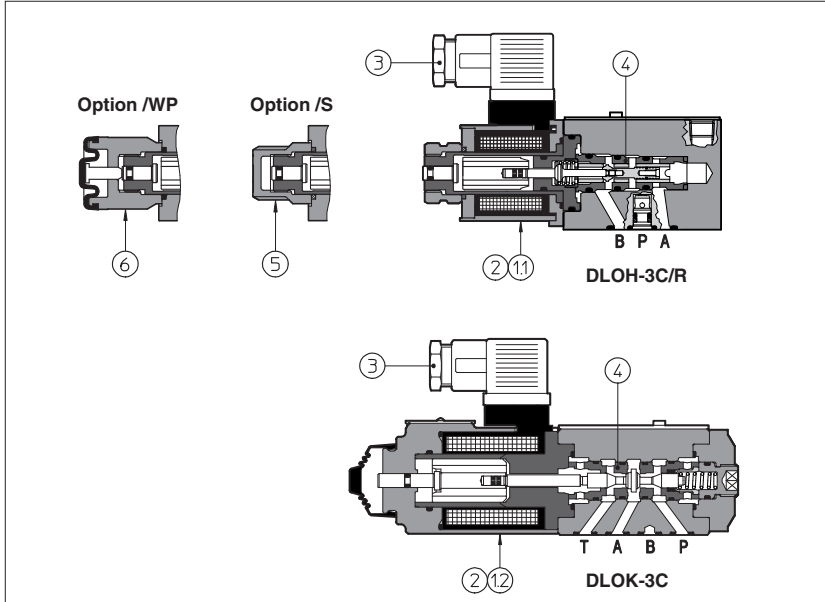


Solenoid directional valves type DLOH, DLOK

poppet type leak free, direct operated, ISO 4401 size 06



DLOH and DLOK are poppet type, two or three way, two position direct operated solenoid valves, designed to operate in oil hydraulic systems with leak free requirements.

They are operated by wet type solenoids type OE for DC and RC rectified current supply.

The DLOH are available with optional manual prolonged override, protected by a rubber cap ⑥.

Standard dimensions cartridge construction allows a wide variety of configurations only by easy replacement of the cartridge ④. Cartridges of DLOH are available also as loose parts for mounting in manifolds, see ⑩.

The coils ② are fully encapsulated with temperature class H.

Mounting surface: **ISO 4401 size 06**

Max flow: **12 l/min (DLOH)**

30 l/min (DLOK)

Max pressure: **350 bar for DLOH**

315 bar for DLOK

1 MODEL CODE

DLO Directional control valve poppet type size 06	H H= max flow: 12 l/min K= max flow: 30 l/min	2 2 = two way (only DLOH) 3 = three way	A / WP Valve configuration, see table ②: A= open in resting position C= closed in resting position	U - X Options: /WP=prolonged manual override protected by rubber cap (only DLOH) /R = with check valve on port P, see ② (only DLOH) /S = no hand operation and poppet overlapping during the intermediate position for safety applications (only DLOH) /L1, /L2, /L3 = device for controlling switching time	24 DC Voltage code, see section ⑤	** Series number	* Seals material, see section ③: - = NBR PE = FKM BT = HNBR
----------------------------------------------------------------	------------------------------------------------------------	------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------	----------------------------	--------------------------------------------------------------------------------

00 = solenoids without coils
X = without connector
See section ⑭ for available connectors, to be ordered separately

- O = solenoid OLK for DC supply (only for DLOK)
- U = solenoid OLU for DC supply (only for DLOH)

2 VALVE CONFIGURATION

DLOH-2A 	DLOH-2A/R 	DLOH-2C 	DLOH-2C/R 	DLOK-3A
DLOH-3A 	DLOH-3A/R 	DLOH-3C 	DLOH-3C/R 	DLOK-3C

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

Assembly position / location	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	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 ² /s - max allowed range 2.8 ÷ 500 mm ² /s		
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 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	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	
Flow direction	As shown in the symbols of table 2		
Operating pressure	DLOH	Ports P, A, B: 350 bar ; Port T 160 bar ;	
	DLOK	Ports P, A, B: 315 bar ; Port T 210 bar ;	
Rated flow	See diagrams Q/Δp at section 6		
Maximum flow	DLOH	12 l/min , see operating limits at section 7	
	DLOK	30 l/min , see operating limits at section 7	
Internal leakage	See diagrams Q/Δp at section 6		

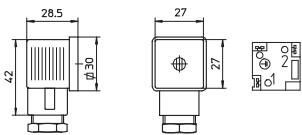
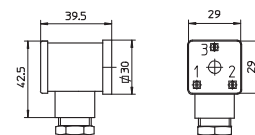
3.1 Coils characteristics

Insulation class	H (180°C) 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	IP 65 (with connectors 666, 667, 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 5
Supply voltage tolerance	± 10%
Certification	cURus North American Standard

4 ELECTRIC/ELECTRONIC CONNECTORS ACCORDING TO DIN 43650

The connectors must be ordered separately

Code of connector	Function
666	Connector IP-65, suitable for direct connection to electric supply source
667	As 666 connector IP-65 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 - I _{max} 1A)

<p>666, 667 (for AC or DC supply)</p> 		<p>669 (for AC supply)</p> 	
CONNECTOR WIRING			
<p>666, 667</p> <p>1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground</p>		<p>669</p> <p>1, 2 = Supply voltage V_{Ac} 3 = Coil ground</p>	
SUPPLY VOLTAGES			
<p>666</p> <p>All voltages</p>		<p>667</p> <p>24 AC or DC 110 AC or DC 220 AC or DC</p>	
		<p>110/50 AC 110/60 AC 230/50 AC 230/60 AC</p>	

5 ELECTRIC FEATURES

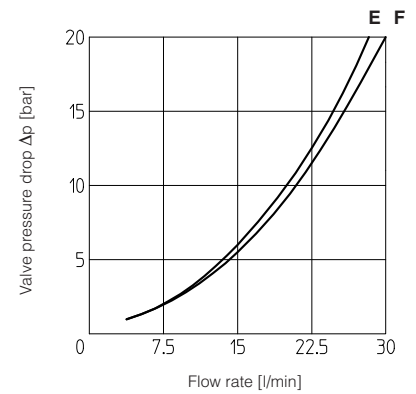
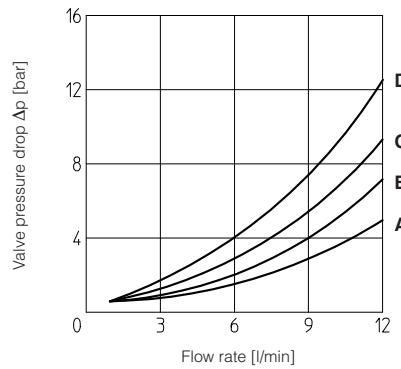
Valve	External supply nominal voltage $\pm 10\%$ (1)	Voltage code	Type of connector	Power consumption (2)	Code of spare coil	Colour of coil label
DLOH	DIRECT CURRENT	6 DC	666 or 667	33 W	COU-6DC	brown
		12 DC			COU-12DC	green
		24 DC			COU-24DC	red
		48 DC			COU-48DC	silver
	ALTERNATE CURRENT	110/50 AC	669	40 VA	COU-110RC	gold
		120/60 AC		35 VA	COU-110RC	gold
		230/50 AC		40 VA	COU-230RC	blue
		230/60 AC		35 VA	COU-230RC	blue
DLOK	DIRECT CURRENT	12 DC	666 or 667	32 W	-	-
		24 DC			-	-
		110 DC			-	-
		220 DC			-	-
	ALTERNATE CURRENT	110/50 AC	669	40 VA	-	-
		120/60 AC		35 VA	-	-
		230/50 AC		40 VA	-	-
		230/60 AC		35 VA	-	-

- (1) For other supply voltages available on request see technical table E010.
 (2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

6 FLOW VERSUS PRESSURE DROP DIAGRAM based on mineral oil ISO VG 46 at 50°C

Flow direction	P → A (1) (P → B)	A → T (B → T)
DLOH-2A	B	-
DLOH-2C	C	-
DLOH-3A	D	C
DLOH-3C	C	A
DLOK-3A	F	E
DLOK-3C	F	E

(1) For two-way valves, pressure drop refers to P→T



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

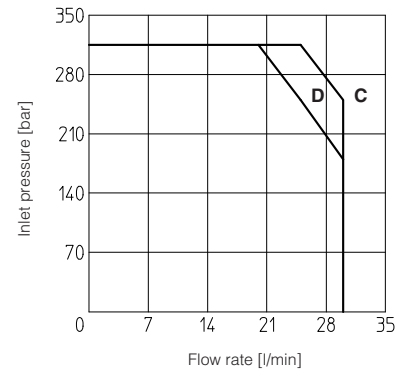
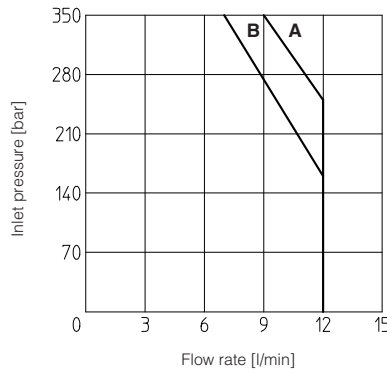
The diagram has been obtained with warm solenoids and power supply at lowest value (Vnom - 10%).

A = DLOH-3A

B = DLOH-2A, DLOH-3C

C = DLOK-3A

D = DLOK-3C



8 SWITCHING TIMES (average values in msec)

Valve type	Connector	Switch-on AC	Switch-on DC	Switch-off
DLO*-**	666, 667	-	45	25
DLO*-**	669	30	-	75
DLO*-**/L1	666, 667	-	60	60
DLO*-**/L2	666, 667	-	80	80
DLO*-**/L3	666, 667	-	110	150

TEST CONDITIONS:

- 8 l/min; 150 bar
- nominal voltage
- 2 bar of counter pressure on port T
- based on mineral oil ISO VG 46 at 50°C

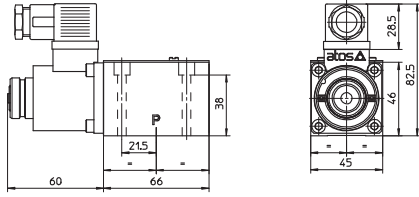
The response time is affected by elasticity of the hydraulic circuit, by variation of hydraulic characteristics and temperature

9 DIMENSIONS [mm]

**DLOH-2*
DLOH-2*/R**

ISO 4401: 2005
Mounting surface: 4401-03-02-0-05
without A and B ports

Fastening bolts:
4 socket head screws M5x50 class 12.9
Tightening torque = 8 Nm
Seals: 2 OR 108
Ports P, T:
Ø = 7,5 mm (max)



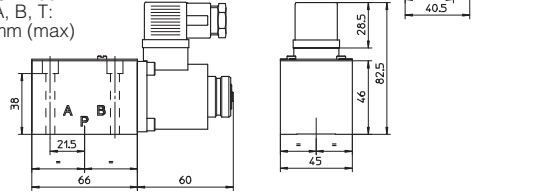
Mass: 1,5 Kg

P = PRESSURE PORT
T = USE PORT
For the max pressures on ports, see section 3

**DLO*-3*
DLO*-3*/R**

ISO 4401: 2005
Mounting surface: 4401-03-02-0-05

Fastening bolts:
4 socket head screws M5x50 class 12.9
Tightening torque = 8 Nm
Seals: 4 OR 108
Ports P, A, B, T:
Ø = 7,5 mm (max)



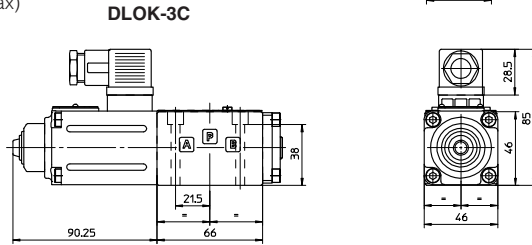
Mass: 1,5 Kg

P = PRESSURE PORT
A = USE PORT (not used for -3C versions)
B = USE PORT (not used for -3A versions)
T = TANK PORT
For the max pressures on ports, see section 3

DLOK-3*

ISO 4401: 2005
Mounting surface: 4401-03-02-0-05

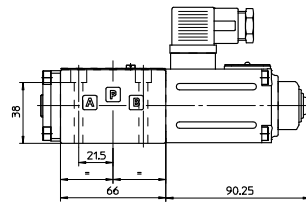
Fastening bolts:
4 socket head screws M5x50 class 12.9
Tightening torque = 8 Nm
Seals: 4 OR 108
Ports P, A, B, T:
Ø = 7,5 mm (max)



Mass: 1,6 Kg

P = PRESSURE PORT
A = USE PORT
B = CLOSED
T = TANK PORT
For the max pressures on ports, see section 3

DLOK-3A

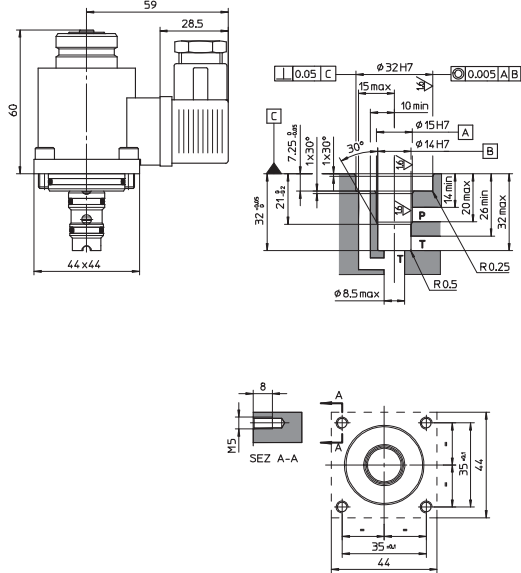


Mass: 1,6 Kg

Overall dimensions refer to valves with connectors type 666

10 INSTALLATION DIMENSIONS OF CARTRIDGES [mm]

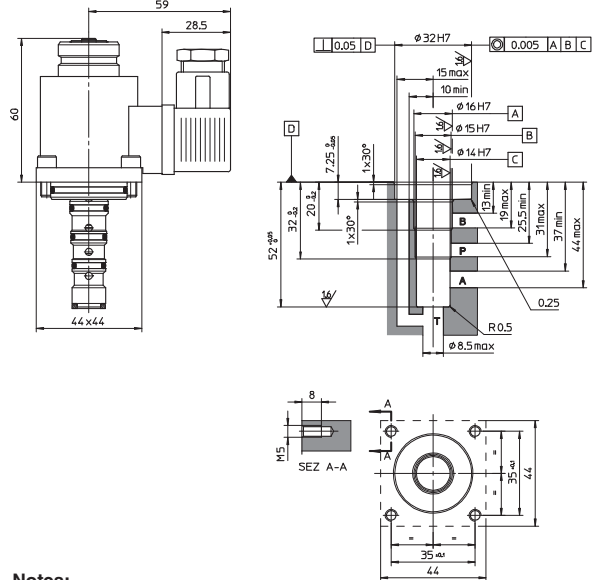
LU-O2*, cartridge of DLOH-2*



Note:
(* for version /WP the height is increased by 14,5 mm)

These cartridges can be installed in the manifolds

LU-O3*, cartridge of DLOH-3*



Notes:
The orifice B is not used by the cartridge type LU-O3A
The orifice A is not used by the cartridge type LU-O3C
(* for version /WP the height is increased by 14,5 mm)

11 MOUNTING SUBPLATES

Valve	Subplate model	Ports location	GAS ports	Ø Counterbore	Mass [Kg]
			A-B-P-T	A-B-P-T [mm]	
DLOH-* DLOK-*	BA-202 (1)	Ports A, B, P, T underneath;	3/8"	-	1,2
	BA-204 (1)	Ports P, T underneath; ports A, B on lateral side	3/8"	25,5	1,8
	BA-302 (1)	Ports A, B, P, T underneath;	1/2"	30	1,8

(1) The subplates are supplied with 4 fastening bolts M5x50 class 12.9; Also available multi station and modular subplates. For further details see table K280.