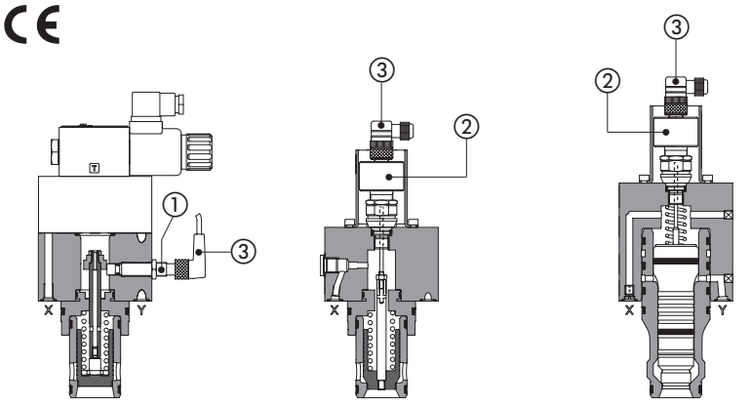
Safety cartridge valves with poppet position monitoring

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



LIFI-3242*/NC **LIDA-3243*/FV** **LIDAS-3243*/FV**

① Inductive proximity sensor **FI**
② Inductive position switch **FV**
③ Sensor electric connector (supplied with the valve)

Safety cartridge valves with poppet position monitoring, **CE** marked and certified by **TÜV,** 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 **TÜV** 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 Δp = 5 bar
Max pressure: up to **420 bar**

1 RANGE OF VALVE'S MODELS

Valve code	Size	Description	DC solenoids		AC solenoids	
			Sensor type			
			/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	1	/	NC	**	/	*

Intermediate saferty element and cartridge according to ISO 7368

Poppet position monitor:
I = inductive proximity switch

Size ISO 7368
16; 25; 32; 40; 50
Other dimensions available on request

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

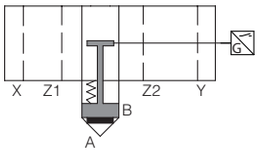
/NC = closed contact with poppet in resting position

Series number

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

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	A	-	2	/	*	F	-	I	X	24DC	**	/	*	/	*

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

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**

Only for LIDEW* and LIDBH**:
X = without connector, to be order separately see section 11

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

Series number

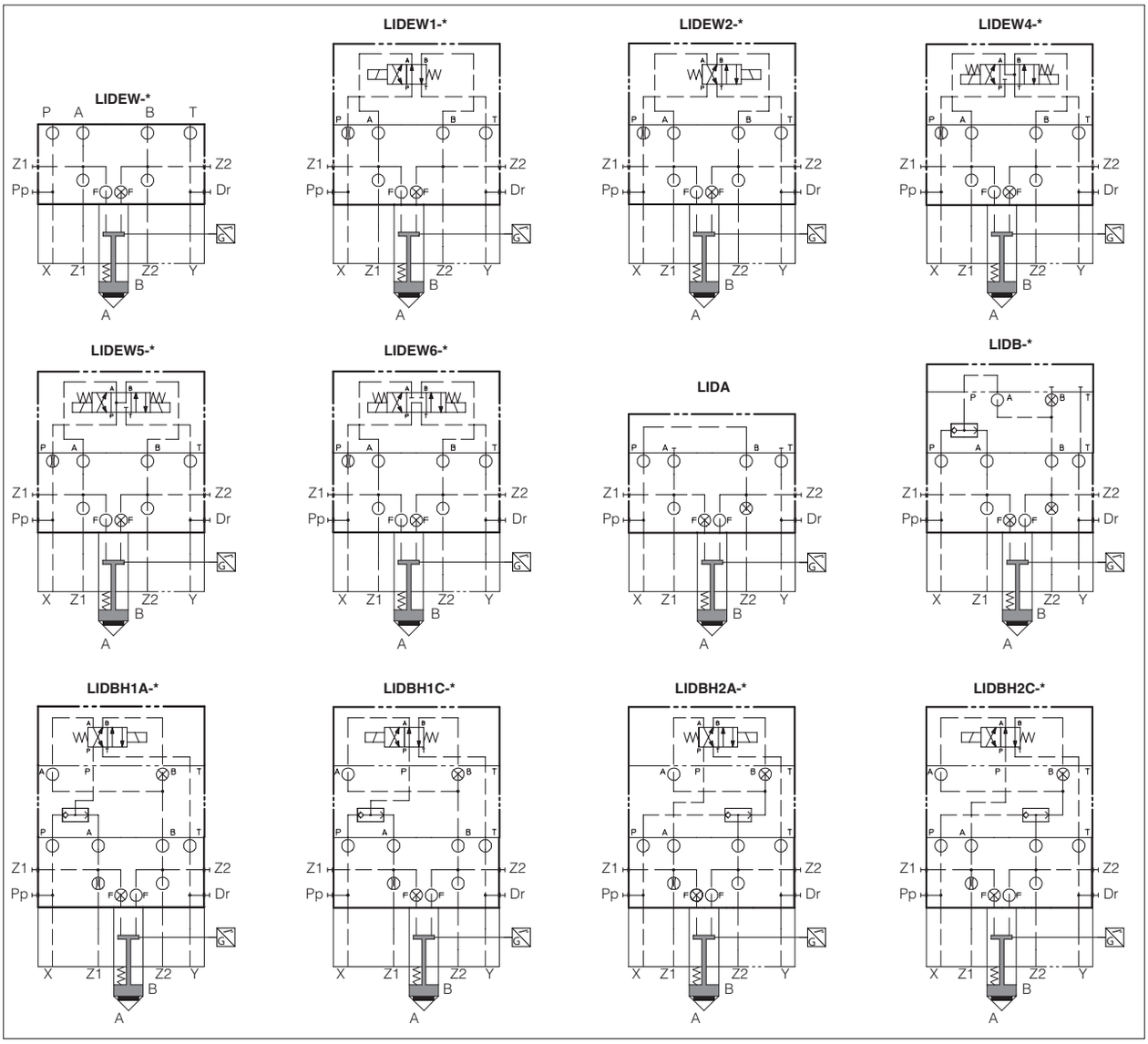
Seals material:
omit for NBR (mineral oil & water glycol)
PE = FKM

Optional different setting of calibrated plugs in the pilot channels (see tech. tables H030, H040)

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.

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)

Pilot solenoid valve only for LIDAH
I = DHI Pmax **350 bar**
E = DHE Pmax **350 bar**
EP = DHEP Pmax **420 bar**

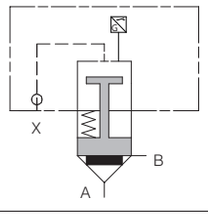
Only for LIDAH
X = without connector, to be order separately see section 11

Only for LIDAH
Voltage code, see section 10

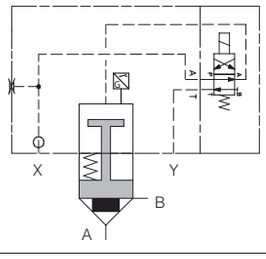
Series number

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

4.1 HYDRAULIC SYMBOLS OF LIDA /FV



LIDA-43/FV**

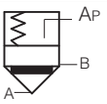
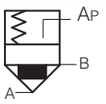


LIDAH-43/FV**

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
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**

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 at Δp 5bar (l/min) see diagrams Q/Δp at section 15	Size **16**	140	120
	25	300	280
	32	550	440
	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

Size ISO 7368:
16; **25**; **32**; **40**; **50**

Poppet type:
43 = with damping nose

Spring cracking pressure
3 = 3 bar

Poppet position monitor:
FV = inductive position switch (double contact)

Pilot solenoid valve only for LIDASH
I = DHI Pmax **350 bar**
E = DHE Pmax **350 bar**
EP = DHEP Pmax **420 bar**

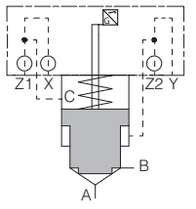
Only for LIDASH
X = without connector, to be order separately see section 11

Only for LIDASH voltage code, see section 10

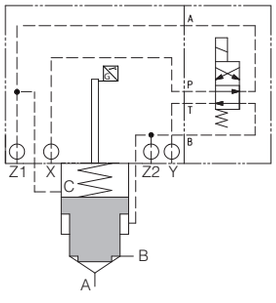
Series number

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

6.1 HYDRAULIC SYMBOLS OF LIDAS



LIDAS/FV

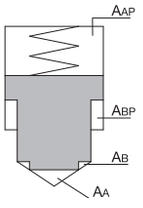


LIDASH-*/FV

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				
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]						
A_A		1,43	3,46	5,30	8,04	13,85
A_B (% of A_A)		58,6	41,7	51,5	56,3	41,7
A_{BP} (% of A_A)		107,0	90,5	85,2	87,9	97,8
A_{AP} (% of A_A)		265,6	232,2	236,7	244,1	239,2
A_A / (A_A + A_B) poppet ratio		0,6				
A_{AP} / (A_A + A_B) piloting ratio		1,6				

7.1 Poppet areas of LIDAS/FV



Poppet areas

A_A = main flow (side A)
A_B = main flow (side B)
A_{AP} = piloting area (close)
A_{BP} = piloting area (open)

Thanks to the areas ratio $A_{AP}/(A_A+A_B)$, 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 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, 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

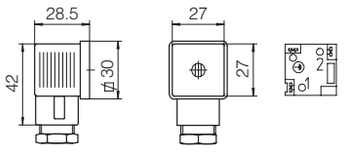
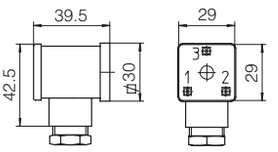
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C		
Recommended viscosity	15÷100 mm²/s - max allowed range 2,8 ÷ 500 mm²/s		
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 μm (β25 ≥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	

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 **DHI**	**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** (4)		60 VA	-	COI-24/50/60AC (1)	pink	-
	24/60 AC							
	48/50 AC	**48/50/60 AC** (4)				COI-48/50/60AC (1)	white	-
	48/60 AC							
	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**			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							
	230/50 AC	**230RC**				COU-230RC	blue	COE-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

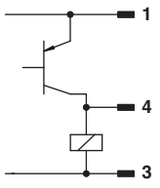
11 COILS ELECTRIC CONNECTORS FOR PILOT SOLENOID VALVES according to DIN 43650 (to be ordered separately)

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**
Type of switch		**/FI** proximity sensor
Supply voltage	[V]	10÷30
Ripple max	[%]	≤ 20
Max current	[mA]	200
Max peak pressure	[bar]	500
Mechanical life		virtually infinite
Switch logic		PNP

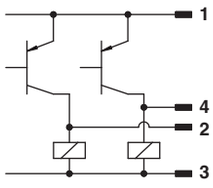
/FI scheme



1 supply +24 VDC
3 GND
4 output signal

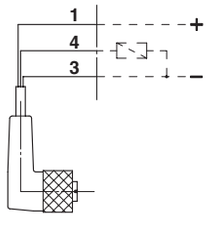
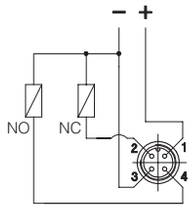
LIDA*/FV, LIDAS*/FV
/FV position switch
20÷32
≤ 10
400
400
virtually infinite
PNP

/FV scheme



1 supply +24 VDC
2 output signal
3 GND
4 output signal

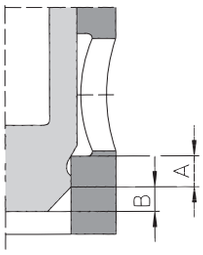
13 CONNECTING SCHEMES OF FI INDUCTIVE PROXIMITY AND FV POSITION SWITCHES

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

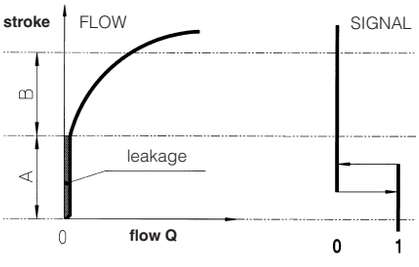
Notes:
- FI and FV sensor's connector are always supplied with the valve
- The /FI and /FV sensors are not provided with a protective earth connection

14 STATUS OF OUTPUT SIGNALS

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).

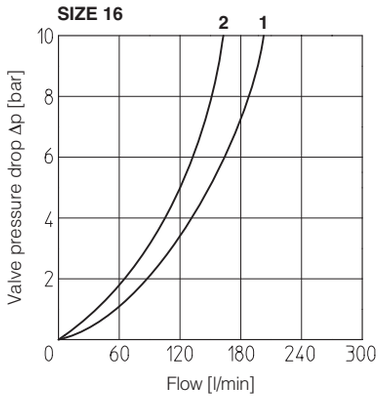


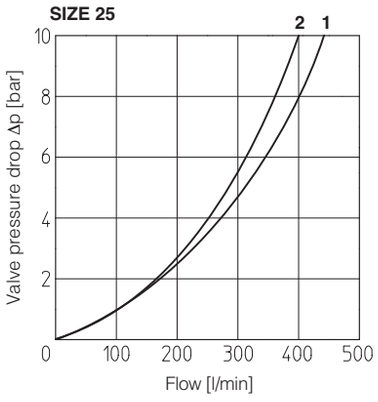
WARNING: the inobservance of following prescriptions invalidates the certification and may represent a risk for personnel injury

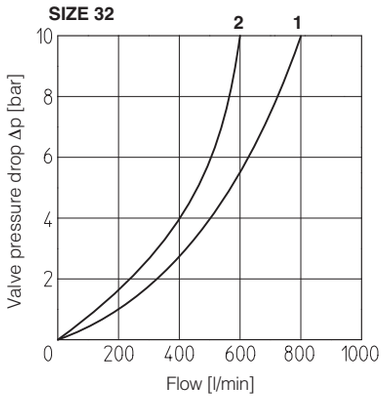
Safety valves must be installed and commissioned only by qualified personnel
Safety valves must not be disassembled
The inductive proximity FI or the inductive position switch FV can be adjusted only by the valve's manufacturer or Atos authorized service centers
Valve's components cannot be interchanged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

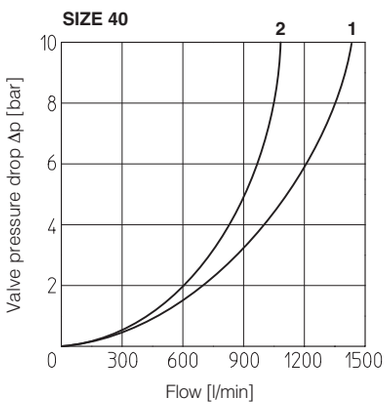
15 Q/Δp DIAGRAMS based on mineral oil ISO VG 46 at 50 °C

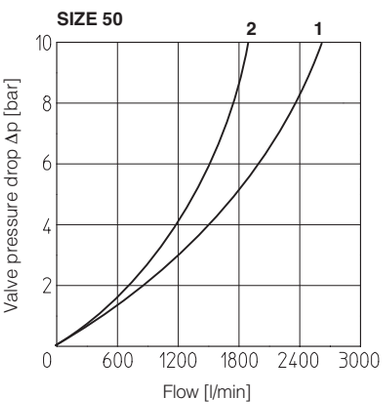
15.1 Q/Δp DIAGRAMS of LIFI and LIDA(H)/FV





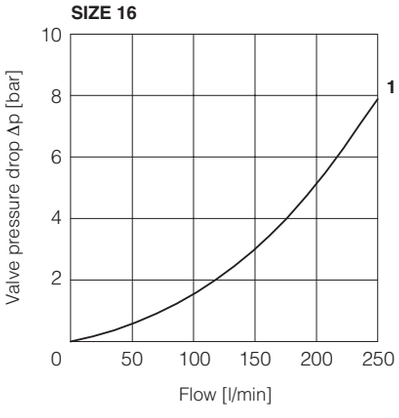


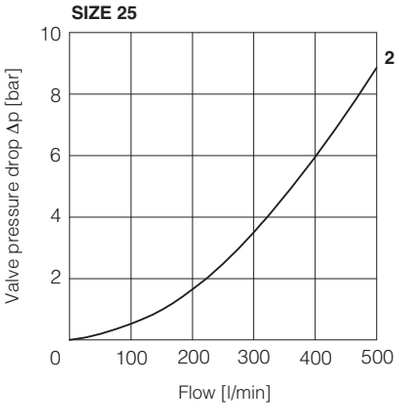


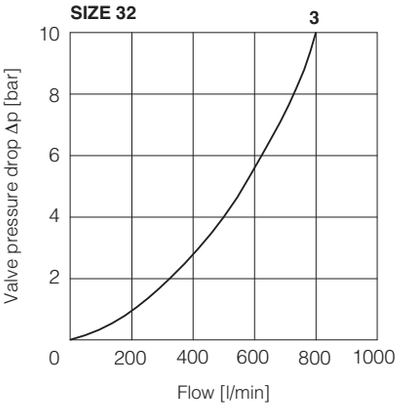


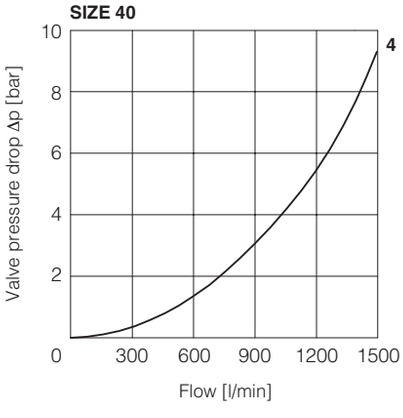
1 = poppet type 42
2 = poppet type 43

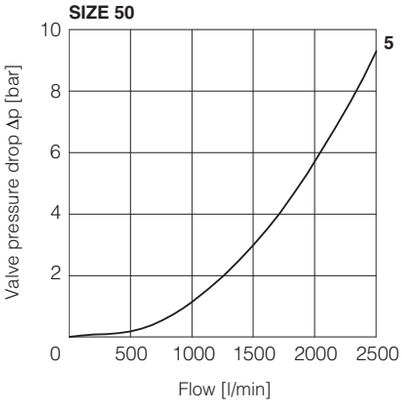
15.2 Q/Δp DIAGRAMS OF LIDAS/FV





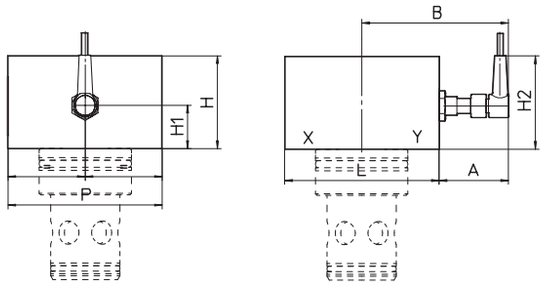






1 = LIDAS*-1643
2 = LIDAS*-2543
3 = LIDAS*-3243
4 = LIDAS*-4043
5 = LIDAS*-5043

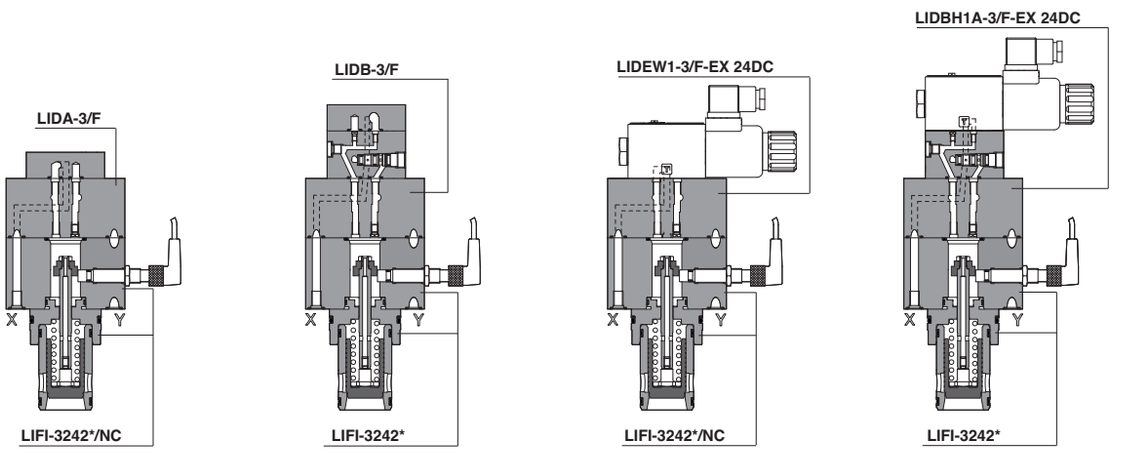
16 DIMENSIONS of LIFI SAFETY COVERS [mm]



	A	B	H	H1	H2	L	P
LIFI-16	54,5	94	50	25	56	72	65
LIFI-25	54,5	97	55	28	59	85	85
LIFI-32	47	97	60	28	59	100	100
LIFI-40	41	103,5	60	30	61	125	125
LIFI-50	44	114	70	30	61	140	140

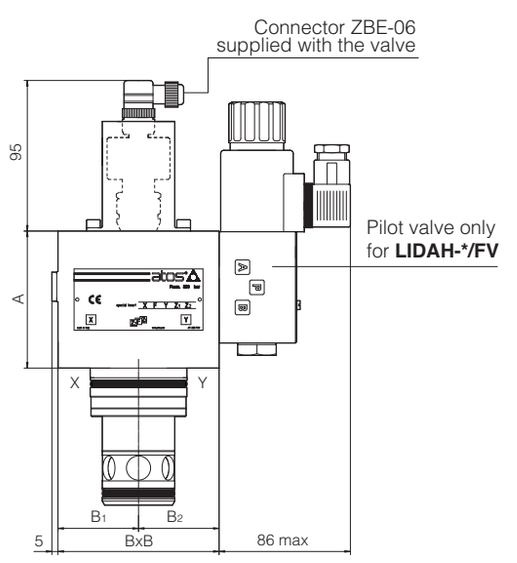
Note: for cover interface and cavity dimensions ISO 7368, see table P006

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

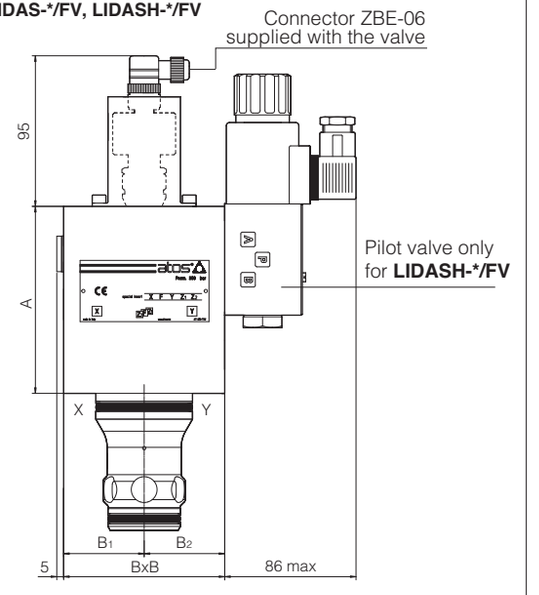


18 INSTALLATION DIMENSIONS of LIDA*/FV and LIDAS*/FV SAFETY CARTRIDGES [mm] (examples in size 32)

LIDA-*/FV, LIDAH-*/FV



LIDAS-*/FV, LIDASH-*/FV



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	B1	B2	A	B	B1	B2	A	B	B1	B2	A	B	B1	B2	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