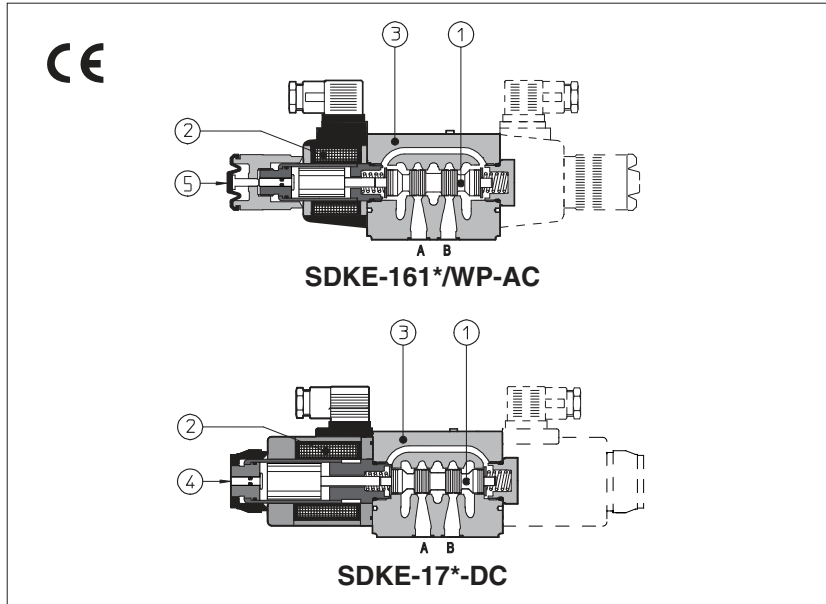


# Solenoid directional valves type **SDKE**

direct operated, ISO 4401 size 10



Spool type, two or three position direct operated valves with threaded solenoids.

Solenoids (2) are made by:

- wet type screwed tube, different for AC and DC power supply, with integrated manual override pin (1)
- interchangeable coils, specific for AC or DC power supply, easily replaceable without tools - see section 5 for available voltages

Standard coils protection **IP65**.

Optional coils are available with North American Standard Certification **cURus**, without connector (option XUL) or with **IP67** AMP Junior Timer, Deutsch or lead wire connections (options XJ, XK, XS).

Wide range of interchangeable spools (1), see section 2.

The valve body (3) is 3 chamber type made by shell-moulding casting with wide internal passages ensuring low pressure drops

Mounting surface: **ISO 4401 size 10**

Max flow: **150 l/min**

Max pressure: **350 bar**

## 1 MODEL CODE

<b>SDKE - 1</b>	<b>61</b>	<b>1</b> / <b>A</b>	<b>X</b>	<b>24 DC</b>	<b>**</b>	<b>*</b>
Directional control valves size 10					Series number	Seals material, see section 4: - = NBR <b>PE</b> = FKM <b>BT</b> = HNBR
Valve configuration, see section 2					Voltage code, see section 5	
<p><b>61</b> = single solenoid, center plus external position, spring centered</p> <p><b>63</b> = single solenoid, 2 external positions, spring offset</p> <p><b>67</b> = single solenoid, center plus external position, spring offset</p> <p><b>70</b> = double solenoid, 2 external positions, without springs</p> <p><b>71</b> = double solenoid, 3 positions, spring centered</p> <p><b>75</b> = double solenoid, 2 external positions, with detent</p>						
Spool type, see section 2.						
Options, see note 1 at section 4.						
						<p><b>00-AC</b> = AC solenoids without coils</p> <p><b>00-DC</b> = DC solenoids without coils</p> <p><b>X</b> = standard coil without connector</p> <p><b>XUL</b> = coils certified <b>cURus</b> without connector</p> <p>See section 14 for available connectors, to be ordered separately</p> <p>Coils certified <b>cURus</b> with special connectors, see section 11</p> <p><b>XJ</b> = AMP Junior Timer connector</p> <p><b>XK</b> = Deutsch connector</p> <p><b>XS</b> = Lead Wire connection</p>

## 2 CONFIGURATIONS and SPOOLS (representation according to ISO 1219-1)

Configurations	Spools	Configurations	Spools
<p><b>61</b></p> <p><b>61/A</b></p> <p><b>67</b></p> <p><b>67/A</b></p> <p><b>71</b></p>	<p>1 0 2</p> <p>1</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>91</p> <p>19</p> <p>93</p> <p>39</p> <p>58</p> <p>1/9</p> <p><b>Note:</b> see also section 4 note 3 for special shaped spools</p>	<p><b>63</b></p> <p><b>63/A</b></p> <p><b>70</b></p> <p><b>75</b></p>	<p>1 0 2</p> <p>0/2</p> <p>1/2</p> <p>2/2</p>

**3 MAIN CHARACTERISTICS, SEALS AND HYDRAULIC FLUIDS** - for other fluids not included in below table, consult our technical office

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 Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option)= -20°C ÷ +80°C HNBR seals (/BT option)= -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	15÷100 mm <sup>2</sup> /s - max allowed range 2.8 ÷ 500 mm <sup>2</sup> /s		
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, achievable with in line filters - 25 µm (β10 ≥75 recommended)		
<b>Hydraulic fluid</b>	<b>Suitable seals type</b>	<b>Classification</b>	<b>Ref. Standard</b>
Mineral oils	NBR, FKM, HNBR	HL, HLP, HLPD, HVLP, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	
Flow direction	As shown in the symbols of table 2		
<b>Operating pressure</b>	Ports P,A,B: <b>350</b> bar; Port T <b>210</b> bar for DC version ( <b>250</b> bar with option /Y); <b>160</b> bar for AC version		
Rated flow	See diagrams Q/Δp at section 6		
<b>Maximum flow</b>	<b>150 l/min</b> , see operating limits at section 7		

**3.1 Coils characteristics**

Insulation class	<b>H</b> (180°C) for DC coils <b>F</b> (155°C) for AC coils Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	<b>IP 65</b> (with connectors 666, 667, 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 5
Supply voltage tolerance	± 10%
Certification (only for XUL, XJ, XK, XS coils)	<b>cURus</b> North American Standard

**4 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 12.

**WPD/KE-DC** = (only for DC supply) manual override with detent, to be ordered separately, see tab. K150

**L7, L8** see section 10 = device for switching time control (only for DC solenoids).

L7 and L8 are available only for spool type 0/1, 1/1, 3/1, 4 and 5.

**2 Type of electric connectors DIN 43650, to be ordered separately** - see section 13.

**666** = standard connector IP-65 for direct connection to electric supply source.

**667** = as 666, but with built-in signal led.

**669** = with built-in rectifier bridge for supplying DC coils by alternate current (AC 110V and 230V - I<sub>max</sub> 1A).

**3 Spools**

- 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.

- spool type **1** is also available as **1/1**, properly shaped to reduce the water-hammer shocks during the switching.

- spool type **1/9** has closed center in rest position but it avoids the pressurization of A and B ports due to the internal leakages.

**5 ELECTRIC FEATURES**

External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil
12 DC	<b>12 DC</b>	666 or 667	36 W	CAE-12DC
14 DC	<b>14 DC</b>			CAE-14DC
24 DC	<b>24 DC</b>			CAE-24DC
28 DC	<b>28 DC</b>			CAE-28DC
110 DC	<b>110 DC</b>			CAE-110DC
220 DC	<b>220 DC</b>			CAE-220DC
110/50/60 AC	<b>110/50/60 AC</b>	669	100 VA (3)	CAE-110/50/60AC (1)
230/50/60 AC	<b>230/50/60 AC</b>			CAE-230/50/60AC (1)
110/50/60 AC	<b>110 DC</b>	669	36 W	CAE-110DC
230/50/60 AC	<b>220 DC</b>			CAE-220DC

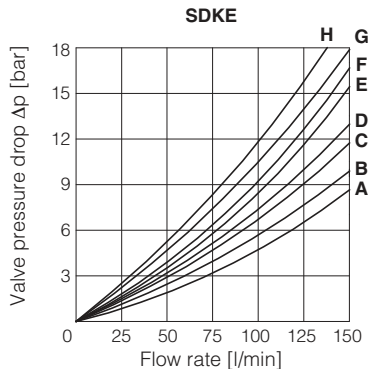
(1) In case of 60 Hz voltage frequency the performances are reduced by 10÷15% and the power consumption is 90 VA

(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.

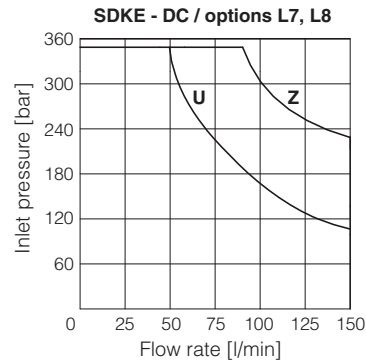
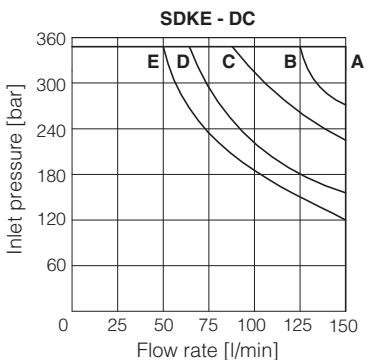
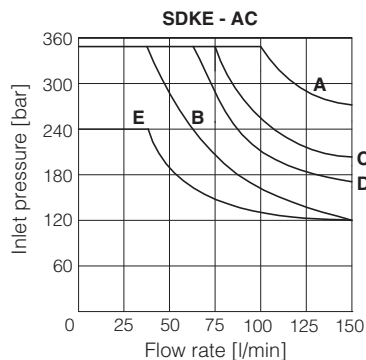
**6 Q/ΔP DIAGRAMS** based on mineral oil ISO VG 46 at 50°C

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, 1/9, 6, 8	A	A	D	C								
3, 3/1, 7	A	A	C	D								
4	B	B	B	B	F							
5, 58	A	B	C	C	G							
1/2	B	C	C	B								
19, 91	F	F	G	G							H	
39, 93	F	F	G	G							H	



**7 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.



Curve	Spool type	
	AC	DC
<b>A</b>	0/1	0, 0/1, 1, 1/1, 3, 3/1, 1/2, 0/2, 8
<b>B</b>	4, 5, 19, 91	6, 7
<b>C</b>	0, 1/1, 3, 3/1	19, 91
<b>D</b>	1, 1/2, 0/2	4, 5
<b>E</b>	6, 7, 8, 2/2	2/2
<b>U</b>	-	4, 5
<b>Z</b>	-	0/1, 1/1, 3/1

**8 SWITCHING TIMES** (average values in msec)

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

**9 SWITCHING FREQUENCY**

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

**10 DEVICES FOR SWITCHING TIME CONTROL**

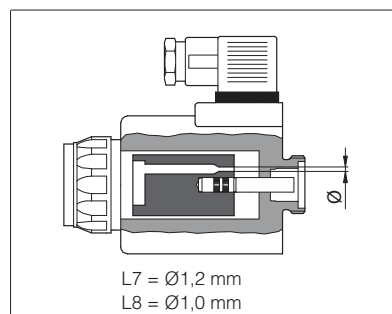
The shifting time control devices L7 and L8 are specifically designed to reduce shocks in the hydraulic circuit, sometime occurring at the valve switching. The soft movement of the actuator is obtained through the control of the spool shifting time, by means of calibrated restrictors (1) installed in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

Two options with different switching effect are available:

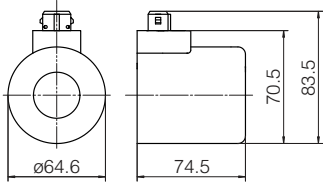
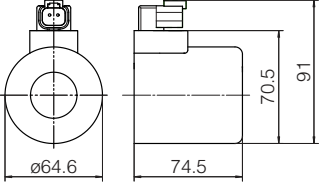
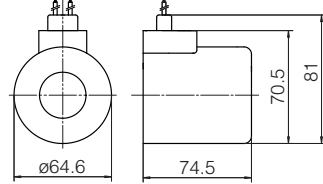
**L7** = calibrated restrictors diam. 1,2 mm

**L8** = calibrated restrictors diam. 1,0 mm

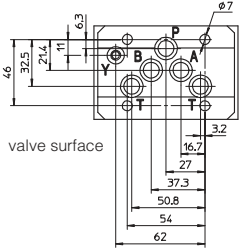
see section [9] for switching time.



**11 COILS TYPE CAE WITH SPECIAL CONNECTORS AND CERTIFIED cURus (only for 12DC, 14DC, 24DC and 28DC)**

<p><b>Options -XJ</b> Coil type CAEJ/UL AMP Junior Timer connector Protection degree IP67</p> 	<p><b>Options -XK</b> Coil type CAEK/UL Deutsch connector, DT-04-2P male Protection degree IP67</p> 	<p><b>Options -XS</b> Coil type CAES/UL Lead Wire connection Cable length = 180 mm</p> 
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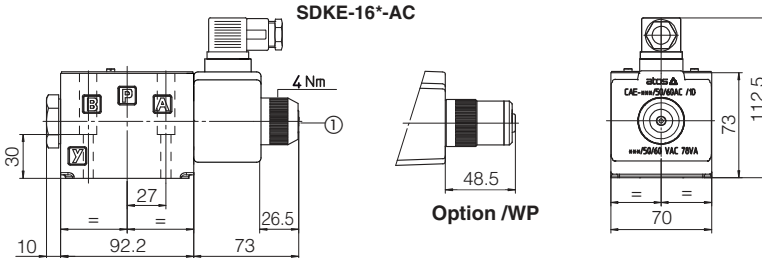
**12 INSTALLATION DIMENSIONS [mm]**



**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 3

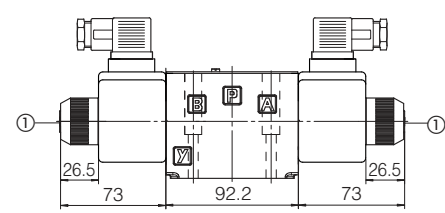
**SDKE-16\*-AC**



Option /WP

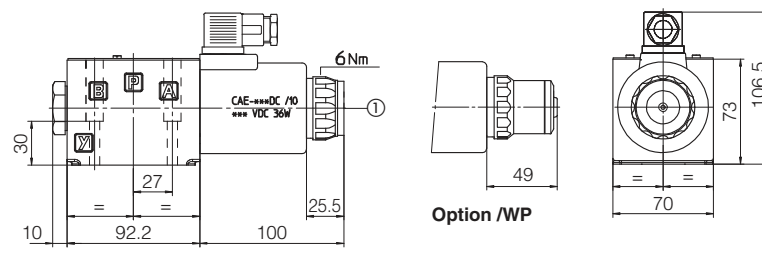
Mass: 3,9 kg

**SDKE-17\*-AC**



Mass: 4,7 kg

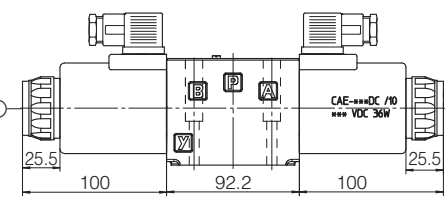
**SDKE-16\*-DC**



Option /WP

Mass: 4,5 kg

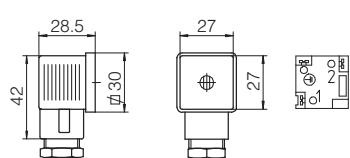
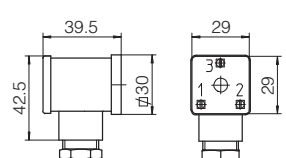
**SDKE-17\*-DC**



Mass: 6,1 kg

① Standard manual override PIN. The manual override operation can be possible only if the pressure at T ports is lower than 50 bar

**13 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately)**

<p><b>666, 667 (for AC or DC supply)</b></p> 	<p><b>669 (for AC supply)</b></p> 	<p style="text-align: center;"><b>CONNECTOR WIRING</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <p><b>666, 667</b> 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground</p> </td> <td style="width: 50%; border: none;"> <p><b>669</b> 1,2 = Supply voltage V<sub>AC</sub> 3 = Coil ground</p> </td> </tr> </table>		<p><b>666, 667</b> 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground</p>	<p><b>669</b> 1,2 = Supply voltage V<sub>AC</sub> 3 = Coil ground</p>
<p><b>666, 667</b> 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground</p>	<p><b>669</b> 1,2 = Supply voltage V<sub>AC</sub> 3 = Coil ground</p>				
<b>SUPPLY VOLTAGES</b>					
<p><b>666</b> All voltages</p>	<p><b>667</b> 24 AC or DC 110 AC or DC 220 AC or DC</p>	<p><b>669</b> 110/50 AC 110/60 AC 230/50 AC 230/60 AC</p>			