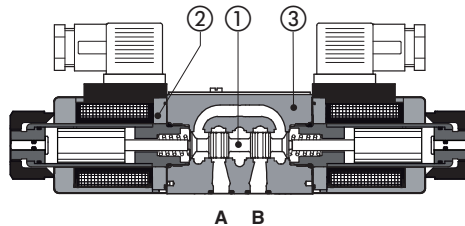


# Solenoid directional valves $P_{max}$ 420 bar

direct operated, ISO 4401 size 06



**DHEP-07\*-\*\*DC**

- ① Spool
- ② Solenoid
- ③ Valve body

## DHEP

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 **06**

Max flow up to **80** l/min

Max pressure: **420** bar

## 1 MODEL CODE

DHEP - 0	63	1/2	/A	X	24 DC	**	/*
Directional control valves <b>DHEP-0</b> = Size 06							Seals material, see sect. ⑮: - = NBR <b>PE</b> = FKM <b>BT</b> = NBR low temperature
Valve configuration, see table ② <b>61</b> = single solenoid, center plus external position, spring centered <b>63</b> = single solenoid, 2 external positions, spring offset <b>67</b> = single solenoid, center plus external position, spring offset <b>71</b> = double solenoid, 3 positions, spring centered <b>75</b> = double solenoid, 2 external positions, with detent							Series number
Spool type, see section ②							Voltage code, see section ⑥
Options, see note 1 at section ⑦							
				<b>00-AC</b> = AC solenoids without coils <b>00-DC</b> = DC solenoids without coils <b>X</b> = without connector See section ⑬ for available connectors, to be ordered separately Coils with special connectors, see section ⑭ <b>XJ</b> = AMP Junior Timer connector <b>XK</b> = Deutsch connector <b>XS</b> = Lead Wire connection			

## 2 CONFIGURATIONS and SPOOLS

Configurations	Spools	Configurations	Spools
<b>61</b>  <b>61/A</b>  <b>67</b>  <b>67/A</b>  <b>71</b> 	                     <p>only for configuration 71</p>	<b>63</b>  <b>63/A</b>  <b>75</b> 	   

### 3 GENERAL CHARACTERISTICS

Assembly position	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, $R_a \leq 0,8$ recommended $R_a 0,4$ - flatness ratio 0,01/100
MTTFd valves according to EN ISO 13849	150 years, see technical table P007
Ambient temperature range	<b>Standard</b> = $-30^{\circ}\text{C} \div +70^{\circ}\text{C}$ <b>/PE</b> option = $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$ <b>/BT</b> option = $-40^{\circ}\text{C} \div +60^{\circ}\text{C}$
Storage temperature range	<b>Standard</b> = $-30^{\circ}\text{C} \div +80^{\circ}\text{C}$ <b>/PE</b> option = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$ <b>/BT</b> option = $-40^{\circ}\text{C} \div +80^{\circ}\text{C}$
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: <b>420</b> bar; Port T <b>210</b> bar for DC version; <b>160</b> bar for AC version
Max flow	<b>80 l/min</b> , see Q/Δp diagram at section 8 and operating limits at section 9

### 5 ELECTRICAL CHARACTERISTICS

Insulation class	<b>H</b> ( $180^{\circ}\text{C}$ ) for DC coils; <b>F</b> ( $155^{\circ}\text{C}$ ) 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 or E-SD correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See section 6
Supply voltage tolerance	$\pm 10\%$

### 6 COIL VOLTAGE

External supply nominal voltage $\pm 10\%$	Voltage code	Type of connector	Power consumption (2)	Code of spare coil
12 DC	<b>12 DC</b>	666 or 667	30 W	COE-12DC
14 DC	<b>14 DC</b>			COE-14DC
24 DC	<b>24 DC</b>			COE-24DC
28 DC	<b>28 DC</b>			COE-28DC
48 DC	<b>48 DC</b>			COE-48DC
110 DC	<b>110 DC</b>			COE-110DC
125 DC	<b>125 DC</b>			COE-125DC
220 DC	<b>220 DC</b>			COE-220DC
24/50 AC	<b>24/50/60 AC</b>		58 VA (3)	COE-24/50/60AC (1)
48/50 AC	<b>48/50/60 AC</b>			COE-48/50/60AC (1)
110/50 AC	<b>110/50/60 AC</b>			COE-110/50/60AC (1)
230/50 AC	<b>230/50/60 AC</b>			COE-230/50/60AC (1)
115/50 AC	<b>115/60 AC</b>		80 VA (3)	COE-115/60AC
230/50 AC	<b>230/60 AC</b>			COE-230/60AC
110/50 AC - 120/60 AC	<b>110 RC</b>	669	30 W	COE-110RC
230/50 AC - 230/60 AC	<b>230 RC</b>			COE-230RC

(1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by  $20 \div 25\%$  and the power consumption is 52 VA.

(2) Average values based on tests preformed at nominal hydraulic condition and ambient/coil temperature of  $20^{\circ}\text{C}$ .

(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

## 7 NOTES FOR DHEP

### 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.



The manual override operation can be possible only if the pressure at T port is lower than 50 bar - see section 17.

**L1, L2, L3** = (only for DHEP-DC) device for switching time control, installed in the valve solenoid, see section 11.

For spools 4 and 4/8 only device L3 is available.

**MV, MO** = auxiliary hand lever positioned vertically (MV) or horizontally (MO). For available configuration and dimensions see table E138.

### 2 Accessories

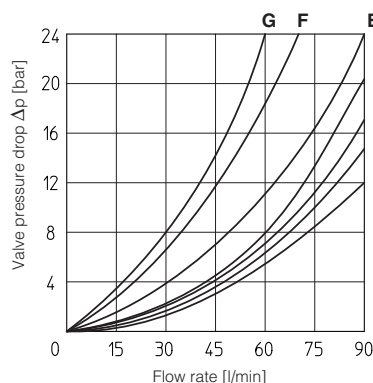
**WPD/HE-DC** = (only for DHEP-DC) manual override with detent, to be ordered separately, see tab. K150

### 3 Special shaped 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, 4, 5** and **58** are also available as **1/1, 4/8, 5/1** and **58/1**. They are properly shaped to reduce water-hammer shocks during the switching
- spools type **1, 1/2, 3, 8** are available as **1P, 1/2P, 3P, 8P** to limit valve internal leakages.
- Other types of spools can be supplied on request.

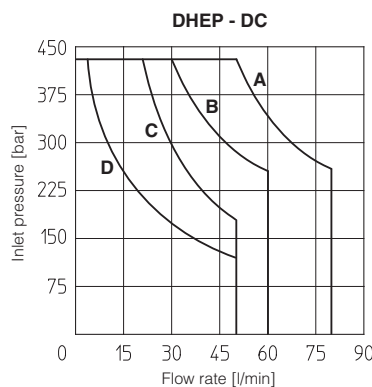
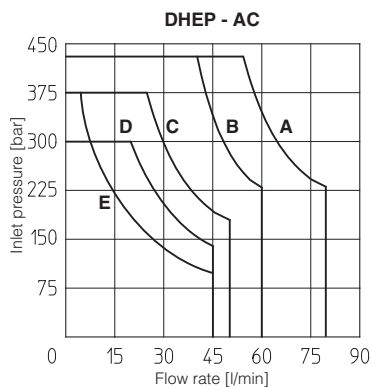
## 8 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

Flow direction Spool type	P→A	P→B	A→T	B→T	P→T
0, 0/1	A	A	C	C	D
1, 1/1	D	C	C	C	
3, 3/1	D	D	A	A	
4, 4/8, 5, 5/1, 58, 58/1 09, 90, 91, 93, 94	F	F	G	C	E
1/2, 0/2	D	D	D	D	
6, 7	D	D	D	D	
8	A	A	E	E	
2	D	D			
2/2	F	F			



## 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.



Curve	Spool type	
	AC	DC
A	1, 1/2, 8	0, 0/1, 1, 1/2, 3, 8
B	0, 0/1, 0/2, 1/1	0/2, 1/1, 6, 7
C	3, 3/1	3/1, 4, 4/8, 5, 5/1, 19, 39, 58, 90, 91, 93, 94
D	4, 4/8, 5, 5/1, 6, 7, 19, 39, 58, 91, 93, 94	2, 2/2
E	2, 2/2	-

## 10 SWITCHING TIMES (average values in msec)

- Test conditions:  
 - 36 l/min; 150 bar  
 - nominal voltage  
 - 2 bar of counter 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.

Valve	Switch-on AC	Switch-off AC	Switch-on DC	Switch-off DC
DHEP	10 - 25	20 - 40	30 - 50	15 - 25
DHEP-*/L1	—	—	60	60
DHEP-*/L2	—	—	80	80
DHEP-*/L3	—	—	150	150

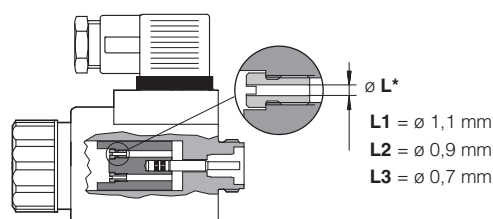
## 12 SWITCHING FREQUENCY

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

## 11 DEVICES FOR THE SWITCHING TIME CONTROL

These devices are used to control the valve's switching time (only for DC version) and therefore reduce the hammering shocks in the hydraulic circuit.

Options L1, L2, L3 control the switching time in both moving directions of the valve spool by means of calibrated restrictors installed in the solenoid anchor.



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

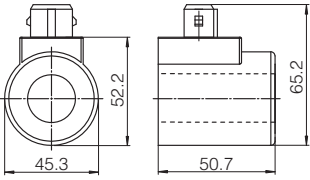
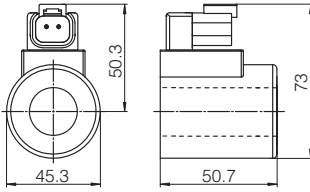
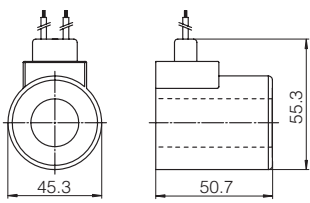
**666** = standard connector IP-65, suitable for direct connection to electric supply source

**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 - I<sub>max</sub> 1A)

**E-SD** = electronic connector which eliminates electric disturbances when solenoid valves are de-energized

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

AMP Junior timer connector	Deutsch connector DT-04-2P	Lead Wire connection
 <p><b>Options -XJ</b> Coil type COEJ AMP Junior Timer connector Protection degree <b>IP67</b></p>	 <p><b>Options -XK</b> Coil type COEK Deutsch connector DT-04-2P male Protection degree <b>IP67</b></p>	 <p><b>Options -XS</b> Coil type COES Lead Wire connection Cable length = 180 mm</p>

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	15 ÷ 100 mm <sup>2</sup> /s - max allowed range 2,8 ÷ 500 mm <sup>2</sup> /s		
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at <a href="http://www.atos.com">www.atos.com</a> or KTF catalog		
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR, FKM, NBR low temp.	HL, HLP, HLPD, HVL, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDR, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

**16 FASTENING BOLTS AND SEALS**

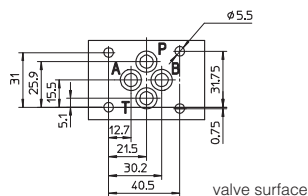
Fastening bolts	Seals
4 socket head screws M5x30 class 12.9 Tightening torque = 8 Nm	4 OR 108; Diameter of ports A, B, P, T: Ø 7,5 mm (max)

# 17 INSTALLATION DIMENSIONS [mm]

ISO 4401: 2005

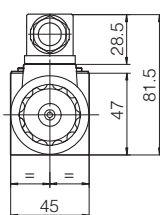
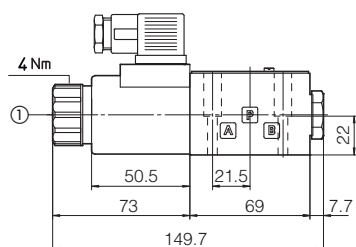
Mounting surface: 4401-03-02-0-05

Mass (Kg)		
	DC	AC
DHEP-06	1,5	1,4
DHEP-07	2	1,8

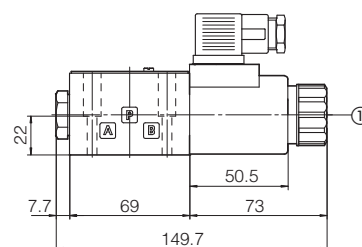


P = PRESSURE PORT  
A, B = USE PORT  
T = TANK PORT

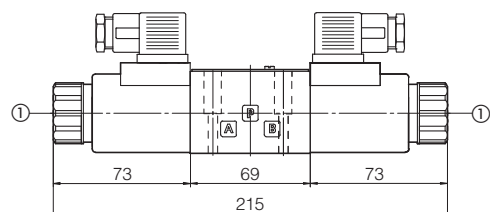
DHEP-06(DC)



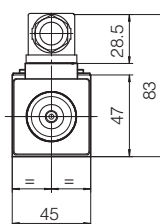
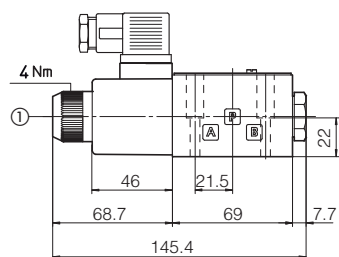
DHEP-06\*/A(DC)



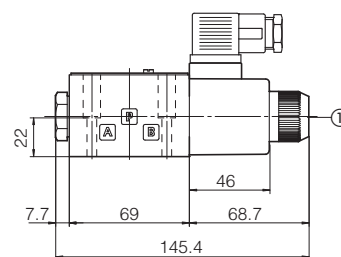
DHEP-07(DC)



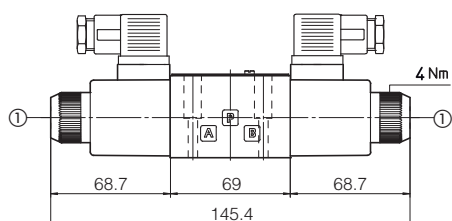
DHEP-06(AC)



DHEP-06\*/A(AC)



DHEP-07(AC)



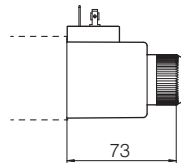
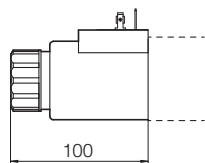
Overall dimensions refer to valves with connectors type 666

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

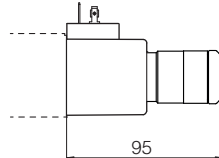
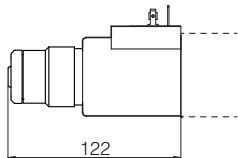
## DC Solenoids

## AC Solenoid

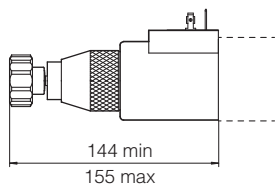
**STD**  
execution



option / **WP**



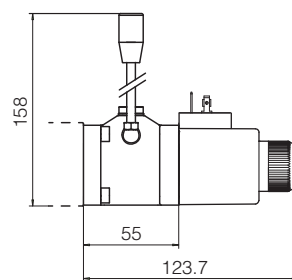
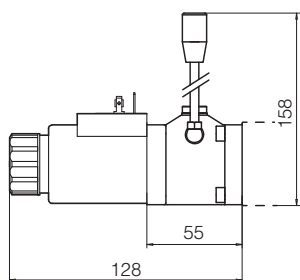
**WPD/HE-DC**  
to be ordered  
separately



Not available  
for AC version

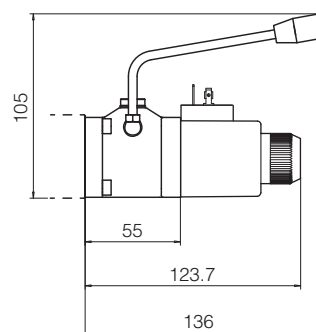
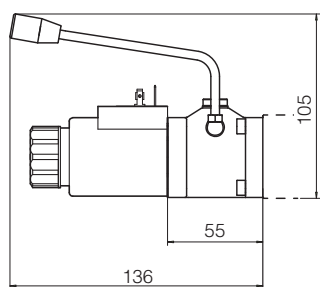
option / **MV**

Mass:  
+ 0,88 kg



option / **MO**

Mass:  
+ 0,88 kg



## 19 RELATED DOCUMENTATION

**E001** Basics for solenoid directional valves  
**K150** Handwheels for hydraulic controls  
**K280** Single and modular subplates  
**K800** Electric and electronic connectors

**P005** Mounting surfaces for electrohydraulic valves  
**E900** Operating and maintenance information