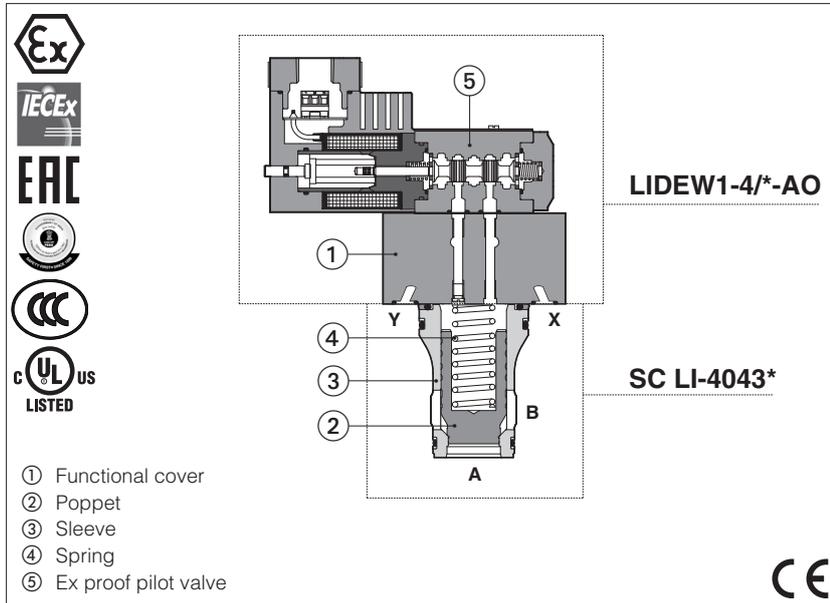


Ex-proof ISO cartridges

directional control - **ATEX, IECEx, EAC, PESO, CCC** or **cULus**



LIDEW, LIDBH

Directional ISO cartridges equipped with ex-proof solenoid pilot valve, certified for safe operation in hazardous environments, with potentially explosive atmosphere.

Certifications:

- Multicertification **ATEX, IECEx, EAC, PESO, CCC** for gas group **II 2G** and dust category **II 2D**
- Multicertification **ATEX, IECEx** for gas group **I M2** (mining)
- **cULus** North American certification for gas group **C&D**

The flameproof enclosure of solenoid prevents the propagation of accidental internal sparks or fire to the external environment. The solenoid is also designed to limit the surface temperature within the classified limits.

LIDEW: directional control with ex-proof solenoid valve for pilot selection

LIDBH: directional control with ex-proof solenoid valve and shuttle valve for pilot selection

Size: **16 ÷ 63** - ISO 7368

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

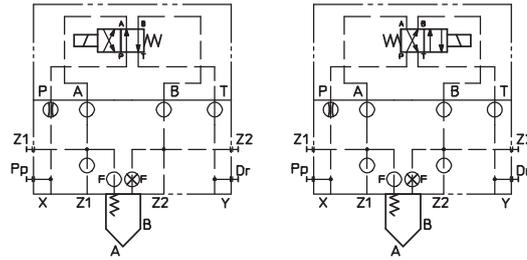
LI	D	EW	1	-	1	/	M	-	AO	/	*	24DC	*	/	*	*
Cover according to ISO 7368	D = directional function	EW = with pilot solenoid valve BH = as EW plus shuttle valve for pilot selection														Optional different setting of the calibrated plugs in the pilot channels see section 3
Cover configuration see section 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																
Solenoid threaded connection for cable gland fitting:																
GK = GK-1/2" - not for cULus (1)																
M = M20x1,5 - not for cULus																
NPT = 1/2" NPT																
Certification type:																
AO = Multicertifications for Group II 2G / II 2D (2)																
AO/M = Multicertifications for Group I M2, ATEX (mining)																
AO/UL = cULus North American certification																
Voltage code - see section 9																
Options (4):																
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)																
O = horizontal cable entrance (2)																
WP = ⚠ manual override protected by metallic cap																
Seals material, see section 10:																
- = NBR																
PE = FKM																
BT = HNBR (3)																
Series number																

(1) Approved only for the Italian market (2) The valves with Multicertification for Group II are also certified for Indian market according to PESO (Petroleum and Explosives Safety Organization). The PESO certificate can be downloaded from www.atos.com
(3) Not for multicertification M group I (mining) (4) For possible combined options, see 3.1

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

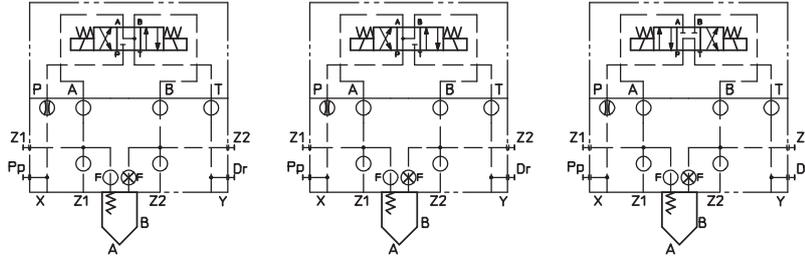
2 VALVES CONFIGURATIONS AND HYDRAULIC SYMBOLS

LIDEW



LIDEW1*-*

LIDEW2*-*

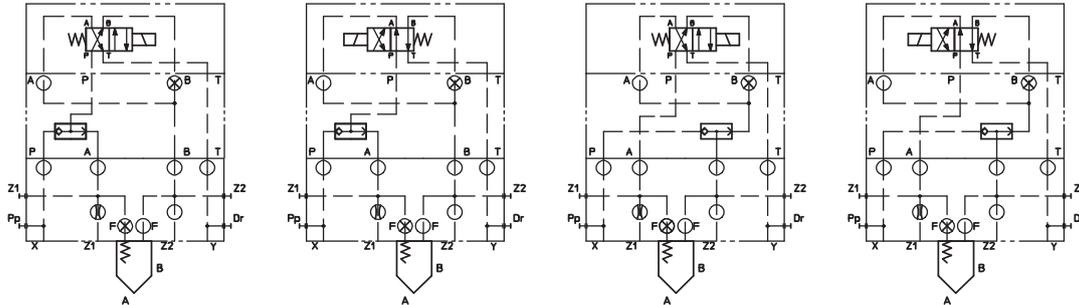


LIDEW4*-*

LIDEW5*-*

LIDEW6*-*

LIDBH



LIDBH1A*-*

LIDBH1C*-*

LIDBH2A*-*

LIDBH2C*-*

3 OPTIONS

For LIDEW*, LIDBH* covers (sizes 40...63):

/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 by rubber cap for solenoid pilot valve. See table K150.

******* = 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:

3.1 Possible combined options:

All combinations are available

LIDEW2

- 1

/*

AO

24DC

**

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 tenths 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

Cover \ Port	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	I*
Cartridge valve						Seals material: - = NBR PE = FKM BT = HNBR
Size (ISO 7368): 16 25 32 40 50 63						High flow: 40 = all sizes
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	

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	Any position
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 ÷ +70°C / PE option = -20°C ÷ +70°C / BT option = -40°C ÷ +70°C
Storage temperature range	Standard = -20°C ÷ +80°C / PE option = -20°C ÷ +80°C / BT option = -40°C ÷ +70°C
Surface protection	Zinc coating with black passivation - salt spray test (EN ISO 9227) > 200 h
Compliance	Explosion proof protection, see section 11 -Flame proof enclosure "Ex d" -Dust ignition protection by enclosure "Ex t" 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 = 210
Rated flow	see section 6

9 ELECTRICAL CHARACTERISTICS

Valve type	LIDEW*/AO LIDBH*/AO	LIDEW*/AO/M LIDBH*/AO/M	LIDEW*/AO/UL LIDBH*/AO/UL
Voltage code (1) $V_{DC} \pm 10\%$	12DC, 24DC, 28DC, 48DC, 110DC, 125DC, 220DC		12DC, 24DC, 110DC, 125DC, 220DC
$VAC 50/60 Hz \pm 10\%$	12AC, 24AC, 110AC, 230AC		12AC, 24AC, 110AC, 230AC
Power consumption at 20°C	8W		12W
Coil insulation	class H		
Protection degree with relevant cable gland	IP66/67 to DIN EN60529		raintight enclosure, UL approved
Duty factor	100%		

(1) For alternating current supply a rectifier bridge is provided built-in the solenoid
For power supply frequency 60 Hz, the nominal supply voltage of solenoids 110AC and 230AC must be 115/60 and 240/60 respectively

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 mm ² /s - max allowed range 2.8 ÷ 500 mm ² /s		
Max fluid contamination level	ISO 4406 class 20/18/15 NAS 1638 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, HVL, HVLDP	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 EX-PROOF SOLENOIDS CERTIFICATION DATA

Valve type	LIDEW*/AO LIDBH*/AO	LIDEW*/AO/M LIDBH*/AO/M	LIDEW*/AO/UL LIDBH*/AO/UL		
Certifications	ATEX IECEx EAC PESO Multicertification Group II	ATEX IECEx Multicertification Group I	cULus North American cULus		
Solenoid certified code	OA	OA/M	OA/EC		
Type examination certificate (1)	ATEX: CESI 02 ATEX 014 IECEX: IECEx CES 10.0010x EAC: TC RU C-IT. 08.B.01784 PESO: P468212/2 CCC: 2020322307003240	ATEX: CESI 03 ATEX 057x IECEX: IECEx CES 12.0007x	2017324 - E366100		
Method of protection	<ul style="list-style-type: none"> • ATEX, EAC Ex II 2G Ex d IIC T6/T4/T3 Gb Ex II 2D Ex tb IIIC T85°C/T200°C Db • IECEx Ex d IIC T6/T4/T3 Gb Ex tb IIIC T85°C/T200°C Db • PESO Ex db IIC T6/T4/T3 Gb • CCC Ex d IIC T6/T4/T3 Gb Ex tD A21 IP66/IP67 T85°C/T135°C/T200°C 	<ul style="list-style-type: none"> • ATEX Ex I M2 Ex db I Mb • IECEx Ex db I Mb 	<ul style="list-style-type: none"> • UL 1203 Class I, Div.I, Groups C & D Class I, Zone I, Groups IIA & IIB 		
Temperature class	T6	T4	-	T6	T5
Surface temperature	≤ 85 °C	≤ 135 °C	≤ 150 °C	≤ 85 °C	≤ 100 °C
Ambient temperature (2)	-40 ÷ +45 °C	-40 ÷ +70 °C	-20 ÷ +70 °C	-40 ÷ +55 °C	-40 ÷ +70 °C
Applicable standards	EN 60079-0: 2012+A11:2013 EN 60079-1:2014 EN 60079-31:2014	IEC 60079-0:2017 IEC 60079-1:2017-04 IEC 60079-31:2013	UL 1203 and UL429, CSA 22.2 n°30-1986 CSA 22.2 n°139-13		
Cable entrance: threaded connection vertical (standard) or horizontal (option /O)	GK = GK-1/2" M = M20x1,5 NPT = 1/2" NPT			1/2" NPT ANSI/ASME B46.1	

(1) The type examiner certificates can be downloaded from www.atos.com

(2) The solenoids **Group II** and **cULus** are certified for minimum ambient temperature -40°C

In case the complete valve must withstand with minimum ambient temperature of -40°C, select **/BT** in the model code

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

12 EX PROOF SOLENOIDS WIRING

Multicertification

Standard version **Option /O**

① cover with threaded connection for vertical cable gland fitting
 ② cover with threaded connection for horizontal cable gland fitting
 ③ terminal board for cables wiring
 ④ standard manual override
 ⑤ screw terminal for additional equipotential grounding

1 = Coil PCB 3 poles terminal board
2 = GND suitable for wires cross sections
3 = Coil up to 2,5 mm² (max AWG14)

cULus certification

Standard version **Option /O**

① cover with threaded connection for vertical cable gland fitting
 ② cover with threaded connection for horizontal cable gland fitting
 ③ terminal board for cables wiring
 ④ standard manual override

⚠ Pay attention to coil polarity

1 = Coil + PCB 3 poles terminal board sugges-
2 = GND sted cable section up to 1,5 mm²
3 = Coil - (max AWG16), see section **13** note 1

alternative GND screw terminal connected to solenoid housing

13 CABLE SPECIFICATION AND TEMPERATURE - Power supply and grounding cables have to comply with following characteristics:

<p>Multicertification Group I and Group II</p> <p>Power supply: section of coil connection wires = 2,5 mm²</p>	<p>Grounding: section of internal ground wire = 2,5 mm² section of external ground wire = 4 mm²</p>
<p>cULus certification:</p> <ul style="list-style-type: none"> Suitable for use in Class I Division 1, Gas Groups C Armored Marine Shipboard Cable which meets UL 1309 Tinned Stranded Copper Conductors Bronze braided armor Overall impervious sheath over the armor <p>Any Listed (UBVZ/UBVZ7) Marine Shipboard Cable rated 300 V min, 15A min. 3C 2,5 mm² (14 AWG) having a suitable service temperature range of at least -25°C to +110°C ("BT" Models require a temperature range from -40°C to +110°C)</p> <p>Note 1: For Class I wiring the 3C 1,5 mm² AWG 16 cable size is admitted only if a fuse lower than 10 A is connected to the load side of the solenoid wiring.</p>	

13.1 Cable temperature

The cable must be suitable for the working temperature as specified in the "safety instructions" delivered with the first supply of the products.

Multicertification

Max ambient temperature [°C]	Temperature class		Max surface temperature [°C]		Min cable temperature
	Group I	Group II	Group I	Group II	
45 °C	-	T6	150 °C	85 °C	not prescribed
70 °C	-	T4	150 °C	135 °C	90 °C

cULus certification

Max ambient temperature [°C]	Temperature class	Max surface temperature [°C]	Min cable temperature
55 °C	T6	85 °C	100 °C
70 °C	T5	100 °C	100 °C

14 CABLE GLANDS only for Multicertification

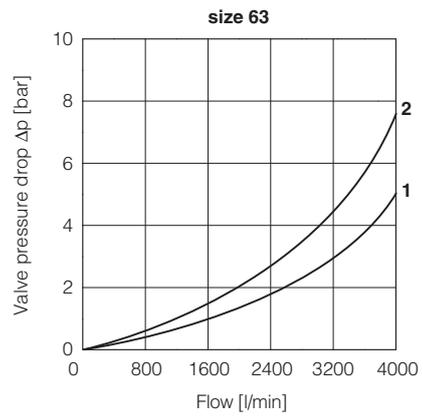
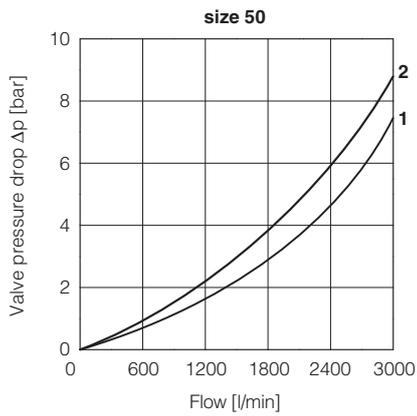
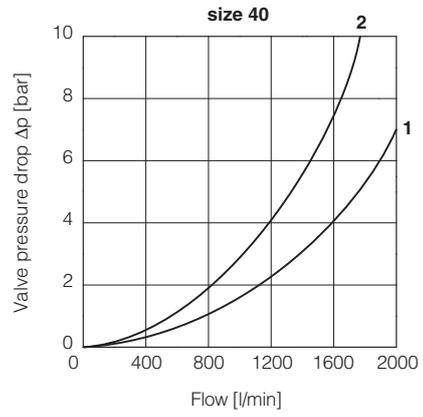
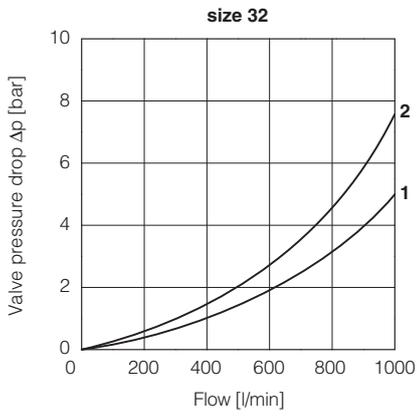
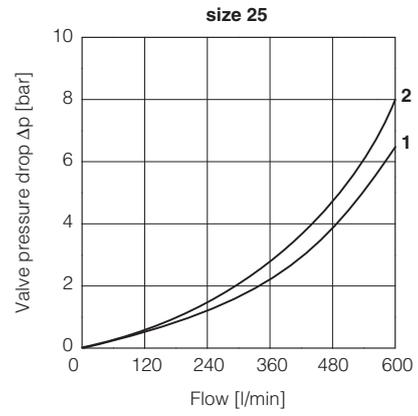
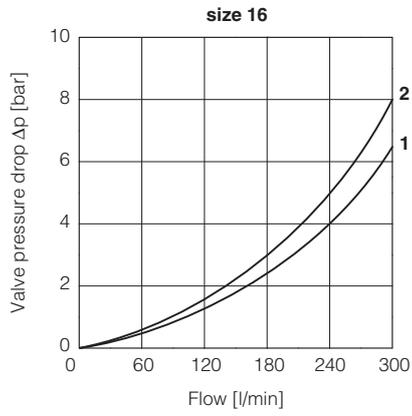
Cable glands with threaded connections GK-1/2", 1/2"NPT or M20x1,5 for standard or armoured cables have to be ordered separately, see tech. table **KX800**

Note: a Loctite sealant type 545, should be used on the cable gland entry threads

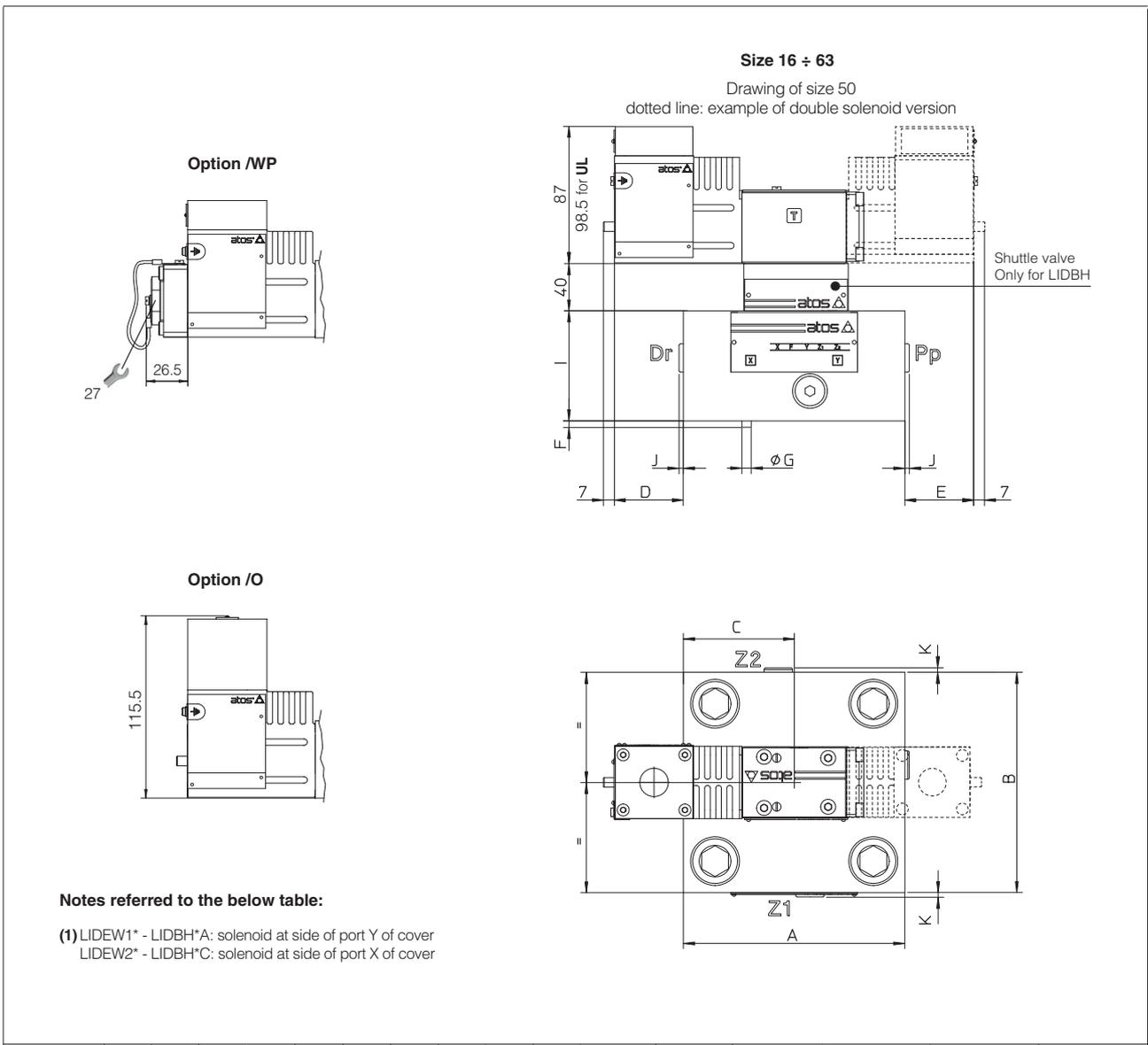
15 **Q/Δp DIAGRAMS** based on mineral oil ISO VG 46 at 50 °C

SC LI High flow - series 40

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



16 COVER INSTALLATION DIMENSIONS [mm] - Multicertified and UL - for cartridge cavity dimensions see tech table P006



Size (1)	A	B	C	D max	E max	F	G	I	J	K	Ports Pp-Dr	Ports Z1-Z2	Seals	Fastening bolts (3)	Tightening torque [Nm]	Mass [Kg]
16	70	65	41	80	92	4	3	40	-	-	-	-	4 OR-108	Nr. 4 M8x45	35	3,95 ÷ 5,7
25	85	85	42,5	78	78	6	5	40	-	-	-	-	4 OR-108	Nr. 4 M12x45	125	4,35 ÷ 6,1
32	100	100	50	71	71	6	5	50	-	-	-	-	4 OR-2043	Nr. 4 M16x55	300	4,85 ÷ 6,7
40	125	125	62,5	58	58	6	5	60	3,5	-	G 1/4	-	4 OR-3043	Nr. 4 M20x70	600	7,75 ÷ 9,6
50	140	140	70	51	51	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	31	31	4	6	80	3,5	3,5	G 3/8	G 3/8	4 OR-3050	Nr. 4 M30x90	2100	18,65 ÷ 20,4

17 RELATED DOCUMENTATION

X010	Basics for electrohydraulics in hazardous environments	EX900	Operating and maintenance information for ex-proof on-off valves
X020	Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, CCC, PESO	KX800	Cable glands for ex-proof valves
X030	Summary of Atos ex-proof components certified to cULus	P006	Mounting surfaces and cavities for cartridge valves