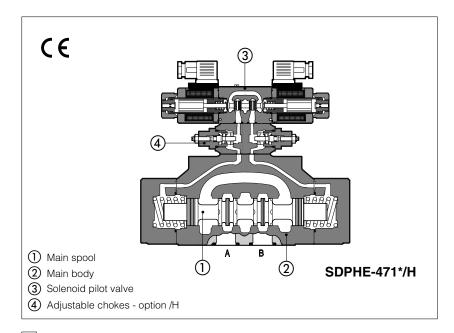


# Solenoid directional valves type SDPHE

pilot operated, ISO 4401 size 16, 25 and 32



Spool type, pilot operated directional solenoid valves available in three or four way configurations.

They are operated by a directional valve ③ type SDHE (see technical table SHE015) equipped with threaded solenoids for AC or DC power supply and certified according to North American Standard cURus.

Spools ① are fully interchangeable and they are available in a wide range of hydraulic configurations.

The valve body is made by shell-moulding castings ② machined by transfer lines and then cleaned by thermal deburring. Optimized flow paths largely cored with extrawide channels to tank ensures low pressure drops.

Valves can be supplied with following optional devices:

- Option /H, adjustable chokes for the valve's switching times control 4);
- Option /S, main spool stroke adjustment.

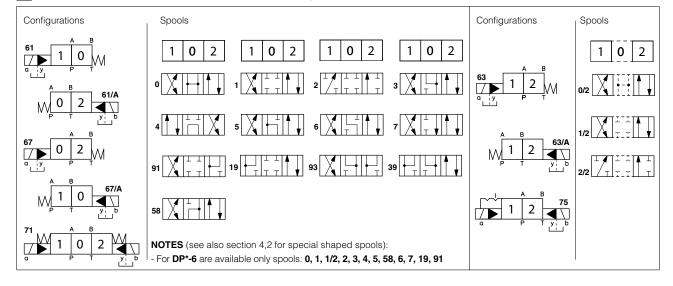
Rugged execution suitable for outdoor use.

Mounting surface: ISO 4401, size 16, 25, 32 Max flow up to 300, 700 and 1000 l/min. Pressure up to 350 bar

#### 1 MODEL CODE **SDPH** 2 61 **24 DC** Α X Ε Seals material, Pilot operated directional control valve see section 3: = NRR Solenoid pilot valve: **E** = SDHE for AC and DC supply, high perfor-**PE** = FKM Series **BT** = HNBR number mances with cURus certified solenoids Voltage code, see section 5 Valve size: 2 = 16 4 = 25 6 = 32 $\mathbf{X}$ = without <u>connector</u> See section 12 for available connectors, Valve configuration, see section 2 to be ordered separately **00-AC** = AC solenoid valve without coils **00-DC** = DC solenoid valve without coils 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 **XJ** = AMP Junior Timer connector 71= double solenoid, 3 positions, spring centered 75= double solenoid, 2 external positions, with detent **XK** = Deutsch connector **XS** = Lead Wire connection Spool type, see section 2 Options, see section 4

Note: SDPHE-\* S PIL version without pilot solenoid valve available on request

2 CONFIGURATIONS and SPOOLS (representation according to ISO 1219-1, for functional scheme, see section 4)



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

Assembly position / location	Any position for all valves except for type -*70 (without springs) that must be installed with horizontal axis if operated by impulses.					
Subplate surface finishing	Roughness index Ra 0,4 - flatne	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)				
MTTFd values according to EN ISO 13849	75 years, for further details see	technical table P007				
Ambient temperature	Standard = $-30^{\circ}\text{C} \div +70^{\circ}\text{C}$ ; /P	<b>E</b> option = $-20^{\circ}$ C ÷ $+70^{\circ}$ C; <b>/BT</b> o	ption = -40°C ÷ +70°C			
Seals, recommended fluid temperature	FKM seals (/PE option)= -20°C	NBR seals (standard) = -20°C ÷ +80°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 mm²/s - max allowed ra	inge 2.8 ÷ 500 mm²/s				
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, achievable with in line filters - 25 μm (β10 ≥75 recommended)					
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard			
Mineral oils	NBR, FKM, HNBR	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524			
Flame resistant without water	FKM	HFDU, HFDR	100 1000			
Flame resistant with water	NBR, HNBR	HFC	ISO 12922			
Flow direction	As shown in the symbols of tab	le 2				
Operating pressure	P, A, B, X = <b>350 bar</b> T = <b>250 bar</b> for external drain (standard) T with internal drain (option /D) and port Y = <b>210 bar</b> SDPHE (DC); <b>160 bar</b> SDPHE (AC) Minimum pilot pressure = 8 bar					
Rated flow	See diagrams Q/\Delta at section 6					
Maximum flow	SDPHE-2: <b>300 l/min;</b> SDPHE-4: <b>700 l/min;</b> SDPHE-6: <b>1000 l/min</b> (see rated flow at section <b>6</b> and operating limits at section <b>7</b> )					

#### 3.1 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  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 or 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric features 5
Supply voltage tolerance	± 10%
Certification	cURus North American standard

## 4 NOTES

#### 4.1 Options

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

/D = Internal drain (standard configuration is external drain)

/E = External pilot pressure (standard configuration is internal pilot pressure).

/S = Main spool stroke adjustment.

/WP = Prolonged manual override protected by rubber cap.

than 50 bar

riangle The manual override operation can be possible only if the pressure at T port is lower

#### Devices for main spool switching control and to reduce the hydraulic shocks at the valve operation

/H = Adjustable chokes (meter-out to the pilot chambers of the main valve).

**/L9** = plug with calibrated restictor in P port of pilot valve - see section 9

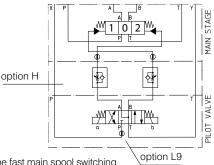
Suggested for pilot pressure higher than 210 bar or to limit the hydraulics shocks caused by the fast main spool switching

#### 4.2 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 are also available as 1/1 and 4/8 that are properly shaped to reduce water-hammer shocks during the switching (to use with option /L\*).

Shaped spool availability	0/1	3/1	1/1	4/8
SDPHE-2, SDPHE-4	•	•	•	•
SDPHE-6	ı	•	•	•

FUNCTIONAL SCHEME (config. 71) example of switching control options



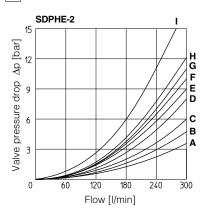
## 5 ELECTRIC FEATURES

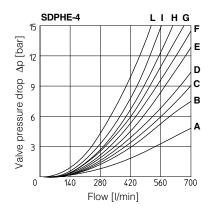
Valve	External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil	
	12 DC	12 DC			COE-12DC	
	14 DC	14 DC			COE-14DC	
	24 DC	24 DC		666 or 667	20 W	COE-24DC
	28 DC	28 DC	666		COE-28DC	
	110 DC	110 DC	or		COE-110DC	
SDPHE	220 DC	220 DC	667		COE-220DC	
SUFFIE	110/50 AC	110/50/60 AC		58 VA <b>(3)</b>	COE-110/50/60AC <b>(1)</b>	
	230/50 AC	230/50/60 AC		56 VA (3)	COE-230/50/60AC <b>(1)</b>	
	110/50 AC	110RC			COE-110RC	
	120/60 AC		669	30 W		
	230/50 AC	230RC	000	00 11	COE-230RC	
	230/60 AC	200110	230110		332 200110	

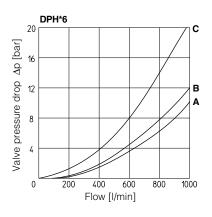
- (1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 10÷15% and the power consumption is 58 VA
- (2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

  (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 150 VA.

## 6 FLOW VERSUS PRESSURE DIAGRAMS Based on mineral oil ISO VG 46 at 50°C







Flow direction Spool type		Р→В	A→T	В→Т	P→T
0/2, 1, 3, 6, 7	Α	Α	D	Α	-
1/1, 1/2	В	В	D	E	-
0	Α	Α	D	E	С
0/1	Α	Α	D	-	-
2	Α	Α	-	-	-
2/2	В	В	-	-	-
3/1	Α	Α	D	D	-
4	С	С	Н	- 1	F
4/8	С	С	G	- 1	F
5	Α	В	F	Н	G
19	С	-	-	G	-
39	С	-	-	Н	-
49	-	D	-	-	-
58	В	Α	F	Н	Н
91	С	С	E	-	-
93	-	С	D	-	-

Flow direction Spool type	P→A	Р→В	A→T	В→Т	P→T
1	В	В	В	D	-
1/1	D	Е	Е	F	-
1/2	E	D	В	С	-
0	D	С	D	Ε	F
0/1, 3/1, 6, 7	D	D	D	F	-
0/2	D	D	D	Е	-
2	В	В	-	-	-
2/2	E	D	-	-	-
3	В	В	D	F	-
4	С	С	Н	L	L
5	Α	D	D	D	Н
19	F	-	-	E	-
39	G	F	-	F	-
58	E	Α	В	F	Н
91	F	F	D		
93	-	G	D	-	-

Flow direction Spool type	P→A	Р→В	A→T	В→Т	P→T
0	Α	Α	В	В	В
1	Α	Α	Α	В	-
3	Α	-	Α	В	-
4	Α	Α	С	С	С

## 7 OPERATING LIMITS For a correct valve operation do not exceed the max recommended flow rates (I/min) shown in the below tables

#### SDPHE-2

	Inlet pressure [bar]				
Spool	70	140	210	350	
	Flow rate [I/min]				
0, 1, 3, 6, 7, 8	300	300	300	300	
2, 4, 4/8	300	300	240	140	
5	260	220	180	100	
0/1, 0/2, 1/2	300	250	210	180	
58, *9, 9*	300	300	270	200	

#### SDPHE-4

	Inlet pressure [bar]				
Spool	70   140   2		210	350	
		Flow rat	te [l/min]		
1, 6, 7, 8	700	700	700	600	
2, 4, 4/8	500	500	450	400	
5, 0/1, 0/2, 1/2	600	520	400	300	
0, 3	700	700	600	540	
58, *9, 9*	500	500	500	450	

#### SDPHE-6

	Inlet pressure [bar]					
Spool	70	140	210	350		
	Flow rate [l/min]					
1, 3, 6, 7,	1000	950	850	700		
0	950	900	800	650		
1/2, 2, 4, 5	850	800	700	450		
58, 19/91	950	850	650	450		

#### SWITCHING TIMES (average values in m sec)

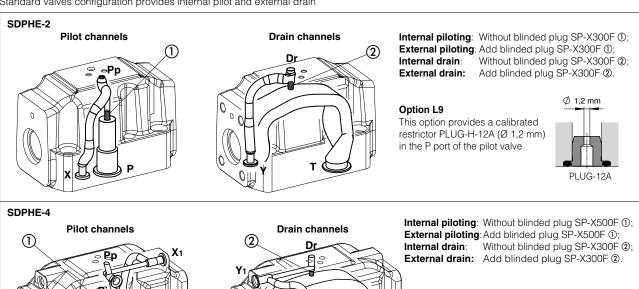
			Piloting pressure					
			70	70 bar		bar	250 bar	
Valve model	Configuration		Alternating current	Direct current	Alternating current	Direct current	Alternating current	Direct current
	71, 61, 67, 61*/A, 67*/A	Switch ON	40	55	30	50	20	40
SDPHE-2	71,01,07,017A,077A	Switch OFF			60	)		
SUPFIE-2	63, 63*/A	Switch ON	55	80	45	70	35	55
	03, 03 /A		95					
	71, 61, 67, 61*/A, 67*/A	Switch ON	60	80	45	60	30	45
SDPHE-4	71,01,07,017A,077A	Switch OFF	80					
SUPFIE-4	63, 63*/A	Switch ON	95	115	75	95	50	65
	00, 00 /A	Switch OFF	130					
	71, 61, 67, 61*/A, 67*/A	Switch ON	70	95	55	70	40	55
SDPHE-6	71, 01, 07, 01 /A, 07 /A	Switch OFF	ch OFF 150			0		
SDFUE-0	63, 63*/A	Switch ON	115	145	95	110	70	90
	03, 03 /A	Switch OFF			28	0		

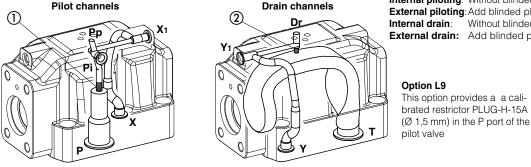
#### Notes:

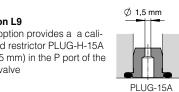
- 1) For configuration 75, times of switching ON and switching OFF are the same: this value is equal to time of switch ON of configuration 63.
- 2) TEST CONDITIONS
- Nominal voltage supply DC (direct) and AC (alternating) with connector type SP-666. The use of other connectors can affect the switching time;
- 2 bar of counter pressure on port T;
- mineral oil: ISO VG 46 at 50°C
- 3) The response time is affected by elasticity of the hydraulic circuit, by variation of hydraulic characteristics and temperature.

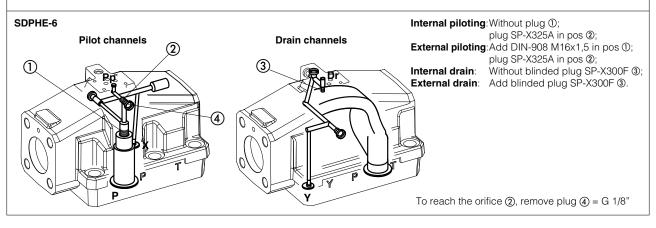
#### 9 PLUGS LOCATION FOR PILOT/DRAIN CHANNELS

Depending on the position of internal plugs, different pilot/drain configurations can be obtained as shown below. To modify the pilot/drain configuration, proper plugs must only be interchanged. The plugs have to be sealed using loctite 270. Standard valves configuration provides internal pilot and external drain









## 10 DIMENSIONS FOR SDPHE-2 [mm]

## SDPHE-2\* ISO 4401: 2005

Mounting surface: 4401-07-07-0-05

Fastening bolts:

4 socket head screws M10x50 class 12.9 Tightening torque = 70 Nm

2 socket head screws M6x45 class 12.9 Tightening torque = 15 Nm

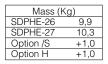
Diameter of ports A, B, P, T:  $\emptyset$  = 20 mm; Diameter of ports X, Y:  $\emptyset = 7$  mm;

Seals: 4 OR 130, 2 OR 2043

= PRESSURE PORT Р A,B = USE PORT = TANK PORT

= EXTERNAL OIL X PILOT PORT = DRAIN PORT

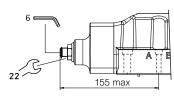
## ø11 34.1 50 65.9 Valve's bottom view 76.6 88.1 101.6

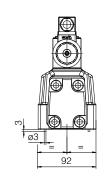


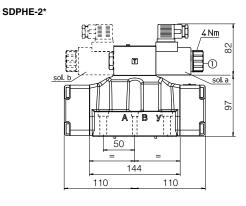
## SDPHE-2\*/H 82 Ŧ 呵 4

# 107.5 107.5

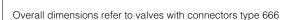
#### Stroke adjustment device for option /S







① Standard manual override PIN



#### 11 DIMENSIONS FOR SDPHE-4 [mm]

## SDPHE-4\*

ISO 4401: 2005

#### Mounting surface: 4401-08-08-0-05

Fastening bolts:

6 socket head screws M12x60 class 12.9 Tightening torque = 125 Nm

Seals: 4 OR 4112; 2 OR 3056

Diameter of ports A, B, P, T:  $\emptyset$  = 24 mm; Diameter of ports X, Y:  $\emptyset$  = 7 mm;

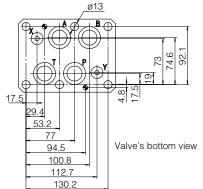
= PRESSURE PORT

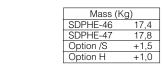
**A,B** = USE PORT **T** = TANK POR

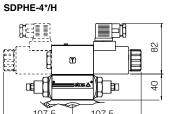
= TANK PORT

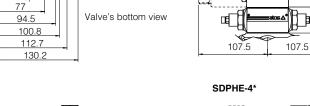
= EXTERNAL OIL PILOT PORT

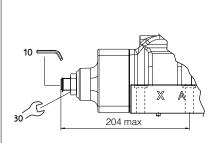
= DRAIN PORT

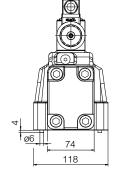


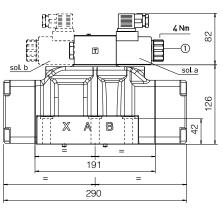








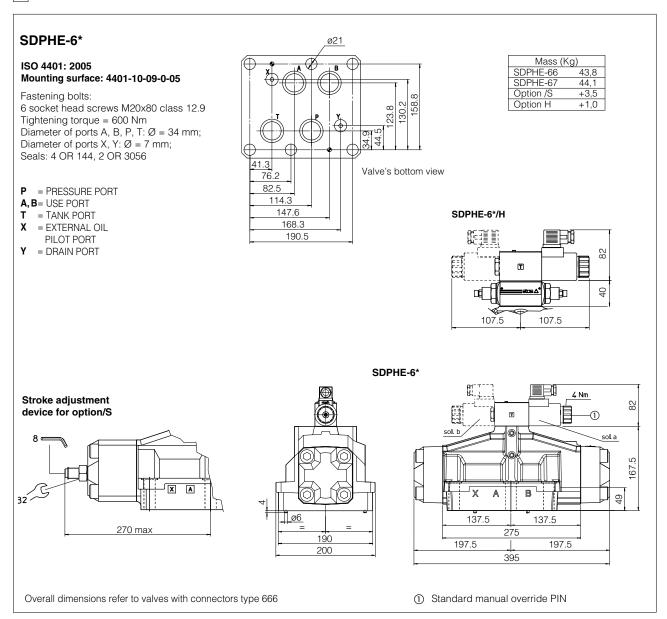




Overall dimensions refer to valves with connectors type 666

Standard manual override PIN

## 12 DIMENSIONS FOR DPH\*-6 [mm]



## [13] ELECTRIC CONNECTORS ACCORDING TO DIN 43650 - the connectors must be ordered separately

Connector code	Function					
666 Connector IP65, suitable for direct connection to electric supply source						
As 666 connector IP65 but with built-in signal led, suitable for direct connection to electric supply source						
669 With built-in rectifier bridge for supplying DC coils by alternating current (AC 110V and 230V - Imax 1A)						