

3 GENERAL CHARACTERISTICS

Installation position	Any position
Cavity	JO-DL-4 = SAE-08-2N; JO-DL-6 = SAE-10-2N; JO-DL-10 = SAE-16-2N
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007
Compliance	CE to Machine Directive 2006/42/EC. -EC type-examination certificate for safety components (1) -ISO 13849 category 1, PLC in high demand mode CE to Low Voltage Directive 2014/35/EU and Machine Directive 2006/42/EC.
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C

(1) The type-examination certificate can be download from www.atos.com

4 SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult Atos Technical Office

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		
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	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

5 ELECTRIC CHARACTERISTICS

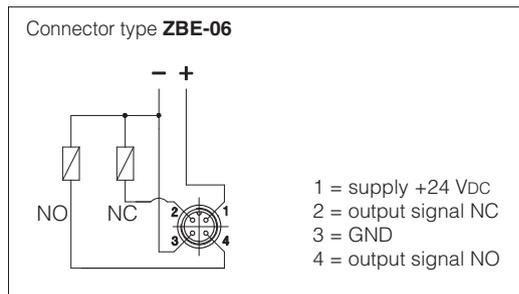
Relative duty factor	100%	
Supply voltage	See model code at section 11	
Supply voltage tolerance	±10%	
Max power	19 Watt	
Power connector	666 (plastic - black); 3 pins, cable clamp PG11, cable max ø 11 mm	to be ordered separately
Type of connector for /FV version	Type ZBE-06 (plastic); 4 pins, cable clamp PG9, cable max ø 8 mm	
Connectors features	666: DIN 43650 - ISO 4400; IP65 (DIN 40050); VDE 0110C ZBE-06: M12 - IEC60947-5-2; IP67 (DIN 40050)	

6 INSTALLATION NOTES

- The assembling of cartridges inside manifolds must be done tightening the valve exagonal ring (for tightening torque, see section **10**). Excessive values can cause anomalous deformation and poppet sticking. For the /FV versions avoid to tighten through the position sensor.
- The CE certification is valid only with shielded electric cables and connector. Consult also tab. P004. These safety valves must be supplied only and always as one complete component, proximity sensor is factory adjusted. The supply of subcomponents invalidates the certification.

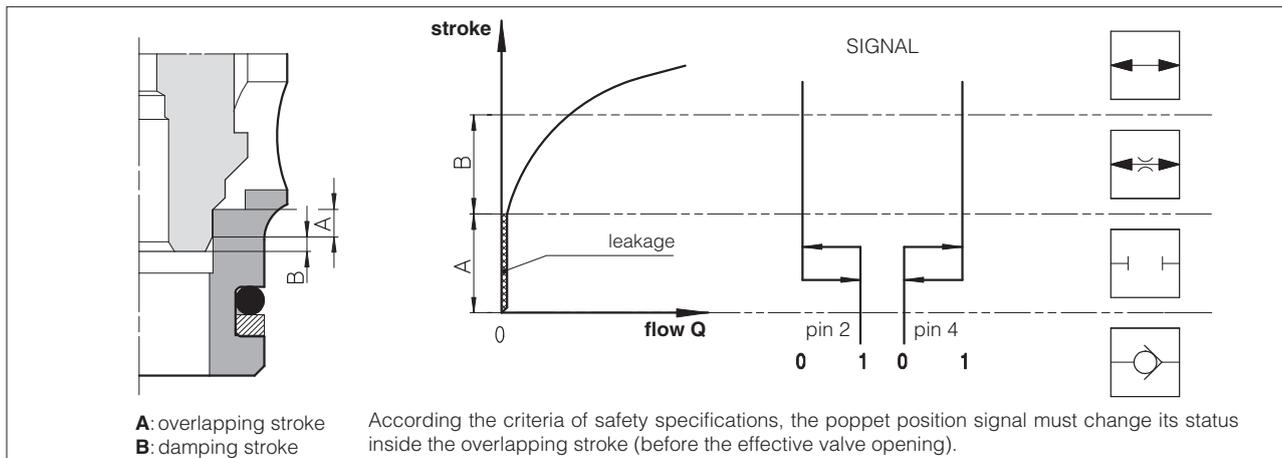
7 TECHNICAL CHARACTERISTICS AND CONNECTING SCHEME OF INDUCTIVE POSITION SWITCH /FV

Type of switch	position switch /FV	
Supply voltage [V]		20÷32
Ripple max [%]		≤ 10
Max current [mA]		400
Max peak pressure [bar]		400
Mechanical life		virtually infinite
Switch logic		PNP



Note: the /FV position switch are not provided with a protective earth connection

8 SIGNAL STATUS - VERSIONS /FV

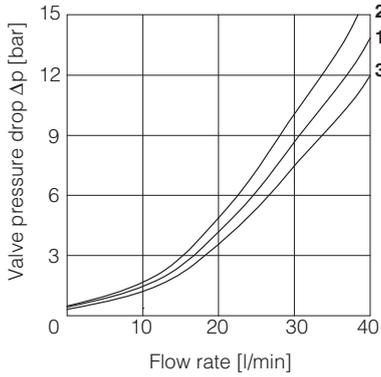


9 DIAGRAMS based on mineral oil ISO VG 46 at 50°C

9.1 JO-DL-4

Valve pressure drop - FV version

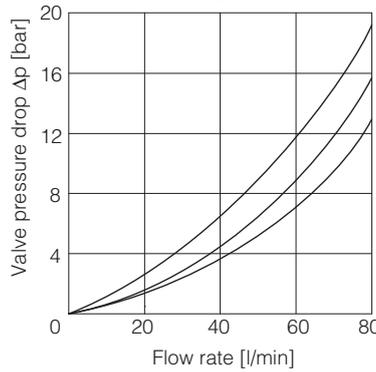
- 1= A → B energized
- 2= B → A de-energized
- 3= B → A energized



9.2 JO-DL-6

Valve pressure drop - FV version

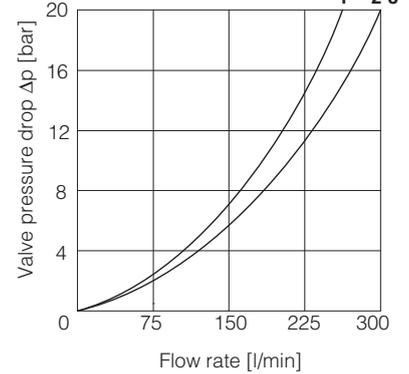
- 1= A → B energized
- 2= B → A de-energized
- 3= B → A energized



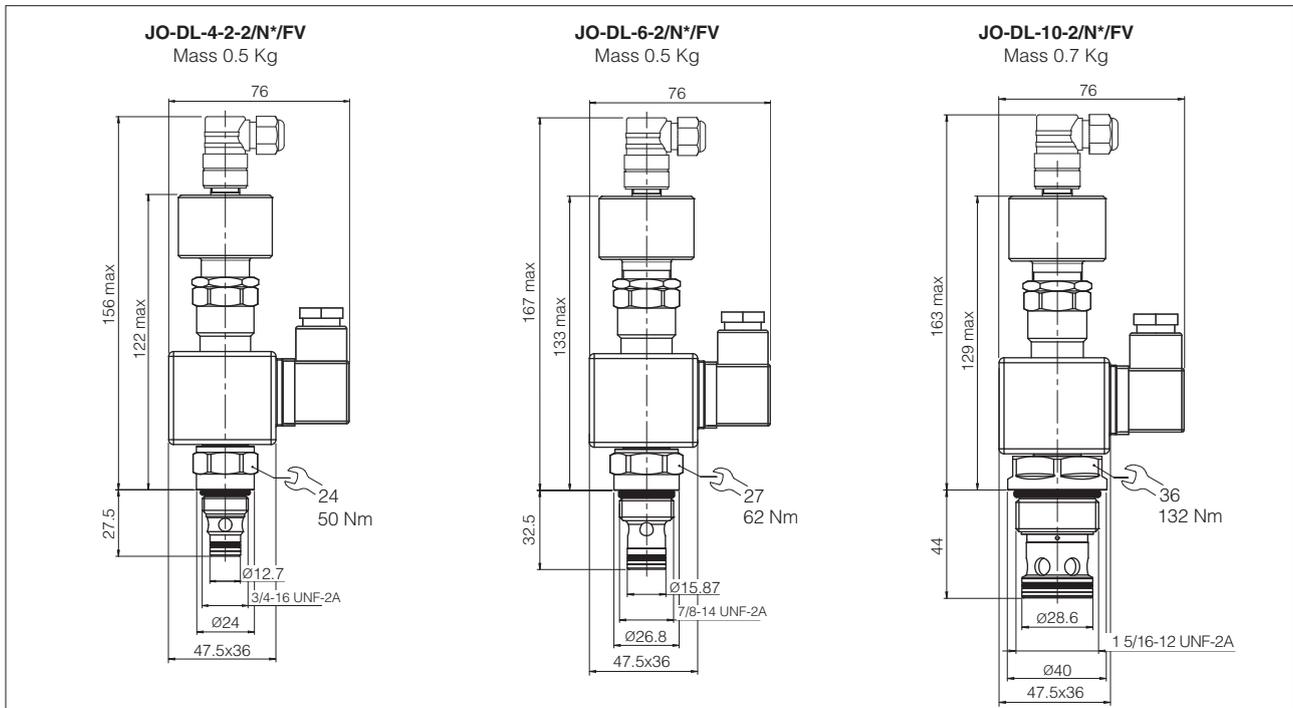
9.3 JO-DL-10

Valve pressure drop - FV version

- 1= A → B energized
- 2= B → A de-energized
- 3= B → A energized

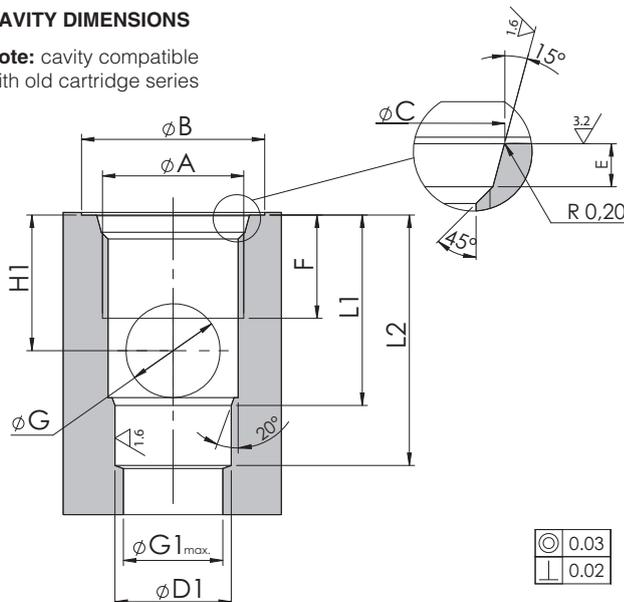


10 DIMENSIONS [mm]



CAVITY DIMENSIONS

Note: cavity compatible with old cartridge series



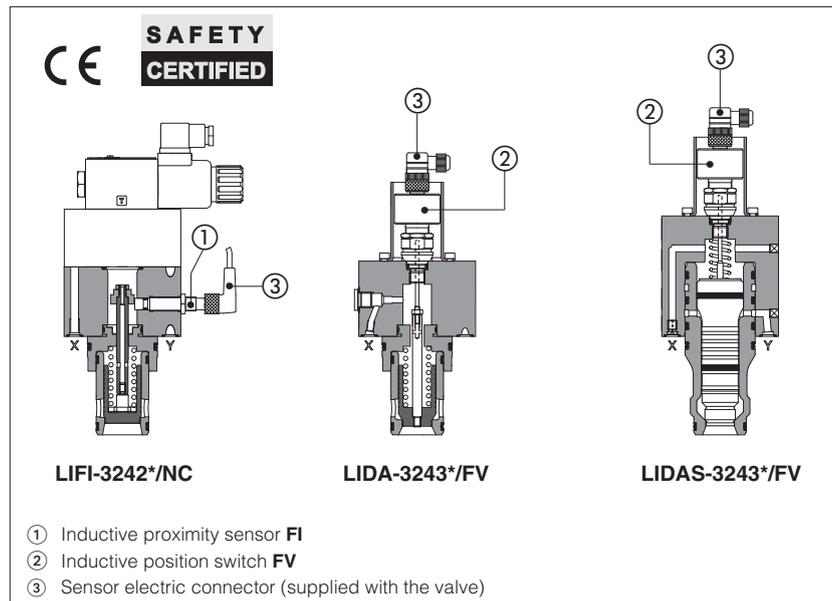
	SAE-08-2N	SAE-10-2N	SAE-16-2N
A	3/4-16 UNF	7/8-14 UNF	1 5/16-12 UNF
B	26	30	42
C	20.6 ^{+0.1} ₀	23.9 ^{+0.1} ₀	35.5 ^{+0.1} ₀
D1	12.7 ^{+0.05} ₀	15.87 ^{+0.05} ₀	28.60 ^{+0.05} ₀
E	2.6 ^{+0.3} ₀	2.6 ^{+0.3} ₀	3.3 ^{+0.3} ₀
F	13	15	20
G	9	12	19
G1	12	15	24
H1	14	18	25
L1	20.5	25.5	36
L2	29	34.5	49



Table EY120-4/E

Safety cartridge valves with poppet position monitoring

ISO standard, on-off, poppet type, conforming to Machine Directive 2006/42/EC - certified by



Safety cartridge valves with poppet position monitoring, **CE** marked and certified by **TUV**, in accordance with safety requirements of Machine Directive 2006/42/EC.

LIFI: intermediate safety element with **FI** inductive proximity sensor, to be coupled with functional covers

LIDA: safety valve with integral cover design and with **FV** inductive position switch, available with optional solenoid pilot valve (LIDAH)

LIDAS: active pilot operated safety valve with **FV** inductive position switch, available with optional solenoid pilot valve (LIDASH), see section 12 for sensors technical characteristics.

These valves are normally used to cut off the hydraulic power line in case of emergency condition, thus avoiding dangerous movements of the machines actuators.

Certification

The **TUV** certificate can be downloaded from www.atos.com, catalog on line, technical information section.

Mounting surface & cavity:
ISO 7368 size **16 to 50**
Max flow: **1800 l/min** at $\Delta p = 5 \text{ bar}$
Max pressure: up to **420 bar**

1 RANGE OF VALVE'S MODELS

Valve code	Size	Description	DC solenoids		AC solenoids	
			/FI	/FV	/FI	/FV
LIFI	16÷50	intermediate elements with cartridge, to be coupled with a functional cover	•		•	
LIDA(H)	16÷50	cartridges valve		•		•
LIDAS(H)	16÷50	active cartridges valve		•		•

Notes: **FI** = inductive proximity sensor, type NO (normally open or NC (normally closed)

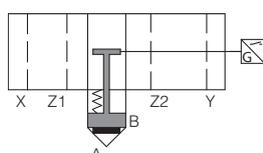
FV = inductive position switch providing both NO and NC contacts to be wired on the electric connector

See section 12 for sensor's characteristics

2 MODEL CODE OF LIFI INTERMEDIATE SAFETY ELEMENT - to be coupled with covers in section 3

LIF	I	-	25	42	/	NC	**	/	*
Intermediate safety element and cartridge according to ISO 7368									Seals material: omit for NBR (mineral oil & water glycol) PE = FKM
Poppet position monitor: I = inductive proximity switch									Series number
Size ISO 7368 16; 25; 32; 40; 50 Other dimensions available on request									/NC = closed contact with poppet in resting position
Type of poppet , see sect. 9 for Q/Δp diagrams 42 = with damping nose, area ratio 1:1,1 43 = with damping nose, area ratio 1:1,6									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

2.1 Hydraulic symbols of LIFI



Note: in LIFI safety valves the cartridge and the intermediate element with poppet position sensor cannot be separated

3 MODEL CODE OF FUNCTIONAL COVERS TO BE COUPLED WITH LIFI SAFETY VALVES

LID
Cover according to ISO 7368

Cover type, see section 3.1 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 ISO 7368

1 = 16; **2** = 25; **3** = 32; **4** = 40; **5** = 50;

Options:

- B** = cartridge piloted via port B of solenoid valve (only for LIDEW* and LIDBH**)
- E** = with external attachment X (1/4" GAS) and underneath port X plugged

F = prearranged for coupling with LIFI cover

For valve type LIDB, LIDEW (in the configuration with external pilot line) Atos can supply leak free poppet type directional pilot valves type DLEH-3*. Consult our technical office for detailed information.

A - 2 / * F - I X 24DC

**** / * / ***
Optional different setting of calibrated plugs in the pilot channels (see tech. tables H030, H040)
Seals material: omit for NBR (mineral oil & water glycol)
PE = FKM
Series number

Voltage code only for LIDEW* and LIDBH**:
see section 10

Only for LIDEW* and LIDBH**:

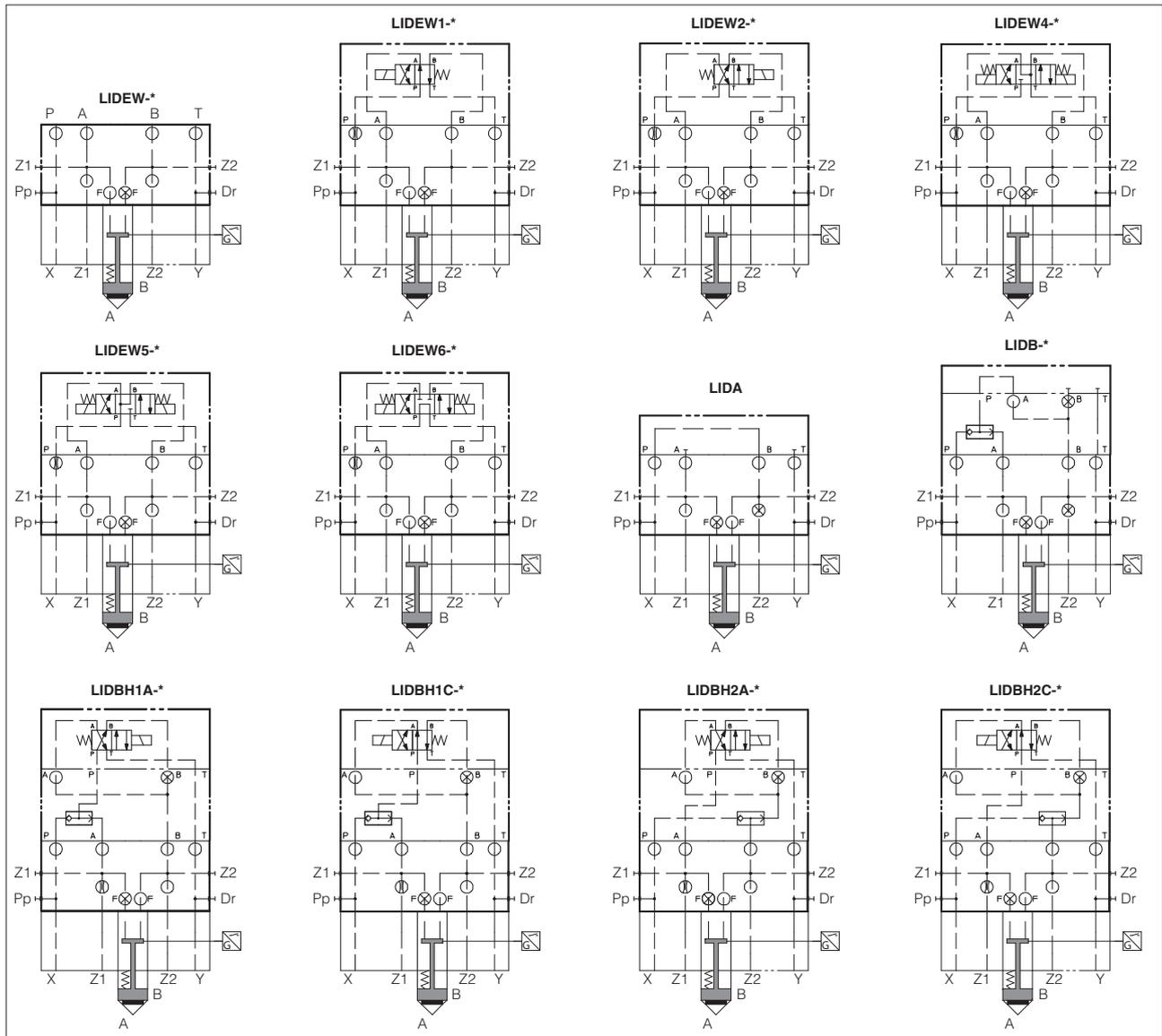
X = without connector, to be order separately see section 11

Type of pilot solenoid valve only for LIDBH** and LIDEW*:

- I** = DHI Pmax **350 bar**
- E** = DHE Pmax **350 bar**
- EP** = DHEP Pmax **420 bar**

3.1 HYDRAULIC SYMBOLS OF FUNCTIONAL COVERS

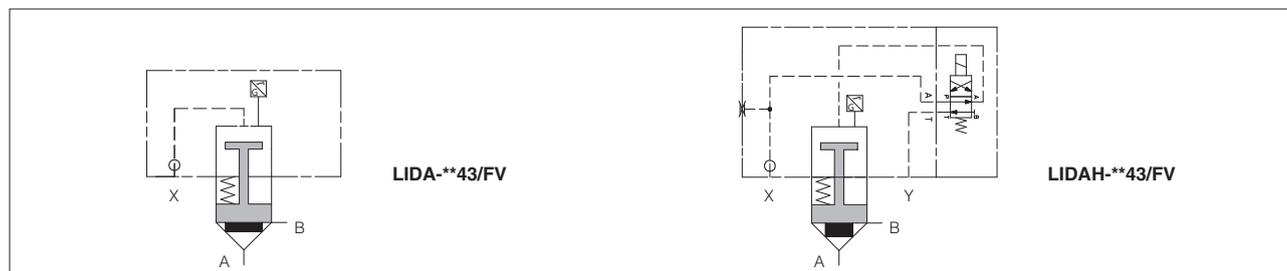
the following symbols show the functional covers coupled with intermediate safety element type LIFI



4 MODEL CODE OF LIDA SAFETY VALVES (integral design cover)

LIDA	H	- 25	43	3	/ FV	- I	X	24DC	**	/ *
Safety cartridge valve according to ISO 7368										
optional pilot valve: - = omit if not required H = with NG 6 pilot valve										
Size ISO 7368: 16; 25; 32; 40; 50										
poppet type: 43 = with damping nose area ratio 1:1,6										
spring cracking pressure: 1 = 0,6 bar 3 = 3 bar 6 = 5,5 bar										
Poppet position monitor: FV = inductive position switch (double contact)										
									Seals material: omit for NBR (mineral oil & water glycol) PE = FKM	
									Series number	
									Only for LIDAH Voltage code, see section 10	
									Only for LIDAH X = without connector, to be order separately see section 11	
									Pilot solenoid valve only for LIDAH	
									I = DHI Pmax 350 bar	
									E = DHE Pmax 350 bar	
									EP = DHEP Pmax 420 bar	

4.1 HYDRAULIC SYMBOLS OF LIDA /FV



5 MAIN CHARACTERISTICS OF LIFI AND LIDA(H)/FV

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	75 years, for further details see technical table P007
Compliance	CE to Machine Directive 2006/42/EC. -EC type-examination certificate for safety components (1) -ISO 13849 category 1, PLC in high demand mode CE to Low Voltage Directive 2014/35/EU and Machine Directive 2006/42/EC. RoHS Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006
Ambient temperature	Standard = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C
Flow direction	A→B or B→A
Operating pressure	LIFI A, B, X, Z1, Z2 = 420 bar
	LIDA/FV A, B, X = 420 bar ;
	LIDAH/FV A, B, X = LIDAH-I = 350 bar ; LIDAH-E = 350 bar ; LIDAH-EP = 420 bar Y = LIDAH-I = 120 bar ; LIDAH-E, -EP (DC) = 210 bar ; LIDAH-E, -EP (AC) = 160 bar

(1) The type-examination certificate can be download from www.atos.com

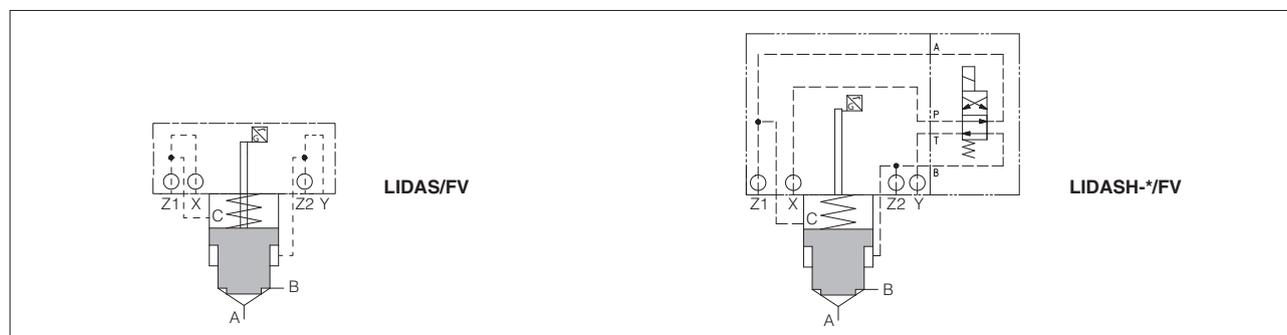
5.1 poppet characteristics of LIFI and LIDA(H)/FV

Poppet type	42 (only LIFI)	43
Functional sketch (Hydraulic symbol)		
Operating pressure	420 bar	
Nominal flow Size 16	140	120
at Δp 5bar		
25	300	280
32	550	440
see diagrams Q/Δp at section 15		
40	1150	860
50	1800	1370
Area ratio A:Ap	1:1,1	1:2 for size 16, 25 1:1,6 for size 32, 40,50

6 MODEL CODE OF LIDAS ACTIVE SAFETY PILOT OPERATED VALVES

LIDAS	H	- 40	43	3	/ FV	- I	X	24DC	**	/ *
Active safety cartridges, according to ISO 7368	Optional pilot valve: - = without pilot solenoid valve H = with pilot solenoid valve					Seals material: omit for NBR (mineral oil & water glycol) PE = FKM				
Size ISO 7368: 16; 25; 32; 40; 50	Poppet type: 43 = with damping nose					Series number				
Spring cracking pressure 3 = 3 bar	Poppet position monitor: FV = inductive position switch (double contact)					Only for LIDASH voltage code, see section 10				
						Only for LIDASH X = without connector, to be order separately see section 11				
						Pilot solenoid valve only for LIDASH I = DHI Pmax 350 bar E = DHE Pmax 350 bar EP = DHEP Pmax 420 bar				

6.1 HYDRAULIC SYMBOLS OF LIDAS

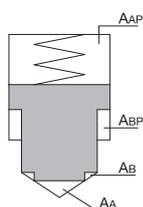


7 MAIN CHARACTERISTICS OF LIDAS/FV

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				
Compliance	CE to Machine Directive 2006/42/EC. -EC type-examination certificate for safety components (1) -ISO 13849 category 1, PLC in high demand mode CE to Low Voltage Directive 2014/35/EU and Machine Directive 2006/42/EC. RoHS Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006				
Ambient temperature	Standard = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C				
Flow direction	A→B or B→A				
Operating pressure	LIDAS/FV	A, B, X, Z1, Z2 = 420 bar			
	LIDASH/FV	A, B, X, Z1, Z2 = LIDASH-I 350 bar ; LIDASH-E 350 bar ; LIDASH-EP 420 bar Y = LIDASH-I 120 bar ; LIDASH-E, -EP (DC) = 210 bar ; LIDASH-E, -EP (AC) = 160 bar ;			
Size	16	25	32	40	50
Maximum flow at Δp = 5 bar [l/min]	200	360	550	1100	1800
Poppet characteristics [cm²]					
AA	1,43	3,46	5,30	8,04	13,85
AB (% of AA)	58,6	41,7	51,5	56,3	41,7
ABP (% of AA)	107,0	90,5	85,2	87,9	97,8
AAP (% of AA)	265,6	232,2	236,7	244,1	239,2
AA / (AA + AB) poppet ratio	0,6				
AAP / (AA + AB) piloting ratio	1,6				

(1) The type-examination certificate can be download from www.atos.com

7.1 Poppet areas of LIDAS/FV



Poppet areas

- AA = main flow (side A)
- AB = main flow (side B)
- AAP = piloting area (close)
- ABP = piloting area (open)

Thanks to the areas ratio $AAP/(AA+AB)$, the valve closing is always ensured with a piloting pressure (X port) equal to the line pressure (A or B line).

8 COILS CHARACTERISTICS

Insulation class	Pilot valve E, EP: H (180°C) for DC coils F (155°C) for AC coils Pilot valve I: H (180°C) for DC or 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	IP 65 (with connectors 666, 667, 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 10
Supply voltage tolerance	± 10%
Certification	cURus North American Standard

9 SEALS AND HYDRAULIC FLUID - 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		
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		
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR, FKM	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDR, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

10 ELECTRIC FEATURES - coils for pilot solenoid valves

Valve	External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (3)		Code of spare coil		
				DHI	DHEP	DHI	Colour of coil label	DHE, DHEP
DHI DHE DHEP	6 DC	6 DC (4)	666 or 667	33 W	30 W	COU-6DC	brown	-
	12 DC	12 DC				COU-12DC	green	COE-12DC
	14 DC	14 DC				COU-14DC	brown	COE-14DC
	24 DC	24 DC				COU-24DC	red	COE-24DC
	28 DC	28 DC				COU-28DC	silver	COE-28DC
	48 DC	48 DC				COU-48DC	silver	COE-48DC
	110 DC	110 DC				COU-110DC	gold	COE-110DC
	125 DC	125 DC				COU-125DC	blue	COE-125DC
	220 DC	220 DC				COU-220DC	black	COE-220DC
	24/50 AC	24/50/60 AC		COI-24/50/60AC (1)	pink	-		
	24/60 AC	(4)						
	48/50 AC	48/50/60 AC		COI-48/50/60AC (1)	white	-		
	48/60 AC	(4)						
	110/50 AC	110/50/60 AC		58 VA	COI-110/50/60AC (1)	yellow	COE-110/50/60AC	
	115/60 AC (5)	115/60 AC		-	80 VA	-	COE-115/60AC	
	120/60 AC (4)	120/60 AC		60 VA	-	COI-120/60AC	white	-
	230/50 AC	230/50/60 AC		60 VA	58 VA	COI-230/50/60AC (1)	light blue	COE-230/50/60AC
	230/60 AC	230/60 AC			80 VA	COI-230/60AC	silver	COE-230/60AC
110/50 AC	110RC	669	33 W	30 W	COU-110RC	gold	COE-110RC	
120/60 AC					COU-230RC	blue	COE-230RC	
230/50 AC								230RC
230/60 AC								

(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 55 VA (DHI) and 58 VA (DHE and DHEP)

(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.

(4) Only for pilot valve DHI

(5) Only for pilot valve DHE and DHEP

11 COILS ELECTRIC CONNECTORS FOR PILOT SOLENOID VALVES according to DIN 43650 (to be ordered separately)

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

12 TECHNICAL CHARACTERISTICS OF INDUCTIVE PROXIMITY AND POSITION SWITCHES

Valve type	LIFI	/FI scheme	LIDA*/FV, LIDAS*/FV	/FV scheme
Type of switch	/FI proximity sensor		/FV position switch	
Supply voltage [V]	10÷30		20÷32	
Ripple max [%]	≤ 20		≤ 10	
Max current [mA]	200		400	
Max peak pressure [bar]	500		400	
Mechanical life	virtually infinite		virtually infinite	
Switch logic	PNP		PNP	
		1 supply +24 VDC 3 GND 4 output signal		1 supply +24 VDC 2 output signal 3 GND 4 output signal

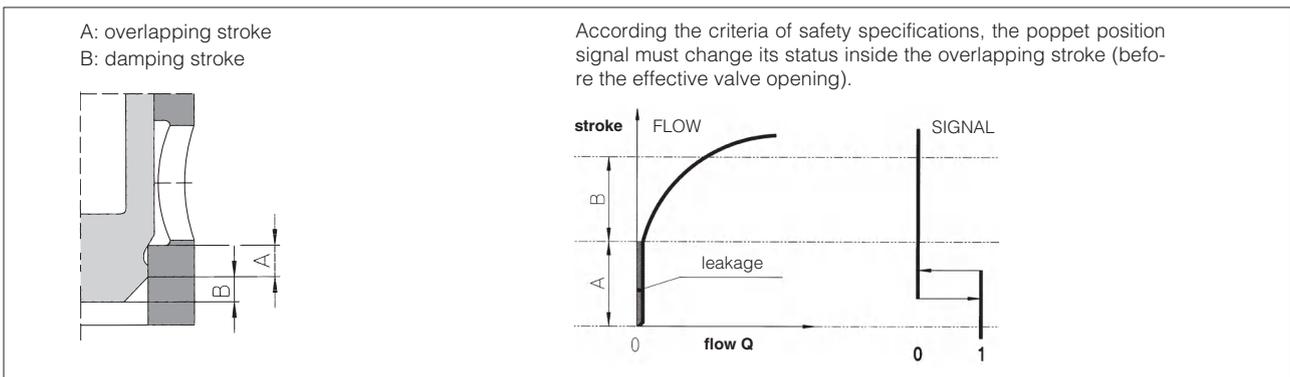
13 CONNECTING SCHEMES OF FI INDUCTIVE PROXIMITY AND FV POSITION SWITCHES

LIFI	LIDA*/FV, LIDAS*/FV
Connector type BKS-B-20-4-03	Connector type ZBE-06 IP65
1 (brown) = supply +24 Vdc 3 (blue) = GND 4 (black) = output signal CABLE LENGHT = 3 m	1 = supply +24 Vdc 2 = output signal NC 3 = GND 4 = output signal NO

Notes:

- FI and FV sensor's connector are always supplied with the valve
- The /FI and /FV sensors are not provided with a protective earth connection

14 STATUS OF OUTPUT SIGNALS



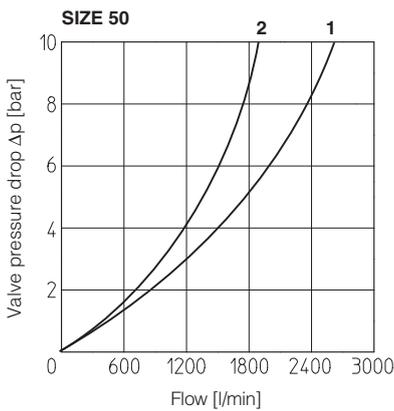
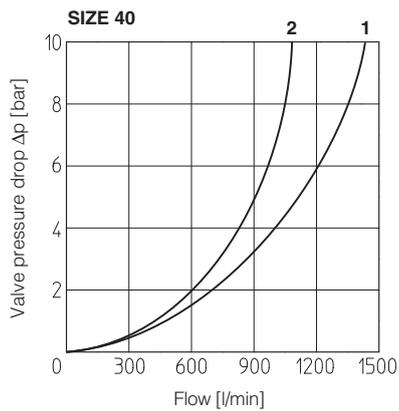
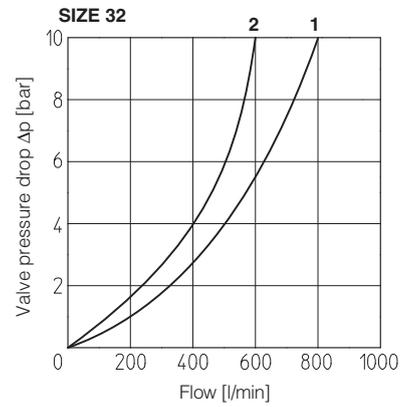
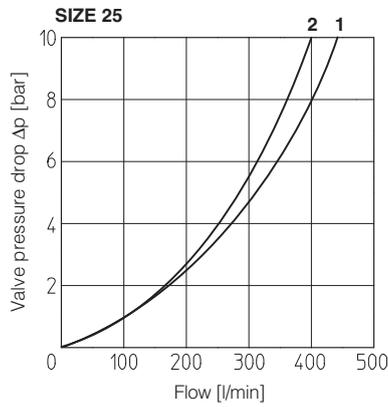
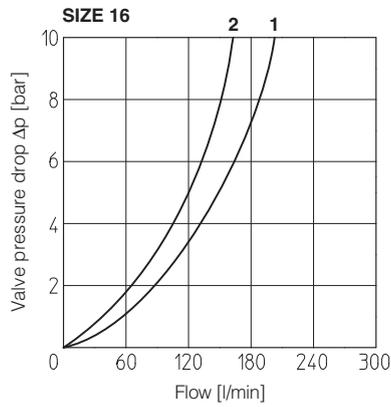
WARNING: the inobservance of following prescriptions invalidates the certification and may represent a risk for personnel injury

- Safety valves must be installed and commissioned only by qualified personnel
- Safety valves must not be disassembled
- The inductive proximity FI or the inductive position switch FV can be adjusted only by the valve's manufacturer or Atos authorized service centers
- Valve's components cannot be interchanged
- The valves must operate without switching shocks and spool vibrations



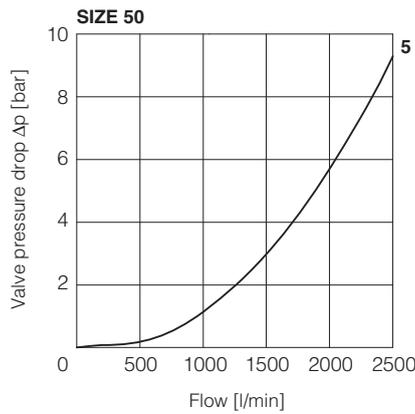
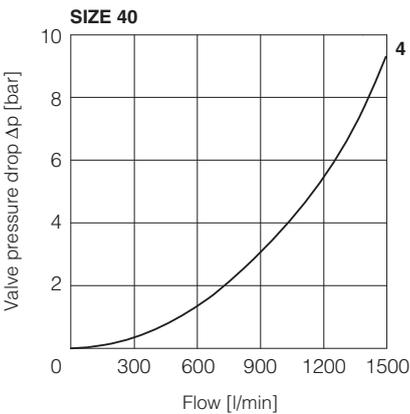
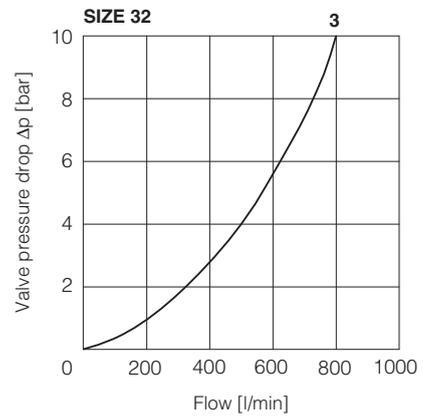
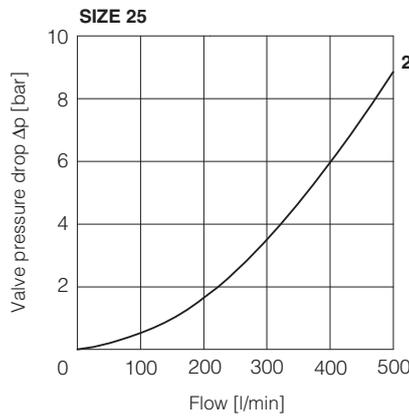
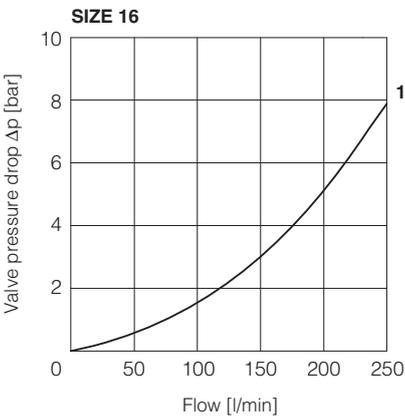
15 Q/Δp DIAGRAMS based on mineral oil ISO VG 46 at 50 °C

15.1 Q/Δp DIAGRAMS of LIFI and LIDA(H)/FV



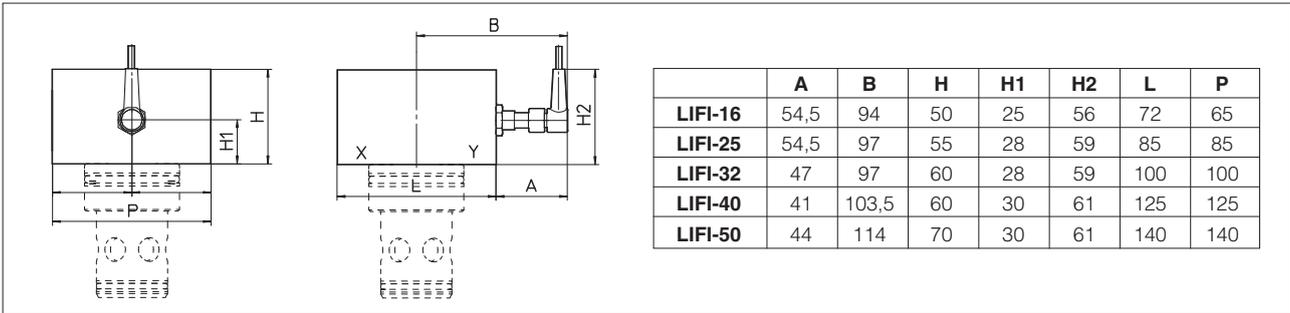
1 = poppet type 42
2 = poppet type 43

15.2 Q/Δp DIAGRAMS OF LIDAS/FV



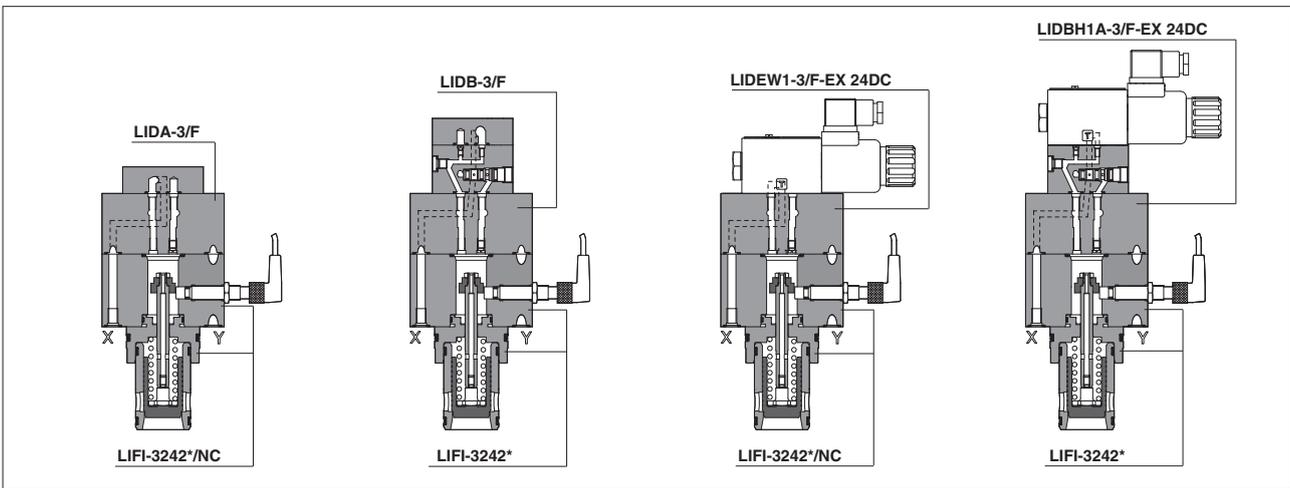
1 = LIDAS*-1643
2 = LIDAS*-2543
3 = LIDAS*-3243
4 = LIDAS*-4043
5 = LIDAS*-5043

16 DIMENSIONS of LIFI SAFETY COVERS [mm]

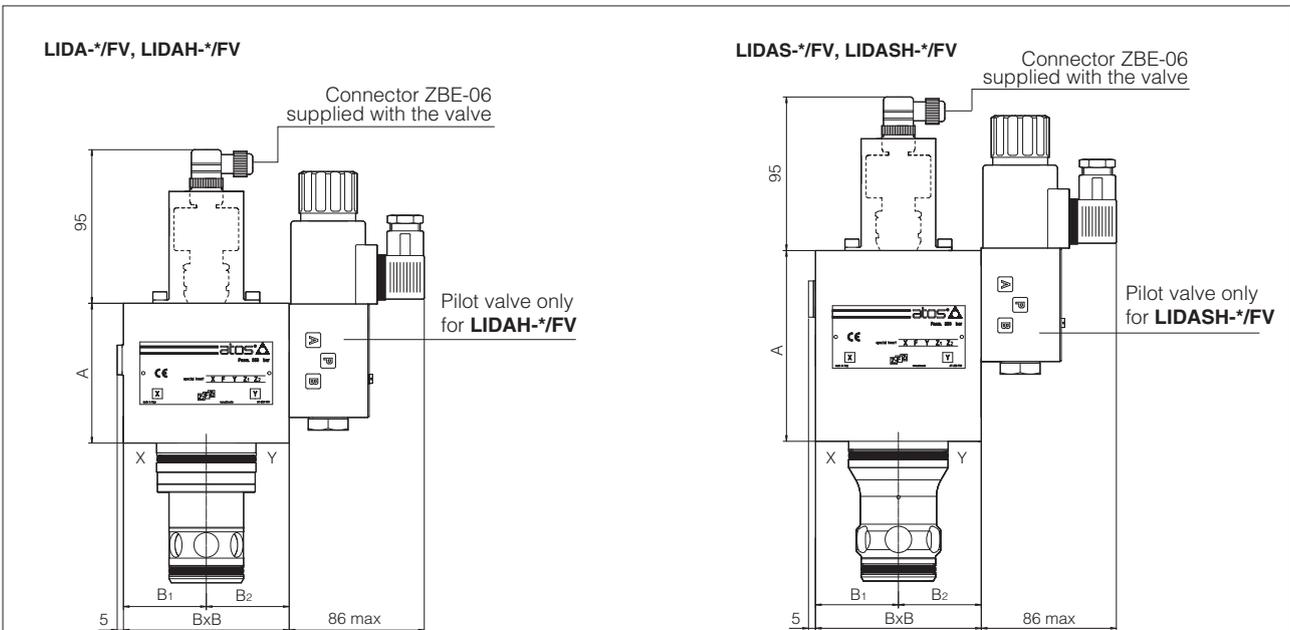


Note: for cover interface and cavity dimensions ISO 7368, see table P006

17 EXAMPLES OF LIFI COUPLED WITH OTHER COVERS (examples in size 32)



18 INSTALLATION DIMENSIONS of LIDA*/FV and LIDAS*/FV SAFETY CARTRIDGES [mm] (examples in size 32)



Note: for cover interface and cavity dimensions ISO 7368, see table P006

Size	LIDA				LIDAH				LIDAS				LIDASH				Seal		Fastening bolts				Tightening torque (Nm)
	A	B	B ₁	B ₂	A	B	B ₁	B ₂	A	B	B ₁	B ₂	A	B	B ₁	B ₂	LIDA	OTHER	LIDA	LIDAH	LIDAS, LIDASH		
16	50	65x85	40.5	39.5	85	65x80	40.5	39.5	85	65	39.5	39.5	95	65x72	32.5	39.5	1 OR 108	4 OR 108	4 M8x50	4 M8x70	4 M8x80	35	
25	50	85	42.5	42.5	85	85	42.5	42.5	102	85	42.5	42.5	115	85	42.5	42.5	1 OR 108	4 OR 108	4 M12x55	4 M12x80	4 M12x95	125	
32	65	100	50	50	85	100	50	50	104	100	50	50	116	100	50	50	1 OR 2043	4 OR 2043	4 M16x70	4 M16x70	4 M16x90	300	
40	65	125	62.5	62.5	85	125	62.5	62.5	111	125	62.5	62.5	125	125	62.5	62.5	1 OR 3043	4 OR 3043	4 M20x80	4 M20x80	4 M20x70	600	
50	65	140	70	70	85	140	70	70	50	140	70	70	135	140	70	70	1 OR 3043	4 OR 3043	4 M20x80	4 M20x80	4 M20x80	600	