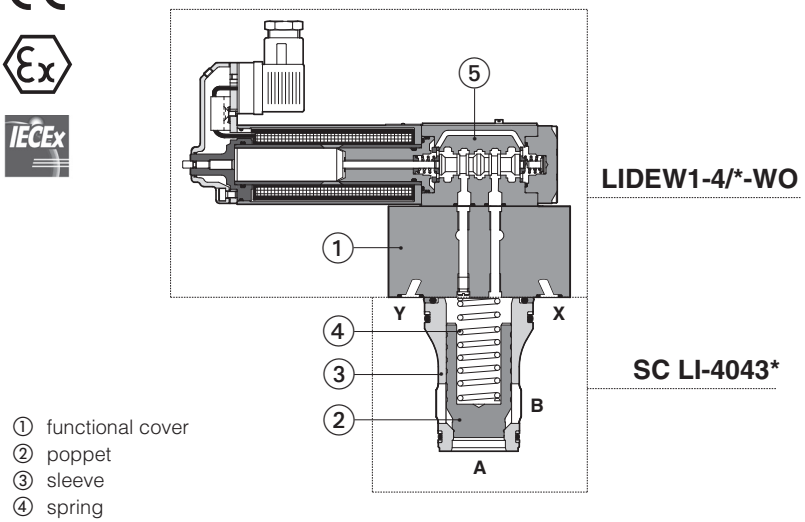
Intrinsically safe ISO cartridge valves

on-off directional control, ISO 7368 - **ATEX** or **IECEx**



① functional cover
② poppet
③ sleeve
④ spring
⑤ intrinsically safe solenoid pilot valve

LIDEW, LIDBH, SC LI

On-off ISO directional cartridges equipped with intrinsically safe solenoid pilot valve for poppet control, certified for safe operation in hazardous environment with potentially explosive atmosphere.

Certifications:

- **ATEX** or **IECEx**:
  II 1G Ex ia IIC, IIB, IIA
  surface plants zone 0, 1 and 2
- **ATEX** or **IECEx**:
  IM2 Ex ia IMb, Ex ib IMb
  surface, tunnels or mining plants

See section 11 for certification data

The valves must be electrically powered through specific "safety barriers" limiting the max current to the solenoid, see section 13

LIDEW: directional control with ex-proof solenoid valve for oppet control

LIDBH: directional control with solenoid valve and shuttle valve for pilot line selection

Size: **16** ÷ **63**
Flow: **240** ÷ **4000 l/min** at Δp 5 bar
Max pressure: **350 bar**

1 MODEL CODE OF COVERS - to be coupled with cartridge in section 5

LI	D	EW / *	-	1	-	1	/	*	-	WO	/	6	*	/	*	*

LI — Cover according to ISO 7368

D = directional function

EW = with pilot solenoid valve
BH = as EW plus shuttle valve for pilot selection

Certification type:
- = Omit for Atex Group II
M = Atex Group I (mining)
IE = IECEx Group II
IEM = IECEx Group I (mining)

Cover configuration see section 2 :
LIDEW: **-**, **1**, **2**, **4**, **5**, **6**
LIDBH: **1A**, **1C**, **2A**, **2C**

Valve size (ISO 7368):
1 = 16 **3** = 32 **5** = 50
2 = 25 **4** = 40 **6** = 63

Options (2):
B = cartridge piloted via port "B" of solenoid pilot valve
E = external attachments X (1/4" GAS) and underneath port X supplied plugged (only for sizes 40...63)
WP = ⚠ manual override

WO = Intrinsically safe slenoid

Connector type:
6 = DIN 43650 (standard)

Series number

Seals material, see section 10 :
- = NBR
PE = FKM
BT = HNBR **(1)**

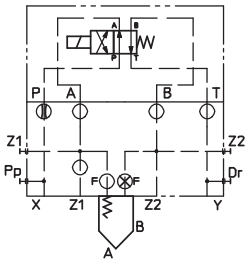
Optional different setting of the calibrated plugs in the pilot channels see section 3

(1) Not for certification **M** and **IEM**, Group I (mining)
(2) Possible combined options: all combinations are available

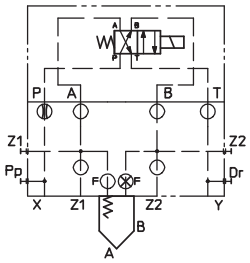
⚠ The pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar

2 VALVES CONFIGURATIONS AND HYDRAULIC SYMBOLS

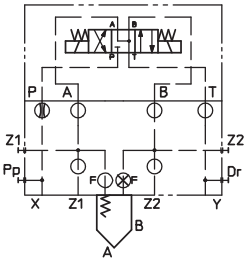
LIDEW



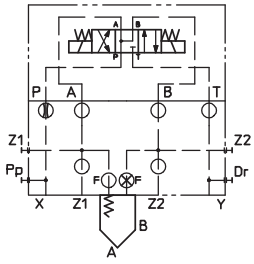
LIDEW1-*



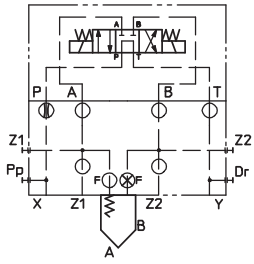
LIDEW2-*



LIDEW4-*

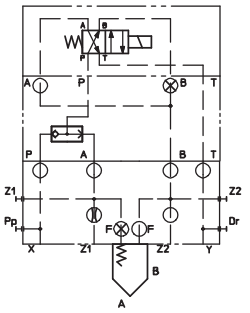


LIDEW5-*

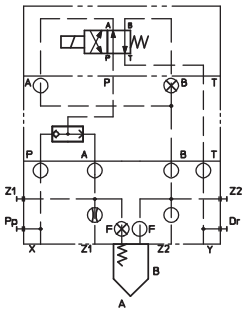


LIDEW6-*

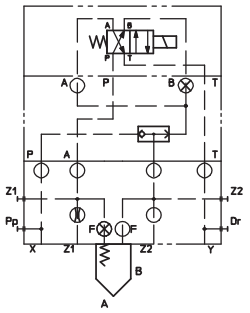
LIDBH



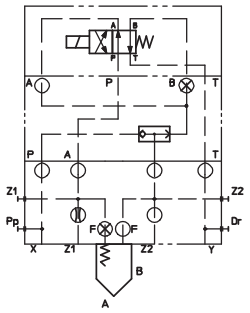
LIDBH1A-*



LIDBH1C-*



LIDBH2A-*



LIDBH2C-*

3 OPTIONS

For LIDEW*, LIDBH* covers (sizes 40…100):

/E = with external attachments Pp and underneath port X supplied plugged;

For all the models:

/B = cartridge piloted via port "B" of solenoid pilot valve;

/F = prearranged for coupling to an intermediate element with poppet position detector for safety function. See tab. EY120.

/WP = prolonged manual override protected for solenoid pilot valve.

******* = Calibrated plugs different from standard ones reported in section 4. The restrictors configuration (if different from the standard) must be indicated at the end of the model code:

LIDEW2	-	1	/*	-	WO	/6	**

P	06
Channel where the orifice has to be provided: **P** = channel X, port P **Z1** = channel Z1 **F** = channel F **Z2** = channel Z2	Size of the throttling hole in teths of millimeters: **05** = 0,5 mm **10** = 1 mm **17** = 1,7 mm **06** = 0,6 mm **12** = 1,2 mm **20** = 2 mm **08** = 0,8 mm **15** = 1,5 mm

4 STANDARD ORIFICES CONFIGURATION

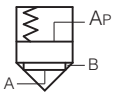
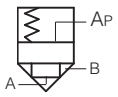
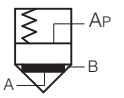
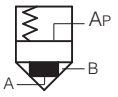
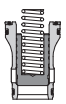
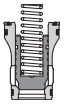
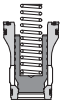
Port \ Cover	LIDEW*-1 LIDBH*-1	LIDEW*-2 LIDBH*-2	LIDEW*-3 LIDBH*-3	LIDEW*-4 LIDBH*-4	LIDEW*-5 LIDBH*-5	LIDEW*-6 LIDBH*-6
Z1 (only for LIDBH*-*)	M4 12A	M4 12A	M6 15A	M6 17A	M6 20A	M6 20A
P	M6 12A	M6 12A	M6 15A	M6 17A	M6 20A	M6 20A

M4 ÷ M8 = screw size; **12A ÷ 20A** = calibrated orifices diameter in tenths of mm; **A** = short calibrated hole

5 MODEL CODE OF SLIP-IN CARTRIDGES, to be coupled with covers in section 1

SC LI	-	16	43	1	40	/*
Cartridge valve		**Size** (ISO 7368): **16 25 32 40 50 63**	**Type of poppet**, see section 6 for maximum flow **32, 33** **42** = as 32 but with dumping nose **43** = as 33 but with dumping nose	**Spring cracking pressure**: **1** = 0,3 bar for poppet 32, 42; **1** = 0,6 bar for poppet 33, 43; **2** = 1,5 bar for poppet 32, 42; **3** = 3 bar for all poppets **6** = 5,5 bar for all poppets	**High flow:** **40** = all sizes	Seals material: **-** = NBR **PE** = FKM **BT** = HNBR

6 TYPE OF POPPET

Type of poppet		**32**	**33**	**42**	**43**
Functional sketch (Hydraulic symbol)					
Operating pressure		**420 bar max** (only SCLI cartridge)			
Nominal flow at Δp 5bar (l/min) see diagrams Q/Δp at section 9	Size **16**	270	270	240	240
	25	550	550	500	500
	32	1000	1000	800	800
	40	1700	1700	1400	1400
	50	2500	2500	2200	2200
	63	4000	4000	3300	3300
Typical section					
Area ratio A:Ap		**1:1,1**	**1:1,5**	**1:1,1**	**1:1,5**
Cracking pressure A→B	Spring **1**	0,3 bar	0,6 bar	0,3 bar	0,6 bar
	2	1,5 bar	-	1,5 bar	-
	3	3 bar	3 bar	3 bar	3 bar
	6	5,5 bar	5,5 bar	5,5 bar	5,5 bar
Cracking pressure B→A	Spring **1**	3 bar	1,2 bar	3 bar	1,2 bar
	2	12,8 bar	-	12,8 bar	-
	3	32,5 bar	6 bar	32,5 bar	6 bar
	6	54,5 bar	11 bar	54,5 bar	11 bar

7 GENERAL CHARACTERISTICS

Assembly position / location	Horizontal position only
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra ≤0,8 recommended Ra 0,4 - flatness ratio 0,01/100)
MTTFd values according to EN ISO 13849	75 years, for further details see technical table P007
Ambient temperature	**Standard** = -20°C ÷ +60°C **/PE** option = -20°C ÷ +60°C **/BT** option = -40°C ÷ +60°C
Storage temperature range	**Standard** = -20°C ÷ +70°C **/PE** option = -20°C ÷ +70°C **/BT** option = -40°C ÷ +70°C
Surface protection	Zinc coating with black passivation - salt spray test (EN ISO 9227) > 200h
Compliance	Intrinsically safe protection "Ex ia", see section 11 RoHs Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006

8 HYDRAULIC CHARACTERISTICS

Functional cover operating pressure	port A, B, X, Z1, Z2 = **350**; port Y = **160**
Rated flow	see section 6

9 ELECTRICAL CHARACTERISTICS - see also section 11

Nominal resistance at 20°C	150 Ω
Coil insulation	Class H
Working voltage	12 ÷ 26 V
Minimum supply current	65mA, from I.S. barriers
Protection degree	IP66
Duty factor	100%
Electrical connector	DIN 43650 2 pin+GND

10 SEALS AND HYDRAULIC FLUIDS - 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 HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°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, HNBR	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

⚠ The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

(1) Performance limitations in case of flame resistant fluids with water:
-max operating pressure = 210 bar
-max fluid temperature = 50°C

11 CERTIFICATION DATA

Valve type		LIDEW LIDBH		LIDEW/**IE** LIDBH/**IE**			LIDEW/**M** LIDBH/**M**			LIDEW/**IEM** LIDBH/**IEM**		
Certification		**ATEX** (Group II)		**IECEx** (Group II)			**ATEX (mining)** (Group I)			**IECEx (mining)** (Group I)		
Solenoid code		**OW-18/6**		**OWI-18/6**			**OWM-18/6**			**OWIM-18/6**		
Type examination certificate **(1)**		CESI 02 ATEX 013		IECEx CES 12.0017			CESI 02 ATEX 013			IECEx CES 12.0017		
Method of protection		**Ex II 1G Ex ia**					**Ex I M2 Ex ia I Mb Ex ib I Mb**					
		IIA T5 Ga	**IIB T6 Ga**		**IIC T6 Ga**							
Electrical characteristics (max values)	Ui [V]	28	28	27	19,5	19,11	28	28	27	19,5	19,11	12,4
	Ii [mA]	396	250	130	360	360	396	250	130	360	360	2200
	Pi [W]	2,8	1,8	0,9	1,64	1,72	2,8	1,8	0,9	1,64	1,72	6,82
	Ci , Li	≅ 0	≅ 0				≅ 0					
Temperature class		**T5**	**T6**				–					
Surface temperature (ambient temp. +60°C)		≤ 100°C	≤ 85°C				≤ 150°C					
Ambient temperature		-20 ÷ +60°C	-40 ÷ +60°C **(2)**				-20 ÷ +60°C					
Applicable standards		EN 60079-0 EN 60079-11 EN 60079-26		IEC 60079-0 IEC 60079-11 IEC 60079-26								

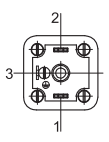
(1) The type examinator certificates can be downloaded from www.atos.com
(2) Only for **/BT** option

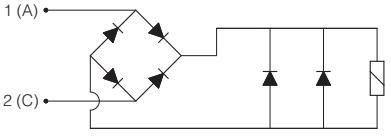
⚠ **WARNING: service work performed on the valve by the end users or not qualified personnel invalidates the certification**

12 SOLENOIDS WIRING

Connector wiring	
/6	Connections
1	Coil
2	Coil
3	GND

DIN 43650





13 **INTRINSICALLY SAFE BARRIERS** - see tech. table **GX010**

The electric supply to these valves must be done through intrinsically safe barriers situated out of potentially flammable environment (i.e. in safe zone), which limit the electric current to the intrinsically safe solenoid. The "intrinsically safe" circuit is virtually unable to produce electrical surges or thermic effects able to cause explosion in hazardous environments also in presence of specific break-down situations. The intrinsically safe barriers must be approved and certified according to the Ex ia protection mode.

To select the proper intrinsically safe barriers following data must be considered:
1) Vmax and Imax of the solenoid as specified in section **11** must not be exceeded also in fault conditions;
2) the resistance of the solenoid is 150 Ω and the current supplied by the barrier, in normal operation condition, must be over the min. limit (65 mA) to ensure the valve correct operation (over 70 mA for max performances).

The barriers type **Y-BXNE 412** are galvanically isolated electronic devices, complying with European Norms EN60079-0/06, EN60079-11/07 and ATEX certified according to protection mode Ex ia IIC.
These barriers ensure the optimized functioning of the Atos valves up to the max operating limits specified in section **8**.

The barriers Y-BXNE-412 are double channel type, suitable to operate valves with double or single solenoid. Two single solenoid valves can be connected to the barrier (one to each channel) but they cannot be contemporary operated.

MODEL CODE OF I.S. BARRIER

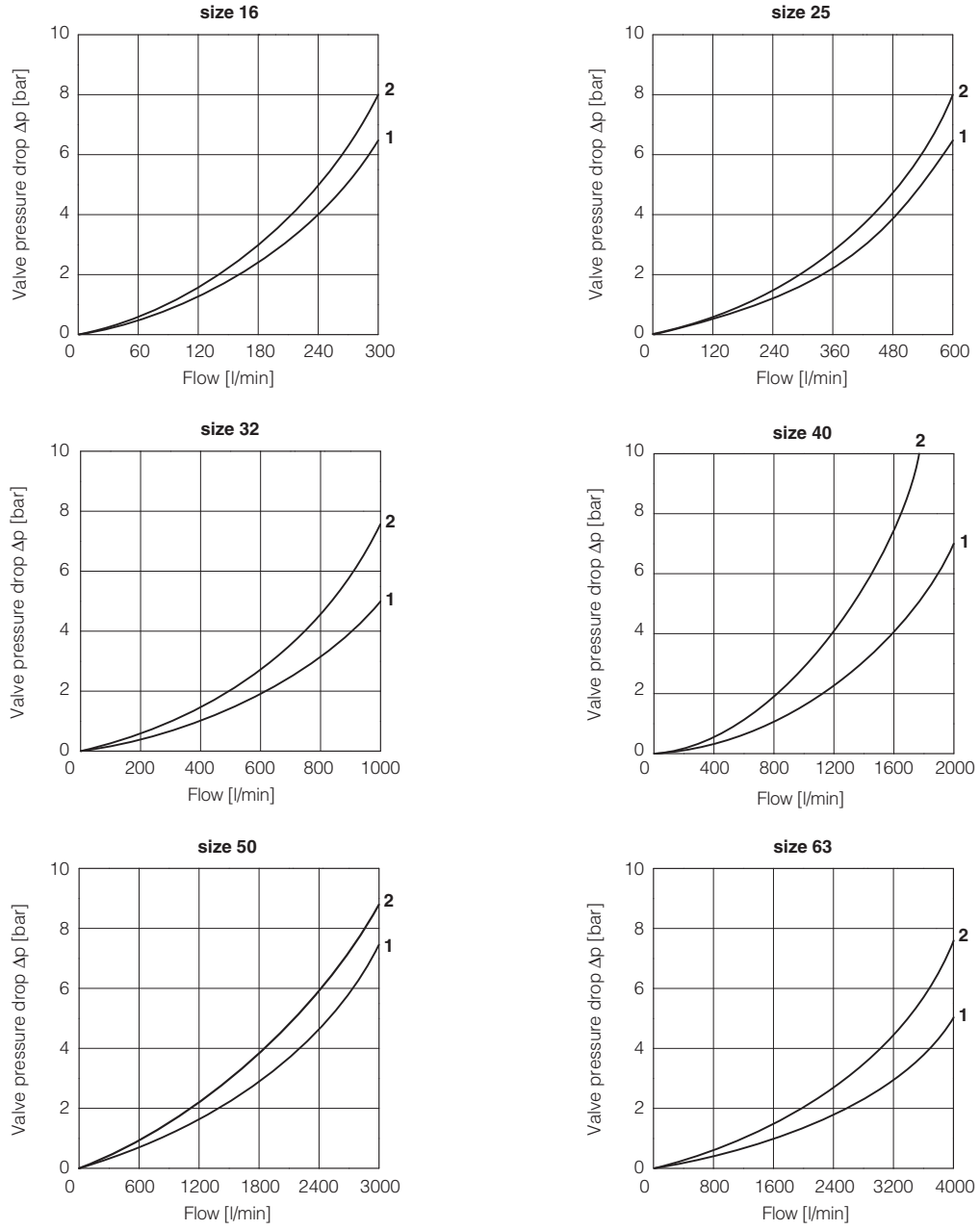
Y-BXNE 412 00	*

Supply voltage
E = 110/230 V_{AC}
2 = 24÷48 V_{DC}

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

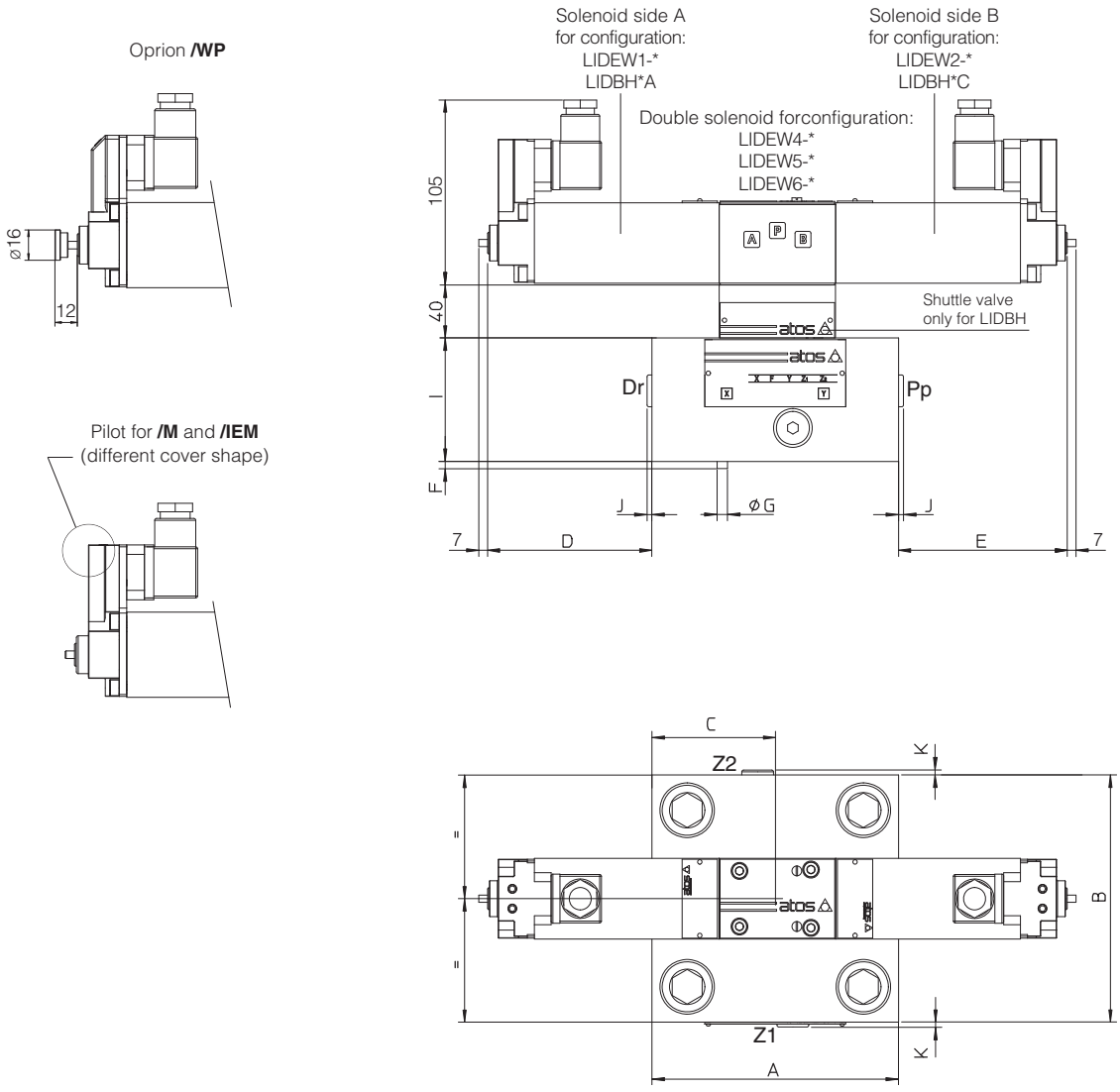
SC LI High flow - series 40

1 = poppet type 32 and 33 **2** = poppet type 42 and 43



15 COVER INSTALLATION DIMENSIONS [mm] - for cartridge cavity dimensions see tech. table P006

Size 16 ÷ 63
Drawing of size 50



Notes referred to the below table:

(1) LIDEW1* - LIDBH*A: solenoid at side of port Y of cover
LIDEW2* - LIDBH*C: solenoid at side of port X of cover

Size (1)	A	B	C	D max	E max	F	G	I	J	K	Ports Pp-Dr	Ports Z_1-Z_2	Seals	Fastening bolts (3)	Tightening torque [Nm]	Mass [Kg]
16	70	65	41	135	123	4	3	40	-	-	-	-	4 OR-108	Nr. 4 M8x45	35	3,95 ÷ 5,7
25	85	85	42,5	123	123	6	5	40	-	-	-	-	4 OR-108	Nr. 4 M12x45	125	4,35 ÷ 6,1
32	100	100	50	115	115	6	5	50	-	-	-	-	4 OR-2043	Nr. 4 M16x55	300	4,85 ÷ 6,7
40	125	125	62,5	102	102	6	5	60	3,5	-	G 1/4	-	4 OR-3043	Nr. 4 M20x70	600	7,75 ÷ 9,6
50	140	140	70	95	95	4	6	70	3,5	3,5	G 1/4	G 1/4	4 OR-3043	Nr. 4 M20x80	600	10,85 ÷ 12,7
63	180	180	90	75	75	4	6	80	3,5	3,5	G 3/8	G 3/8	4 OR-3050	Nr. 4 M30x90	2100	18,65 ÷ 20,4

16 RELATED DOCUMENTATION

X010	Basics for electrohydraulics in hazardous environments
X050	Summary of Atos intrinsically safe components certified to ATEX, IECEx
EX950	Operating and maintenance information for intrinsically safe valves
P006	Mounting surfaces and cavities for cartridge valves