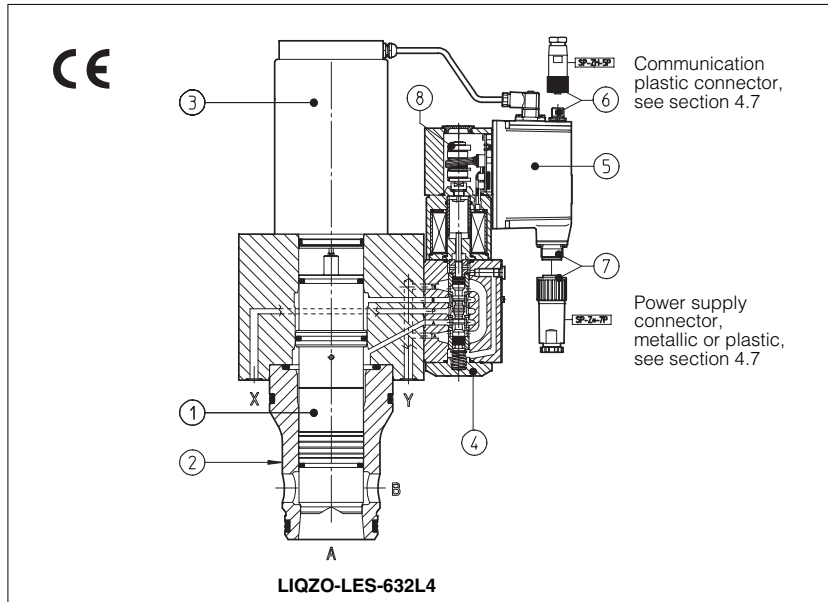


Proportional throttle cartridges type LIQZO-L*, 2-way

high dynamics, ISO 7368 sizes from 16 to 80



LIQZO-LE are 2-way proportional cartridge valves, designed for mounting in manifold blocks and provide proportional flow control according to the electronic reference signal.

They operate in association with electronic drivers, see section 8, which supply the proportional valves with proper current to align valve regulation to the reference signal supplied to the electronic driver.

They are available in different executions:

- -L, with two position transducers ③, ④;
- -LE, -LES as -L plus analogue (LE) or digital (LES) integral electronics ⑤.

The regulation is operated by means of a poppet ① with double piloting area sliding into a sleeve ② and provided of integral LVDT position transducer ③.

The spool is operated by means of a high performances proportional directional valve ④ in "rugged" executions to withstand high vibrations and mechanical stresses (size 06 for cartridge dimensions up to size 50 and size 10 for cartridge dimensions up to size 80).

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 -TES execution:

- -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.

- Reduced response times and high dynamic performances;
- Typical applications: plastic injection and blow moulding, ceramics, punching & nibbling machines, die-casting, foundry and sheet machinery;
- ISO 7368 sizes from 16 to 80;
- Max flow up to 4500 l/min with differential pressure $\Delta p = 5$ bar, see section 2;
- Max pressure: 350 bar.

1 MODEL CODE

LIQZO - LES - PS - 25 2 L4 / * ** /*

Flow control valve

L = with two position transducers
LE = as L plus integral electronics
LES = as L plus integral digital electronics

Communication interfaces (only for LES)

PS = RS232 serial
BC = CANbus
BP = PROFIBUS-DP

Size:

16	25	32	40
50	63	80	

Note: Sizes 100 available on request

2 = 2 way

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

Design number

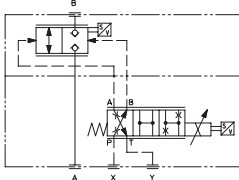
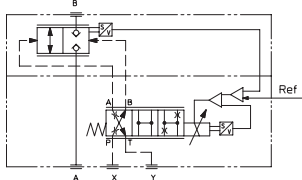
Options, see section 4
 for -LE execution:

I = current reference (4÷20 mA)
F = fault signal
Q = enable signal
S = with logic state signals
 (12 poles connector)
Z = enable, fault and monitor signals
 (12 poles connector)

for -LES execution (12 poles connector):
Z = double power supply, enable and fault

Regulation characteristic: **L4** = linear

2 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C) (3)

Hydraulic symbols	 LIQZO-L		 LIQZO-LE, LIQZO-LES					
	Model							
Size	LIQZO-L, LIQZO-LE							
Size	16	25	32	40	50	63	80	
Max regulated flow at $\Delta p = 5$ bar	250	500	800	1200	2000	3000	4500	
at $\Delta p = 10$ bar	350	700	1100	1700	2800	4250	6350	
Maximum flow	600	1200	1800	2500	4000	6000	10000	
Max pressure	350							
Nominal flow of pilot valve at $\Delta p = 70$ bar	4	7	14	40	40	90	90	
Leakage of pilot valve at $P = 100$ bar	0,5	0,5	0,5	0,7	0,7	1	1	
Response time 0 ÷ 100% step signal (1)	13	14	15	18	20	24	30	
Pilot volume (2)	1,98	2,16	7,0	9,4	8,5	32,5	39,5	
Hysteresis	≤ 0,1%							
Repeatability	± 0,1%							

Above performance data refer to valves coupled with Atos electronic drivers, see section 8.

(1) Response time to step signal (0% → 100%) are measured from 10% and 90% of step values with piloting pressure 140 bar and are strictly referred to valve regulation.

(2) Recommended piloting pressure is 140 ÷ 160 bar.

(3) In case of long interruption of the hydraulic supply to the pilot valve, the driver has to be switched off to avoid its overheating.

3 MAIN CHARACTERISTICS OF THROTTLE CARTRIDGES VALVES TYPE LIQZO-L*

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 -L execution; -20°C ÷ +60°C for -LE and LES executions
Fluid	Hydraulic oil as per DIN 51524 ... 535 for other fluids see section I
Recommended viscosity	15 ÷ 100 mm ² /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)

3.1 Coils characteristics

Valve model	LIQZO-L*-16...50	LIQZO-L*-63...80
Coil resistance R at 20°C	3 ÷ 3,3 Ω	3,8 ÷ 4,1 Ω
Max. solenoid current	2,6 A	3 A
Max. power	35 Watt	40 Watt
Protection degree (CEI EN-60529)	IP65 for -L execution; IP65÷67 for -LE and -LES executions, depending to the connector type (see sect. 4.7)	
Duty factor	Continuous rating (ED=100%)	

4 INTEGRAL ELECTRONICS OPTIONS AND WIRING

- 4.1 Option /I** It provides the 4÷20 mA current reference signal and the current feedback signals instead of the standard 0÷10V (± 10V). 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.
- 4.2 Option /F** Safety option providing an output signal which switches to zero in case of interruption of the transducer feedback cable. In this condition the valve functioning is disabled.
- 4.3 Option /Q** Safety option providing the possibility to enable or disable the valve functioning without cutting the power supply.
- 4.4 Option /S** Option for diagnostic controls, providing three on-off output signals for the real time monitor of the valve's spool position (central, P→A or P→B). For the electrical wiring of **-LE** electronics with option **/S** (12 poles connector), see table G200.
- 4.5 Option /Z** For **-TE** execution: option providing the same characteristics of **/F** and **/Q** plus the monitor signal of the spool position.
For **-TES** execution: 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, see tab. G200 and G210.

4.6 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	-LE, -LES	-LE/I	-LE/F	-LE/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}	Reference 0 V _{dc}	Enabling input normal working 9 ÷ 24 V _{dc}
D	Input signal +	0 ÷ 10 V _{dc}	4 ÷ 20 V _{dc}	0 ÷ 10 V _{dc}	0 ÷ 10 V _{dc}
E	Input signal -				
F	Monitor	0 ÷ 10 V referred to pin C (signal 0 V _{dc})	4 ÷ 20 mA referred to pin C (signal 0 V _{dc})	Fault signal alarm = 0 V _{dc}	0 ÷ 10 V referred to pin B (signal 0 V)
	Spool position	1 V = 10% of spool position	4 ÷ 20 mA = 0÷100% of spool position	Normal working = +24 V _{dc}	1 V = 10% of spool position
G	Earth	Connect only when the power supply is not conform to VDE 0551 (CEI 14/6)			

COMMUNICATION CONNECTORS (for -LES)			
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

POSITION TRANSDUCER CONNECTORS (-L)	
PIN	Signal description
1	OUTPUT SIGNAL
2	SUPPLY -15 V _{dc}
3	SUPPLY +15 V _{dc}
4	GND

Note:

- electrical signals (e.g. actual - feedback signals) acquired via 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-892).
- installation notes with basic information for commissioning and start-up, are always supplied with relevant components, together with the specific technical tables.

4.7 Model codes of power supply and communication connectors

VALVE VERSION	-L		-LE, -LES		-LE/S, -LE/Z -LES/Z	-RS232 (-PS) OR CANBUS (-BC)	PROFIBUS (-BP)
	Power supply	Transducer					
CONNECTOR CODE	SP-666	SP-345	SP-ZH-7P (1)	SP-ZM-7P (1)	SP-ZH-12P (1)	SP-ZH-5P (1)	SP-ZH-5P/BP (1)
CONNECTOR CODE	IP65	IP65	IP67	IP66	IP65	IP67	IP67

(1) to be ordered separately (2) M8 connector moulded on cable 5 mt lenght

5 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-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.

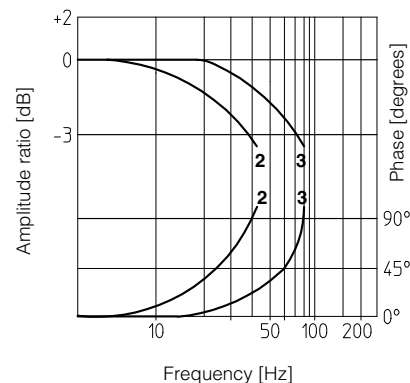
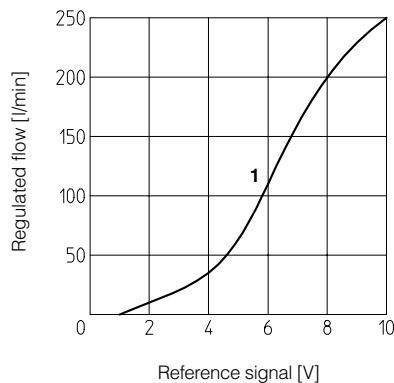
The protocol operating instructions to be implemented in the standard protocols (DS301V4.02, DSP408 for CANbus and DPVO for PROFIBUS-DP) are described in the user manuals MAN-S-BC (for **-BC** option) and MAN-S-BP (for **-BP** option) supplied with the relevant programming device kits.

The above programming devices have to be ordered separately.

6 DIAGRAMS (based on mineral oil ISO VG 46 at 50 °C)

6.1 Regulation diagrams

1 = LIQZO-L*-16*



6.2 Bode diagrams

stated at nominal hydraulic conditions

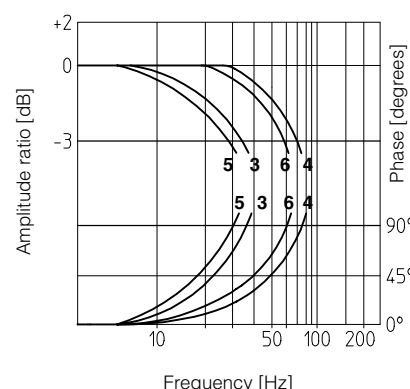
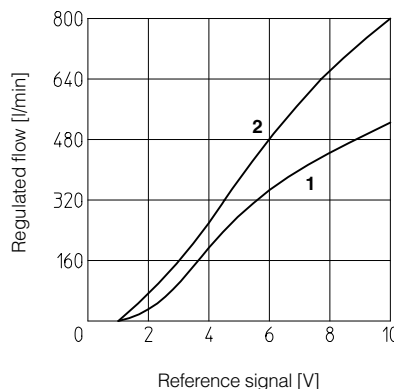
2 = LIQZO-L*-16*: 10% ↔ 90%

3 = LIQZO-L*-16*: 50% ± 5%

6.3 Regulation diagrams

1 = LIQZO-L*-25*

2 = LIQZO-L*-32*



6.4 Bode diagrams

stated at nominal hydraulic conditions

3 = LIQZO-L*-25*: 10% ↔ 90%

4 = LIQZO-L*-25*: 50% ± 5%

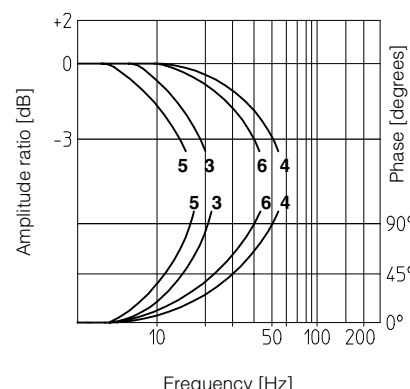
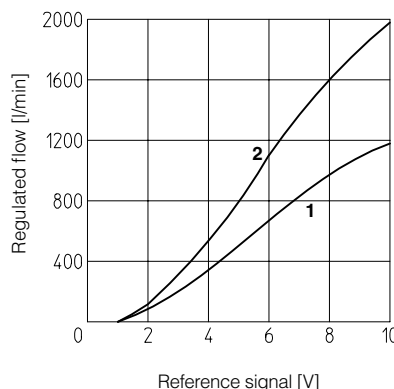
5 = LIQZO-L*-32*: 10% ↔ 90%

6 = LIQZO-L*-32*: 50% ± 5%

6.5 Regulation diagrams

1 = LIQZO-L*-40*

2 = LIQZO-L*-50*



6.6 Bode diagrams

stated at nominal hydraulic conditions

3 = LIQZO-L*-40*: 10% ↔ 90%

4 = LIQZO-L*-40*: 50% ± 5%

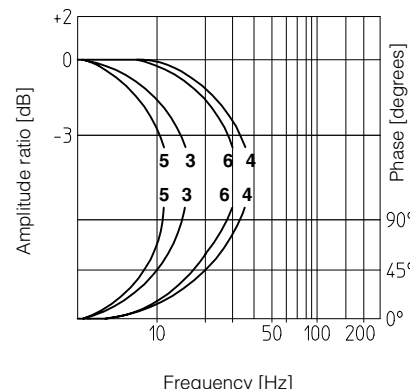
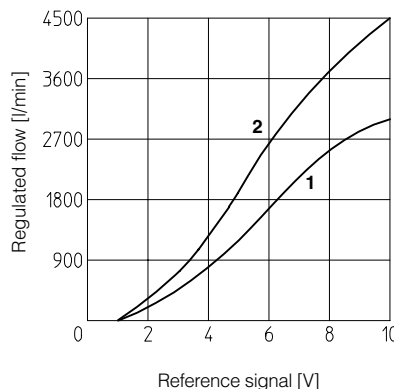
5 = LIQZO-L*-50*: 10% ↔ 90%

6 = LIQZO-L*-50*: 50% ± 5%

6.7 Regulation diagrams

1 = LIQZO-L*-63*

2 = LIQZO-L*-80*



6.8 Bode diagrams

stated at nominal hydraulic conditions

3 = LIQZO-L*-63*: 10% ↔ 90%

4 = LIQZO-L*-63*: 50% ± 5%

5 = LIQZO-L*-80*: 10% ↔ 90%

6 = LIQZO-L*-80*: 50% ± 5%

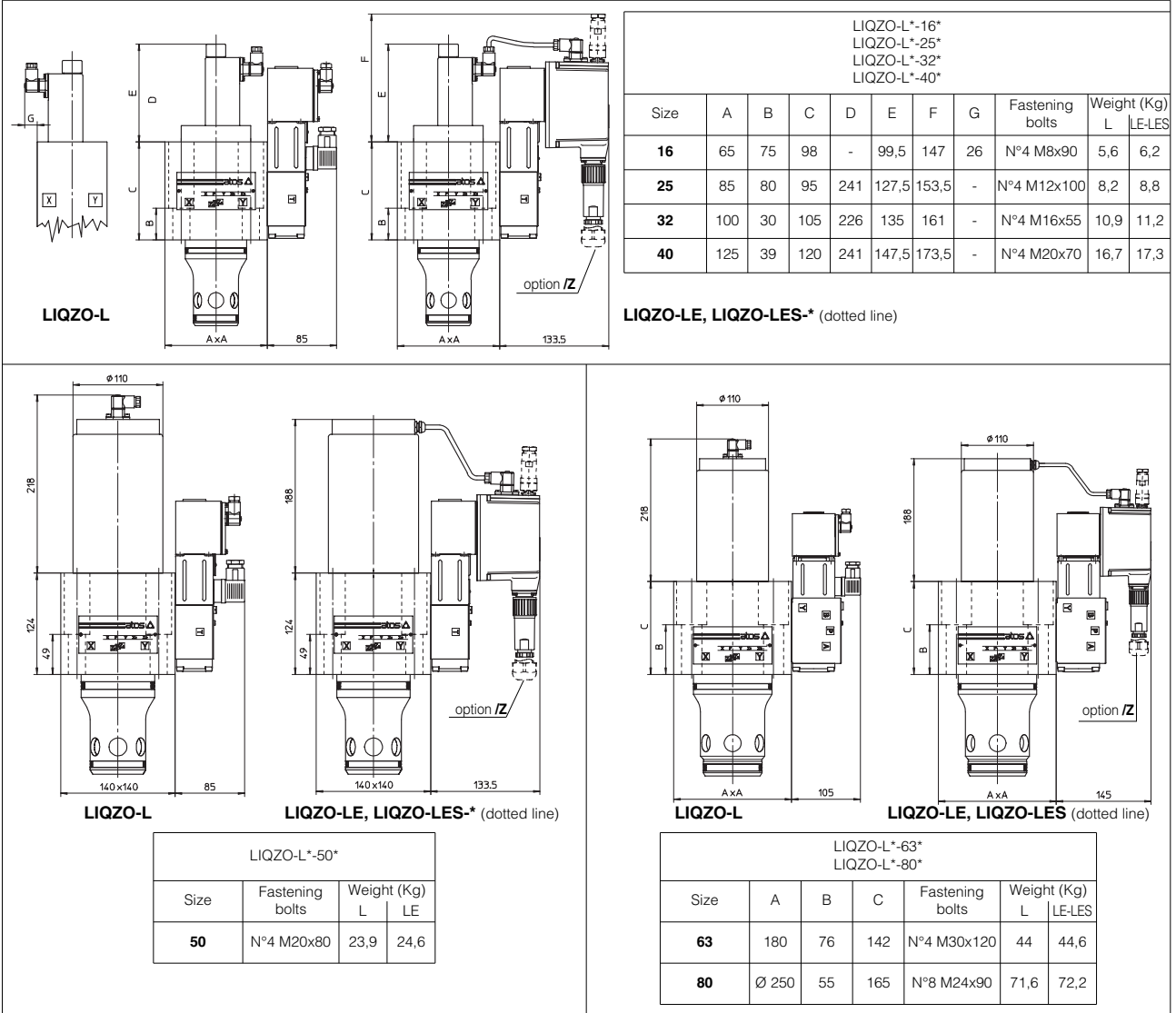
Note:

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

6.9 Dynamic response

The response times in section 2 and the frequency responses of the bode diagrams in sections 6.2, 6.4, 6.6, 6.8, have to be considered as average values. For the valves with digital electronics the dynamics performances can be optimized by setting the internal software parameters.

7 INSTALLATION DIMENSIONS [mm]



8 ELECTRONIC DRIVERS FOR LIQZO-L*

Valve model	-L	-LE	-LES
Drivers model	E-ME-L	E-RI-LE	E-RI-LES
Data sheet	G150	G200	G210

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

9 COVER INTERFACE AND RECESS DIMENSIONS [mm]

