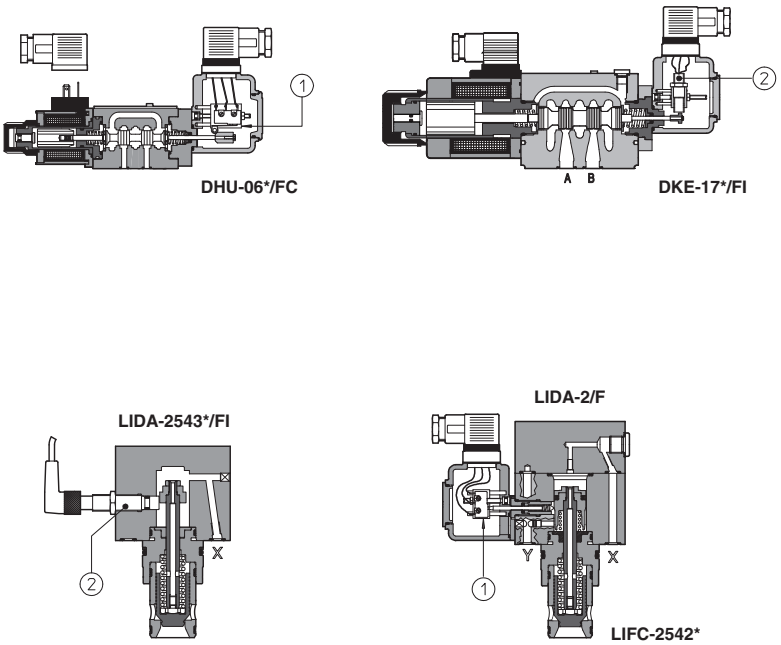
Safety valves direct, pilot operated and cartridge execution with mechanical microswitches or inductive proximity sensors conforming to Machine Directive 2006/42/CE - **obsolete components** - availability on request



These valves are designed to fulfil the safety criteria imposed to machine manufacturers by the European Machine Directive.

In addition to the normal function they supplies an electrical on-off output signal indicating the position of the spool/poppet of the valve.

The safety function performed by the valve is to cut off the hydraulic power line in case of emergency condition, avoiding dangerous movements of the machines actuators. The spool position signal informs the machine controller about the "open" or "intercepted" status of the hydraulic line.

Two versions are provided:
- with mechanical microswitch ①;
- with inductive proximity sensor ②;
  see section 12 for technical characteristics.

These valves are available in direct, piloted and cartridge execution and they keep the same hydraulic and electric characteristics of standard products from which they are derived.

Classic example of application: on presses or on blow moulding machines the safety valves are used to shut off the fluid energy to one or more actuators as a consequence of the opening of a mechanical safety device ("gate") or as a consequence of an "emergency stop" command.

The components shown on this technical table are CE marked and certified by TÜV, in accordance with the technical safety requirements provided in the **Machine Directive 2006/42/CE** but not included in the safety components of annex IV.

For details about the applicable EN standards, see www.atos.com, catalog on line page, section P, table P004.

1 MODEL CODE OF DIRECTIONAL CONTROL SAFETY SOLENOID VALVES

DHU	–	0	63	1/2	/A	FI	/NC	-	X	24DC	**	/*

Type of solenoid valve
DHI, DHU = direct, size 06 (see tab. E010)
DKE, DKER = direct, size 10 (see tab E025)

Size ISO 4401
0 = size 06
1 = size 10

Valve configuration, see section 2
61 = single solenoid, central plus external position, spring centered
63 = single solenoid, 2 external positions, spring offset
67 = single solenoid, external plus central position, spring offset
71 = double solenoid, 3 positions, spring centered
75 = double solenoid, 2 external positions, with detent

Spool type, see section 2

Options (WP not available for safety valves) (1)

Type of sensor
FC = mechanical microswitch - for DHU
FI = inductive proximity sensor - for DHU
FIE = external inductive proximity sensor available only for single solenoid version - for DHI, DHU, DKE, DKER

Electrical signal (only for /FI and /FIE versions):
/NC = electric contact is closed when the valve is de-energized
/NO = electric contact is open when the valve is de-energized
For /FC version both the normally open contact and the normally closed contact are already available on the connector.

X = without solenoid connector, to be order separately (see tab. K500)

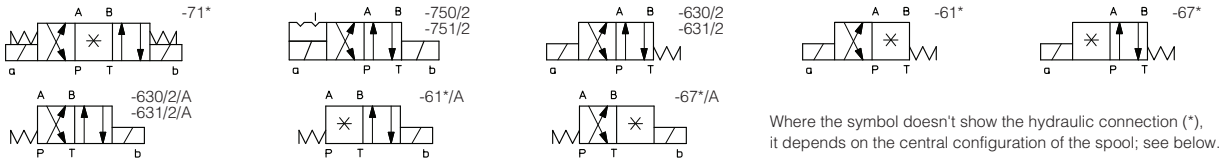
Voltage code, see section 11

Series number

Synthetic fluids:
WG = water glycol
PE = phosphate ester

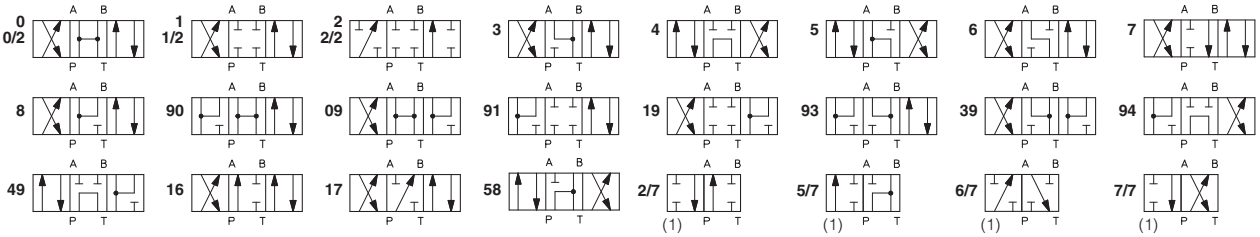
(1) See tab. E010 for DH*, tab. E025 for DKE*

2 CONFIGURATION



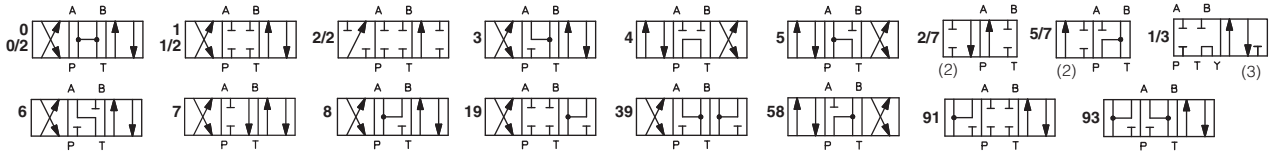
Where the symbol doesn't show the hydraulic connection (*), it depends on the central configuration of the spool; see below.

Spools for DH* valves



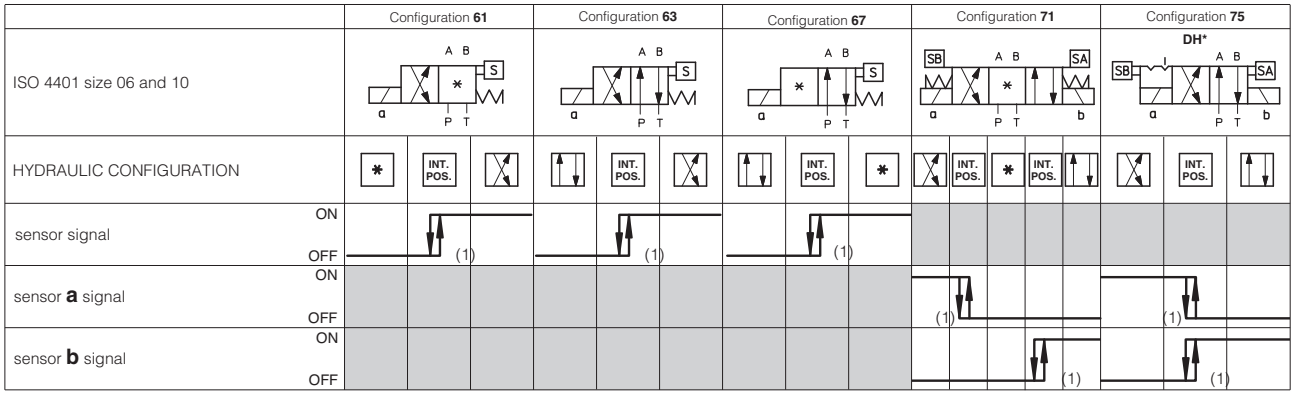
(1) Spools to be coupled only to valve configuration 61, not available version /A

Spools for DKE* valves



(2) Spools to be coupled only to valve configuration 63, not available version /A
(3) Only for execution DKE(R)-1611/3/A

3 STATUS OF OUTPUT SIGNAL FOR DIRECTIONAL VALVES WITH INDUCTIVE SENSORS TYPE /FI (/FIE)



Diagrams show the behaviour of the output signal for FI inductive sensors type NO. For FI inductive sensors type NC the behaviour is opposite (high level signal instead of low level signal and viceversa)

(1) According the criteria of safety specifications, the spool position signal must change its status during the intermediate position between two hydraulic configurations.

4 OPERATING LIMITS

Max pressure P port: **315 bar** (for DKE, DKER)
350 bar (for DH*)

Max pressure T port: see next table

P/Q characteristics: DH see tab. E010, section 8
DK see tab. E025, section 8

MAX PRESSURE T PORT (bar), peaks included:

	DH*	DKE*
/FC	20	-
/FI	5	-
/FIE	20	20 (1)

(1) 250 bar if the Y drain port is connected to the tank

5 SAFETY VALVES IN CARTRIDGE EXECUTION (MADE BY INTERMEDIATE ELEMENT AND COVER)

5.1 MODEL CODE FOR INTERMEDIATE ELEMENT INCLUSIVE OF THE CARTRIDGE

LIF C – 25 42 1 ** /*

Intermediate element (with poppet position detector) including the cartridge

Type of sensor:
C = mechanical microswitch

Size (ISO 7368), the same of the cover (see section 21)
16; 25; 32; 40; 50
Other dimensions available on request

Type of poppet, see tab. H030 for Q/Δp diagrams
42 = With damping nose, area ratio 1:1,1
43 = With damping nose, area ratio 1:2 (for size 16 and 25)
1:1,6 (for size 32, 40 and 50)
normally closed, to be coupled with covers type LIDA, LIDB, LIDBH**, LIDEW* see section 5.2

Spring cracking pressure:
1 = 0,3 bar for poppet 42; 0,6 bar for poppet 43
2 = 1,5 bar for poppet 42
3 = 3 bar for all poppets
6 = 5,5 bar for all poppets

Series number

Synthetic fluid:
WG = water-glycol
PE = phosphate ester

Note: in these safety valves the cartridge and the intermediate element with poppet position detector cannot be separated.

5.2 COVER MODEL CODE

LID A – 2 / E F -I X 24DC ** /* /*

Cover according to ISO 7368 to be coupled with LIFC safety valves

Cover type, see section 6 for hydraulic configuration:
A = direct pilot
B = with shuttle valve for pilot selection;
EW* = with solenoid valve for pilot selection
BH** = as EW* but with shuttle valve for pilot selection;

Size
1 = 16; **2** = 25; **3** = 32; **4** = 40; **5** = 50;
Other sizes available on request

E = with external attachment X (1/4" GAS) and underneath port X plugged

F = prearranged for coupling with LIFC cover, see section 6

Type of pilot solenoid valve (only for LIDBH** and LIDEW*):
-I = DHI for AC and DC supply

Only for LIDBH** and LIDEW*:
X = without connector, to be order separately (See tab. K500)

Voltage code (only for LIDBH** and LIDEW*) see section 11

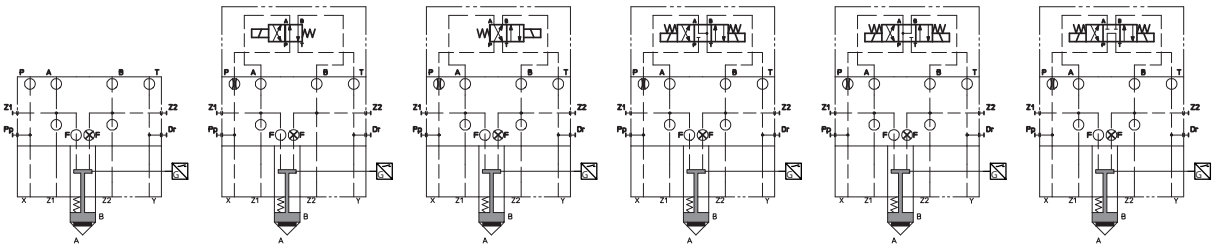
Series number

Synthetic fluid:
WG = water-glycol
PE = phosphate ester

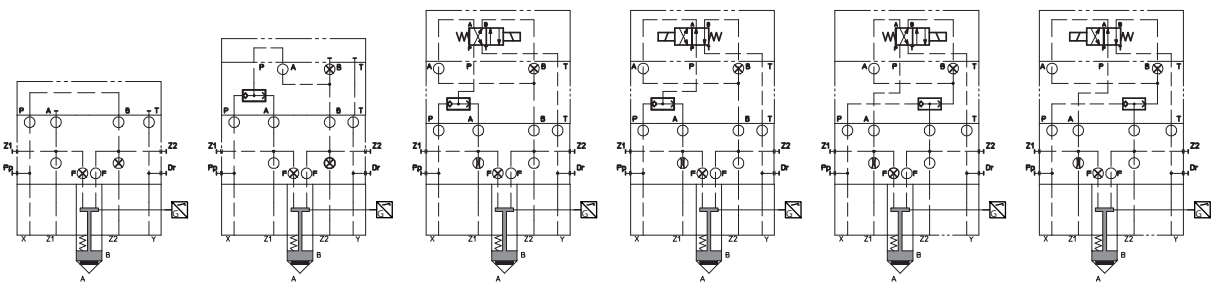
Special execution of the calibrated plugs in the pilot channels (see tables H030, H040)

According to the machinery safety requirements, in particular applications at least two safety valves (redundancy) will be provided (the first one leak free type). For valve type LIDB, LIDEW (in the configuration with external pilot line) Atos can supply leak free poppet type directional pilot valves type DLOH-3*. Consult our technical office for detailed information.

6 HYDRAULIC SYMBOLS (the following symbols shown the covers function coupled with safety valve LIFC)



LIDEW-* **LIDEW1-*** **LIDEW2-*** **LIDEW4-*** **LIDEW5-*** **LIDEW6-***



LIDA **LIDB-*** **LIDBH1A-*** **LIDBH1C-*** **LIDBH2A-*** **LIDBH2C-***

7 MODEL CODE OF SAFETY VALVES IN CARTRIDGE EXECUTION (INTEGRAL DESIGN COVER)

LIDA H – 25 43 3 / FI / NC – IX 24DC ** /*

Safety cartridge valve according to ISO 7368

optional pilot valve :
- **-** = omit if not required
- **H** = with NG 6 pilot valve

size:
16 25 32 40 50

poppet type:
43 = with damping nose, area ratio 1:2 (size 16 and 25)
1:1,6 (size 32,40 and 50)

spring cracking pressure:
- **1** = 0,6 bar
- **3** = 3 bar
- **6** = 5,5 bar

FI = inductive proximity sensor

NC = normally closed contact

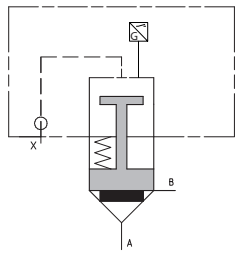
only for LIDAH:
IX = without solenoid connectors to be ordered separately (See tab. K500)

only for LIDAH:
Voltage code see section 11

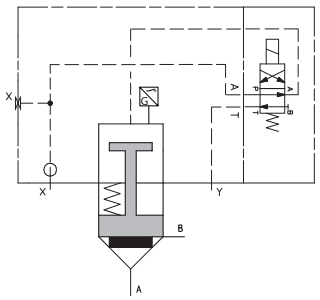
series number

sinthetic fluids:
WG = water glycol
PE = phosphate esters

8 HYDRAULIC SYMBOLS



LIDA-43/FI/NC**



LIDAH-43/FI/NC**

9 TECHNICAL CHARACTERISTIC

Sizes		16	25	32	40	50
Max flow (Δp = 6 bar)	[l/min]	130	300	480	940	1500
Max pressure	[bar]	350 bar at ports A, B and X				

10 MODEL CODE OF SAFETY VALVES IN CARTRIDGE EXECUTION (integral design cover)

LIDAS H - 40 43 3 / FI - I X 24DC ** / *

On-off active cartridges, according to ISO 7368

Pilot control
- **-** = without pilot solenoid valve
- **H** = with pilot solenoid valve

Size: **16 25 32 40 50**

poppet type:
43 = (with damping nose)

3 = spring cracking pressure 3 bar

Type of switch:
FI/NC = inductive position switch, normally closed
FI/NO = inductive position switch, normally open

Pilot valve only for LIDASH
- **-I** = DHI for AC and DC supply, with **cURus** certified solenoids
- **-E** = DHE for AC and DC supply, high performances, with **cURus** certified solenoids

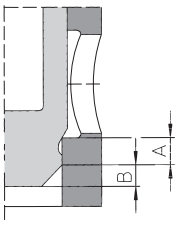
Only for LIDASH
X = without connector, see section 15

Only for LIDASH
voltage code, see section 15

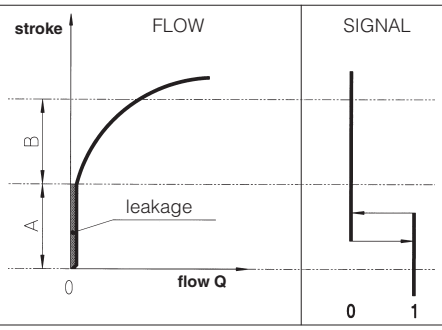
Series number

Seals material:
omit for NBR (mineral oil & water glycol)
PE = FPM

11 STATUS OF OUTPUT SIGNALS for cartridge valves (for LIFI and LIDA*/FI)



A: overlapping stroke
B: damping stroke



According the criteria of safety specifications, the poppet position signal must change its status inside the overlapping stroke (before the effective valve opening).

12 VOLTAGE CODE

Valve	External supply nominal voltage ± 10%	**Voltage code**	Type of connector	Power consumption
DHI DHE DHU	6 DC	**6 DC**	SP-666 or SP-667	33 W
	9 DC	**9 DC**		
	12 DC	**12 DC**		
	14 DC	**14 DC**		
	18 DC	**18 DC**		
	24 DC	**24 DC**		
	28 DC	**28 DC**		
	48 DC	**48 DC**		
	110 DC	**110 DC**		
	125 DC	**125 DC**		
	220 DC	**220 DC**		
LIDAH LIDEW LIDBH	24/50 AC 24/60 AC	**24/50/60 AC**		60 VA
	48/50 AC 48/60 AC	**48/50/60 AC**		
	110/50 AC 120/60 AC	**110/50/60 AC** **120/60 AC**		
	230/50 AC 230/60 AC	**230/50/60 AC** **230/60 AC**		
	110/50 AC 120/60 AC	**110RC**	SP-669	40 VA 35 VA
	230/50 AC 230/60 AC	**230RC**		40 VA 35 VA

Valve	External supply nominal voltage ± 10%	**Voltage code**	Type of connector	Power consumption
DKE DKER	12 DC	**12 DC**	SP-666 or SP-667	36 W (DKE) 39W (DKER)
	24 DC	**24 DC**		
	110 DC	**110 DC**		
	220 DC	**220 DC**		
	110/50/60 AC	**110/50/60 AC**		85 VA (DKE) 105 VA (DKER)
	230/50/60 AC	**230/50/60 AC**		
	110/50/60 AC	**110 DC**	SP-669	36 W (DKE) 39 W (DKER)
	230/50/60 AC	**220 DC**		

13 TECHNICAL CHARACTERISTICS OF INDUCTIVE PROXIMITY SENSORS AND MECHANICAL MICROSWITCHES

INDUCTIVE PROXIMITY SENSORS (/FI, /FIE)				
Type of valves		DHU /FI	DH*, DKE* /FIE	LIFI, LIDA*/FI
Supply voltage	[V]	10÷30	10÷30	10÷30
Ripple max	[%]	≤ 10	≤ 10	≤ 5
Max current	[mA]	100	200	200
Power consumption	[mA]	10	10	8
Voltage drop	[V]	≤ 3	≤ 1,5	≤ 1,5
Max switching frequency	[Hz]	1000	1500	1000
Max peak pressure	[bar]	100	350	350
Mechanical life		infinite		

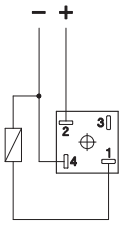
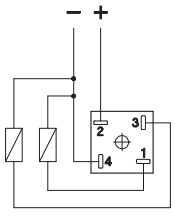
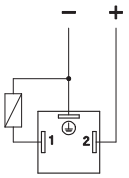
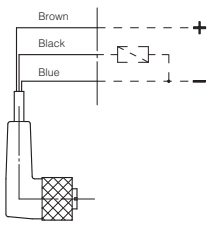
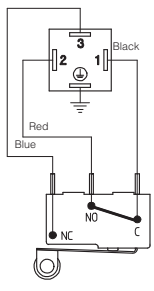
MECHANICAL MICROSWITCHES (/FC)				
Max switching power			With resistive load	With inductive load
	AC	125 V	5 A	5 A
		250 V	5 A	5 A
	DC	30 V	5 A	3 A
		50 V	1 A	1 A
		125 V	0,5 A	0,03 A
		250V	0,25 A	0,03 A
Mechanical life	Min 100 millions cicles			

14 CONNECTORS FOR INDUCTIVE PROXIMITY SENSORS AND MECHANICAL MICROSWITCHES

The connector for proximity sensor and mechanical microswitches are always supplied with the valves

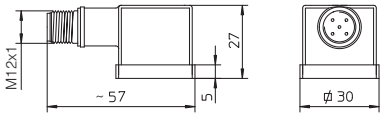
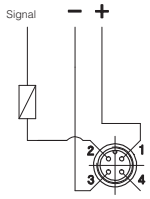
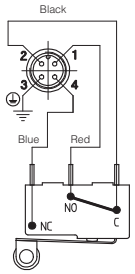
VALVE TYPE	CONNECTOR TYPE	VALVE TYPE	CONNECTOR TYPE
DHU/FI	**SP-345**	**LIDA*/FI**	Special connector with 3m molded cable (included)
DH*/FIE	**SP-666**	**LIFC**	**SP-666**
DHU/FC	**SP-666**	**LIDAS/FI**	**SP-666**
DKE*/FIE	**SP-666**	**LIDASH/FI**	**SP-666**

15 CONNECTING SCHEMES OF INDUCTIVE PROXIMITY SENSORS AND MECHANICAL MICROSWITCHES

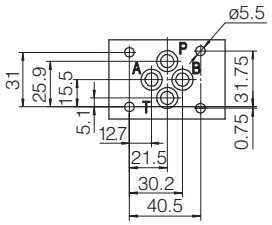
VERSIONS WITH INDUCTIVE PROXIMITY (/FI, /FIE)				**ALL VALVES WITH MECHANICAL MICROSWITCH (/FC)**
DHU/FI single solenoid	**DHU/FI** double solenoid	**DH*/FIE; DKE*/FIE**	**LIDA*/FI**	
Connector type **SP-345**	Connector type **SP-345**	Connector type **SP-666**		Connector type **SP-664** The drawing shows the switch in closed position
				
1 = output signal S 2 = supply +24 Vdc 3 = not connected 4 = GND	1 = output signal SA 2 = supply +24 Vdc 3 = output signal SB 4 = GND	1 = output signal S 2 = supply +24 Vdc ⏚ = GND	black = output signal brown = supply +24 Vdc blue = GND CABLE LENGHT = 3 m	1 = common (C) 2 = normally open contact (NO) 3 = normally closed contact (NC) ⏚ = EARTH

For the signal status see section 3 and section 10

16 OPTIONAL CONNECTOR TYPE SP-666/M12 the connector has to be ordered separately

Optional connector type **SP-666/M12** The optional connector type SP-666/M12 provides the standard interface DIN 43650 for connection to sensor type /FI, FC or FIE and the M12 standard interface to the user side.	**CONNECTING SCHEMES**	
	DH*/FIE **DKE*/FIE** single solenoid	**ALL VALVES WITH MECHANICAL MICROSWITCH (/FC)**
	 1 = supply +24 VDC 2 = output signal S 3 = supply GND 4 = not connected	 1 = normally open contact (NO) 2 = common (C) 3 = EARTH 4 = normally closed contact (NC)

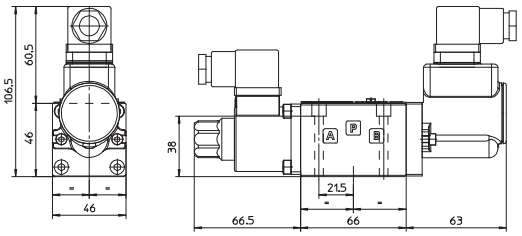
17 DH*-*/FI, /FC and /FIE DIMENSIONS [mm]



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).

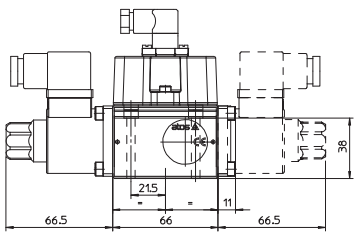
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
For the max pressures on ports, see section 4

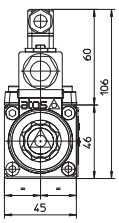
DHI-*/FIE



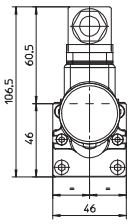
Mass: kg 1,6

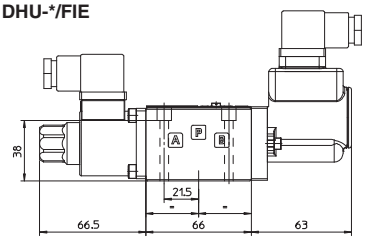
DHU-*/FI





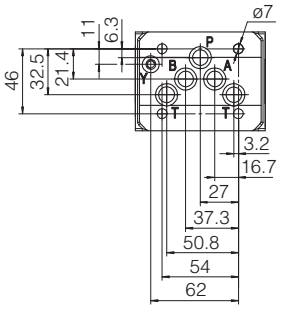
DHU-*/FC
DHU-*/FIE





Mass:
kg 1,6 (one solenoid)
kg 1,9 (two solenoids)

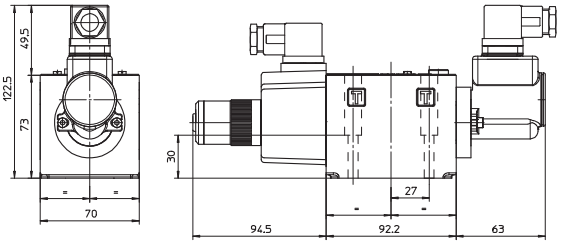
Mass: kg 1,6



ISO 4401: 2005
Mounting surface: 4401-05-05-0-05
(without port X)
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Seals: 5 OR 2050. 1 OR 108
Ports P,A,B,T: Ø = 11.5 mm (max)
Ports Y: Ø = 5 mm

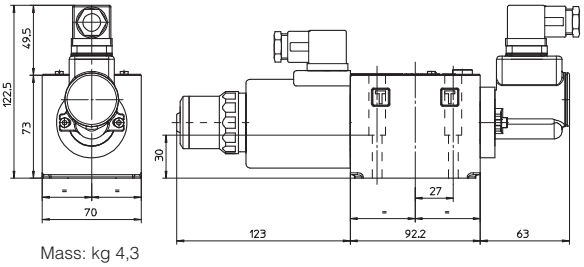
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
Y = DRAIN PORT
For the max pressures on ports, see section 4

DKE-*/FIE-AC



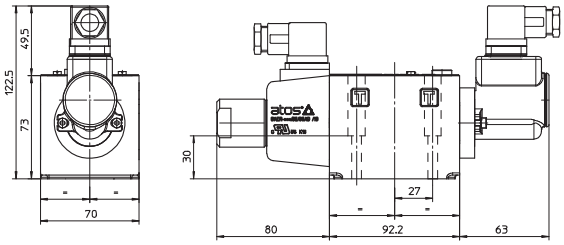
Mass: kg 3,9

DKE-*/FIE-DC



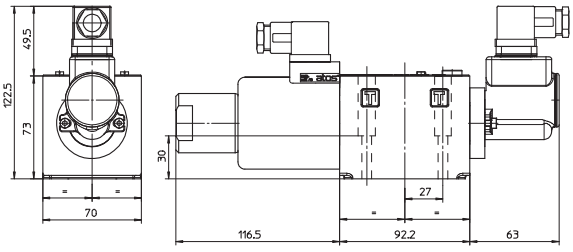
Mass: kg 4,3

DKER-*/FIE-AC



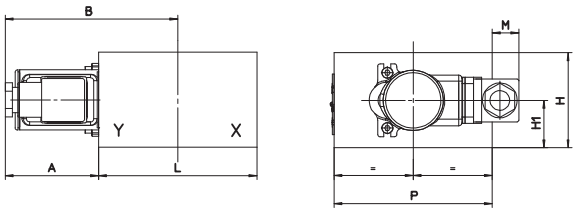
Mass: kg 3,7

DKER-*/FIE-DC



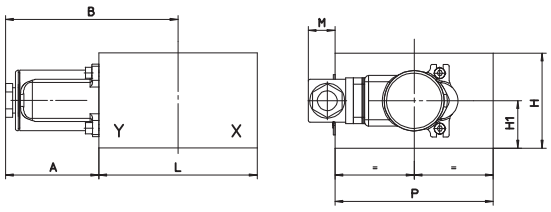
Mass: kg 4,5

19 LIFC DIMENSIONS [mm]



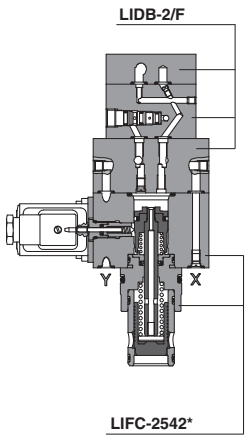
LIFC-16
LIFC-25

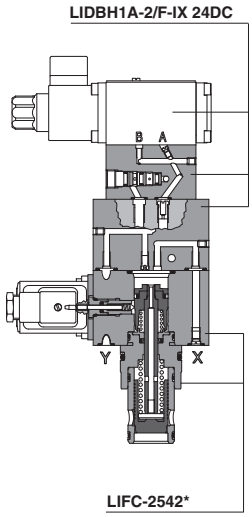
	A	B	H	H1	L	M	P
LIFC-16	64	103,5	50	25	72	37	65
LIFC-25	64	106,5	55	28	85	27	85
LIFC-32	64	114	60	28	100	19	100
LIFC-40	64	126,5	60	30	125	6,5	125
LIFC-50	64	134	70	30	140	/	140



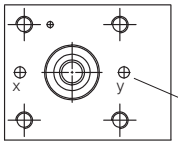
LIFC-32
LIFC-40
LIFC-50

20 EXEMPLES OF LIFC COUPLED WITH OTHER COVERS (examples with cartridges size 25)



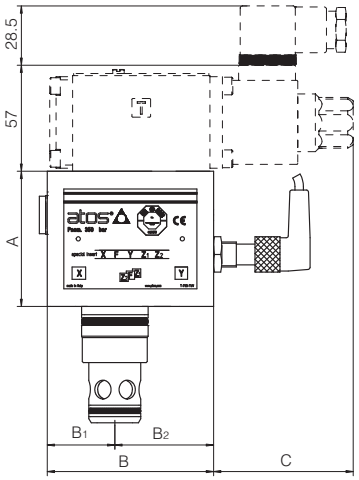


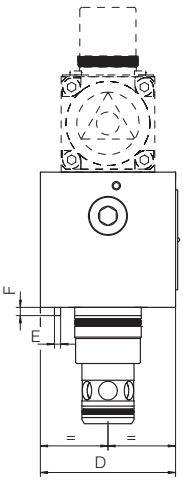
21 LIDA*/FI DIMENSIONS [mm]



Cover interface of LIDA-*/FI and LIDAH-*/FI
UNI ISO 7368
For dimensions of cover interface and cartridge recess, see section 22

Y port only for LIDAH-*/FI



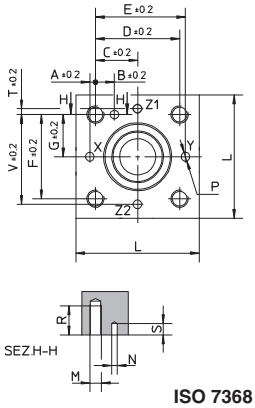


LIDA-*/FI

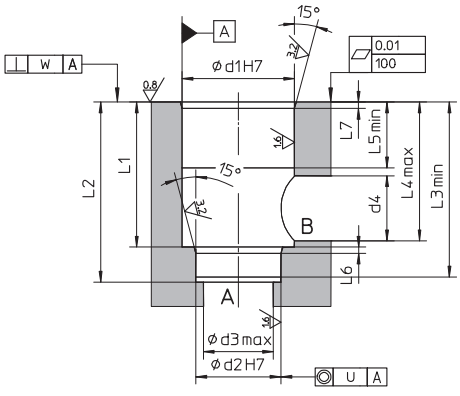
LIDAH-*/FI (dotted line)

Size	A	B	B1	B2	C	D	E	F	Seal (for LIDA)	Seal (for LIDAH)	Fastening bolts	Tightening torque (Nm)
16	65	80	32.5	47.5	54.5	65	3	4	1 OR 108	2 OR 108	4 M8x60	35
25	70	85	42.5	42.5	62.5	85	5	4	1 OR 108	2 OR 108	4 M12x60	125
32	75	100	50	50	55	100	5	6	1 OR 2043	2 OR 2043	4 M16x70	300
40	75	125	62.5	62.5	49	125	5	6	1 OR 2050	2 OR 2050	4 M20x80	600
50	80	140	70	70	52	140	6	4	1 OR 2050	2 OR 2050	4 M20x90	600

22 COVER INTERFACE AND RECESS DIMENSIONS [mm]



ISO 7368



ISO 7368

COVER INTERFACE														RECESS											
Size	A	B	C	D	E	F	G	L	M	Ø N	P_{max}	R	S min	ød1	ød2	ød3	ød4	L1	L2	L3	L4	L5	L6	L7	U	W
16	2	12,5	23	46	48	46	23	65	M8	4	4	20	6	32	25	16	16	$43^{+0,1}_{0}$	$56^{+0,1}_{0}$	54	42,5	20	2	2	0,03	0,05
25	4	13	29	58	62	58	29	85	M12	6	6	30	8	45	34	25	25	$58^{+0,1}_{0}$	$72^{+0,1}_{0}$	70	57	30	2,5	2,5	0,03	0,05
32	6	18	35	70	76	70	35	102	M16	6	8	38	8	60	45	32	32	$70^{+0,1}_{0}$	$85^{+0,1}_{0}$	83	68,5	30	2,5	2,5	0,03	0,1
40	7,5	19.5	42.5	85	92.5	85	42,5	125	M20	6	10	46	8	75	55	40	40	$87^{+0,1}_{0}$	$105^{+0,1}_{0}$	102	84,5	30	3	3	0,05	0,1
50	8	20	50	100	108	100	50	140	M20	8	10	46	8	90	68	50	50	$100^{+0,1}_{0}$	$122^{+0,1}_{0}$	117	97,5	35	3	4	0,05	0,1