DHE

Directional valves

Direct, spool type, subplate, AC or DC solenoids, cURus marked. DIN, AMP, Deutsch or wire connectors

Sizes	Qmax	Pmax
06 ISO 4401	80 l/min	350 bar

Features

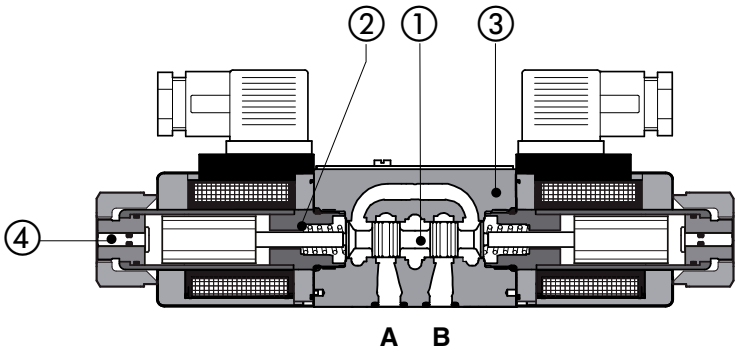
- 4/3, 4/2 or 3/2 way
- Subplate mounting ISO 4401-03-02-0-05
- High performance solenoids, cURus certified coils
- Electric connection DIN EN 175301-803 (IP65) or optional AMP Junior Timer (IP67), Deutsch (IP69), Lead wire
- Optional manual override with rubber cap
- Auxiliary hand lever
- Optional devices for switching time control

Description

Spool type, two or three position direct operated valves with high performance threaded solenoids certified according the North American standard cURus. Solenoids 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 5 for available voltages

Overview



1 - Spool
2 - On-off solenoid
3 - Valve body
4 - Manual override pin

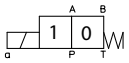
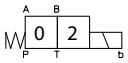
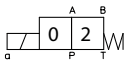
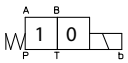
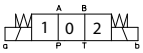
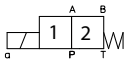
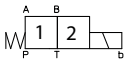
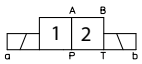
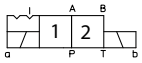
1 MODEL CODE

DHE	-	0	61	1	/	A	/	L1	-	X	24DC	*	/	*
1		2	3	4		5		6		7	8	9		10

1 - **Valve type**	
DHE	Directional control

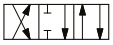
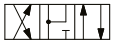
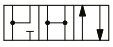
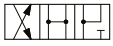
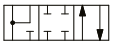
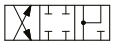
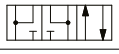
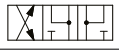
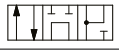
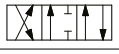
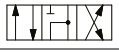
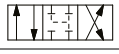
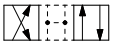
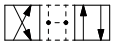
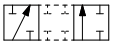
2 - **Valve size, ISO 4401**	
0	Size 06

3 - **Configuration**

	standard	option /A
61		
67		
71		
63		
70		
75		

4 - **Spool type**

Configuration: 61, 61/A, 67, 67/A, 71

0		**1**	
2		**3**	
4		**5**	
6		**6/7 (1)**	
7		**8**	
90		**09**	
91		**19**	
93		**39**	
94		**49**	
16		**17**	
58		**1/9**	
Configuration: 63, 63/A, 70, 75			
			
0/2		**1/2**	
2/2 (2)			

(1) Only for configuration 61, not available for version /A
(2) Not available for configuration 75
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 8 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.
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 - **Construction options**		
A	Solenoid at side of port B	only for 61, 63, 67
	Hand lever at side of port B	only for 71, with MO or MV option
MO	Horizontal hand lever	
MV	Vertical hand lever	
WP	Manual override	

WP option cannot be combined with **MO** or **MV** options
WP manual override operation can be possible only if the pressure at T port is lower than 50 bar
MO, MV, AMO, AMV are available for configuration: 61 - 63 - 71, spools: 0 - 0/2 - 1 - 1P - 1/2 - 1/2P - 3 - 3P - 4 - 7
WPD/HE-DC (only for DHE-DC) manual override with detent, to be ordered separately, see tab. K150

6 - **Switching time options** - only for DC voltage	
L1	restrictor Ø1,1 mm acting in both spool directions
L2	restrictor Ø1,1 mm acting in both spool directions
L3	restrictor Ø 0,7 mm acting in both spool directions

See section 7, 9
For spools 4 and 4/8 only device L3 is available.

7 - **Coil and connector options**	
00-AC	AC solenoids without coils
00-DC	DC solenoids without coils
X	without connector
XJ	AMP Junior Timer connector
XK	Deutsch connector
XS	Lead Wire connection

See section 4.4

8 - **Voltage code**	
12DC	for X, XJ, XK, XS
14DC	
24DC	
28DC	
48DC	for X
110DC	
125DC	
220DC	
24/50/60AC	
48/50/60AC	
110/50/60AC	
230/50/60AC	
115/60AC	
230/60AC	
110RC	
230RC	

See section 4.2

9 - **Series identification** - not required for ordering	
.....	series number

10 - **Seals material**	
-	NBR
PE	FKM
BT	NBR low temperature

2 GENERAL CHARACTERISTICS

Assembly position	Any position
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 range	Standard = -30°C ÷ +70°C; /PE option = -20°C ÷ +70°C; /BT option = -40°C ÷ +70°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 Comply with Directive 2011/65/EU as amended (RoHS 2), including Delegated Directive (EU) 2015/863 and all subsequent delegated directives in force on the date of this statement REACH Regulation (EC) n°1907/2006

3 HYDRAULIC CHARACTERISTICS

Operating pressure	Ports P,A,B: 350 bar; Port T 210 bar for DC version; 160 bar for AC version
Rated flow	See diagrams Q/Δp at section 5
Maximum flow	80 l/min, see operating limits at section 6

Recommended viscosity	15÷100 mm^2/s - max allowed range 2,8 ÷ 500 mm^2/s
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog

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

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	

4 ELECTRIC CHARACTERISTICS

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 EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN60529	IP 65 (with connectors 666, 667, 669 correctly assembled)
Duty factor	100%
Supply voltage and frequency	See section 4.2
Supply voltage tolerance	± 10%
Certification	CURUS North American Standard

4.2 Voltage code

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

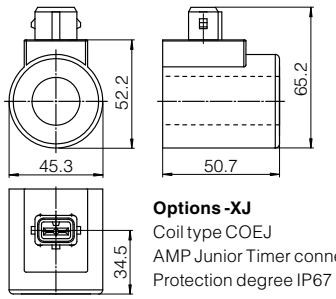
(1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 20 ÷25% and the power consumption is 52 VA.
(2) Average values based on tests preformed at nominal hydraulic condition and ambient/coil temperature of 20°C.
(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

4.3 Electric connectors according to DIN EN 175301-803 (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)

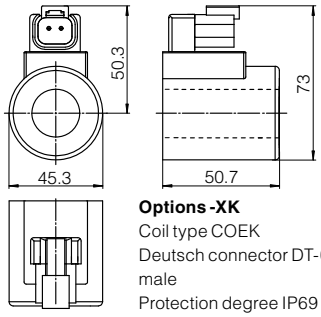
4.4 Coil with special connectors only for voltage supply 12, 14, 24, 28 VDC

AMP Junior timer connector



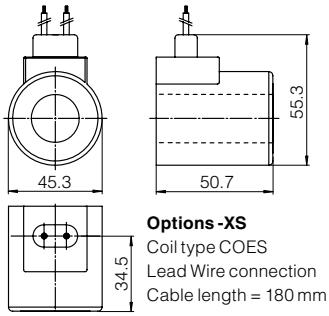
Options -XJ
Coil type COEJ
AMP Junior Timer connector
Protection degree IP67

Deutsch connector DT-04-2P



Options -XK
Coil type COEK
Deutsch connector DT-04-2P male
Protection degree IP69

Lead Wire connection

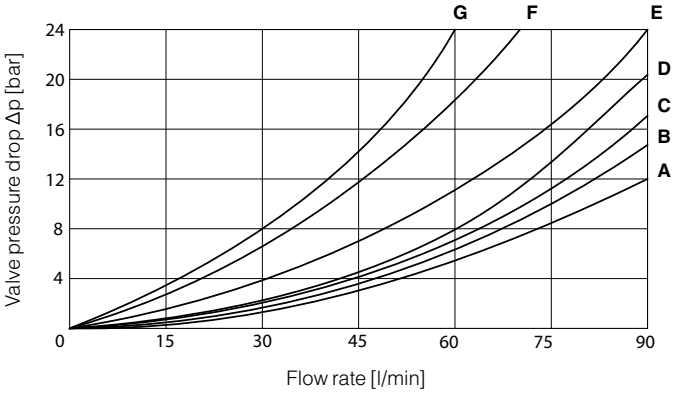


Options -XS
Coil type COES
Lead Wire connection
Cable length = 180 mm

Note: for the electric characteristics refer to standard coils features - see section · 4.2

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

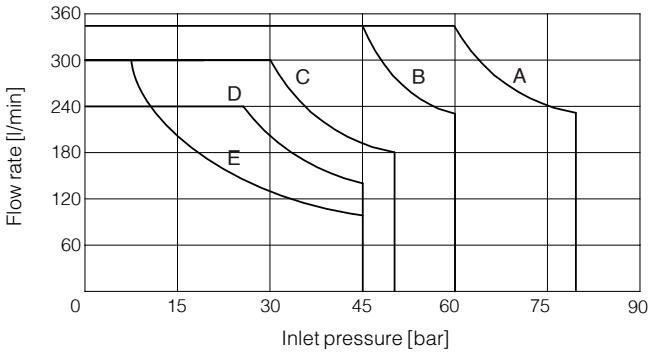
Flow direction / Spool type	P→A	P→B	A→T	B→T	P→T
0, 0/1	A	A	C	C	D
1, 1/1	D	C	C	C	
3, 3/1	D	D	A	A	
4, 4/8, 5, 5/1, 49, 58, 58/1, 94	F	F	G	C	E
1/2, 0/2	D	D	D	D	
6, 7, 16, 17	D	D	D	D	
8	A	A	E	E	
2	D	D			
2/2	F	F			
09, 19, 90, 91	E	E	D	D	
1/9, 39, 93	F	F	G	G	



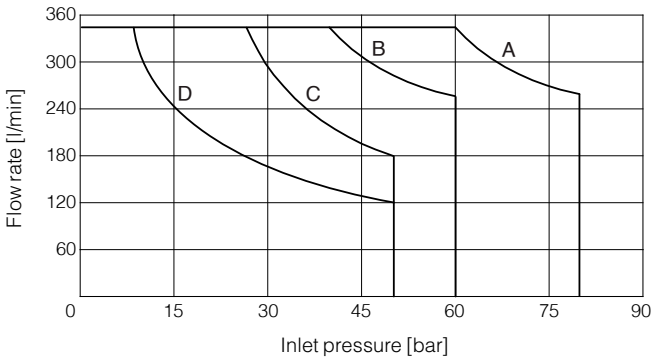
6 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value (Vnom - 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
A	1, 1/2, 8
B	0, 0/1, 0/2, 1/1, 1/9, 3
C	3, 3/1, 6, 7
D	4, 4/8, 5, 5/1, 16, 17, 19, 39, 58, 58/1, 09, 90, 91, 93, 94
E	2, 2/2



Curve	Spool type
	DC
A	0, 0/1, 1, 1/2, 3, 8
B	0/2, 1/1, 6, 7, 1/9, 19
C	3/1, 4, 4/8, 5, 5/1, 16, 17, 19, 39, 49, 58, 58/1, 09, 90, 91, 93, 94
D	2, 2/2



7 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.

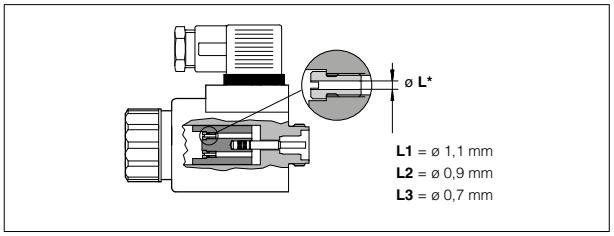
Valve	Switch-on AC	Switch-onAC	Switch-onDC	Switch-off DC
DHE	10 - 25	20 - 40	30 - 50	15 - 25
DHE-*/L1	--	--	60	60
DHE-*/L2	--	--	80	80
DHE-*/L3	--	--	150	150

8 SWITCHING FREQUENCY

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

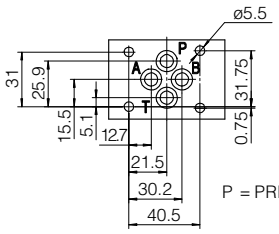
9 DEVICES FOR SWITCHING TIME CONTROL

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.



10 DIMENSIONS [mm]

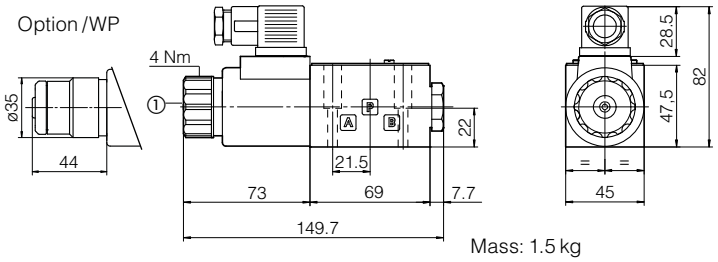
ISO 4401: 2005
Mounting surface: 4401-03-02-0-05
Fastening bolts: 4 socket head screws:
M5x30 class 12.9
Tightening torque = 8 Nm
Seals: 4 OR 108
Ports P.A.B.T: Ø = 7.5 mm (max)



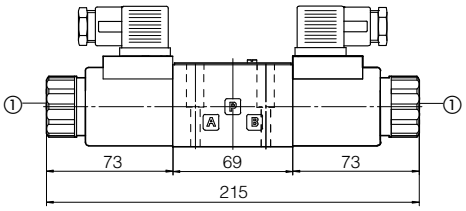
A, B = USE PORT
T = TANK PORT
View from X

P = PRESSURE PORT

DHE-06(DC)



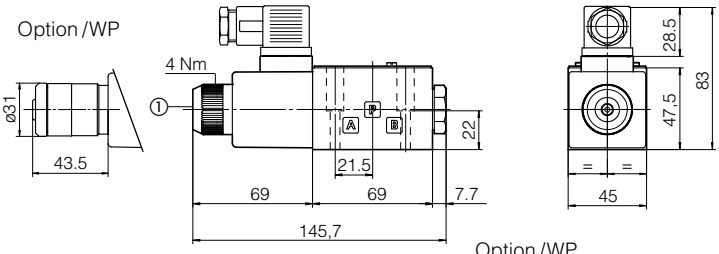
DHE-07(DC)



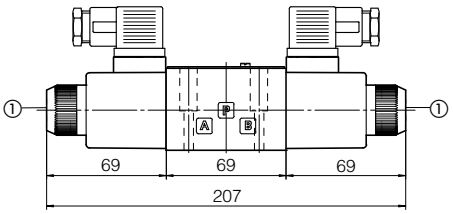
Mass: 1.5 kg

Option /WP

DHE-06(AC)



DHE-07(AC)



Option /WP

Mass: 1.4 kg

① Mass: 1.8 kg

⚠ Standard manual override PIN

Overall dimensions refer to valves with connector 666

11 PLUG-IN RESTRICTOR (to be ordered separately)

The use of plug-in restrictors in valve's ports P or A or B may be necessary in case of particular conditions as long flexible hoses or the presence of accumulators which could cause at the valve switching instantaneous high flow peaks over the max valve's operating limits.

PLUG-H	-	**	A

08, 10, 12, 15 calibrated orifice diameter in tenths of mm
Example PLUG-H-**12** = orifice diameter **1,2 mm**
Other orifice dimensions are available on request

Short calibrated orifice