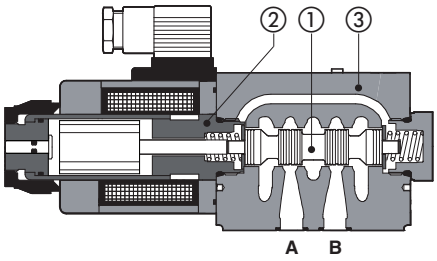
Solenoid directional valves Pmax 420 bar

direct operated, ISO 4401 size 10



DKEP-16*-DC**

① Spool
② Solenoid
③ Valve body

DKEP

Spool type, direct operated solenoid valves with max pressure up to 420 bar for heavy duty applications.

They are equipped with threaded solenoids certified according the North American standard **cURus**

Single and double solenoid valves are available in two or three position configurations and with a wide range of interchangeable spools ①, see section 2.

Solenoids ② are made by:

- wet type screwed tube, different for AC and DC power supply, with integrated manual override pin.
- interchangeable coils, specific for AC or DC power supply, easily replaceable without tools - see section 6 for available voltages

Standard coils protection IP65 (once correctly assembled with relevant electric connectors).

The valve body ③ is made by high strength cast iron.

Mounting surface ISO 4401 size **10**
Max flow up to **150** l/min
Max pressure: **420** bar

1 MODEL CODE

DKEP - 1	61	0	/A	X	24 DC	**	/*

Directional control valves
DKEP-1 = Size 10

Valve configuration, see table 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

Spool type, see section 2

Options, see note 1 at section 7

00-AC = AC solenoids without coils
00-DC = DC solenoids without coils
X = without connector
See section 13 for available connectors, to be ordered separately
Coils with special connectors, see section 14
XJ = AMP Junior Timer connector
XK = Deutsch connector
XS = Lead Wire connection

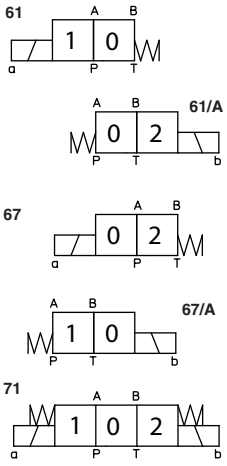
Voltage code, see section 6

Series number

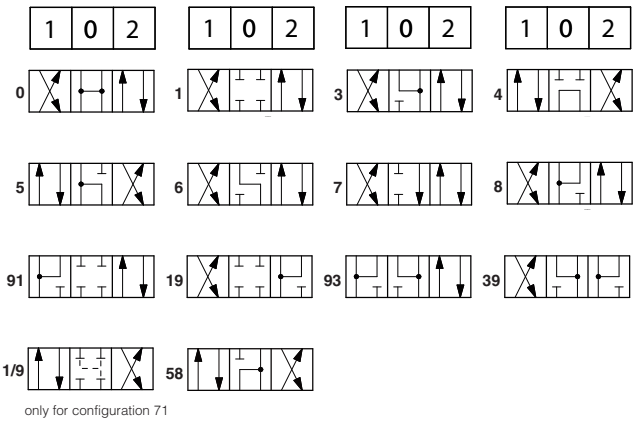
Seals material, see sect. 3, 4:
- = NBR
PE = FKM
BT = NBR low temperature

2 CONFIGURATIONS and SPOOLS

Configurations

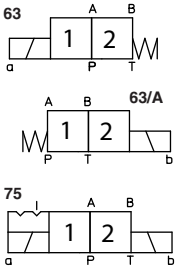


Spools

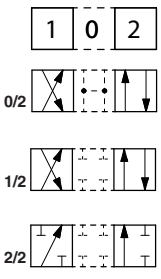


only for configuration 71

Configurations



Spools



3 GENERAL CHARACTERISTICS

Assembly position	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra ≤0,8 recommended Ra 0,4 - flatness ratio 0,01/100
MTTFd valves according to EN ISO 13849	150 years, see technical table P007
Ambient temperature range	**Standard** = -30°C ÷ +70°C **/PE** option = -20°C ÷ +70°C **/BT** option = -40°C ÷ +60°C
Storage temperature range	**Standard** = -30°C ÷ +80°C **/PE** option = -20°C ÷ +80°C **/BT** option = -40°C ÷ +80°C
Surface protection	Body: zinc coating with black passivation Coil: zinc nickel coating (DC version) plastic incapsulation (AC version)
Corrosion resistance	Salt spray test (EN ISO 9227) > 200 h
Compliance	CE to Low Voltage Directive 2014/35/EU RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

4 HYDRAULIC CHARACTERISTICS

Operating pressure	Ports P,A,B: **420** bar; Port T **210** bar for DC version; (**350** bar for option /Y); **160** bar for AC version
Max flow	**150 l/min**, see Q/Δp diagram at section 9 and operating limits at section 10

5 ELECTRICAL 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 EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	**IP 65** (with connectors 666, 667, 669 or E-SD correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See section 6
Supply voltage tolerance	± 10%

6 COIL VOLTAGE

External supply nominal voltage ± 10%	**Voltage code**	Type of connector	Power consumption (2)	Code of spare coil
12 DC	**12 DC**	666 or 667	36 W	CAE-12DC
14 DC	**14 DC**			CAE-14DC
24 DC	**24 DC**			CAE-24DC
28 DC	**28 DC**			CAE-28DC
110 DC	**110 DC**			CAE-110DC
125 DC	**125 DC**			CAE-125DC
220 DC	**220 DC**			CAE-220DC
110/50/60 AC	**110/50/60 AC**		100 VA (3)	CAE-110/50/60AC (1)
230/50/60 AC	**230/50/60 AC**			CAE-230/50/60AC (1)
115/50 AC	**115/60 AC**		130 VA (3)	CAE-115/60AC
230/50 AC	**230/60 AC**			CAE-230/60AC
110/50/60 AC	**110 DC**	669	36 W	CAE-110DC
230/50/60 AC	**220 DC**			CAE-220DC

(1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 20÷25% and the power consumption is 90 VA.
(2) Average values based on tests preformed 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.

7 NOTES FOR DKEP

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.
L7, L8 see section 8 = device for switching time control (only for DC solenoids), available only for spool type 0/1, 1/1, 3/1, 4 and 5.
Y = external drain, only for DC version, to be selected if the pressure at T port is higher than the max allowed limits.

⚠ The manual override operation can be possible only if the pressure at T port is lower than 50 bar

WPD/KE-DC = manual override with detent, to be ordered separately, see tab. K150

2 Special spools

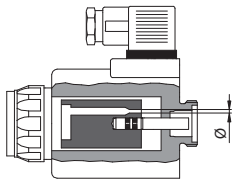
- spools type **0** and **3** are also available as **0/1** and **3/1** with restricted oil passages in central position, from user ports to tank.
- spools type **1** is also available as **1/1**, properly shaped to reduce the water-hammer shocks during the switching.
- spool type **1/9** has closed center in rest position but it avoids the pressurization of A and B ports due to the internal leakages.
- other types of spools can be supplied on request.

8 DEVICES FOR SWITCHING TIME CONTROL

These devices are only available for DC valve version (5 chambers body) and can control the switching time and therefore reduce the coil hammering in the hydraulic circuit.

- **L7/L8**: controls the switching time in both moving directions of the spool by means of fixed calibrated restrictor (gauged flow). The restrictor is installed in the solenoid's anchor.

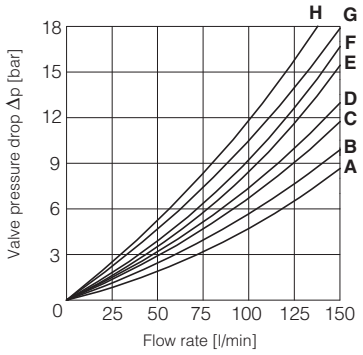
For a correct operation of the switching time control, the passage in which the control device is installed must be completely filled with oil.



L7 = Ø1,2 mm
L8 = Ø1,0 mm

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

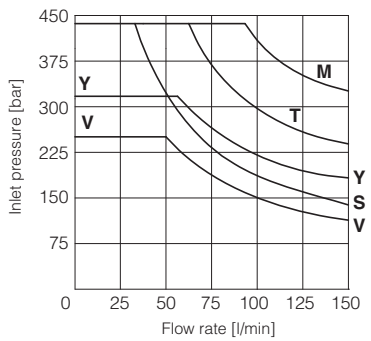
Flow direction / Spool type	P→A	P→B	A→T	B→T	P→T	B→A
0, 0/1, 0/2, 2/2	A	A	B	B		
1, 1/1, 1/3, 6, 8	A	A	D	C		
3, 3/1, 7	A	A	C	D		
4	B	B	B	B	F	
5	A	B	C	C	G	
1/2	B	C	C	B		
2/7	D			F		
5/7	B			A	E	
19	A	D	C			H



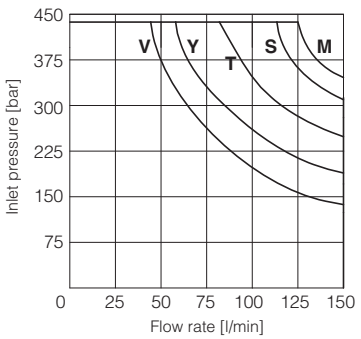
10 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

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.

DKEP - AC



DKEP - DC



Curve	Spool type AC	Spool type DC
M	0/1, 5/7, 1/3	0, 0/1, 1, 1/1, 3, 3/1, 1/2, 0/2, 8
S	2/7, 4, 5, 19	1/3, 5/7, 6, 7
Y	1, 1/2, 0/2	4, 5, 2/7
V	6, 7, 8, 2/2	2/2
T	0, 1/1, 3, 3/1	19
U	-	4, 5
Z	-	0/1, 1/1, 3/1

11 SWITCHING TIMES (average values in msec)

Valve	Switch-on AC	Switch-on DC	Switch-off AC	Switch-off DC
DKEP + 666 / 667	40	60	25	35

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.

12 SWITCHING FREQUENCY

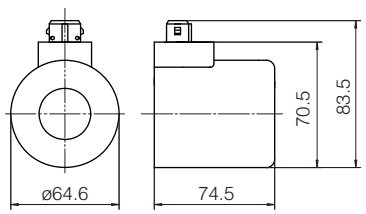
Valve	AC (cycles/h)	DC (cycles/h)
DKEP + 666 / 667	7200	15000

13 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately, see tech table K800)

666 = standard connector IP-65, suitable for direct connection to electric supply source
667 = as 666, but with built-in signal led. Available for power supply voltage 24 AC or DC, 110 AC or DC, 220 AC or DC
669 = with built-in rectifier bridge for supplying DC coils by alternate current (AC 110V and 230V - Imax 1A)

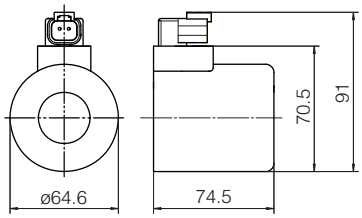
14 COIL WITH SPECIAL CONNECTORS only for voltage supply 12, 14, 24, 28 VDC

AMP Junior timer connector



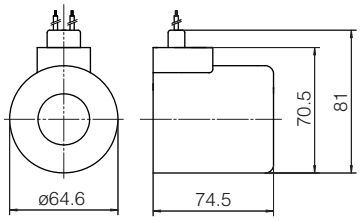
Options -XJ Coil type CAEJ
AMP Junior Timer connector
Protection degree **IP67**

Deutsch connector DT-04-2P



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

Lead Wire connection



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

Note: for the electric characteristics refer to standard coils features - see section 6

15 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature		NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C NBR low temp. seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity		20÷100 mm²/s - max allowed range 15 ÷ 380 mm²/s		
Max fluid contamination level	normal operation	ISO4406 class 18/16/13 NAS1638 class 7	see also filter section at www.atos.com or KTF catalog	
	longer life	ISO4406 class 16/14/11 NAS1638 class 5		
Hydraulic fluid		**Suitable seals type**	**Classification**	**Ref. Standard**
Mineral oils		NBR, FKM, NBR low temp.	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water		FKM	HFDU, HFDR	ISO 12922
Flame resistant with water		NBR, NBR low temp.	HFC	

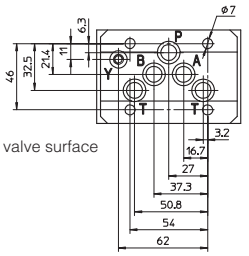
16 FASTENING BOLTS AND SEALS

Fastening bolts	Seals
4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm	5 OR 2050; (1 OR 108 for Y optional port); Diameter of ports A, B, P, T: Ø 11.5mm (max); Y: Ø 5mm (optional port)

17 INSTALLATION DIMENSIONS [mm]

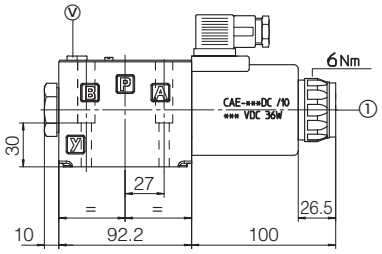
ISO 4401: 2005
Mounting surface according to 4401-05-05-0-05
(without X port, Y port optional)

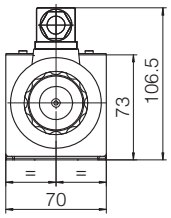
Mass (Kg)		
	DC	AC
DKEP-16	4,5	3,9
DKEP-17	6,1	4,7



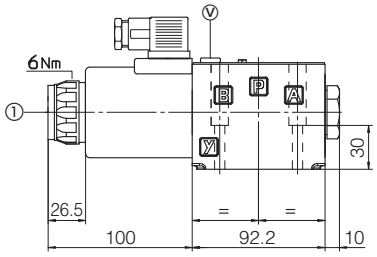
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
Y = DRAIN PORT (optional)

DKEP-16*-DC

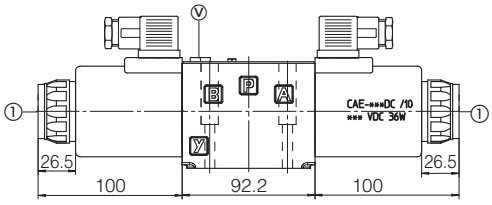




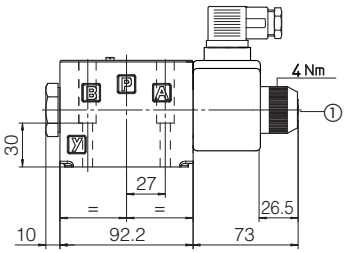
DKEP-16*/A-DC

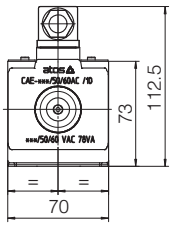


DKEP-17*-DC

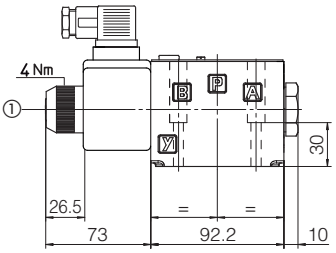


DKEP-16*-AC

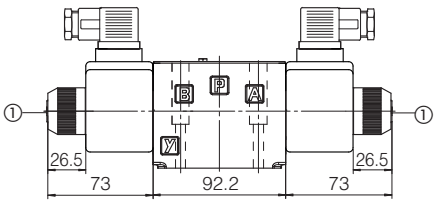




DKEP-16*-AC

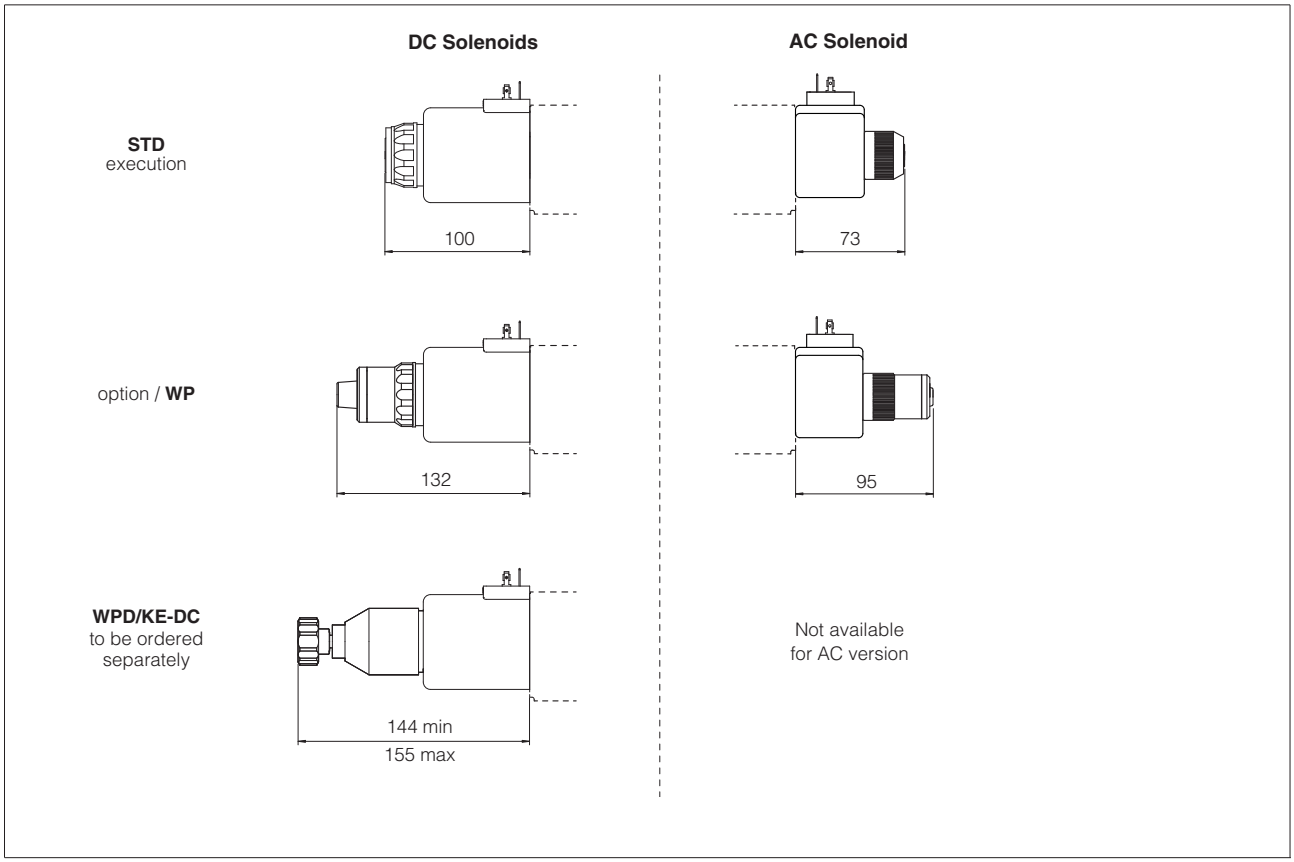


DKEP-17*-AC



Overall dimensions refer to valves with connectors type 666
① Standard manual override PIN. The manual override operation can be possible only if the pressure at T ports is lower than 50 bar
Ⓥ Option L, L1, L2, L3, LR

18 MANUAL OVERRIDE



19 RELATED DOCUMENTATION

E001	Basics for solenoid directional valves	**P005**	Mounting surfaces for electrohydraulic valves
K150	Handweels for hydraulic controls	**E900**	Operating and maintenance information
K280	Single and modular subplates		
K800	Electric and electronic connectors		