B (only for single solenoid valves). In standard versions, solenoid is mounted at side of port A.

WP = prolonged manual override protected by rubber cap - see section 14.

L7, L8, see section 12 = device for switching time control (only for DC solenoids).

2 Type of electric connectors DIN 43650, to be ordered separately - see section 15.
SP-666 = standard connector IP-65 for direct connection to electric supply source.
SP-667 = as SP-666, but with built-in signal led.
SP-669 = with built-in rectifier bridge for supplying DC coils by alternate current (AC 110V and 230V - Imax 1A).

3 Spools
- spools type **0/2, 1/2, 2/2** are only used for two position valves: single solenoid valves, type SDKE-163*/*; double solenoid valves type SDKE-175*/2.
- spools type **0** and **3** are also available as **0/1** and **3/1** with restricted oil passages in central position, from user ports to tank.
- spools type **1** is also available as **1/1**, properly shaped to reduce the water-hammer shocks during the switching.
- other types of spools can be supplied on request.

6 ELECTRIC FEATURES

External supply nominal voltage ± 10%	**Voltage code**	Type of connector	Power consumption (2)	Code of spare coil
12 DC	**12 DC**	SP-666 or SP-667	36 W	SP-CAE-12DC
14 DC	**14 DC**			SP-CAE-14DC
24 DC	**24 DC**			SP-CAE-24DC
28 DC	**28 DC**			SP-CAE-28DC
110 DC	**110 DC**			SP-CAE-110DC
220 DC	**220 DC**			SP-CAE-220DC
110/50/60 AC	**110/50/60 AC** (3)		85 VA (2)	SP-CAE-110/50/60AC (1)
230/50/60 AC	**230/50/60 AC** (3)			SP-CAE-230/50/60AC (1)
110/50/60 AC	**110 DC**	SP-669	36 W	SP-CAE-110DC
230/50/60 AC	**220 DC**			SP-CAE-220DC

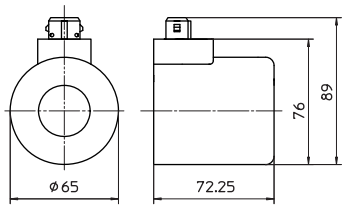
(1) In case of 60 Hz voltage frequency the performances are reduced by 10÷15% and the power consumption is 80 VA.

(2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

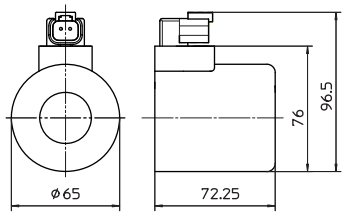
(3) When solenoid is energized, the inrush current is approx 3 times the holding current. Inrush current values correspond to a power consumption of about 280 VA.

7 COILS TYPE CAE* WITH SPECIAL CONNECTORS (only for 12DC, 14DC, 24DC and 28DC)

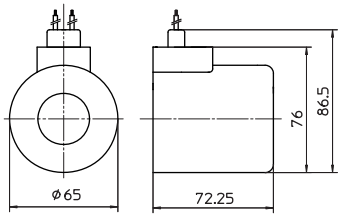
Options -XJ
Coil type SP-CAEJ
AMP Junior Timer connector
Protection degree IP67



Options -XK
Coil type SP-CAEK
Deutsch connector, DT-04-2P male
Protection degree IP67

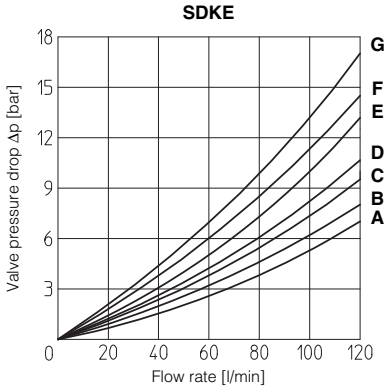


Options -XS
Coil type SP-CAES
Lead Wire connection
Cable lenght = 180 mm



8 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

Flow direction / Spool type	P→A	P→B	A→T	B→T	P→T	B→A
0, 0/1, 0/2, 2/2	A	A	B	B		
1, 1/1, 6, 8	A	A	D	C		
3, 3/1, 7	A	A	C	D		
4	B	B	B	B	E	
5, 58	A	B	C	C	F	
1/2	B	C	C	B		
19, 39, 91, 93	A	D	C			G



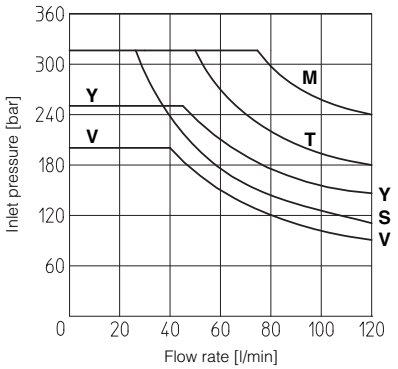
9 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value (V_{nom} - 10%). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.

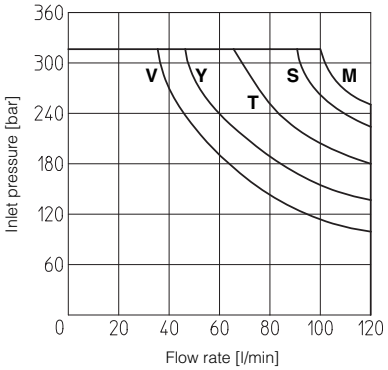
SDKE

Curve	Spool type AC	Spool type DC
M	0/1	0, 0/1, 1, 1/1, 3, 3/1, 1/2, 0/2, 8
S	4, 5, 58, 19, 39, 91, 93	6, 7
Y	1, 1/1, 1/2, 0/2	4, 5, 58
V	6, 7, 8, 2/2	2/2
T	0, 3, 3/1	19, 39, 91, 93

SDKE - AC



SDKE - DC



10 SWITCHING TIMES (average values in msec)

Valve	Switch-on AC	Switch-on DC	Switch-off AC	Switch-off DC
SDKE + SP-666 / SP-667	40	60	25	35
SDKE + SP-669	60	—	90	—
SDKE-*/L7	—	100	—	100
SDKE-*/L8	—	150	—	150

Test conditions:

- 50 l/min; 150 bar
- nominal supply voltage
- 2 bar of back pressure on port T
- mineral oil ISO VG 46 at 50°C

The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

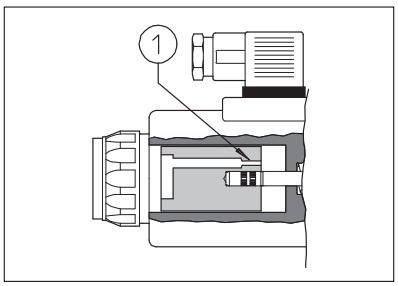
11 SWITCHING FREQUENCY

Valve	AC (cycles/h)	DC (cycles/h)
SDKE + SP-666 / SP-667	7200	15000

12 DEVICES FOR SWITCHING TIME CONTROL

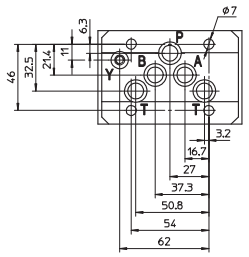
The shifting time control devices L7 and L8 are specifically designed to reduce shocks in the hydraulic circuit, sometime occurring at the valve switching.
The soft movement of the actuator is obtained through the control of the spool shifting time, by means of calibrated restrictors ① installed in the solenoid core.
The soft shifting device version is possible only with DC solenoids.

Two options with different switching effect are available:
L7 = calibrated restrictors diam. 1,2 mm
L8 = calibrated restrictors diam. 1,0 mm
see section 10 for switching time.



13 INSTALLATION DIMENSIONS [mm]

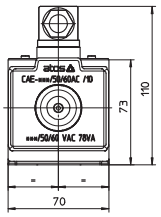
valve surface

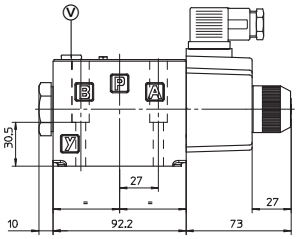


ISO 4401: 2005
Mounting surface according to 4401-05-05-0-05
(without X port, Y port optional)
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Seals: 5 OR 2050 and 1 OR 108
Ports P,A,B,T: Ø = 11.5 mm (max)
Ports Y: Ø = 5 mm

P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
Y = DRAIN PORT (only for option /Y)
For the max pressures on ports, see section 4

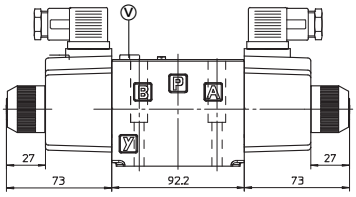
SDKE-16*-AC





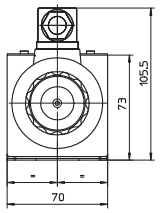
Mass: 3,6 kg

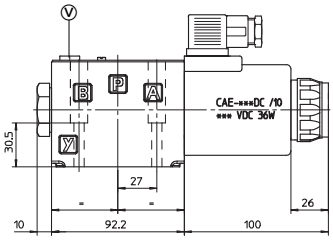
SDKE-17*-AC



Mass: 4,3 kg

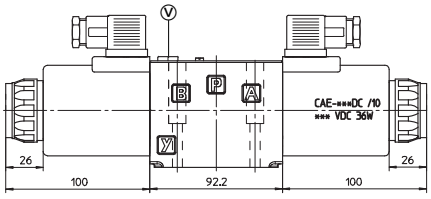
SDKE-16*-DC





Mass: 4,2 kg

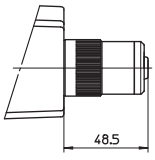
SDKE-17*-DC



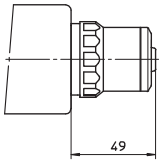
Mass: 5,7 kg

14 OPTION /WP

SDKE-AC



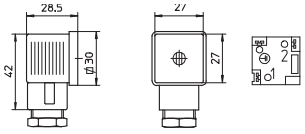
SDKE-DC



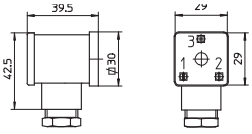
15 ELECTRIC CONNECTORS ACCORDING TO DIN 43650

The connectors must be ordered separately

SP-666, SP-667 (for AC or DC supply)



SP-669 (for AC supply)



CONNECTOR WIRING

SP-666, SP-667	**SP-669**
1 = Positive ⊕ 2 = Negative ⊖ ⏚ = Coil ground	1,2 = Supply voltage VAC 3 = Coil ground

SUPPLY VOLTAGES

SP-666	**SP-667**	
All voltages	24 AC or DC 110 AC or DC 220 AC or DC	110/50 AC 110/60 AC 115/60 AC 230/50 AC 230/60 AC