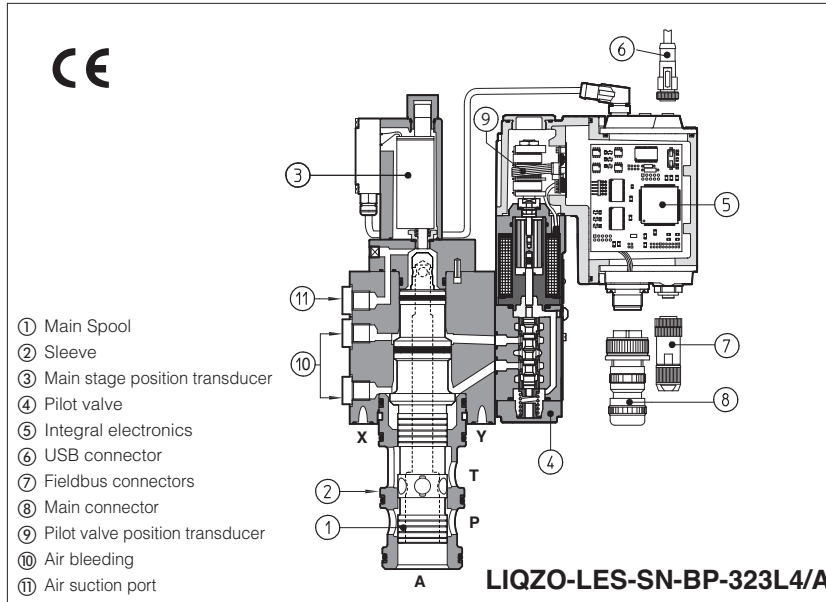


Servoproportional 3-way cartridges

digital, with two position transducers, sizes from 25 to 80, rugged design



- ① Main Spool
- ② Sleeve
- ③ Main stage position transducer
- ④ Pilot valve
- ⑤ Integral electronics
- ⑥ USB connector
- ⑦ Fieldbus connectors
- ⑧ Main connector
- ⑨ Pilot valve position transducer
- ⑩ Air bleeding
- ⑪ Air suction port

LIQZO-LEB, LIQZP-LEB LIQZO-LES, LIQZP-LES

Servoproportional 3-way cartridge valves specifically designed for high speed closed loop controls. They are equipped with two LVDT position transducers for best dynamics in directional controls and not compensated flow regulations. The cartridge execution for blocks installation grants high flow capabilities and minimized pressure drops.

The integral digital electronic driver performs the valve's hydraulic regulation according to the reference signal and assures valve-to-valve interchangeability thanks to the factory presetting.

Servoproportional cartridges are available in LEB basic execution with analog reference signals and USB port for software functional parameters setting or in LES full execution which includes also optional alternated P/Q controls and fieldbus interfaces for functional parameters setting, reference signals and real-time diagnostics.

LIQZO: sizes from **25 to 40**,
Max flow: **500 to 1050 l/min**
Max pressure: **350 bar**

LIQZP: sizes from **50 to 80**,
Max flow: **2000 to 5000 l/min**
Max pressure: **420 bar**

1 MODEL CODE

LIQZO	-	L	-	ES	-	SN	-	NP	-	25	3	L4	/	*	**	/	*
Servoproportional cartridge LIQZO = size 25 to 40, Pmax 350 bar LIQZP = size 50 to 80, Pmax 420 bar																	Seals materials see section 4, 5 - = NBR PE = FPM BT = HNBR
Series number																	

L = closed-loop
two LVDT transducer

Integral digital drivers:
EB = basic (1)
ES = full

Alternated P/Q controls - see section 3
SN = none
SP = pressure control (1 pressure transducer)
SL = force control (1 load cell)

Fieldbus interfaces USB port always present:
NP = Not present (1) **EW** = POWERLINK
BC = CANopen **EH** = EtherCAT
BP = PROFIBUS DP **EI** = EtherNet/IP

Valve size, see section 3

LIQZO =	25	32	40
l/min	185	330	420
LIQZP =	50	63	80
l/min	780	1250	2100

Nominal flow (l/min) at Δp 5 bar

Hydraulic options, see section 2

A = reversal hydraulic configuration of main spool:
P-A in rest position

Electronic options, see sections 4, 5

I = current reference input and monitor 4÷20 mA (omit for standard voltage reference input and monitor ±10 V)

Only for **SN (2)**:

F = fault signal

Q = enable signal

Z = double power supply (3), enable, fault and monitor signals - 12 pin connector

Only for **SP, SL**:

C = current feedback for remote transducer(s)

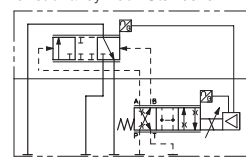
Spool type
regulating characteristics:

L4 = linear

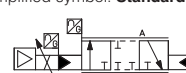


Configuration: 3 = 3 way

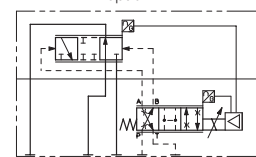
functional symbol: **Standard**



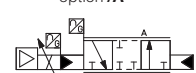
simplified symbol: **Standard**



option **/A**



option **/A**



(1) **LEB** available only in version **SN-NP**
(3) double power supply only for **LES**

(2) **F, Q, Z** options are standard for **SP, SL** versions

2 GENERAL NOTES

LIQZO-LEB, LES and LIQZP-LEB, LES proportional cartridges are **CE** marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive). Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in table F003 and in the installation notes supplied with relevant components. The electrical signals of the valve (e.g. monitor signals) must not be directly used to activate safety functions or components, as prescribed by the European standards (Safety requirements of fluid technology systems and components-hydraulics, EN-982).



WARNING To avoid overheating and possible damage of the electronic driver, the valves must be never energized without hydraulic supply to the pilot stage. In case of prolonged pauses of the valve operation during the machine cycle, it is always advisable to disable the driver (option /Q or /Z). A safety fuse 2,5 A installed on 24VDC power supply of each valve is always recommended, see also Power supply note at sections 9



WARNING The loss of the pilot pressure causes the undefined position of the main spool. The sudden interruption of the power supply during the valve operation causes the immediate main spool opening A → T or P → A (for option /A). This could cause pressure surges in the hydraulic system or uncontrolled movements which may lead to machine damages.

3 ALTERNATED P/Q CONTROLS - only for LES

S* options add the closed loop control of pressure (**SP**) or force (**SL**) to the basic functions of proportional directional valves flow regulation. A dedicated algorithm alternates pressure (force) depending on the actual hydraulic system conditions. An additional connector is available for transducers to be interfaced to the valve's driver (1 pressure transducer for SP or 1 load cell for SL). Main 12 pin connector is the same as /Z option plus two analog signals specific for the pressure (force) control. For detailed information and connector wiring of options SP, SL see tech table **GS212**.

4 FIELDBUS - only for LES

Fieldbus allows the direct communication of the proportional valve with machine control unit for digital reference signal, diagnostics and settings of functional parameters. Analog reference signal remain available on the main connector for quick commissioning and maintenance. For detailed information about fieldbus features and specification see tech table **GS510**.

5 MAIN CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

Assembly position	Any position			
Subplate surface finishing	Roughness index, Ra 0,4 flatness ratio 0,01/100 (ISO 1101)			
MTTFd values according to EN ISO 13849	75 years, see technical table P007			
Ambient temperature range	standard = -20°C ÷ +60°C		/BT option = -40°C ÷ +60°C	
Storage temperature range	standard = -20°C ÷ +70°C		/BT option = -40°C ÷ +70°C	
Coil resistance R at 20°C	3 ÷ 3,3 Ω			
Max. solenoid current	2,6 A			
Max. power	50 Watt			
Insulation class	H (180°) Due to the occurring surface temperatures of the solenoid coils, the European standards ISO 13732-1 and EN982 must be taken into account			
Protection degree to DIN EN60529	IP66/67 with mating connector			
Tropicalization	Tropical coating on electronics PCB			
Duty factor	Continuous rating (ED=100%)			
EMC, climate and mechanical load	See technical table G004			
Communication interface	USB Atos ASCII coding	CANopen EN50325-4 + DS408	PROFIBUS DP EN50170-2/IEC61158	EtherCAT, POWERLINK EtherNet/IP IEC 61158
Communication physical layer	not insulated USB 2.0 + USB OTG	optical insulated CAN ISO11898	optical insulated RS485	Fast Ethernet, insulated 100 Base TX

Size	25	32	40	50	63	80
Max regulated flow [l/min]						
Δp P-A or A-T at Δp = 5 bar	185	330	420	780	1250	2100
at Δp = 10 bar	260	470	590	1100	1750	3000
Max permissible flow	500	850	1050	2000	3100	5000
Max pressure [bar]	LIQZO		Ports P, A, T = 350		X = 350	Y ≤ 10
	LIQZP		Ports P, A, T = 420		X = 350	Y ≤ 10
Nominal flow of pilot valve at Δp = 70 bar [l/min]	4	8	28	40	100	100
Leakage of pilot valve at P = 100 bar [l/min]	0,2	0,2	0,5	0,7	0,7	0,7
Piloting pressure [bar]	min: 40% of system pressure max 350 recommended 140 ÷ 160					
Piloting volume [cm³]	2,16	7,2	8,9	17,7	33,8	42,7
Piloting flow (1) [l/min]	6,5	20	25	43	68	76
Response time 0 ÷ 100% step signal (2) [ms]	21	22	22	25	30	34
Hysteresis [% of the max regulation]	≤ 0,1					
Repeatability [% of the max regulation]	± 0,1					
Thermal drift	zero point displacement < 1% at ΔT = 40°C					

Note:

Above performance data refer to valves coupled with Atos electronic drivers, see section 7.

(1) with step reference input 0÷100%

(2) with pilot pressure = 140 bar, see detailed diagrams in section 8.2

6 SEALS AND HYDRAULIC FLUID - 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	20÷100 mm ² /s - max allowed range 15 ÷ 380 mm ² /s		
Fluid contamination class	ISO 4406 class 20/18/15 NAS 1638 class 9, in line filters of 10 µm (β ₁₀ ≥75 recommended)		
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	

7 ELECTRONIC DRIVERS

Valve model	LEB	LES	LES-SP, SL
Drivers model	E-RI-LEB-N	E-RI-LES-N	E-RI-LES-S
Type	Digital		
Format	Integral to valve		
Data sheet	GS208	GS210	GS212

Note: for main and communication connector see sections **13**, **14**

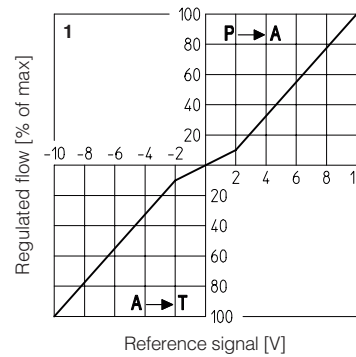
8 DIAGRAMS (based on mineral oil ISO VG 46 at 50 °C)

8.1 Regulation diagrams, see note

1 = LIQZO, LIQZP (all sizes)

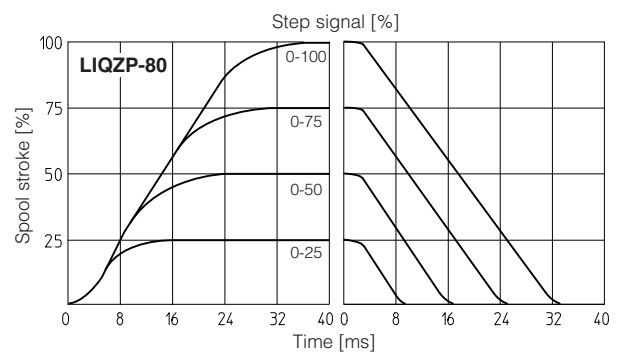
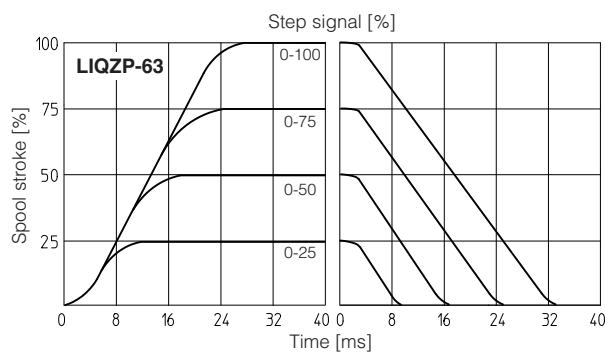
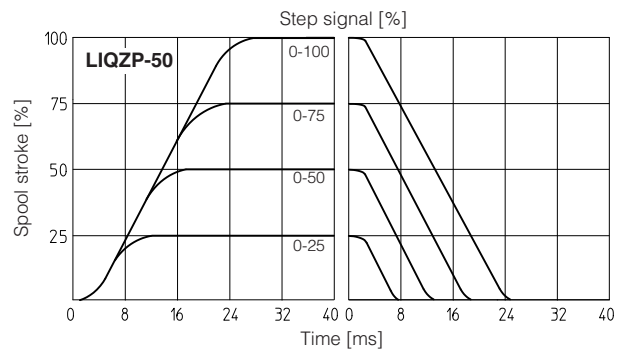
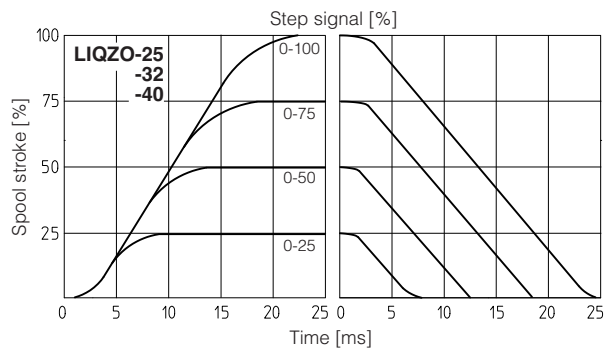
Hydraulic configuration vs. reference signal:

	standard	option /A	
Reference signal	0 ÷ +10 V 12 ÷ 20 mA	P → A	A → T
Reference signal	0 ÷ -10 V 4 ÷ 12 mA	A → T	P → A

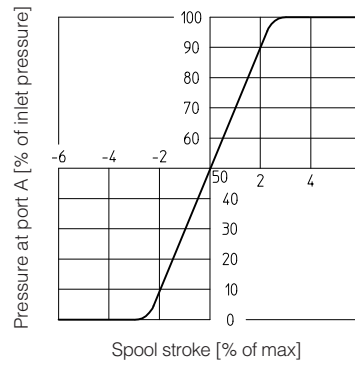
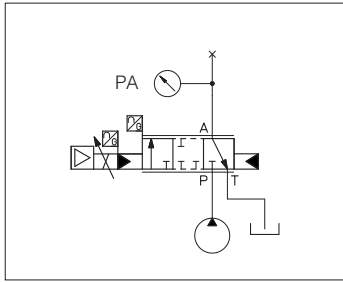


8.2 Response time

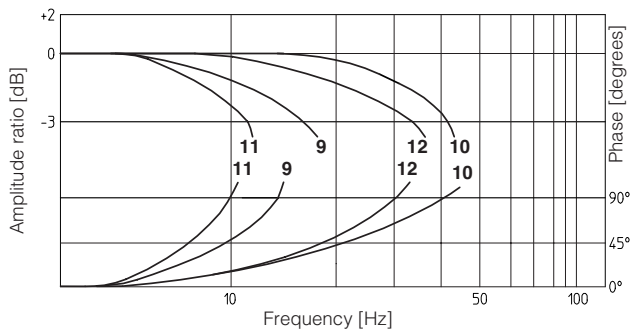
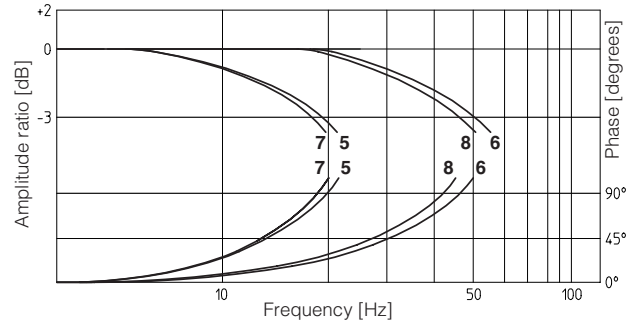
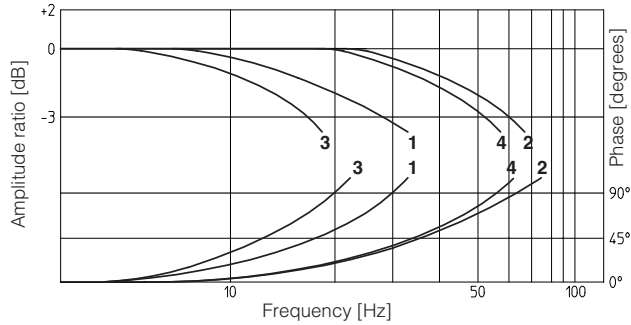
The response times in below diagrams are measured at different steps of the reference input signal. They have to be considered as average values. For the valves with digital electronics the dynamics performances can be optimized by setting the internal software parameters.



8.3 Pressure gain diagram



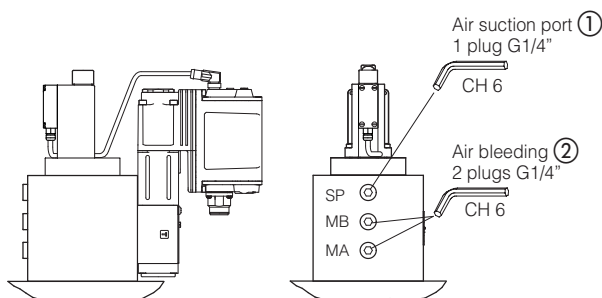
8.4 Bode diagrams



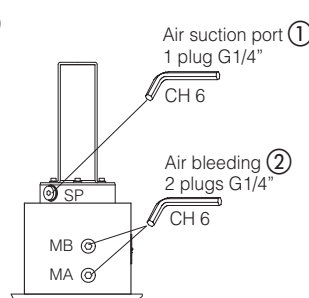
- 1 = LIQZO-L*-253L4: ± 90%
- 2 = LIQZO-L*-253L4: ± 5%
- 3 = LIQZO-L*-323L4: ± 90%
- 4 = LIQZO-L*-323L4: ± 5%
- 5 = LIQZO-L*-403L4: ± 90%
- 6 = LIQZO-L*-403L4: ± 5%
- 7 = LIQZP-L*-503L4: ± 90%
- 8 = LIQZP-L*-503L4: ± 5%
- 9 = LIQZP-L*-633L4: ± 90%
- 10 = LIQZP-L*-633L4: ± 5%
- 11 = LIQZP-L*-803L4: ± 90%
- 12 = LIQZP-L*-803L4: ± 5%

9 AIR BLEEDING

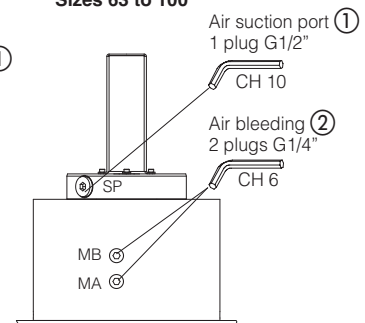
Size 16 to 40



Size 50



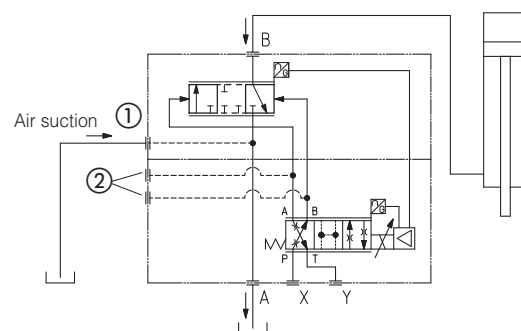
Sizes 63 to 100



① To be used only in case port A is connected to tank and subjected to negative pressure, consult our technical office.

② At the machine commissioning it is advisable to bleed the air from piloting chambers, by loosening the 2 plugs shown in the picture.

Operate the valve for few seconds at low pressure and then lock the plugs.



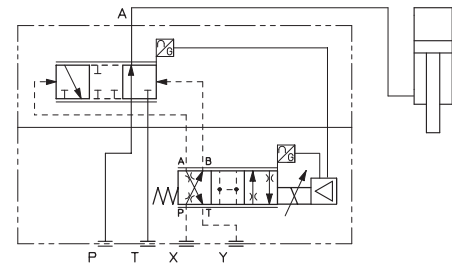
10 HYDRAULIC OPTIONS

Option /A

The standard valve version provides the hydraulic configuration A-T of main spool in absence of electric power supply to the valve.

The option /A provides the reversed configuration P-A of main spool in absence of electric power supply to the valve.

This execution is particularly requested in vertical presses for safety reasons, because in case of electric power breakdown the P-A configuration of the main spool prevents the uncontrolled and dangerous downstroke of the press ram.



Option /A

11 ELECTRONIC OPTIONS

Standard driver execution provides on the 7 pin main connector:

Power supply - 24 VDC must be appropriately stabilized or rectified and filtered; **2,5 A** fuse time lag is required in series to each driver power supply. Apply at least a 10000 μ F/40 V capacitance to single phase rectifiers or a 4700 μ F/40 V capacitance to three phase rectifiers

Reference input signal - analog differential input with ± 10 VDC nominal range (pin D, E), proportional to desired valve spool position

Monitor output signal - analog output signal proportional to the actual valve's spool position with ± 10 VDC nominal range

Note: a minimum booting time between 400 and 800 ms has been considered from the driver energizing with the 24 Vdc power supply before the valve has been ready to operate. During this time the current to the valve coils is switched to zero.

11.1 Option /F

It provides a Fault output signal in place of the Monitor output signal, to indicate fault conditions of the driver (cable interruption of spool transducers or reference signal - for /I option): Fault presence corresponds to 0 VDC, normal working corresponds to 24 VDC

11.2 Option /I

It provides 4 \div 20 mA current reference and monitor signals, instead of the standard 0 \div +10 V.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 V or ± 20 mA.

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; the valve functioning is disabled in case of reference signal cable breakage.

11.3 Option /Q

To enable the driver, supply 24 VDC on pin C referred to pin B: Enable input signal allows to enable/disable the current supply to the solenoid, without removing the electrical power supply to the driver; it is used to maintain active the communication and the other driver functions when the valve has to be disabled. This condition does not comply with European Norms EN13849-1 (ex EN954-1).

11.4 Option /Z

It provides, on the 12 pin main connector, the following additional features:

Enable Input Signal

To enable the driver, supply 24 VDC on pin 3 referred to pin 2: Enable input signal allows to enable/disable the current supply to the solenoid, without removing the electrical power supply to the driver; it is used to maintain active the communication and the other driver functions when the valve has to be disabled. This condition does not comply with European Norms EN13849-1 (ex EN954-1).

Fault Output Signal

Fault output signal indicates fault conditions of the driver (solenoid short circuits/not connected, reference signal cable broken for 4 \div 20mA input, etc.). Fault presence corresponds to 0 VDC, normal working corresponds to 24 VDC (pin 11 referred to pin 2): Fault status is not affected by the Enable input signal

Power supply for driver's logics and communication - only for LES

Separate power supply (pin 9,10) allow to cut solenoid power supply (pin 1,2) while maintaining active diagnostics, USB and fieldbus communication. A safety fuse is required in series to each driver power supply: 500 mA fast fuse.

11.5 Options /C - only for SP, SL

Option /C is available to connect pressure (force) transducers with 4 \div 20 mA current output signal, instead of the standard ± 10 V.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 V or ± 20 mA.

11.6 Possible combined options

For SN: /FI, /IQ and /IZ

For SP, SL: /CI

12 ELECTRONIC CONNECTIONS AND LEADS

12.1 Main connector signals - 7 pin - standard, /F and /Q options (A1)

PIN	Standard	/Q	/F	TECHNICAL SPECIFICATIONS	NOTES
A	V+			Power supply 24 Vdc Rectified and filtered: $V_{RMS} = 20 \div 32 V_{MAX}$ (ripple max 10 % V _{PP})	Input - power supply
B	V0			Power supply 0 Vdc	Gnd - power supply
C	AGND		AGND	Analog ground	Gnd - analog signal
		ENABLE		Enable (24 Vdc) or disable (0 Vdc) the valve, referred to V0	Input - on/off signal
D	Q_INPUT+			Flow reference input signal: ± 10 Vdc / ± 20 mA maximum range Defaults are 0 \div +10 Vdc for standard and 4 \div 20 mA for /I option	Input - analog signal Software selectable
E	INPUT-			Negative reference input signal for Q_INPUT+	Input - analog signal
F	Q_MONITOR referred to:			Flow monitor output signal: ± 10 Vdc / ± 20 mA maximum range Defaults are 0 \div +10 Vdc for standard and 4 \div 20 mA for /I option	Output - analog signal Software selectable
	AGND	V0			
G			FAULT	Fault (0 Vdc) or normal working (24 Vdc)	Output - on/off signal
	EARTH			Internally connected to the driver housing	

12.2 Main connector signals - 12 pin - /Z option and SP, SL (A2)

PIN	LEB-SN /Z	LES-SN /Z	LES-SP, SL Fieldbus NP		TECHNICAL SPECIFICATIONS	NOTES
1	V+				Power supply 24 Vdc Rectified and filtered: $V_{RMS} = 20 \div 32 V_{MAX}$ (ripple max 10% V _{PP})	Input - power supply
2	V0				Power supply 0 Vdc	Gnd - power supply
3	ENABLE referred to:				Enable (24 Vdc) or disable (0 Vdc) the valve	Input - on/off signal
	V0	VL0	VL0	V0		
4	Q_INPUT+				Flow reference input signal: ± 10 Vdc / ± 20 mA maximum range Defaults are 0 \div +10 Vdc for standard and 4 \div 20 mA for /I option	Input - analog signal Software selectable
5	INPUT-				Negative reference input signal for Q_INPUT+ and F_INPUT+	Input - analog signal
6	Q_MONITOR referred to:				Flow monitor output signal: ± 10 Vdc / ± 20 mA maximum range Defaults are 0 \div +10 Vdc for standard and 4 \div 20 mA for /I option	Output - analog signal Software selectable
	AGND	VL0	VL0	V0		
7	AGND				Analog ground	Gnd - analog signal
		NC			Do not connect	
8	R_ENABLE				Repeat enable, output repeter signal of enable input, referred to V0 Do not connect	Output - on/off signal
		NC				
9	NC				Do not connect	
		VL+				
10	NC				Do not connect	
		VL0		D_IN0		
11	FAULT referred to:				Fault (0 Vdc) or normal working (24 Vdc)	Output - on/off signal
	V0	VL0	VL0	VL0		
PE	EARTH				Internally connected to the driver housing	

Note: do not disconnect VL0 before VL+ when the driver is connected to PC USB port

12.3 Communications connectors (B) - (C)

(B) USB connector - M12 - 5 pin always present		
PIN	SIGNAL	TECHNICAL SPECIFICATION (1)
1	+5V_USB	Supply for external USB Flash Drive
2	ID	USB Flash Drive identification
3	GND_USB	Signal zero data line
4	D-	Data line -
5	D+	Data line +

(C1) (C2) BP fieldbus execution, connector - M12 - 5 pin		
PIN	SIGNAL	TECHNICAL SPECIFICATION (1)
1	+5V	Termination supply signal
2	LINE-A	Bus line (high)
3	DGND	Data line and termination signal zero
4	LINE-B	Bus line (low)
5	SHIELD	

Notes: (1) shield connection on connector's housing is recommended

(C1) (C2) BC fieldbus execution, connector - M12 - 5 pin		
PIN	SIGNAL	TECHNICAL SPECIFICATION (1)
1	CAN_SHLD	Shield
2	not used	(C1) - (C2) pass-through connection (2)
3	CAN_GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

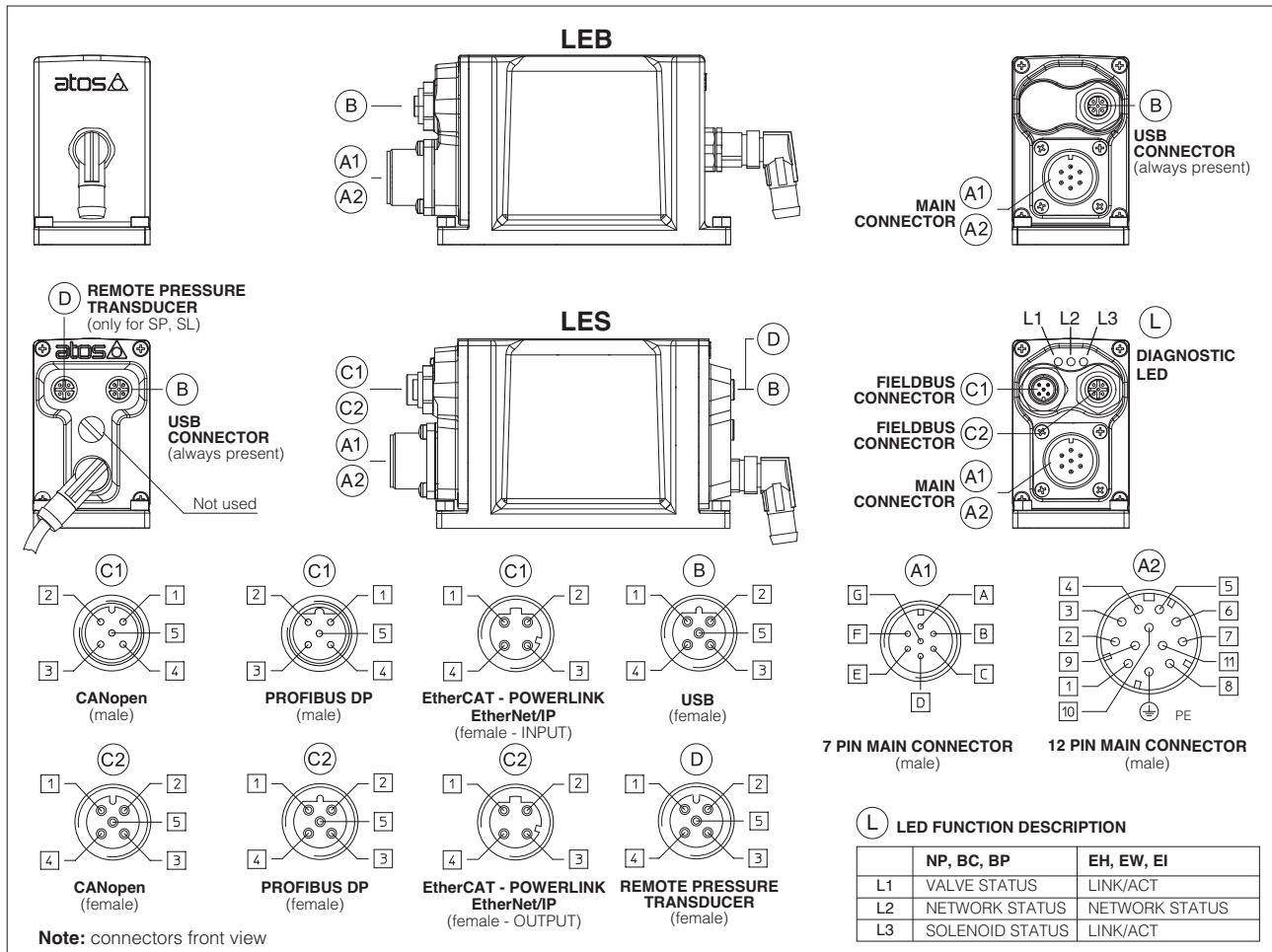
(C1) (C2) EH, EW, EI fieldbus execution, connector - M12 - 4 pin		
PIN	SIGNAL	TECHNICAL SPECIFICATION (1)
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
Housing	SHIELD	

(2): pin 2 can be fed with external +5V supply of CAN interface

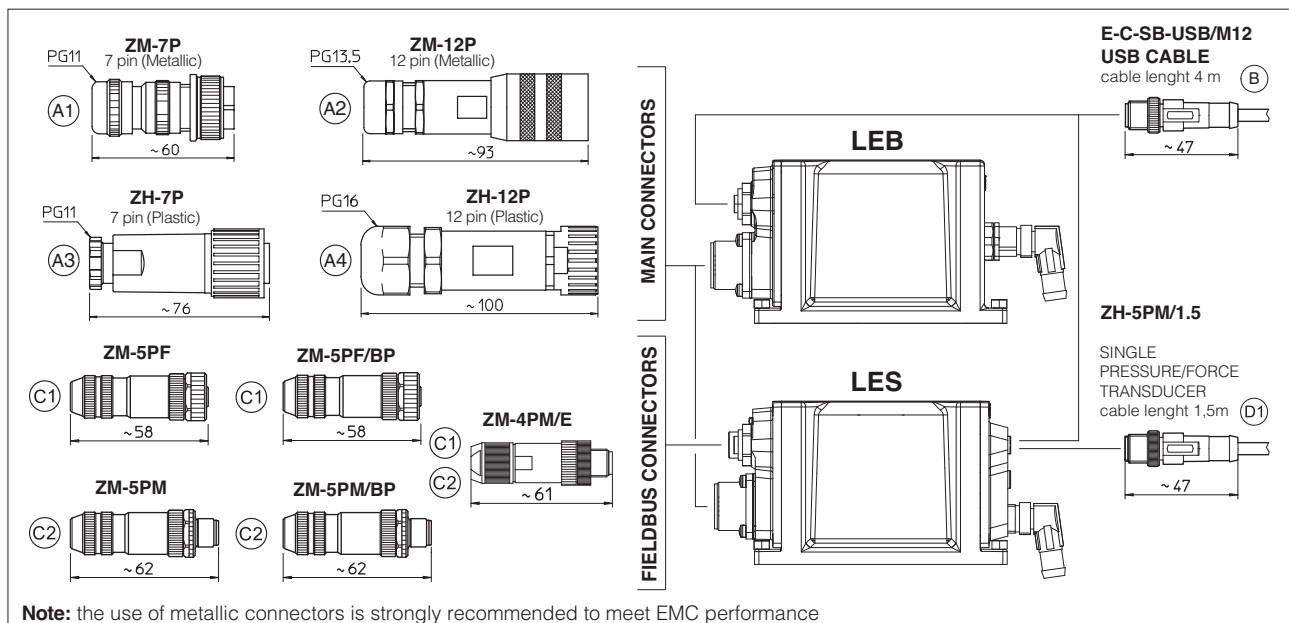
12.4 Remote pressure transducer connector - M12 - 5 pin - only for SP, SL (D)

PIN	SIGNAL	TECHNICAL SPECIFICATION	Voltage	Current
1	VF +24V	Power supply +24Vdc	Connect	Connect
2	TR	Signal transducer ± 10 Vdc / ± 20 mA maximum range, software selectable Defaults are ± 10 Vdc for standard and 4 \div 20 mA for /C option	Connect	Connect
3	AGND	Common GND for transducer power and signals	Connect	/
4	NC	Not Connect	/	/
5	NC	Not Connect	/	/

12.5 Connections layout



13 CONNECTORS



14 MODEL CODES OF MAIN CONNECTORS AND COMMUNICATION CONNECTORS - to be ordered separately

VALVE VERSION	LEB LES	LEB /Z LES /Z	BC - CANopen	BP - PROFIBUS DP	EH - EtherCat EW - POWERLINK EI - EtherNet/IP	P/Q controls SP, SL
CONNECTOR CODE	ZM-7P (A1) ZH-7P (A3)	ZM-12P (A2) ZH-12P (A4)	ZM-5PF (C1) ZM-5PM (C2)	ZM-5PF/BP (C1) ZM-5PM/BP (C2)	ZM-4PM/E (C1) ZM-4PM/E (C2)	ZH-5PM/1.5 (1) (D1)
PROTECTION DEGREE	IP67					
DATA SHEET	GS208, GS210, GS212, K500					

only for LES

(1) only for SP or SL

15 PROGRAMMING TOOLS - see table **GS500**

Valve's functional parameters and configurations, can be easily set and optimized using Atos E-SW programming software connected via USB port to the digital driver. For fieldbus versions, the software permits valve's parameterization through USB port also if the driver is connected to the central machine unit via fieldbus.

The software is available in different versions according to the driver's options:

E-SW-BASIC support: NP (USB) PS (Serial) IR (Infrared)

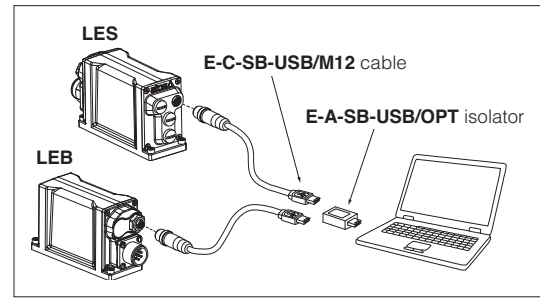
E-SW-FIELDBUS support: BC (CANopen) BP (PROFIBUS DP) EH (EtherCAT)
EW (POWERLINK) EI (EtherNet/IP)

E-SW-*/PQ support: valves with SP, SF, SL alternated control (e.g. E-SW-BASIC/PQ)

WARNING: drivers USB port is not isolated!

The use of isolator adapter is highly recommended for PC protection (see table **GS500**)

USB connection



16 FASTENING BOLTS and VALVE MASS

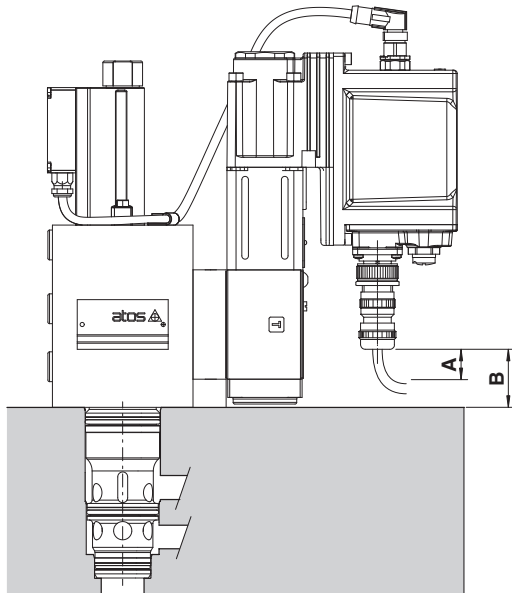
LIQZO			
Size	Fastening bolts class 12.9 (1)	Tightening torque	Mass (Kg)
25	N°4 M12x100	125 Nm	8,8
32	N°4 M16x60	300 Nm	11,2
40	N°4 M20x70	600 Nm	17,3

LIQZP			
Size	Fastening bolts class 12.9 (1)	Tightening torque	Mass (Kg)
50	N°4 M20x80	600 Nm	24,6
63	N°4 M30x120	2100 Nm	44,6
80	N°8 M24x80	1000 Nm	72,2

(1) Fastening bolts supplied with the valve

17 MAIN CONNECTIONS INSTALLATION DIMENSIONS

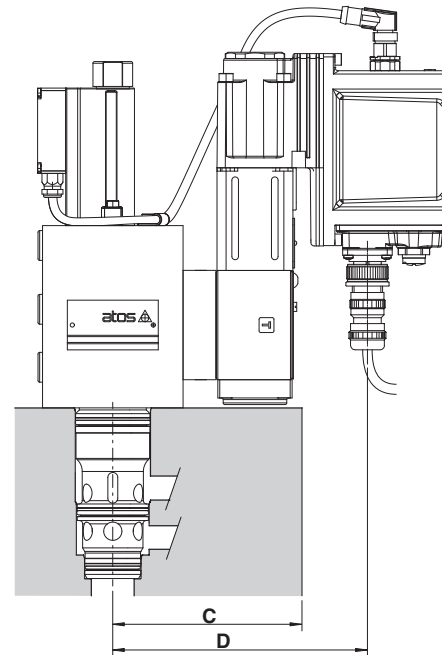
Installation 1 - possible interference between manifold and main connector



A = 15 mm space to remove the 7 or 12 pin main connectors

B = Clearance between main connector to valve's mounting surface. See the below table to verify eventual interferences, depending to the valve size and connector type

Installation 2 - no interference



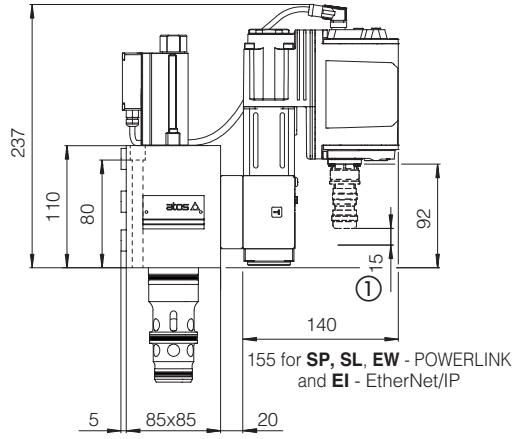
C = Max manifold dimension to avoid interference with the main connector, see below table

Reference dimension	Main connector code	Valve size					
		25	32	40	50	63	80
B	ZM-7P	32	32	32	45	68	68
	ZH-7P	Note 1	Note 1	Note 1	29	52	52
	ZM-12P	Note 1	Note 1	Note 1	Note 1	35	35
	ZH-12P	Note 1	Note 1	Note 1	Note 1	Note 1	Note 2
C (max) for standard valve	-	134	141	154	161	192	222
C (max) for /A option	-	114	121	134	141	172	202
D for standard valve	-	154	161	174	181	212	242
D for /A option	-	134	141	154	161	192	222

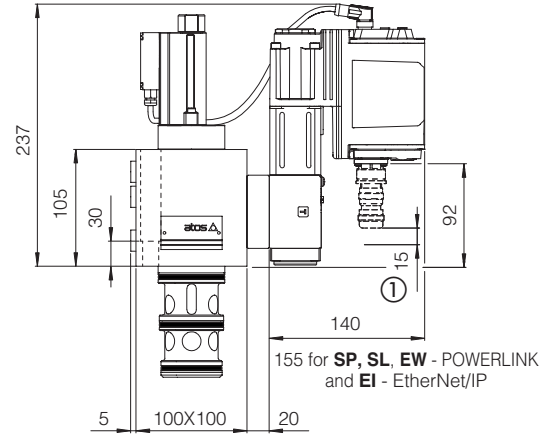
Above dimensions refer to the main connector fully screwed to driver's connector. The space **A** = 15 mm to remove the connector must be considered
Note 1: the connector installation can be performed only if the valve's driver protrudes from the edge of the relevant mounting manifold as represented in above "Installation 2"

Note 2: the connector installation may be critical, depending to the cable size and bending radius

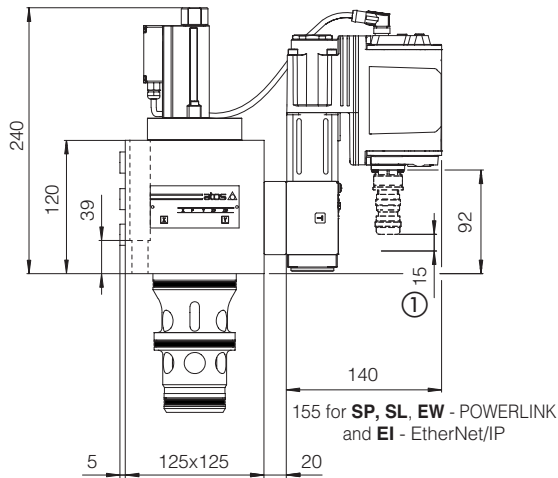
LIQZO-LEB-253
LIQZO-LES-253



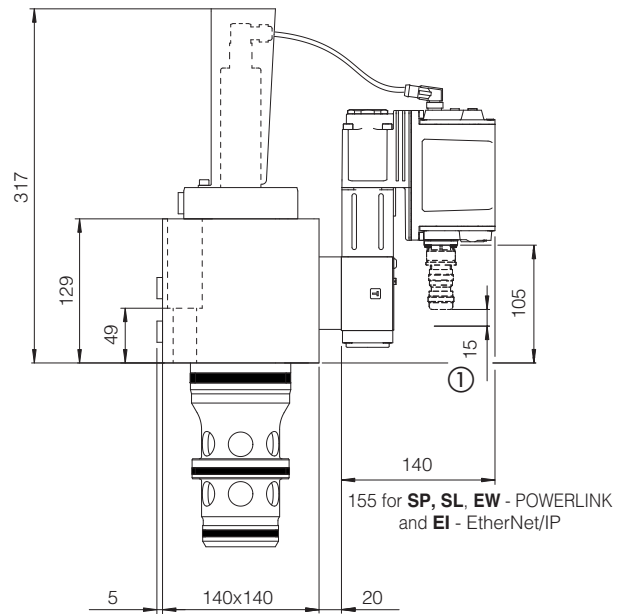
LIQZO-LEB-323
LIQZO-LES-323



LIQZO-LEB-**-403
LIQZO-LES-**-403



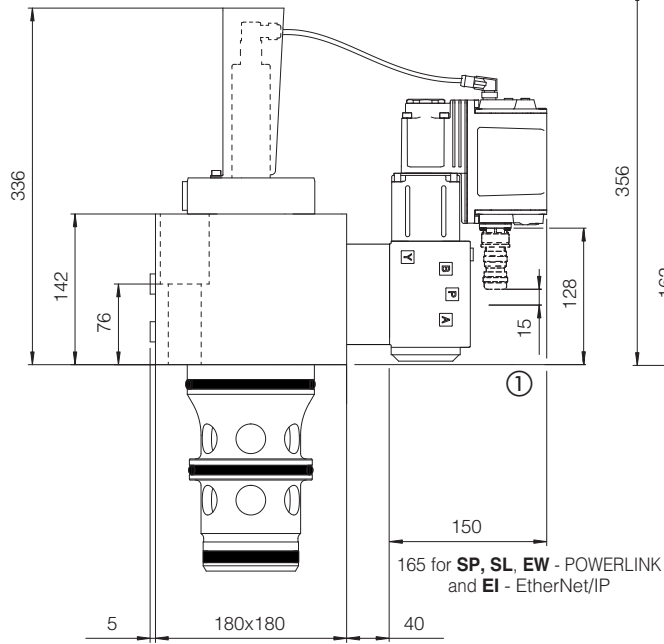
LIQZP-LEB-503
LIQZP-LES-503



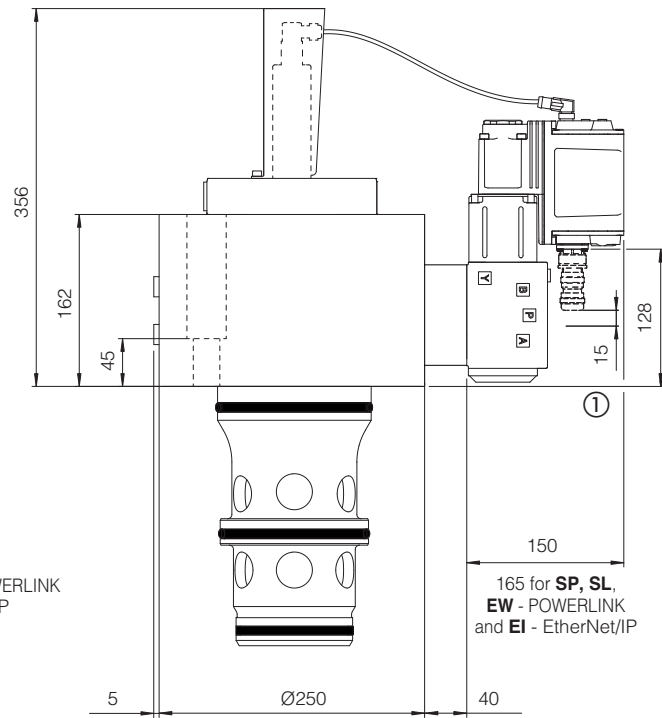
① Space to remove the 7 or 12 pin main connector. For main and communication connectors see section 13, 14

Note: for mounting surface and cavity dimensions see tech. table P006

LIQZP-LEB-633
LIQZP-LES-633



LIQZP-LEB-803
LIQZP-LES-803



① Space to remove the 7 or 12 pin main connector. For main and communication connectors see section 13, 14

Note: for mounting surface and cavity dimensions see see tech. table P006