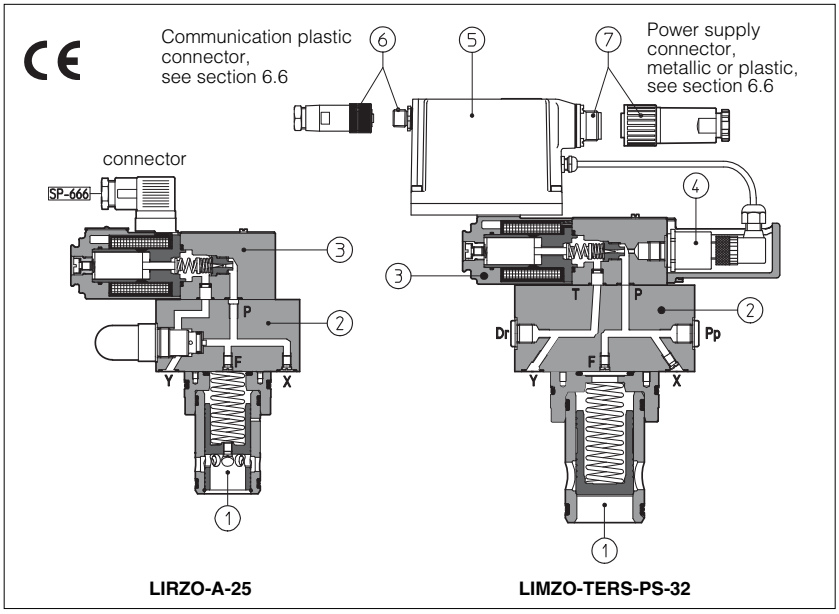
Proportional pressure control cartridges type LI*ZO

compensator, relief, reducing, ISO 7368 sizes from 16 to 80



LIRZO-A-25 **LIMZO-TERS-PS-32**

LICZO, LIMZO and LIRZO are 2-way proportional pressure cartridges which provide compensation, relief and reducing controls according to the electronic reference signals.

They operate in association with electronic drivers, see section 11 which supply the proportional valves with proper current to align valve regulation to the reference signal supplied to the electronic driver.

These valves are composed by a 2-way cartridge ① housed in a recess of standard ISO/DIN dimensions and by a closing cover ② with a piloting proportional pressure relief valve ③ type RZMO, see tab. F007.

They are available in different executions:

- -A, without pressure transducer.
- -AE, -AES, as -A plus analogue (AE) or digital (AES) integral electronics.
- -TERS with integral pressure transducer ④ plus digital electronics ⑤ preset in closed loop, featuring improved static and dynamic performances.
- -AERS as -TERS but without integral pressure transducer (predisposed for connection of remote pressure transducer).

The integral electronics ⑤ ensures factory presetting, fine functionality plus valve-to-valve interchangeability and simplified wiring and installation.

Following communication interfaces ⑥ are available for the digital -AES, -TERS and -AERS executions:

- -PS, RS232 serial communication interface. The valve reference signal is provided with analogue commands via the 7 (or 12) pins connector ⑦.
- -BC, CANbus interface
- -BP, PROFIBUS-DP interface

In the -BC and -BP interfaces the valve reference signal is provided via fieldbus; during start up or maintenance, the valves can be operated with analogue signals via the 7 (or 12) pins connector ⑦.

Size: 16, 25, 32, 40, 50, 63, 80.
Max flow: up to 3000 l/min.
Max pressure: 315 bar.

1 MODEL CODE FOR COVERS

LIMZO - TERS - PS - 3 / 210 / * ** / *

Proportional cartridge valves
LICZO = pressure compensator
LIMZO = pressure relief
LIRZO = pressure reducing

A = without pressure transducer
AE = as A plus integral electronics
AES = as A plus integral digital electronics
TERS = with integral digital electronics and pressure transducer
AERS= as TERS but with remote pressure transducer (to be ordered separately, see tab. G460)

Communication interfaces (only for AES, TERS and AERS)
PS = RS232 serial
BC = CANbus
BP = PROFIBUS-DP

Size:
1 = 16; **2** = 25; **3** = 32; **4** = 40; **5** = 50 (not for LIRZO)
6 = 63; (only for LIMZO) **8** = 80; (only for LIMZO-A, -AE, -AES)

Max regulated pressure:
50 = 50 bar (not for -TERS and -AERS)
100 = 100 bar **210** = 210 bar **315** = 315 bar

Synthetic fluids
WG = water-glycol
PE = phosphate ester

Series number

Option:
P = with integral mechanical pressure limiter (standard for size 1, 2 and 3)
for -A execution:
6 = with 6 Vdc coil instead of standard 12Vdc coil
18 = with 18 Vdc coil instead of standard 12Vdc coil
for -AE executions:
I = current reference (4÷20 mA)
Q = enable signal
for -AES, -TERS and -AERS executions:
I = current reference 4÷20 mA (only for -TERS execution)
Z = double power supply, enable and fault (12 pin connector)
C = remote pressure transducer with current feedback 4÷20 mA (only for AERS execution)

2 MODEL CODE FOR CARTRIDGES

SC LI - 32 31 2 ** / *

Cartridge according to ISO 7368

Size: the same of relative cover

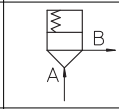
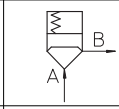
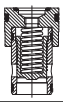
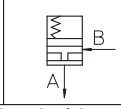
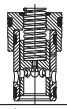
Type of cartridge, see section 3 for functions
31 = for LIMZO and LICZO **36** = for LICZO **37** = for LIRZO

Spring cracking pressure:
2 = 1,5 bar for poppet 31
3 = 3 bar; **6** = 6 bar for poppet 31 and 36
4 = 4 bar: **7** = 7 bar for poppet 37

Synthetic fluids
WG = water-glycol
PE = phosphate ester

Series number

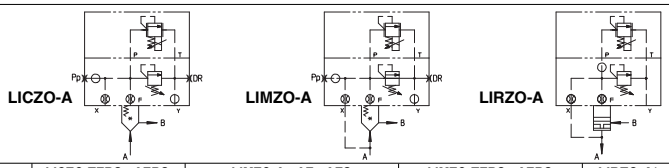
3 TYPICAL FUNCTIONS OF CARTRIDGES

Type	Functional sketch (hydraulic symbol)	Typical section	Area ratio (1)
31			1:1
36			1:1
37			1:1

(1) It is the ratio of the area A to the area on which the pilot pressure is applied.

4 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols



Valve model		LICZO-A*					LICZO-TERS, -AERS					LIMZO-A, -AE, -AES							LIMZO-TERS, -AERS						LIRZO-A*			-TERS, -AERS		
Valve size		16	25	32	40	50	16	25	32	40	50	16	25	32	40	50	63	80	16	25	32	40	50	63	16	25	32	16	25	32
Max flow	[l/min]	200	400	750	1000	2000	200	400	750	1000	2000	200	400	750	1000	2000	3000	4500	200	400	750	1000	2000	3000	160	320	600	160	320	600
Min regulated pressure at port A	[bar]	9	8,5	8	13	15	9	8,5	8	13	15	7	7	7	10,5	12	12	(1)	7	7	7	10,5	12	12	7					
Max regulated pressure at port A	[bar]	50; 100; 210; 315					100; 210; 315					50; 100; 210; 315							100; 210; 315											
Response time 0-100% step signal (depending on installation) -see section 9.4	[ms]	100-400					80-300					100-450							80-350						100-220			80-170		
Hysteresis	[% of the regulated max pressure]	≤ 2					≤ 0,5					≤ 1,5							≤ 0,5						≤ 2			≤ 0,5		
Linearity	[% of the regulated max pressure]	≤ 3					≤ 1					≤ 3							≤ 1						≤ 1					
Repeatability	[% of the regulated max pressure]	≤ 2					≤ 0,2					≤ 2							≤ 0,2						≤ 0,2					
Thermal drift		zero point displacement < 1% at ΔT = 40°C																												

(1) consult our technical office

Above performance data refer to valves coupled with Atos electronic drivers, see section 11.

5 MAIN CHARACTERISTICS OF PROPORTIONAL PRESSURE CARTRIDGES TYPE LI*ZO

Assembly position	Any position
Subplate surface finishing	Roughness index, $\sqrt{}^{0.4}$ flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	-20°C ÷ +70°C for -A execution; -20°C ÷ +60°C for -AE and -AES; -20°C ÷ +50°C for -TERS and -AERS
Fluid	Hydraulic oil as per DIN 51524 ... 535 for other fluids see section 1
Recommended viscosity	15 ÷100 mm²/s at 40°C (ISO VG 15÷100)
Fluid contamination class	ISO 18/15 achieved with in line filters of 10 μm and $\beta_{10} \geq 75$ (recommended)
Fluid temperature	-20°C +60°C (standard and /WG seals) -20°C +80°C (/PE seals)

5.1 Electrical characteristics

Coil resistance R at 20°C	3 ÷ 3.3 Ω for standard 12 V_{DC} coil; 2 ÷ 2,2 Ω for 6 V_{DC} coil; 13 ÷ 13,4 Ω for 18 V_{DC} coil
Max solenoid current	2,6 A for standard 12 V_{DC} coil; 3,25 A for 6 V_{DC} coil; 1,5 A for 18 V_{DC} coil
Max power	40 Watt
Protection degree (CEI EN-60529)	IP65 for -A execution; IP65÷67 for -AE, -TERS and AERS executions, depending to the connector type (see sect. 6.6)
Relative duty factor	Continuous rating (ED=100%)

6 INTEGRAL ELECTRONICS OPTIONS AND WIRING

6.1 Option /I
It provides the 4÷20 mA current reference signal and the current feedback signals instead of the standard 0÷10 V. It is normally used in case of long distance between the machine control unit and the valve or where the reference signal can be affected by electrical noise. In case of breakage of the reference signal cable, the valve functioning is disabled.

6.2 Option /Q
Safety option providing the possibility to enable or disable the valve functioning without cutting the power supply.

6.3 Option /Z
Safety option, specifically introduced for -BC and -BP communication interfaces, provides two separated electric power supplies for the digital electronic circuits and for the solenoid power supply stage. The Enable and Fault signals are also available. The option **/Z** allows to interrupt the valve functioning by cutting the solenoid power supply (e.g. for emergency, as provided by the European Norms EN954-1 for components with safety class 2), but keeping energized the digital electronic circuits, thus avoiding fault conditions of the machine fieldbus controller.
For the electrical wiring of -AES, -TERS and AERS electronics with option **/Z** (12 pin connector), see tab. G115 and G205.

6.4 Option /C
The valve electronics is set to receive the 4÷20 mA feedback signal from the remote pressure transducer, instead of the standard 0÷10 V.

6.5 Integral electronics wiring
For the electric wiring shielded cables must be provided: the shield must be connected to the power supply zero **on the generator side**, see tab. **F003**

POWER SUPPLY CONNECTOR				
PIN	SIGNAL DESCRIPTION	**-AE, -AES, -TERS, -AERS**	**-AE/I (-TERS/I, -AERS/I)**	**-AE/Q**
A	Power supply 24 V_{DC}	Stabilized: +24V_{DC}		
B	Power supply zero	Filtered and rectified: V_{rms} = 21 ÷ 33 (ripple max 2V_{pp})		
C	Signal zero	Reference 0 V_{DC}	Reference 0 V_{DC}	Enabling input normal working 9 ÷ 24 V_{DC}
D	Input signal +	0 ÷ 10 V_{DC}	4 ÷ 20 mA	0 ÷ 10 V
E	Input signal -			
F	Monitor driving current (for -AE, -AES) regulated pressure (for -TERS, -AERS)	0 ÷ 10 V referred to pin C (signal 0 V_{DC}) 1V = 1A 1V = 10% of regulated pressure	0 ÷ 5 V (-AE/I) 4 ÷ 20 mA (-TERS/I) 1V = 1A 4 ÷ 20 mA = 0÷100% of regulated pressure	0 ÷ 5 V referred to pin B (signal 0 V_{DC}) 1V = 1A –
G	Earth	Connect only when the power supply is not conform to VDE 0551 (CEI 14/6)		

COMMUNICATION INTERFACE CONNECTORS (-AES, -TERS, -AERS)				
Communication options		**-PS** (RS232) male connector	**-BC** (CAN Bus) male connector	**-BP** (PROFIBUS-DP) female connector (reverse key)
Pin number Signal description	1	NC Not Connected	CAN_SHLD Shield	+5V Termination voltage
	2	NC Not Connected	NC Not Connected	LINE -A Bus line (high)
	3	RS_GND Signal zero data line	CAN_GND Signal zero data line	DGND Signal zero data line / termination voltage
	4	RS_RX Valves receiving data line	CAN_H Bus line (high)	LINE-B Bus line (low)
	5	RS_TX Valves transmitting data line	CAN_L Bus line (low)	SHIELD Shield

PRESSURE TRANSDUCER CONNECTOR (-AERS) see section 10		
PIN	**standard version**	option **/C**
1	Pressure signal	Pressure signal
2	Reserved (do not connect)	Reserved (do not connect)
3	Power supply	Power supply
4	GND	Reserved (do not connect)

Note:
- electrical signals (e.g. feedback signals) processed by valve electronics must not be used to switch off the machine safety functions. This is in accordance with the European standards (Safety requirements of fluid technology systems and components - hydraulics, EN 982).
- installation notes with basic information for commissioning and start-up are always supplied with the relevant components, together with the specific technical tables.

6.6 Model codes of power supply and communication connectors

VALVE VERSION	**-A**	**-AE, -AES, -TERS, -AERS**		**-AES/Z, -TERS/Z, -AERS/Z**	**-RS232 (-PS) OR CANBUS (-BC)**	**PROFIBUS (-BP)**	**PRESSURE TRANSDUCER** *only for AERS*
CONNECTOR CODE	**SP-666**	**SP-ZH-7P** (1)	**SP-ZM-7P** (1)	**SP-ZH-12P** (1)	**SP-ZH-5P** (1)	**SP-ZH-5P/BP** (1)	**SP-ZH-4P-M8/5** (1)
PROTECTION DEGREE	**IP65**	**IP67**	**IP67**	**IP65**	**IP67**	**IP67**	**IP67**

(1) to be ordered separately

7 PROGRAMMING DEVICES

The functional parameters of the digital valves, as the bias, scale, ramp and linearization of the regulation characteristic, can be easily set and optimized with graphic interface by using the following software programming devices suitable for standard PC:

KIT-E-SW-PS for electronics with RS232 interface (option **-PS**)

KIT-E-SW-PS-TERS only for -TERS-PS electronics - simplified version of KIT-E-SW-PS with only bias and scale settings.

KIT-E-SW-PS-TERS/U as KIT-E-SW-PS-TERS with serial to USB interface.

KIT-E-SW-BC for electronics with CANbus interface (option **-BC**)

KIT-E-SW-BP for electronics with PROFIBUS-DP interface (option **-BP**)

see tab. G500 for complete information about the programming device kits and for the PC minimum requirements.

Only for the -BC and -BP communication options, the functional parameters can be alternatively set via fieldbus through the machine control unit, using the standard communication protocol implemented by Atos.

The protocol operating instructions to be implemented in the standard protocols (DS301V4.02, DSP408 for CANbus and DPVO for PROFIBUS-DP) are described in the user manuals MAN-S-BC (for -BC option) and MAN-S-BP (for -BP option) supplied with the relevant programming device kits.

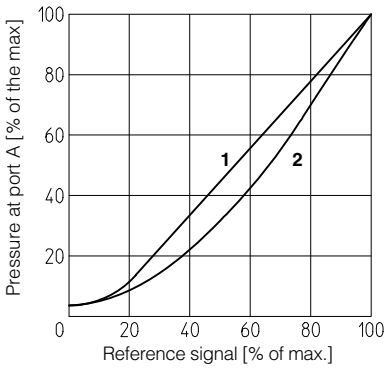
The above programming devices have to be ordered separately.

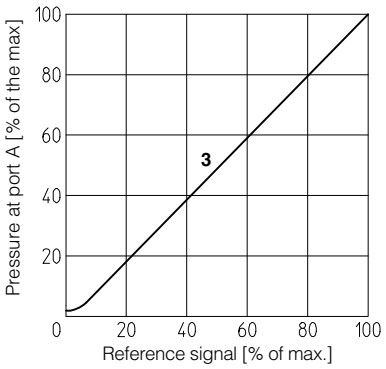
8 DIAGRAMS OF LICZO/LIMZO (based on mineral oil ISO VG 46 at 50 °C)

8.1 Regulation diagrams

1 = LIMZO-A, LIMZO-AE, LIMZO-AES
2 = LICZO-A, LICZO-AE, LICZO-AES
3 = LICZO-TERS, LICZO-AERS, LIMZO-TERS, LIMZO-AERS

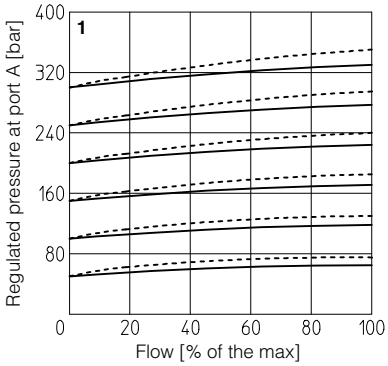
Note:
1) For the valves with digital electronics, the regulation characteristic can be modified by setting the internal software parameters, see tab. G500.

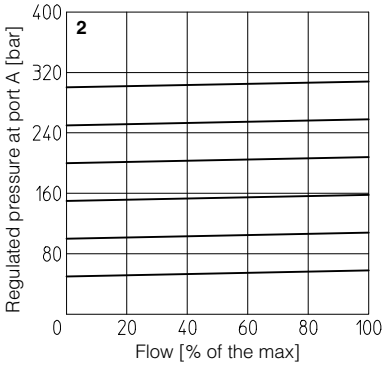




8.2 Pressure/flow diagrams

1 = LICZO-A, LICZO-AE, LICZO-AES
LIMZO-A, LIMZO-AE, LIMZO-AES
2 = LICZO-AERS, LICZO-TERS
LIMZO-AERS, LIMZO-TERS

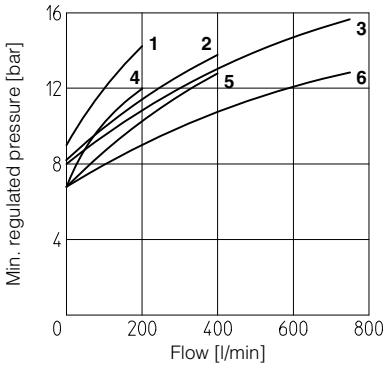


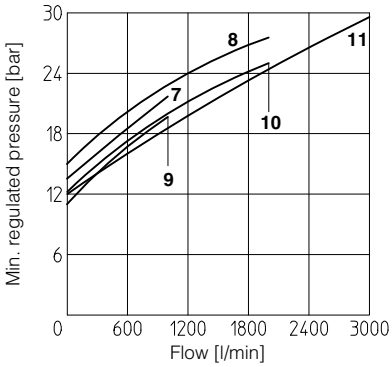


8.3 Min. pressure/flow diagrams
with reference signal "null"

1 = LIMZO-*-1
2 = LIMZO-*-2
3 = LIMZO-*-3
4 = LICZO-*-1
5 = LICZO-*-2
6 = LICZO-*-3
7 = LICZO-*-4
8 = LICZO-*-5
9 = LIMZO-*-4
10 = LIMZO-*-5
11 = LIMZO-*-6

Note: for LIMZO-*-8 consult our technical office





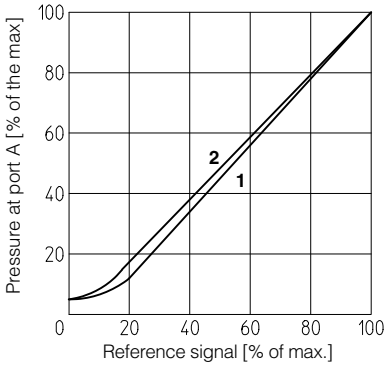
9 DIAGRAMS OF LIRZO (based on mineral oil ISO VG 46 at 50 °C)

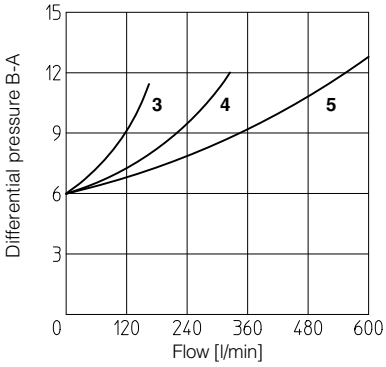
9.1 Regulation diagrams

1 = LIRZO-TERS, LIRZO-AERS
2 = LIRZO-A, LIRZO-AE, LIRZO-AES

9.2 Min. pressure/flow diagrams
with reference signal "null"

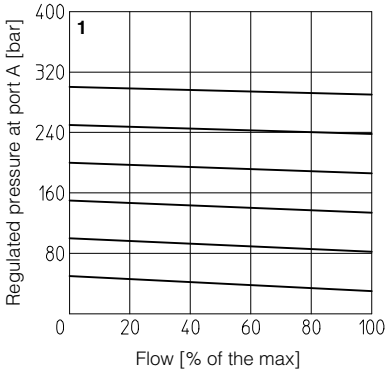
3 = LIRZO-*-1
4 = LIRZO-*-2
5 = LIRZO-*-3

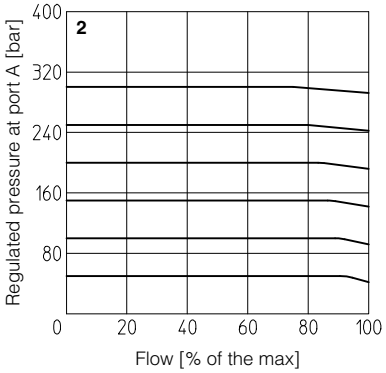




9.3 Pressure/flow diagrams

1 = LIRZO-A, LIRZO-AE, LIRZO-AES
2 = LIRZO-AERS, LIRZO-TERS

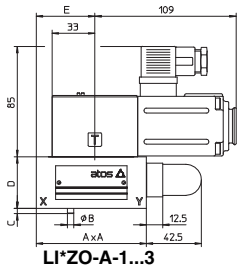




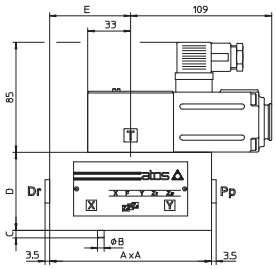
9.4 Dynamic response
The response times in section 4 have to be considered as average values.

The integral closed loop control of -TERS and -AERS valves is affected by the stiffness of the hydraulic circuit: greater is the stiffness of the circuit, the better are the perfomances. The valves dynamic performances can be optimized depending on the stiffness characteristics of the hydraulic circuit, by setting the internal software parameters. This regulation is particularly helpful in case of circuits with accumulators and/or with great fluid volumes and/or with long hoses.

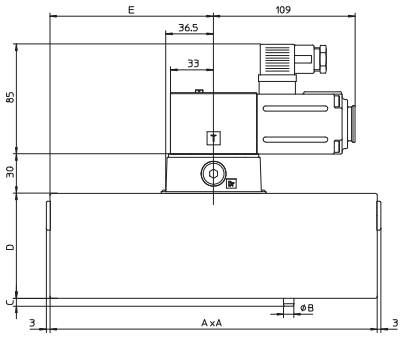
10 COVER DIMENSIONS of LI*ZO-AE and -AES [mm]



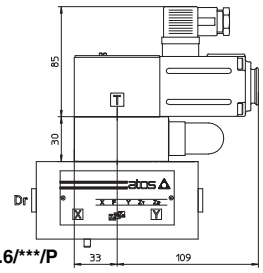
LI*ZO-A-1...3



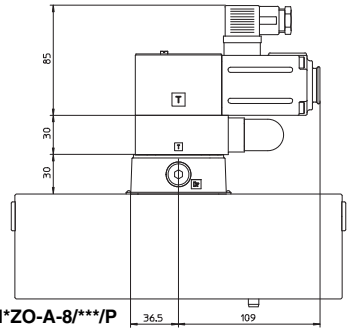
LI*ZO-A-4...6



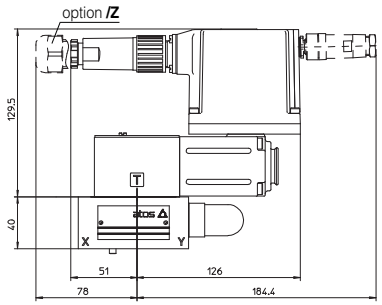
LI*ZO-A-8



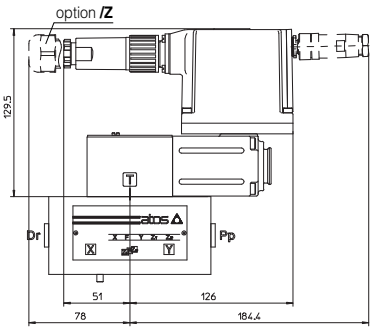
LI*ZO-A-4...6/*/P**



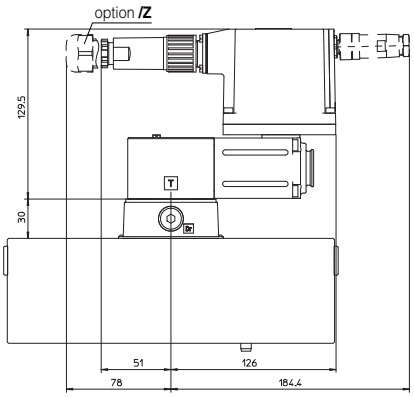
LI*ZO-A-8/*/P**



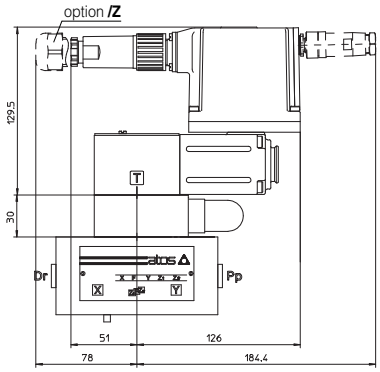
LI*ZO-AE-1...3
LI*ZO-AES-*-1...3 (dotted line)



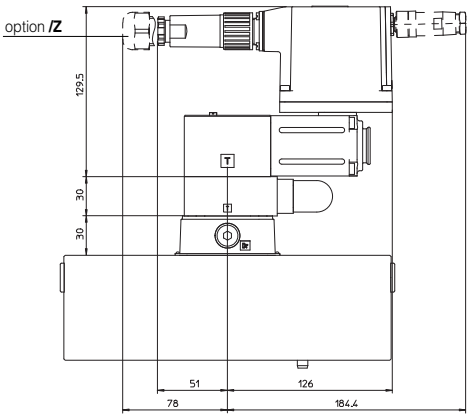
LI*ZO-AE-4...6
LI*ZO-AES-4...6 (dotted line)



LI*ZO-AE-8
LI*ZO-AES-8 (dotted line)



LI*ZO-AE-4...6/*/P**
LI*ZO-AES-*-4...6/*/P** (dotted line)

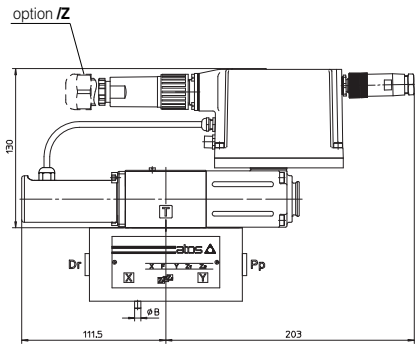


LI*ZO-AE-8/*/P**
LI*ZO-AES-*-8/*/P** (dotted line)

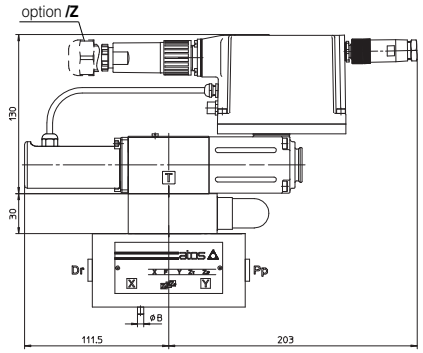
Sizes	A	Ø B	C	D	E	Port Pp-Dr	Seal	Fastening bolts class 12.9	Tightening torque Nm	Mass (Kg) -A	Mass (Kg) -AE, -AES
16	65(1)	3	4	40	45,25	-	2 OR 108	n° 4 M8x45	35	3,5	4,1
25	85	5	6	40	42,5	-	2 OR 108	n° 4 M12x45	125	4	4,6
32	100	5	6	50	50	-	2 OR 2043	n° 4 M16x55	300	5,3	5,9
40	125	5	6	60	62,5	G 1/4	2 OR 2050	n° 4 M20x70	600	8,9 (2)	9,5 (2)
50	140	6	4	70	70	G 1/4	2 OR 2050	n° 4 M20x80	600	12,4 (2)	13 (2)
63	180	6	4	80	90	G 3/8	2 OR2056	n° 4 M30x90	2100	21,6 (2)	22,2 (2)
80	Ø250	8	6	80	125	G 3/8	2 OR123	n° 8 M24x90	1000	33 (2)	33,6 (2)

(1) Cover is not squared: 65x80
(2) For option /P the weight is increased by 1,4 Kg

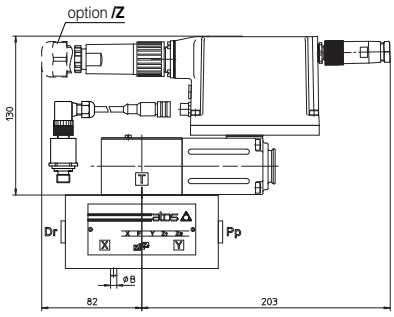
11 COVER DIMENSIONS of LI*ZO-TERS and -AERS [mm]



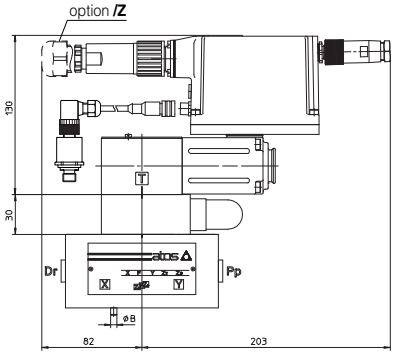
LI*ZO-TERS-*-1...6



LI*ZO-TERS-*-4...6/*/P**



LI*ZO-AERS-*-1...6



LI*ZO-AERS-*-4...6/*/P**

Sizes	A	Ø B	C	D	Port Pp-Dr	Seal	Fastening bolts class 12.9	Tightening torque Nm	Mass (Kg) -TERS -AERS
16	65(1)	3	4	40	-	2 OR 108	n° 4 M8x45	35	4,3
25	85	5	6	40	-	2 OR 108	n° 4 M12x45	125	4,8
32	100	5	6	50	-	2 OR 2043	n° 4 M16x55	300	6,1
40	125	5	6	60	G 1/4	2 OR 2050	n° 4 M20x70	600	9,7 (2)
50	140	6	4	70	G 1/4	2 OR 2050	n° 4 M20x80	600	13,2 (2)
63	180	6	4	80	G 3/8	2 OR2056	n° 4 M30x90	2100	22,4 (2)

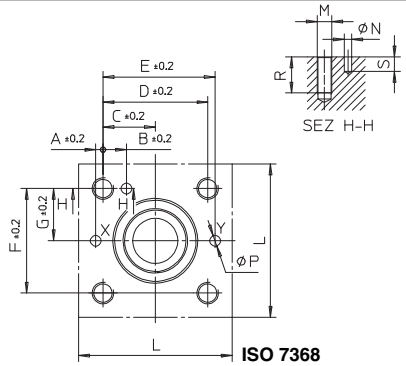
(1) Cover is not squared: 65x80
(2) For option /P the weight is increased by 1,4 Kg

12 ELECTRONIC DRIVERS FOR LICZO-*, LIMZO-*, LIRZO-*

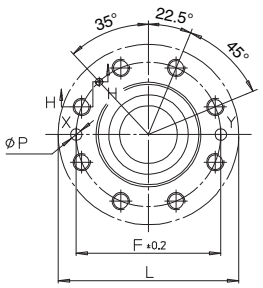
Valve model	-A				-AE	-AES	-TERS	-AERS
Drivers model	E-MI-AC-01F	E-BM-AC-01F	E-ME-AC-01F	E-RP-AC-01F	E-RI-AE	E-RI-AES	E-RI-TERS	E-RI-AERS
Data sheet	G010	G025	G035	G100	G110	G115	G205	

For complete information about the drivers characteristics and relevant options, see the technical data sheet specified in the table.

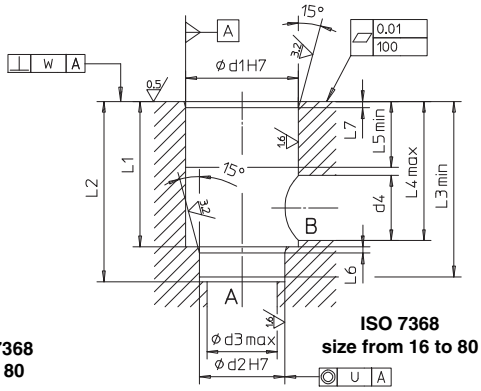
13 COVER INTERFACE AND RECESS DIMENSIONS [mm]



ISO 7368 size from 16 to 63



ISO 7368 size 80



ISO 7368 size from 16 to 80

	COVER INTERFACE													RECESS											
Size	A	B	C	D	E	F	G	L	M	Ø N	P_{max}	R	S min	ød1	ød2	ød3	ød4	L1	L2	L3	L4	L5	L6	L7	U	W
16	2	12,5	23	46	48	46	23	65	M8	4	4	20	6	32	25	16	16	$43^{+0,1}_{0}$	$56^{+0,1}_{0}$	54	42,5	20	2	2	0,03	0,05
25	4	13	29	58	62	58	29	85	M12	6	6	30	8	45	34	25	25	$58^{+0,1}_{0}$	$72^{+0,1}_{0}$	70	57	30	2,5	2,5	0,03	0,05
32	6	18	35	70	76	70	35	102	M16	6	8	38	8	60	45	32	32	$70^{+0,1}_{0}$	$85^{+0,1}_{0}$	83	68,5	30	2,5	2,5	0,03	0,1
40	7,5	19.5	42.5	85	92.5	85	42,5	125	M20	6	10	46	8	75	55	40	40	$87^{+0,1}_{0}$	$105^{+0,1}_{0}$	102	84,5	30	3	3	0,05	0,1
50	8	20	50	100	108	100	50	140	M20	8	10	46	8	90	68	50	50	$100^{+0,1}_{0}$	$122^{+0,1}_{0}$	117	97,5	35	3	4	0,05	0,1
63	12.5	24.5	62.5	125	137,5	125	62.5	180	M30	8	12	66	8	120	90	63	63	$130^{+0,1}_{0}$	$155^{+0,1}_{0}$	150	127	40	4	4	0,05	0,2
80	-	-	-	-	-	Ø200	-	Ø250	M24	10	16	54	10	145	110	80	80	$175^{+0,2}_{0}$	$205^{+0,2}_{0}$	200	170,5	40	5	5	0,05	0,2
100	-	-	-	-	-	Ø245	-	Ø300	M30	10	20	63	10	180	135	100	100	$210^{+0,2}_{0}$	$245^{+0,2}_{0}$	239	205,5	50	5	5	0.05	0.2