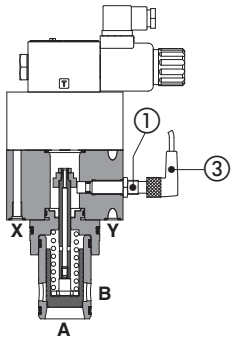
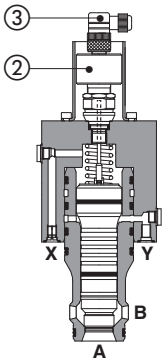
Safety cartridge valves with poppet position monitoring

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

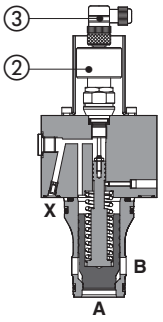
SAFETY CERTIFIED CE



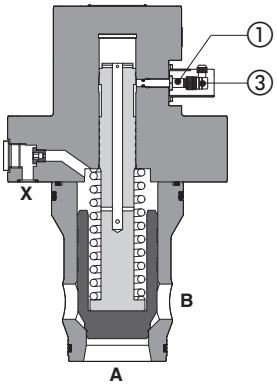
LIFI-3242*/NC



LIDAS-3243*/FV



LIDA-3243*/FV



LIDA-100433/FI

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.
They are used to cut-off the hydraulic user line, preventing undesired movements of the machine actuators.

Contactless sensor type **FI** (inductive proximity) or **FV** (inductive position switch) monitors the poppet "closed" position so that the valve "safe" condition can be clearly verified by the machine controller

Available models:

LIFI: intermediate safety element and cartridge with sensor type **FI**, designed for coupling with functional covers type LIDA, LIDB, LIDEW, LIDBH, to realize different hydraulic schemes.

LIDA: integral cover design and cartridge with sensor type FV (size 16-50) or FI (size 63-100), typically used to intercept the flow in one direction.
LIDAH version with solenoid pilot valve to control the poppet opening / closing.

LIDAS: actively pilot operated valve with sensor type FV.
The valve's poppet is hydraulically controlled in both open or closed position by a pilot pressure though X and Y ports.
LIDASH version with sensor type FV (size 16-50) or FI (size 63-80) and solenoid pilot valve to control the poppet opening / closing.

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 **100**
Max flow: **6300 l/min** at Δp = 5 bar
Max pressure: up to **420 bar**

1 RANGE OF SAFETY CARTRIDGE MODELS

Valve code	size ISO 7368	Description	Max flow [l/min] at Δp 5 bar	Max pressure [bar]	Pilot valve	Sensor type	
						/FI	/FV
LIFI	16÷50	intermediate elements with cartridge, to be coupled with a functional cover	1800	420	-	●	
LIDA /FV	16÷50	cartridge valve, integral cover design	2200	420	-		●
LIDA /FI	63÷100		6300	420	-	●	
LIDAH /FV-E	16÷50	cartridge valve, integral cover design with pilot solenoid valve	2200	350	DHE		●
LIDAH /FV-EP	16÷50		2200	420	DHEP		●
LIDAS /FV	16÷50	cartridges valve, actively pilot operated	1800	420	-		●
LIDASH /FV-E	16÷50	cartridge valve, actively pilot operated with pilot solenoid valve	1800	350	DHE		●
LIDASH /FV-EP	16÷50		1800	420	DHEP		●
LIDASH /FI-E	63, 80		3000	350	DKE	●	
LIDASH /FI-EP	63, 80		3000	420	DKEP	●	

Notes: **FI** = inductive proximity sensor, type NC (normally closed)
FV = inductive position switch providing both NO and NC contacts to be wired on the electric connector
See section 18 and 19 for sensor's characteristics

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

LI	FI	-	25	42	1	/	NC	**	/	*

Intermediate saferty element and cartridge according to ISO 7368

Poppet position monitor:F
I = inductive proximity switch

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

Type of poppet, see sect. 21 for Q/Δp diagrams
42 = with damping nose, area ratio 1:1,1
43 = with damping nose, area ratio 1:2 (size 16 and 25), 1:1,6 (size 32, 40, 50)

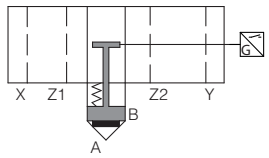
/NC = closed contact with poppet in resting position

Series number

Seals material:
- = NBR
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 (see also tech tables H030, H040)

LID	A	-	2	/	*	F	-	E	X	24DC	**	/	*	/	*

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

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

Seals material:
- = NBR
PE = FKM

Series number

Voltage code only for LIDEW* and LIDBH**: see section 16

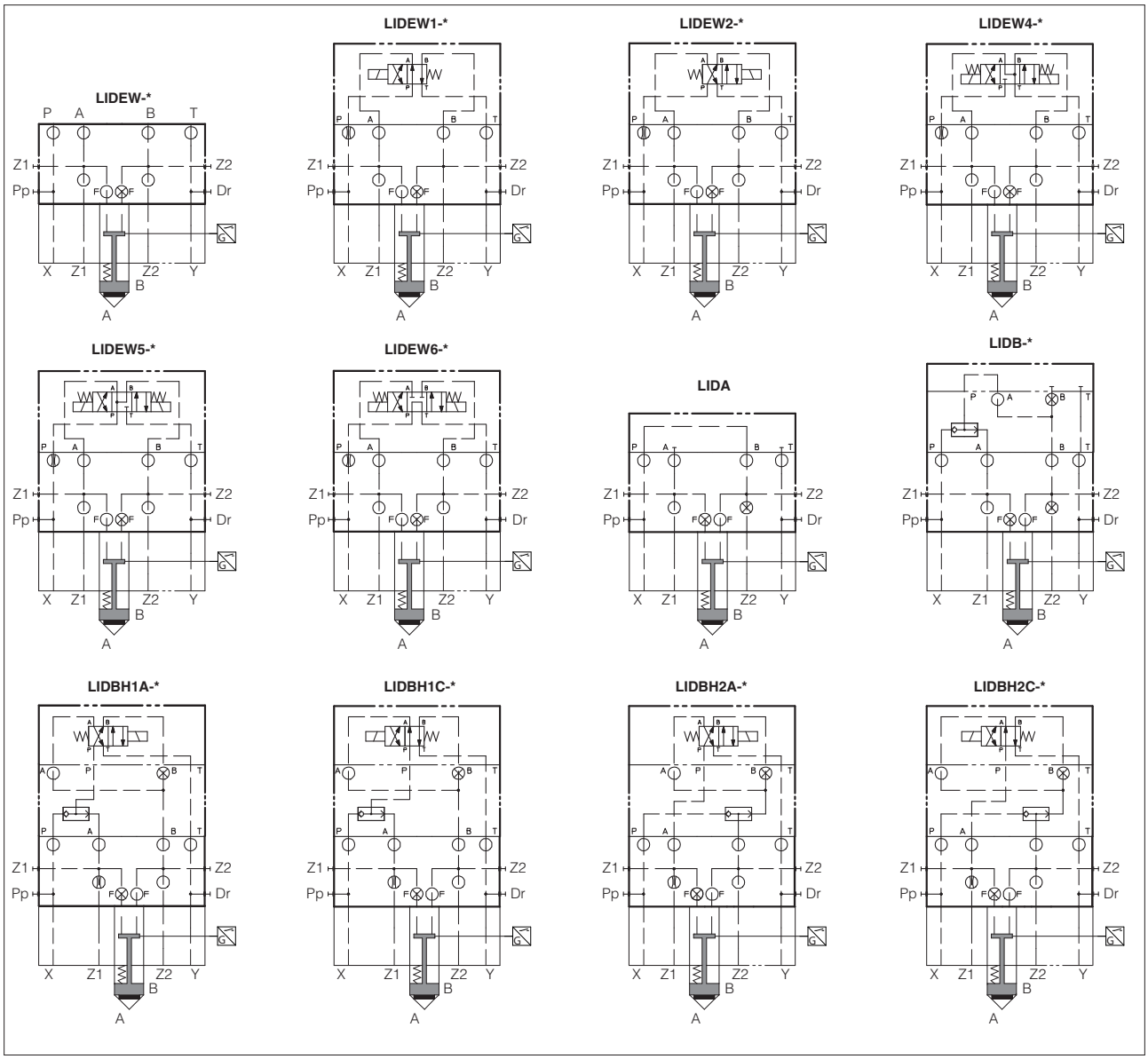
Only for LIDEW* and LIDBH**:
X = without connector, to be order separately see section 17

Type of pilot solenoid valve only for LIDBH** and LIDEW*:
E = DHE Pmax **350 bar**
EP = DHEP Pmax **420 bar**

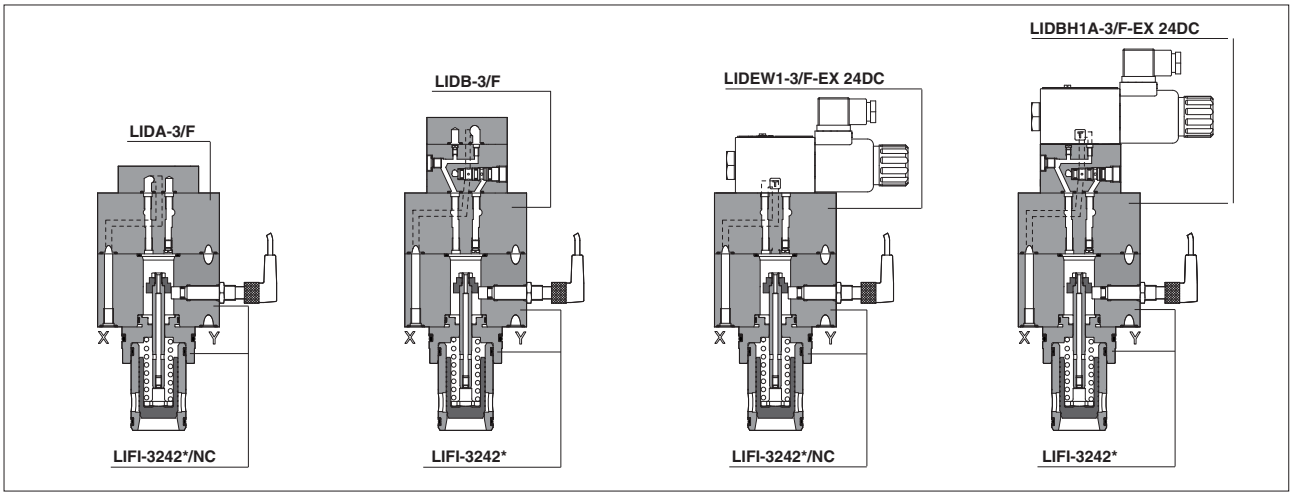
For valve type LIDB, LIDEW (in the configuration with external pilot line) Atos can supply leak free poppet type directional pilot valves type DLEH-3*. Consult our technical office for detailed information.

3.1 HYDRAULIC SYMBOLS OF FUNCTIONAL COVERS

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



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



5 **MODEL CODE OF LIDA** integral cover design

LIDA	-	25	43	3	/	FI	**	/	*

Safety cartridge valve

Size ISO 7368:
16; **25**; **32**; **40**;
50; **63**; **80**; **100**;

poppet type:
43 = with damping nose area ratio 1:1,5

spring cracking pressure:
1 = 0,6 bar (not for size 63÷100)
3 = 3 bar
6 = 5,5 bar (not for size 63÷100)

Poppet position monitor:
For size 16÷50
FV = inductive position switch (double contact)
For size 63÷100
FI = inductive proximity sensor

Series number

Seals material:
- = NBR
PE = FKM

6 **MODEL CODE OF LIDAH** integral cover design, with pilot solenoid valve

LIDA	H	-	25	43	3	/	FV	-	E	X	24DC	**	/	*

Safety cartridge valve

H = with pilot solenoid valve

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

poppet type:
43 = with damping nose area ratio 1:1,5

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
E = DHE Pmax **350 bar**
EP = DHEP Pmax **420 bar**

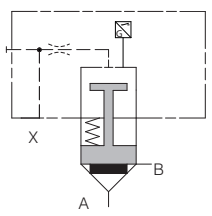
X = without connector, to be order separately see section 17

Voltage code, see section 16

Series number

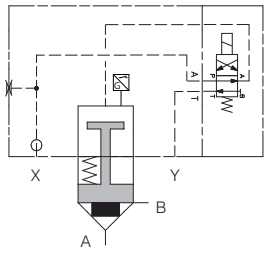
Seals material:
- = NBR
PE = FKM

6.1 HYDRAULIC SYMBOLS OF LIDA /FV (/FI) and LIDAH /FV



LIDA-43/FI**
(size 63÷100)

LIDA-43/FV**
(size 16÷50)



LIDAH-43/FV**
(size 16÷50)

7 MODEL CODE OF LIDAS actively pilot operated

LIDAS	-	40	43	3	/	FV	**	/	*

Safety cartridges, actively piloted operated

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)

Series number

Seals material:
- = NBR
PE = FKM

8 MODEL CODE OF LIDASH actively pilot, with pilot solenoid valve

LIDAS	H	-	40	43	3	/	FV	-	E	X	24DC	**	/	*

Safety cartridges, actively piloted operated

H = with pilot solenoid valve

Size ISO 7368:
16; **25**; **32**; **40**; **50**; **63**; **80**;

Poppet type:
43 = with damping nose

Spring cracking pressure
3 = 3 bar

Poppet position monitor:
For size 16÷50
FV = inductive position switch (double contact)
For size 63 and 80
FI = inductive proximity sensor

Pilot solenoid valve
E = DHE (size 16÷50) Pmax **350 bar**
DKE (size 63 and 80) Pmax **350 bar**
EP = DHEP (size 16÷50) Pmax **420 bar**
DKEP (size 63 and 80) Pmax **420 bar**

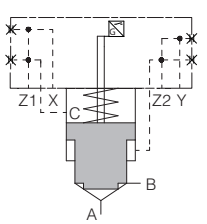
X = without connector, to be order separately see section 17

voltage code, see section 16

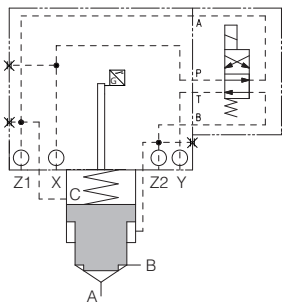
Series number

Seals material:
- = NBR
PE = FKM

8.1 HYDRAULIC SYMBOLS OF LIDAS



LIDAS/FV



LIDASH-*/FV
(size 16÷50)
LIDASH-*/FI
(size 63 and 80)

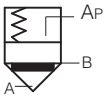
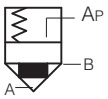
9 GENERAL CHARACTERISTICS

Assembly position	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index: Ra ≤0,8, recommended Ra 0,4 – Flatness ratio 0,01/100
MTTFd valves according to EN ISO 13849	150 years for LIFI, LIDA, LIDAS; 75 years for LIDAH, LIDASH for futher details see technical table P007
Ambient temperature range	**Standard** = -20°C ÷ +60°C **/PE** option = -20°C ÷ +60°C
Storage temperature range	**Standard** = -20°C ÷ +70°C **/PE** option = -20°C ÷ +70°C
Surface protection	Zinc coating with black passivation, galvanic treatment (driver housing)
Corrosion resistance	Salt spray test (EN ISO 9227) > 200 h
Vibration resistance	See technical table G004
Compliance	CE according to EMC directive 2014/30/EU (Immunity: EN 61000-6-2; Emission: EN 61000-6-3) RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

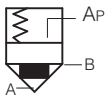
10 FLOW DIRECTION AND OPERATING PRESSURE

Flow direction	A→B or B→A
Operating pressure	**LIFI** A, B, X, Z1, Z2 = **420** bar;
	LIDA /FV (size 16÷50), **LIDA /FI** (size 63÷100) A, B, X = **420** bar;
	LIDAH /FV-E A, B, X = **350** bar; Y = **210** bar (DC), **160** bar (AC)
	LIDAH /FV-EP A, B, X = **420** bar; Y = **210** bar (DC), **160** bar (AC)
	LIDAS /FV A, B, X, Y, Z1, Z2 = **420** bar;
	LIDASH /FV-E A, B, X, Z1, Z2 = **350** bar; Y = **210** bar (DC), **160** bar (AC)
	LIDASH /FV-EP A, B, X, Z1, Z2 = **420** bar; Y = **210** bar (DC), **160** bar (AC)

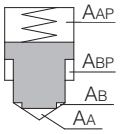
11 HYDRAULIC CHARACTERISTICS OF LIFI

Size	**16**	**25**	**32**	**40**	**50**
Poppet type **42**  **Nominal flow** at Δp 5 bar (l/min)	140	300	550	1150	1800
Area ratio A:Ap	1:1,1				
Poppet type **43**  **Nominal flow** at Δp 5 bar (l/min)	120	280	440	860	1370
Area ratio A:Ap	1:2		1:1,6		

12 HYDRAULIC CHARACTERISTICS OF LIDA, LIDAH

Size	**16**	**25**	**32**	**40**	**50**	**63**	**80**	**100**
Poppet type **43**  **Nominal flow** at Δp 5 bar (l/min)	240	500	800	1400	2200	3300	4000	6300
Area ratio A:Ap	1:1,5							

13 HYDRAULIC CHARACTERISTICS OF LIDAS, LIDASH

Size	**16**	**25**	**32**	**40**	**50**	**63**	**80**
Maximum flow at Δp = 5 bar [l/min]	200	300	550	1100	1800	2400	3000
Poppet characteristics  **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).							
AA [cm²]	1,43	3,46	5,30	8,04	13,85	30,19	35,68
AB (% of AA)	58,6	41,7	51,5	56,3	41,7	46,34	49,75
ABP (% of AA)	107,0	90,5	85,2	87,9	97,8	30,74	28,40
AAP (% of AA)	265,6	232,2	236,7	244,1	239,2	177,0	178,20
AA / (AA + AB) poppet ratio	0,6					0,68	
AAP / (AA + AB) piloting ratio	1,6					1,2	1,19

14 **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 mm²/s - max allowed range 2,8 ÷ 500 mm²/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	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

15 **COILS CHARACTERISTICS**

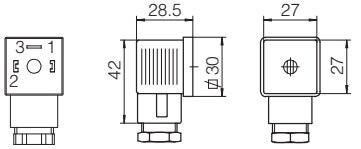
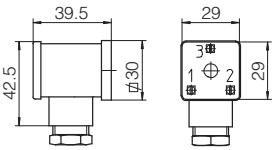
Insulation class	Pilot valve **E**, **EP**: **H** (180°C) for DC coils **F** (155°C) for AC coils Due to the occuring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	**IP 65** (with connectors 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

16 **COIL VOLTAGE**

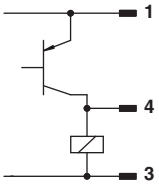
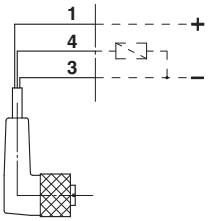
External supply nominal voltage ± 10%	**Voltage code** (1)	-EX, -EPX (DHE, DHEP) Power consumption (3)	-EPX (DKE, DKEP) Power consumption (3)	-EX, -EPX (DHE, DHEP) Code of spare coil pilot valve	-EX, -EPX (DKE, DKEP) Code of spare coil pilot valve
12 DC	**12 DC**	30W	36W	COE-12DC	CAE-12DC
24 DC	**24 DC**			COE-24DC	CAE-24DC
110 DC	**110 DC**			COE-110DC	CAE-110DC
220 DC	**220 DC**			COE-220DC	CAE-220DC
110/50 AC (2)	**110/50/60 AC**	58VA (4)	-	COE-110/50/60AC	-
110/50/60 AC		-	100VA (4)	-	CAE-110/50/60AC
115/60 AC (2)	**115/60 AC**	80VA (4)	130VA (4)	COE-115/60AC	CAE-115/60AC
230/50 AC (2)	**230/50/60 AC**	58VA (4)	-	COE-230/50/60AC	-
230/50/60 AC		-	100VA (4)	-	CAE-230/50/60AC
230/60 AC	**230/60 AC**	80VA (4)	130VA (4)	COE-230/60AC	CAE-230/60AC

(1) For other supply voltages available on request see technical tables of specific pilot solenoid valve.
(2) 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 58 VA (DHE*), 90 VA (DKE*)
(3) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.
(4) When solenoid is energized, the inrush current is approx 3 times the holding current.

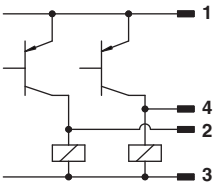
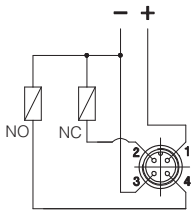
17 COILS ELECTRIC CONNECTORS FOR PILOT SOLENOID VALVES according to DIN EN 175201-804 (ex DIN 43651), to be ordered separately

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

18 TECHNICAL CHARACTERISTICS OF /FI INDUCTIVE PROXIMITY SENSOR

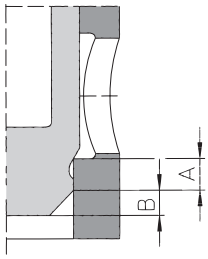
Valve type		**LIFI, LIDA*/FI, LIDAS*/FI**	**/FI** scheme	Connector type **BKS-B-20-4-03**
Type of switch		**/FI** proximity sensor		
Supply voltage	[V]	10÷30		
Ripple max	[%]	≤ 20		
Max current	[mA]	200		
Max peak pressure	[bar]	500	**1** supply +24 VDC **3** GND **4** output signal	**1** (brown) = supply +24 VDC **3** (blue) = GND **4** (black) = output signal CABLE LENGHT = 3 m
Mechanical life		virtually infinite		
Switch logic		PNP		

19 TECHNICAL CHARACTERISTICS OF /FV POSITION SWITCH

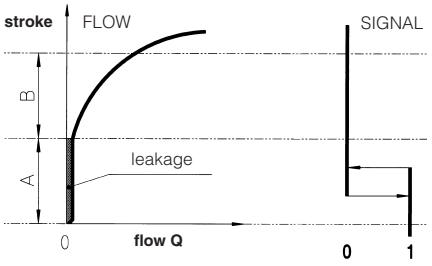
Valve type		**LIDA*/FV, LIDAS*/FV**	**/FV** scheme	Connector type **ZBE-06** IP65
Type of switch		**/FV** proximity sensor		
Supply voltage	[V]	20÷32		
Ripple max	[%]	≤ 10		
Max current	[mA]	400		
Max peak pressure	[bar]	400	**1** supply +24 VDC **2** output signal **3** GND **4** output signal	**1** = supply +24 VDC **2** = output signal NC **3** = GND **4** = output signal NO
Mechanical life		virtually infinite		
Switch logic		PNP		

20 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).

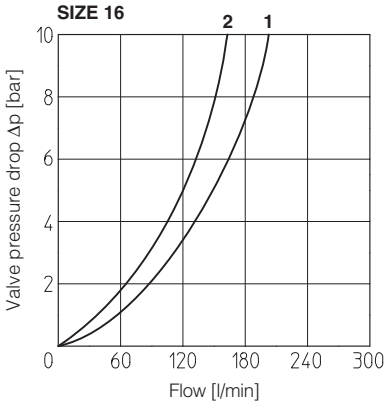


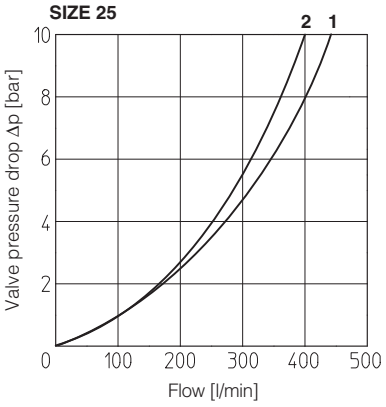
WARNING: the inobservance of following prescriptions invalidates the certification and may represent a risk for personnel injury

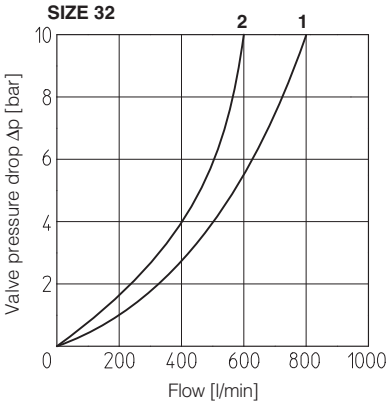
Safety valves must be installed and commissioned only by qualified personnel
Safety valves must not be disassembled
The inductive proximity FI or the inductive position switch FV can be adjusted only by the valve's manufacturer or Atos authorized service centers
Valve's components cannot be interchanged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

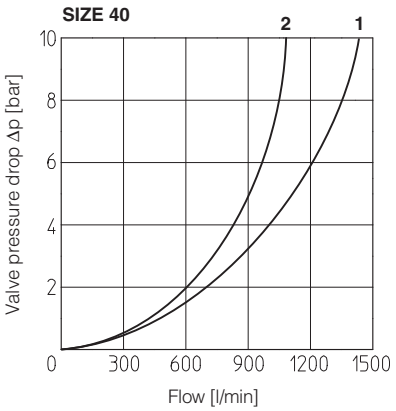
21 Q/Δp DIAGRAMS based on mineral oil ISO VG 46 at 50 °C

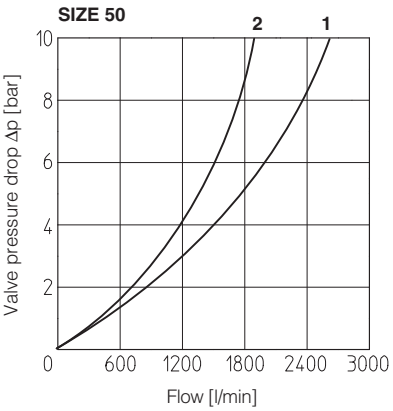
21.1 Q/Δp DIAGRAMS of LIFI







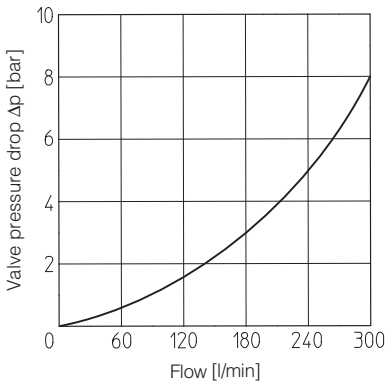




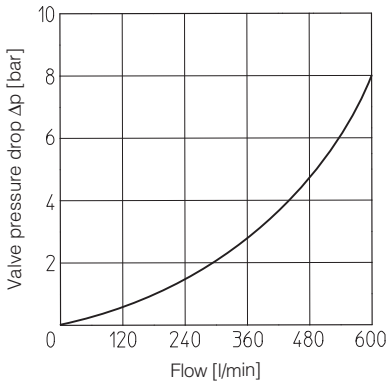
1 = poppet type 42
2 = poppet type 43

21.2 Q/Δp DIAGRAMS of LIDA /FV and LIDAH /FV

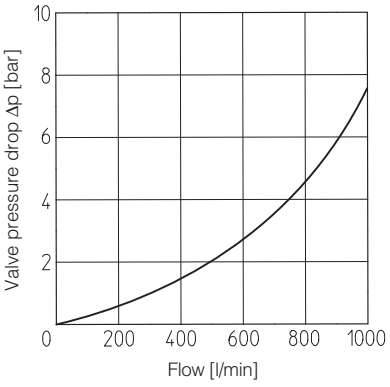
SIZE 16



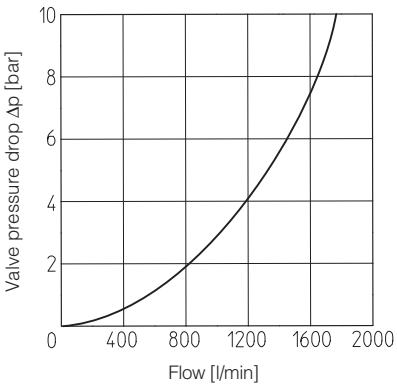
SIZE 25



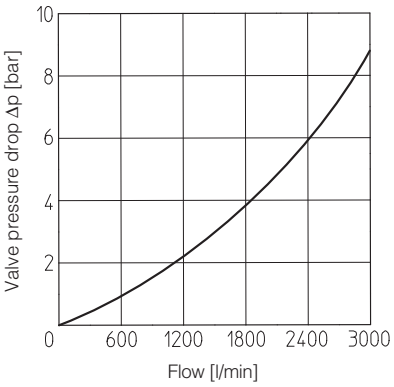
SIZE 32



SIZE 40

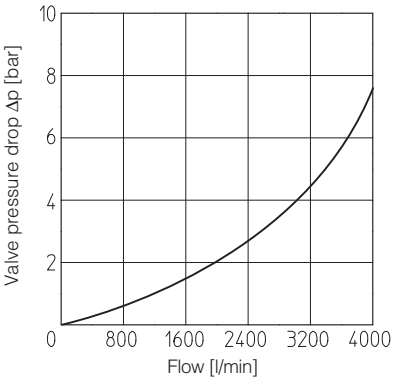


SIZE 50

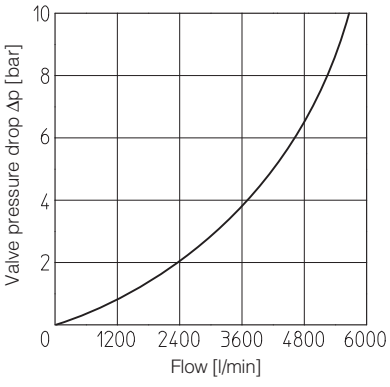


21.3 Q/Δp DIAGRAMS of LIDA /FI

SIZE 63



SIZE 80



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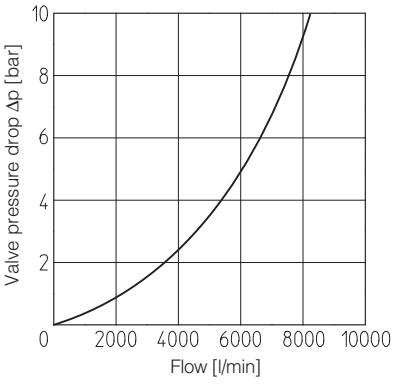
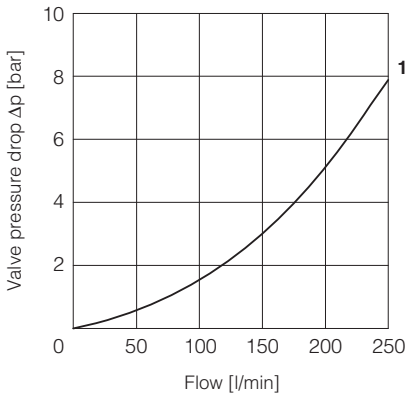
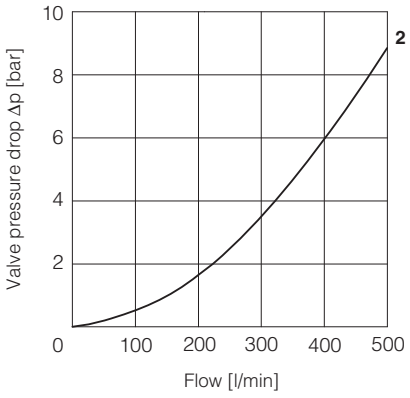


21.4 Q/Δp DIAGRAMS OF LIDAS /FV and LIDASH /FV

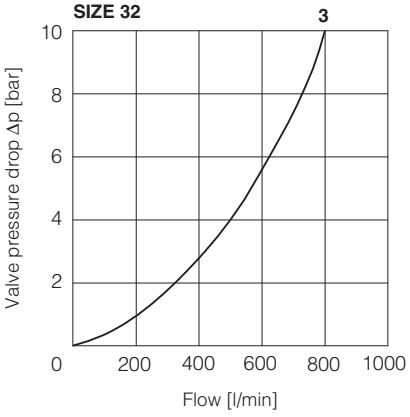
SIZE 16



SIZE 25



SIZE 32



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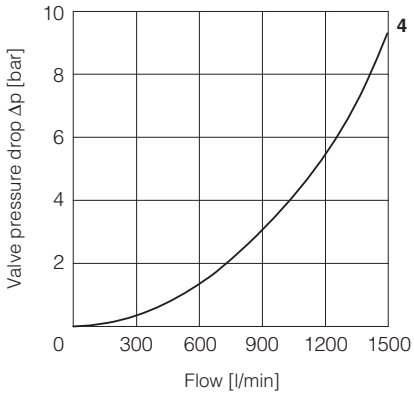
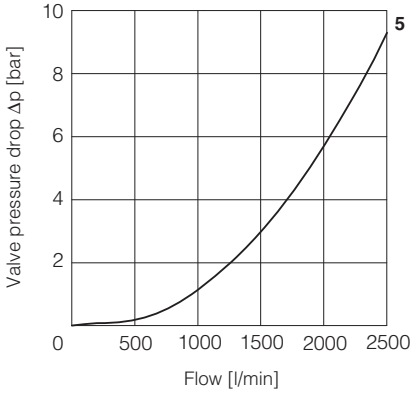
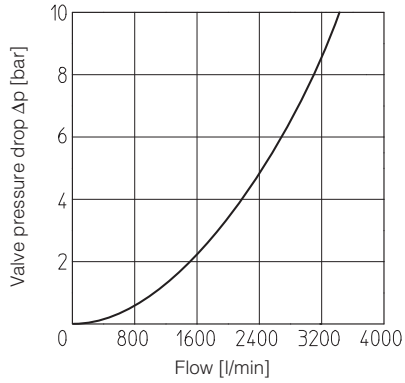


SIZE 50

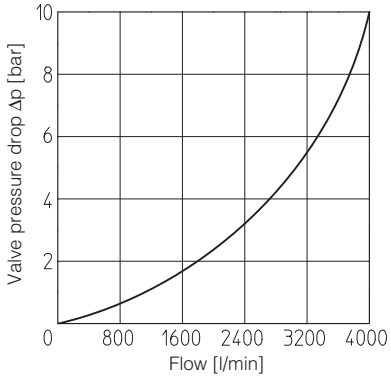


21.5 Q/Δp DIAGRAMS OF LIDASH/FI

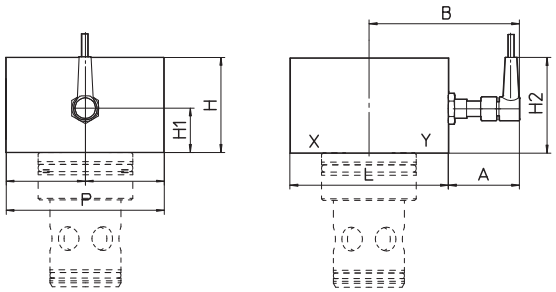
SIZE 63



SIZE 80



22 INSTALLATION DIMENSIONS of LIFI [mm]

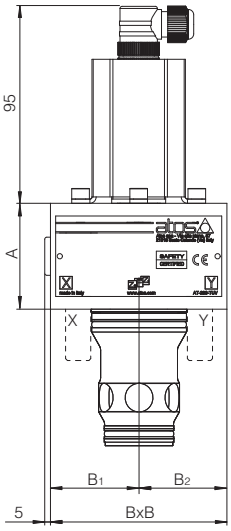


	A	B	H	H1	H2	L	P
LIFI-16	54,5	94	50	25	56	72	65
LIFI-25	54,5	97	55	28	59	85	85
LIFI-32	47	97	60	28	59	100	100
LIFI-40	41	103,5	60	30	61	125	125
LIFI-50	44	114	70	30	61	140	140

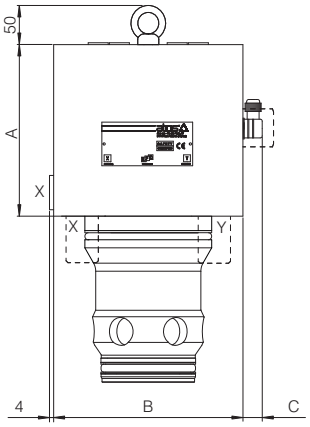
Note: for cover interface and cavity dimensions ISO 7368, see table P006

23 INSTALLATION DIMENSIONS of LIDA /FV and LIDA /FI [mm]

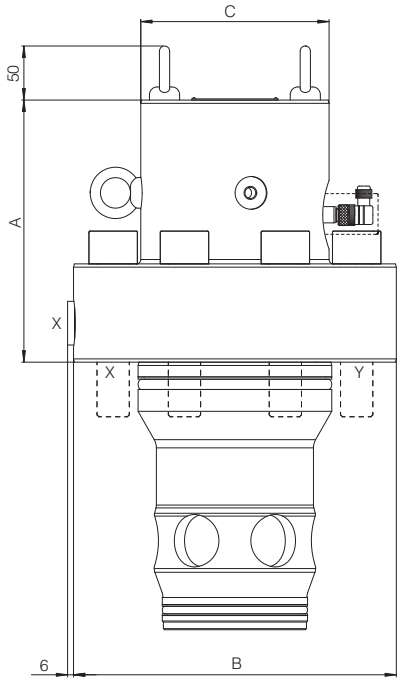
LIDA-*/FV
size 16÷50

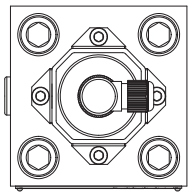


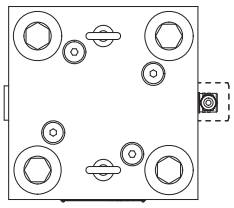
LIDA-*/FI
size 63

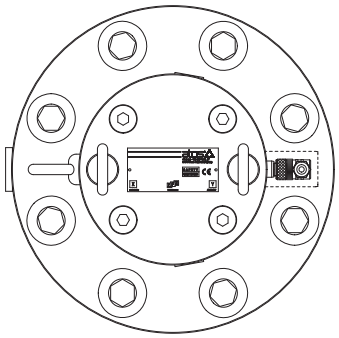


LIDA-*/FI
size 80







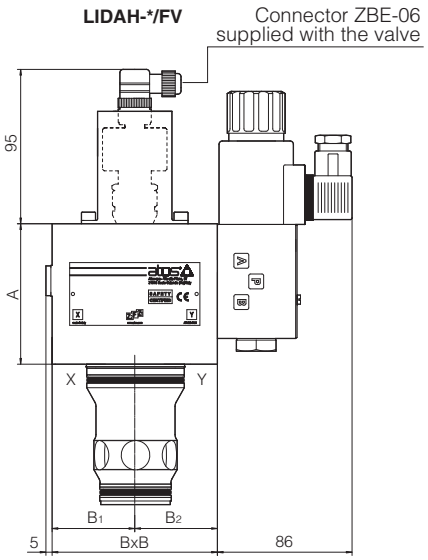


Note: for cover interface and cavity dimensions ISO 7368, see table P006
Ports Z1, Z2 not connected

Size	A	B	B1	B2	C	Seal	connection port X	Fastening bolts class 12.9	Mass (Kg)
16	56	65x72	32.5	32.5	-	4 OR 108	G1/4"	N°4 M8x50 35 Nm	2,7
25	60	85	42.5	42.5	-	4 OR 108	G1/4"	N°4 M12x60 125 Nm	4,5
32	70	100	50	50	-	4 OR 2043	G1/4"	N°4 M16x70 300 Nm	6,7
40	91.5	125	62.5	62.5	-	4 OR 3043	G1/4"	N°4 M20x80 600 Nm	13,7
50	95	140	70	70	-	4 OR 3043	G1/4"	N°4 M20x80 600 Nm	14,5
63	160	180	-	-	34	1 OR 3050	G3/4"	N°4 M30x120 2100 Nm	41
80	200	Ø250	-	-	160	1 OR 4075	G1/2"	N°8 M24x120 1000 Nm	60
100	240	Ø300	-	-	175	1 OR 4087	G1/2"	N°8 M30x140 2100 Nm	120

24 INSTALLATION DIMENSIONS of LIDAH /FV [mm] (with pilot solenoid valve)

LIDAH-*/FV

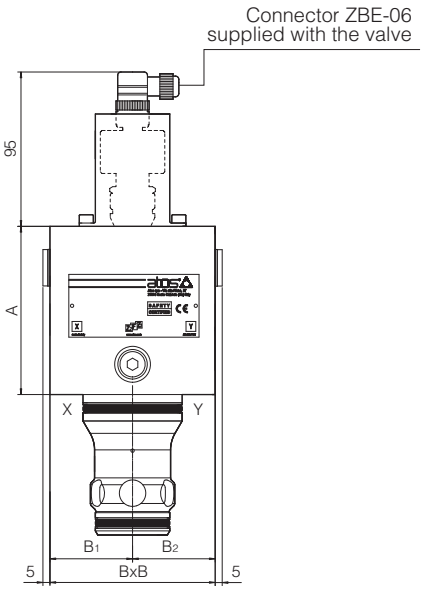


Note: for cover interface and cavity dimensions ISO 7368, see table P006

Size	A	B	B1	B2	Seal	connection port X	Fastening bolts class 12.9	Mass (Kg)
16	80	65x72	32.5	32.5	4 OR 108	G1/4"	N°4 M8x90 35 Nm	4,5
25	80	85	42.5	42.5	4 OR 108	G1/4"	N°4 M12x80 125 Nm	7,0
32	85	100	50	50	4 OR 2043	G1/4"	N°4 M16x70 300 Nm	8,2
40	91.5	125	62.5	62.5	4 OR 3043	G1/4"	N°4 M20x80 600 Nm	14,2
50	95	140	70	70	4 OR 3043	G1/4"	N°4 M20x80 600 Nm	16

25 INSTALLATION DIMENSIONS of LIDAS /FV [mm]

LIDAS-*/FV

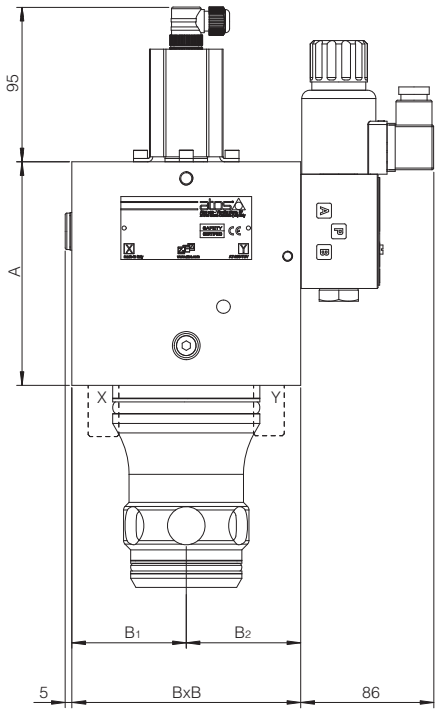


Note: for cover interface and cavity dimensions ISO 7368, see table P006

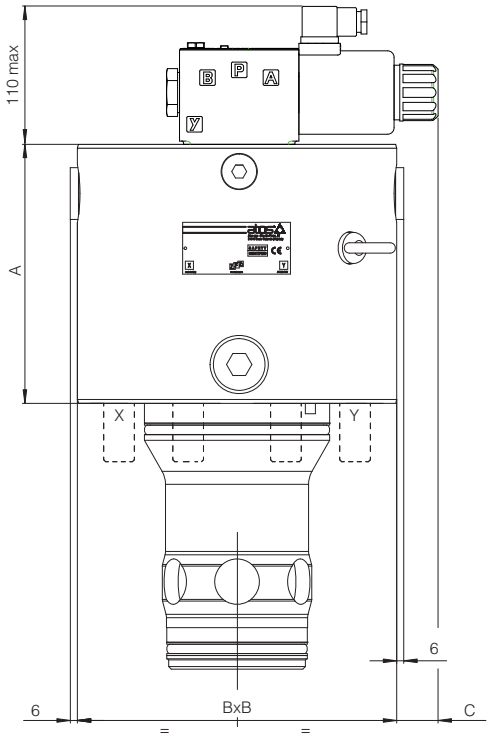
Size	A	B	B1	B2	Seal	connection port X, Y, Z1, Z2	Fastening bolts class 12.9	Mass (Kg)
16	85	65	39.5	39.5	4 OR 108	G1/8"	N°4 M8x80 35 Nm	3
25	102	85	42.5	42.5	4 OR 108	G1/8"	N°4 M12x95 125 Nm	5,9
32	104	100	50	50	4 OR 2043	G3/8"	N°4 M16x90 300 Nm	7,5
40	111	125	62.5	62.5	4 OR 2043	G3/8"	N°4 M20x70 600 Nm	14,7
50	135	140	70	70	4 OR 2043	G3/8"	N°4 M20x80 600 Nm	19,7

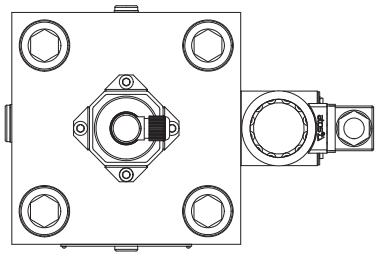
26 INSTALLATION DIMENSIONS of LIDASH /FV and LIDASH /FI [mm] (with pilot solenoid valve)

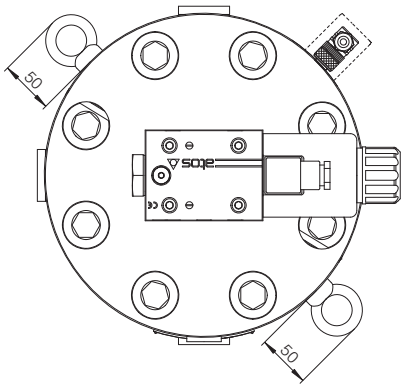
LIDASH-*/FV
size 16÷50



LIDASH-*/FI
size 63 and 80







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

Size	A	B	B1	B2	C (max)	Seal	connection port X, Z1, Z2	Fastening bolts class 12.9	Mass (Kg)
16	96	65x72	32.5	39.5	-	4 OR 108	G1/8"	N°4 M8x80 35 Nm	4,6
25	115	85	42.5	42.5	-	4 OR 108	G1/8"	N°4 M12x95 125 Nm	7,6
32	116	100	50	50	-	4 OR 2043	G3/8"	N°4 M16x90 300 Nm	9,1
40	125	125	62.5	62.5	-	4 OR 2043	G3/8"	N°4 M20x70 600 Nm	15,8
50	135	140	70	70	-	4 OR 2043	G3/8"	N°4 M20x80 600 Nm	20,8
63	192	180	-	-	65	4 OR 3050	(X, Y, Z1, Z2) G3/8"	N°4 M30x120 2100 Nm	51
80	200	Ø250	-	-	15	4 OR 4106	(X, Y, Z1, Z2) G1"	N°8 M24x100 1000 Nm	80