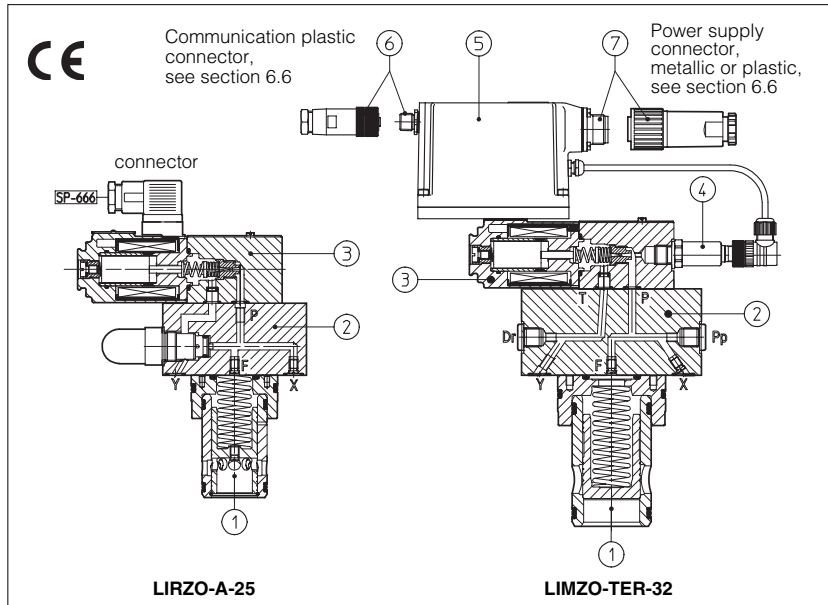


# Proportional pressure cartridges type LI\*ZO

ISO 7368 sizes from 16 to 63



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.

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 (only for LICZO, LIMZO) **6** = 63; (only for LIMZO)

### Option:

**P** = with integral mechanical pressure limiter (standard for size 1, 2 and 3)

for -A execution:

**6** = with 6 V<sub>DC</sub> coil instead of standard 12V<sub>DC</sub> coil

**18** = with 18 V<sub>DC</sub> coil instead of standard 12V<sub>DC</sub> coil

for -AE executions:

**I** = current reference (4÷20 mA)

**Q** = enable signal

for -AES, -TERS and -AERS executions:

**Z** = double power supply, enable and fault (12 pin connector)

**C** = remote pressure transducer with current feedback 4÷20 mA (only for AERS execution)

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

Design number

## 2 MODEL CODE FOR CARTRIDGES - see notes at section 11

**SC LI - 32 31 2 \*\* / \***

Cartridge according to ISO 7368

Size: the same of relative cover

Type of cartridge, see section 11 for functions  
**31** = for LIMZO and LICZO **36** = for LICZO **37** = for LIRZO

Synthetic fluids  
**WG** = water-glycol  
**PE** = phosphate ester

Design number

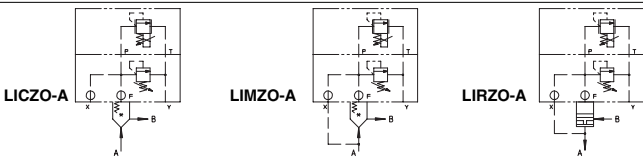
Spring cracking pressure:

**2** = 1,5 bar for poppet 31

**3** = 3 bar and **6** = 6 bar for poppet 31 and 36

**4** = 4 bar and **7** = 7 bar for poppet 37

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

| Hydraulic symbols  |  |     |     |               |      |     |                   |     |      |               |     |     |                   |      |      |               |     |     |     |      |      |      |     |     |     |     |     |     |
|--|--|-----|-----|---------------|------|-----|-------------------|-----|------|---------------|-----|-----|-------------------|------|------|---------------|-----|-----|-----|------|------|------|-----|-----|-----|-----|-----|-----|
| Valve model  | LICZO-A*   |     |     | LICZO-TER (2) |      |     | LIMZO-A*          |     |      | LIMZO-TER (2) |     |     | LIRZO-A*          |      |      | LIRZO-TER (2) |     |     |     |      |      |      |     |     |     |     |     |     |
| Valve size   | 16   | 25  | 32  | 40            | 50   | 16  | 25                | 32  | 40   | 50            | 16  | 25  | 32                | 40   | 50   | 63            | 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          | 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            | 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 |     |     | 50; 100; 210; 315 |      |      | 100; 210; 315 |     |     |     |      |      |      |     |     |     |     |     |     |
| Response time 0-100% signal variation (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  |     |     | ≤ 2           |      |     | ≤ 1,5             |     |      | ≤ 2           |     |     | ≤ 2               |      |      | ≤ 2           |     |     |     |      |      |      |     |     |     |     |     |     |

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

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 <a href="#">I</a>             |
| Recommended viscosity      | 15 ÷ 100 mm <sup>2</sup> /s at 40°C (ISO VG 15÷100)   |
| Fluid contamination class  | ISO 18/15 achieved with in line filters of 10 µm and β <sub>10</sub> ≥ 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 <sub>DC</sub> coil; 2 ÷ 2,2 Ω for 6 V <sub>DC</sub> coil; 13 ÷ 13,4 Ω for 18 V <sub>DC</sub> coil |
| Max solenoid current             | 2,6 A for standard 12 V <sub>DC</sub> coil; 3,25 A for 6 V <sub>DC</sub> coil; 1,5 A for 18 V <sub>DC</sub> 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. For the digital executions -TERS and AERS the option **I** is available on request.

### 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 poles connector), see tab. G115 and G210.

### 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 <sub>DC</sub>   | Stabilized: +24V <sub>DC</sub>  |  |   |
| B                      | Power supply zero   | Filtered and rectified: V <sub>rms</sub> = 21 ÷ 33 (ripple max 2V <sub>pp</sub> )                   |  |   |
| C                      | Signal zero   | Reference 0 V <sub>DC</sub>   | Reference 0 V <sub>DC</sub>  | Enabling input normal working 9 ÷ 24 V <sub>DC</sub>                  |
| D                      | Input signal +  | 0 ÷ 10 V <sub>DC</sub>  | 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 <sub>DC</sub> )<br>1V = 1A<br>1V = 10% of regulated pressure | 0 ÷ 5 V (-AE/I) 4 ÷ 20 mA (-TERS/I)<br>1V = 1A<br>4 ÷ 20 mA = 0÷100% of regulated pressure | 0 ÷ 5 V referred to pin B (signal 0 V <sub>DC</sub> )<br>1V = 1A<br>- |
| 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<br>Signal description                        | 1                             | NC                           | CAN_SHLD   | +5V                 |
|   |                               | Not Connected                | Shield   | Termination voltage |
|   | 2                             | NC                           | NC   | LINE -A             |
|   |                               | Not Connected                | Not Connected                                    | Bus line (high)     |
|   | 3                             | RS_GND                       | CAN_GND  | DGND                |
|   | Signal zero data line         | Signal zero data line        |  |                     |
| 4   | RS_RX                         | CAN_H                        | LINE-B   |                     |
|   | Valves receiving data line    | Bus line (high)              | Bus line (low)                                   |                     |
| 5   | RS_TX                         | CAN_L                        | SHIELD   |                     |
|   | Valves transmitting data line | Bus line (low)               | Shield   |                     |

| PRESSURE TRANSDUCER CONNECTOR (-AERS) see section <a href="#">I0</a> |                  |                 |
|--|------------------|-----------------|
| PIN  | standard version | option /C       |
| 1  | Pressure signal  | Pressure signal |
| 2  | Not connected    | Not connected   |
| 3  | Power supply     | Power supply    |
| 4  | GND              | Not connected   |

#### 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                    | IP66         | 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-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.**

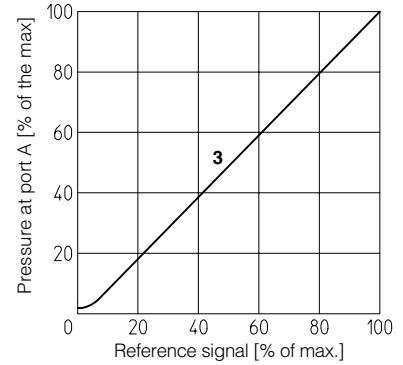
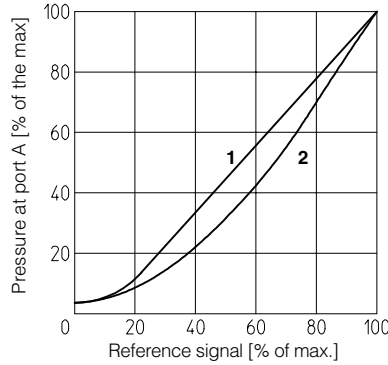
## 8 DIAGRAMS OF LICZO/LIMZO (based on mineral oil ISO VG 46 at 50 °C)

### 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

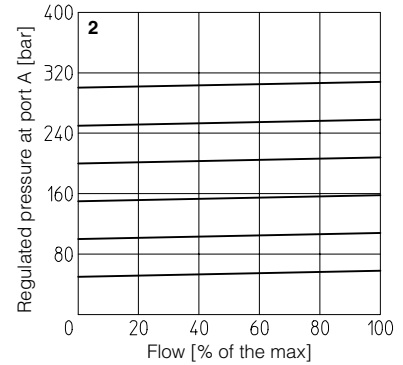
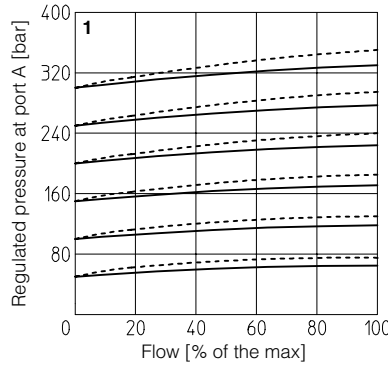
#### Note:

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



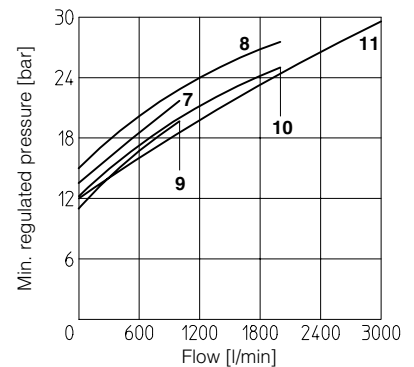
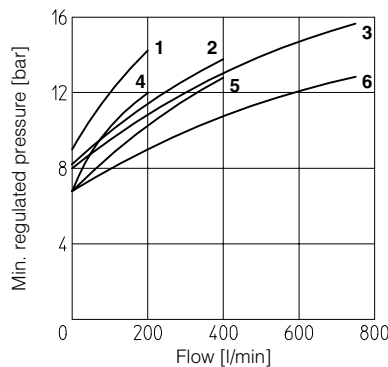
### 8.2 Pressure/flow diagrams

- 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



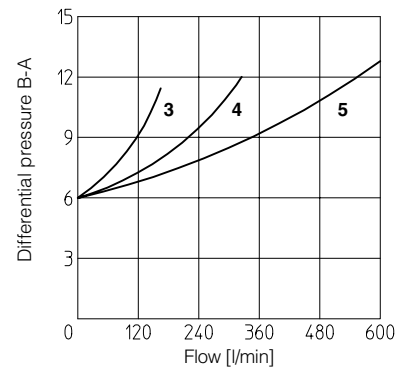
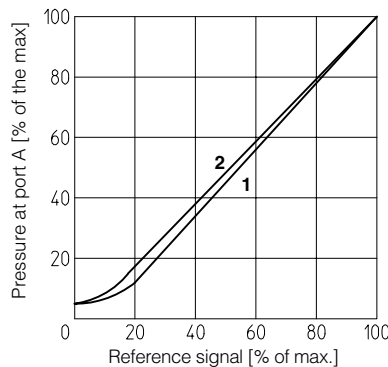
## 9 DIAGRAMS OF LIRZO (based on mineral oil ISO VG 46 at 50 °C)

### 9.1 Regulation diagrams

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

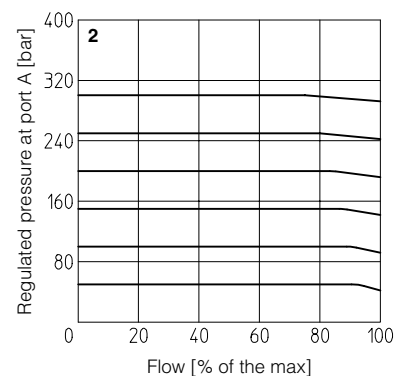
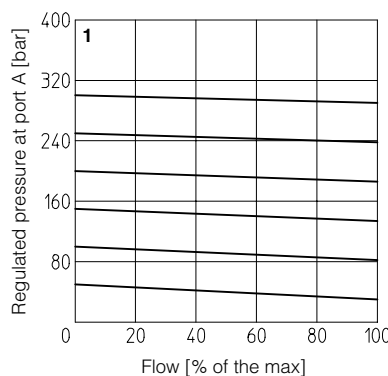
### 9.2 Min. pressure/flow diagrams with reference signal "null"

- 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 2 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 performances. 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 [mm]**

**LI\*ZO-A-1...3**  
option /Z

**LI\*ZO-A-4...6**  
option /Z

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

**LI\*ZO-TERS-4...6\*\*\*P**  
**LI\*ZO-AERS-4...6\*\*\*P** (dotted line)

| Sizes | A                 | B | C | D  | E     | Port Pp-Dr | Seal      | Fastening bolts | Tightening torque | Weight (Kg)         |                     |                     |
|-------|-------------------|---|---|----|-------|------------|-----------|-----------------|-------------------|---------------------|---------------------|---------------------|
|       |                   |   |   |    |       |            |           |                 |                   | -A                  | -AE, -AES           | -TERS, -AERS        |
| 16    | 65 <sup>(1)</sup> | 3 | 4 | 40 | 45,25 | -          | 2 OR 108  | n° 4 M8x45      | 41,6              | 3,5                 | 4,1                 | 4,3                 |
| 25    | 85                | 5 | 6 | 40 | 42,5  | -          | 2 OR 108  | n° 4 M12x45     | 143               | 4                   | 4,6                 | 4,8                 |
| 32    | 100               | 5 | 6 | 50 | 50    | -          | 2 OR 2043 | n° 4 M16x55     | 346               | 5,3                 | 5,9                 | 6,1                 |
| 40    | 125               | 5 | 6 | 60 | 62,5  | G 1/4      | 2 OR 2050 | n° 4 M20x70     | 674               | 8,9 <sup>(2)</sup>  | 9,5 <sup>(2)</sup>  | 9,7 <sup>(2)</sup>  |
| 50    | 140               | 6 | 4 | 70 | 70    | G 1/4      | 2 OR 2050 | n° 4 M20x80     | 674               | 12,4 <sup>(2)</sup> | 13 <sup>(2)</sup>   | 13,2 <sup>(2)</sup> |
| 63    | 180               | 6 | 4 | 80 | 90    | G 3/8      | 2 OR 2056 | n° 4 M30x90     | 1170              | 21,6 <sup>(2)</sup> | 22,2 <sup>(2)</sup> | 22,4 <sup>(2)</sup> |

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

**11 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     | G210      |           |

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

**12 COVER INTERFACE AND RECESS DIMENSIONS [mm]**

| Sizes | ∅ d1 | ∅ d2 | ∅ d3 max | ∅ d4 max | L1                               | L2                               | L3  | L4 max | L5 | L6  | L7  | U    | W    |
|-------|------|------|----------|----------|----------------------------------|----------------------------------|-----|--------|----|-----|-----|------|------|
| 16    | 32   | 25   | 16       | 22,5     | 43 <sup>+0,1</sup> <sub>0</sub>  | 56 <sup>+0,1</sup> <sub>0</sub>  | 54  | 42,5   | 20 | 2   | 2   | 0,03 | 0,05 |
| 25    | 45   | 34   | 25       | 27       | 58 <sup>+0,1</sup> <sub>0</sub>  | 72 <sup>+0,1</sup> <sub>0</sub>  | 70  | 57     | 30 | 2,5 | 2,5 | 0,03 | 0,05 |
| 32    | 60   | 45   | 32       | 38,5     | 70 <sup>+0,1</sup> <sub>0</sub>  | 85 <sup>+0,1</sup> <sub>0</sub>  | 83  | 68,5   | 30 | 2,5 | 2,5 | 0,03 | 0,1  |
| 40    | 75   | 55   | 40       | 54,5     | 87 <sup>+0,1</sup> <sub>0</sub>  | 105 <sup>+0,1</sup> <sub>0</sub> | 102 | 84,5   | 30 | 3   | 3   | 0,05 | 0,1  |
| 50    | 90   | 68   | 50       | 62,5     | 100 <sup>+0,1</sup> <sub>0</sub> | 122 <sup>+0,1</sup> <sub>0</sub> | 117 | 97,5   | 35 | 3   | 3   | 0,05 | 0,1  |
| 63    | 120  | 90   | 63       | 87       | 130 <sup>+0,1</sup> <sub>0</sub> | 155 <sup>+0,1</sup> <sub>0</sub> | 150 | 127    | 40 | 4   | 4   | 0,05 | 0,2  |

| Sizes | A    | B    | C    | D   | E     | F   | G    | J min | K | L min | M   | ∅ N | P max | R  | S max |
|-------|------|------|------|-----|-------|-----|------|-------|---|-------|-----|-----|-------|----|-------|
| 16    | 2    | 12,5 | 23   | 46  | 48    | 46  | 23   | -     | - | 65    | M8  | 4   | 4     | 22 | 8     |
| 25    | 4    | 13   | 29   | 58  | 62    | 58  | 29   | -     | - | 85    | M12 | 6   | 6     | 30 | 8     |
| 32    | 6    | 18   | 35   | 70  | 76    | 70  | 35   | -     | - | 102   | M16 | 6   | 8     | 38 | 8     |
| 40    | 7,5  | 19,5 | 42,5 | 85  | 92,5  | 85  | 42,5 | -     | - | 125   | M20 | 6   | 10    | 46 | 8     |
| 50    | 8    | 20   | 50   | 100 | 108   | 100 | 50   | -     | - | 140   | M20 | 8   | 10    | 46 | 8     |
| 63    | 12,5 | 24,5 | 62,5 | 125 | 137,5 | 125 | 62,5 | -     | - | 180   | M30 | 8   | 12    | 66 | 8     |