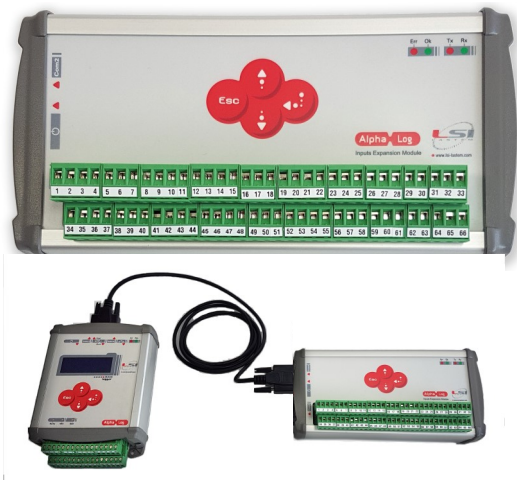
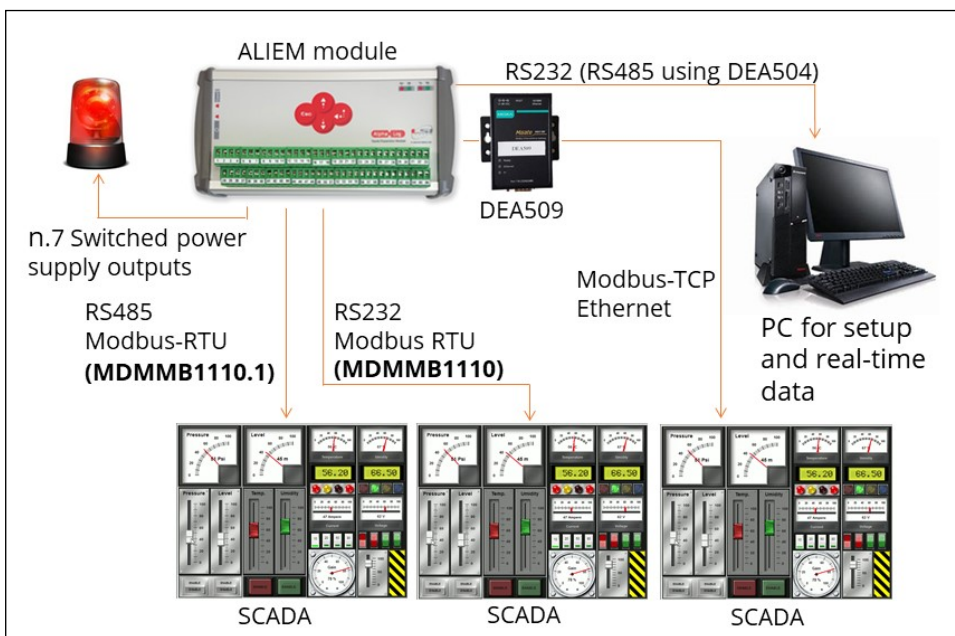


## ALIEM module



- ▶ N.8 (N.16 single-ended) analog inputs, N.4 digital inputs
- ▶ Modbus-RTU output on RS232/RS485 port
- ▶ N.99 measurements considering channels for sensor acquisition and derived quantities and calculations
- ▶ Internal library for calculating derived quantities and mathematical calculations
- ▶ Extremely low power consumption
- ▶ Strong protections on inputs, outputs and power ports
- ▶ Outputs: instant values, mobile elaboration values (ave/min/max/total) with acquisition rate programmable individually for each sensor
- ▶ Switched power supply outputs for sensors power requirement or external devices with programmable alarm logics

ALIEM module is an analogue/digital interface between a wide range of sensors and devices and the master unit through RS232/485 Modbus-RTU protocol. Typically one or more ALIEM modules are used to increase the number of inputs in the LSI LASTEM's Alpha-Log data logger, but it can be used as independent device to interface sensors to third-part devices with RS232/485 Modbus input requirement. ALIEM has been explicitly designed for environmental/meteorological applications. Robust, well protected from electrical disturbs and reliable, ALIEM makes measurements possible even in the most severe environments, while the 18-bit A/D converter ensures accurate and reliable data in classic meteorological, hydrological and air quality applications and, more generally, in any environmental application.



### ▶ Peripherals

ALIEM is equipped with the following peripherals:

- **MDMMB1110**: N.2 RS232 DCE ports.
- **MDMMB1110.1**: N.1 RS232 DCE port, N.1 RS485 port.

RS232/1 port is used to:

- System configuration using 3DOM program
- Display instant values using 3DOM or X-Panel programs
- Receive radio sensors from radio receiver

### ▶ Data communication protocol (Modbus)

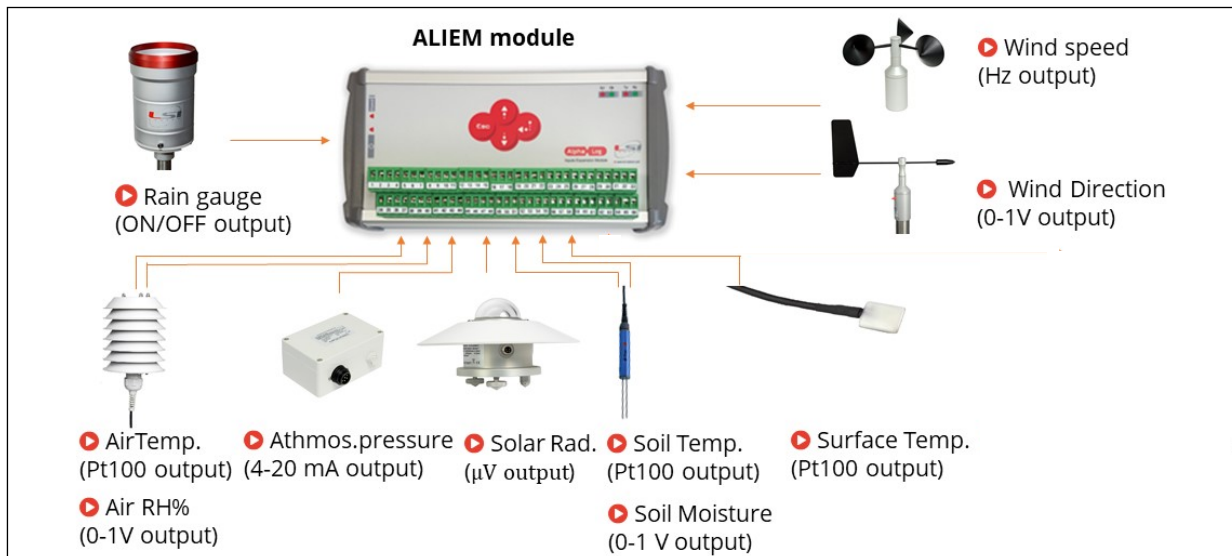
Data delivery to Modbus Master devices via:

- Modbus RTU: on RS232 or RS485 (see PN)
- Modbus TCP over Ethernet (using DEA509 adapter)

### ▶ Statistical elaboration and time base

The data transmitted by Modbus protocol can concern instantaneous values, but also mobile statistical values.

- Average/Minimum/Maximum/Standard Deviation
- Wind elaborations
- Totals



### ▶ Inputs for analog and digital sensors

- N.8 analog differential inputs (N.16 single-ended)
- N.4 digital inputs (Pulse/Frequency)
- N.1 RS232 (same used for system configuration)

### ▶ Sensors acquisition rate

Programmable for each input (from 1 second to 12 hours).

### ▶ Derived and calculated quantities

Internal library of derived environmental quantities. These calculations use acquired quantities, constant values and other calculated quantities. The library also includes mathematical functions (*See Derived Quantities data sheet*). ALIEM module manages up to 99 channels between acquired, derived and calculated quantities.

### ▶ Firmware update

ALIEM module has a function (Boot loader) that allows you to send, via RS232, a firmware update from a PC directly connected via RS232.

### ▶ Configuration

The configuration is carried out by means of the 3DOM program on PC. The configuration file is sent to the instrument via RS232/USB.

### ▶ Built-in Temperature sensor

Built-in Temperature sensor (accuracy  $0.1^{\circ}\text{C}$ ) also used as thermocouples cold junction.

### ▶ Switched power supply outputs

N.7 independent electrical outputs to supply power to sensors (8...30 Vdc @ 1.1 A each output). To limit energy consumption, it is possible to set an advanced power supply from the acquisition event, (warm-up) that is interrupted immediately after the acquisition itself.

### ▶ Alarms

Any independent switched power supply output can be used to switch-on/off external devices using configurable alarm logics. Each output can have many AND/OR alarm logics. These outputs become relay outputs with an external module (MG3023).

### ▶ Power supply

ALIEM module runs at 8...30 Vdc. The optional batteries are external and are housed in the available ELF boxes. (*see Accessories*). ALIEM can also run by solar panel using external solar power regulator module (included in the ELF340-345 enclosures).

### ▶ Power consumption and battery duration

ALIEM has a very low power consumption (standby < 4 mW), 115 mW during measurements.

▶ ALIEM module together with Alpha-Log data logger inside ELF340 enclosure with the following included devices:

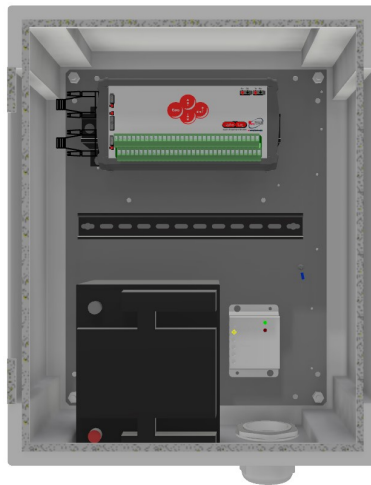
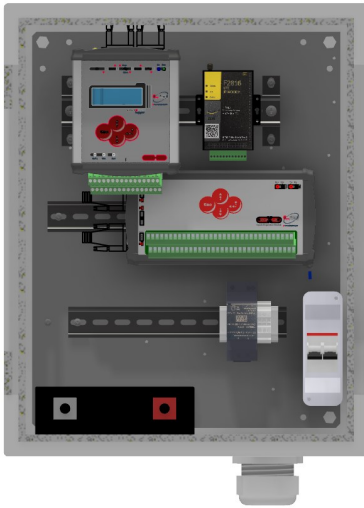
- 110...230 Vca-> 13,8 Vcc converter
- Thermal magnetic switch
- 2 Ah back-up battery

▶ ALIEM module inside ELF345 enclosure with the following included devices:

- Solar regulator
- Space available for 15 or 40 Ah (in the picture) battery types

▶ ALIEM module inside ELF340 enclosure with the following included devices:



- 110...230 Vca-> 13,8 Vcc converter
- Thermal magnetic switch
- 2 Ah back-up battery



## ▶ Installation

ALIEM module can be placed inside DIN mounting racks or IP66 enclosure (ELF series) alone or together with Alpha-Log data logger. LSI-LASTEM offers a selection of ELF enclosures (see Accessories) against shock, water, dust and atmospheric agents. Depending on the ELF's models, the enclosure can also accommodate power systems and batteries.

## ALIEM models

Codice	MDMMB110	MDMMB110.1
		
<b>Description</b>	ALIEM module	
<b>Inputs type</b>	Terminal block	
<b>Analog inputs</b>	N.8 differential (N. 16 single-ended)	
<b>Digital inputs</b>	N.4 (on/off or frequency/counter)	
<b>RS-232 port</b>	N.2	N.1
<b>RS485 port</b>	-	N.1
<b>Included accessories</b>	RS232/USB adapter, RS232 cable, DIN-bar mounting, DTE to DCE adapter	RS232/USB adapter, RS232 cable, DIN-bar mounting, DTE to DCE adapter, adapter for RS485 cable wires

**Technical features — ALIEM**

Analog inputs		Range	Resolution	Accuracy (@ 25°C)	
Analog inputs	Volt	-300...1200 mV	40 $\mu$ V	$\pm$ 100 $\mu$ V	
		$\pm$ 78 mV	3 $\mu$ V	$\pm$ 35 $\mu$ V	
		$\pm$ 39 mV	1.5 $\mu$ V	$\pm$ 25 $\mu$ V	
	Pt100	-50...125°C	0.003°C	$\pm$ 0.05°C	
		-50...600°C	0.013°C	$\pm$ 0.11°C	
	Resistances	80...140 $\Omega$	0.0013 $\Omega$	$\pm$ 0.02 $\Omega$	
		80...320 $\Omega$	0.005 $\Omega$	$\pm$ 0.05 $\Omega$	
		0...6000 $\Omega$	0.19 $\Omega$	$\pm$ 1.5 $\Omega$	
	Thermo-couples	E-IPTS 68 -200...1000°C	<0.1°C	$\pm$ 1.5°C	
		J-IPTS 68 -50...600°C	<0.1°C	$\pm$ 1.2°C	
		J – DIN -50 ... 600°C	<0.1°C	$\pm$ 1.2°C	
		K-IPTS 68 -150...1350°C	<0.1°C	$\pm$ 1.9°C	
		S-IPTS 68 0...1600°C	0.22°C	$\pm$ 4.9°C	
		T-IPTS 68 -200...200°C	<0.1°C	$\pm$ 1.4°C	
	Inputs number	N.8 differential (N.16 single-ended)			
	Voltage clamping	$\pm$ 2.5 V			
	ESD protections (complies standards)	IEC 61000-4-2 Contact Discharge $\pm$ 12 kV IEC 61000-4-2 Air-Gap Discharge $\pm$ 15 kV IEC 61000-4-5 Surge 3.0 A (8/20 $\mu$ s)			
	EMC filter	X2Y filters on all inputs			
	Channel to Channel crosstalk	-80 dB			
	Temperature error (@-10...30°C)	-300...1200 mV < $\pm$ 0.01% FS $\pm$ 39 mV < $\pm$ 0.01% FS $\pm$ 78 mV < $\pm$ 0.01% FS			
Digital inputs	Inputs number	N.4			
	Mode	<ul style="list-style-type: none"> <li>N.2 input for sensors with optoelectronics (freq. max 10 kHz)</li> <li>N.2 Frequency input (freq. max 5 kHz)</li> <li>N.4 Logic state input ON/OFF (they acquire signals 0...3 Vdc)</li> </ul>			
	Max input freq.	5 kHz			
	Accuracy	3 Hz @ 5 kHz			
	Protections (power)	Peak pulse power: <ul style="list-style-type: none"> <li>600 W (10/1000 <math>\mu</math>s)</li> <li>4 kW (8/20 <math>\mu</math>s)</li> </ul>			
	Protections (complies standards)	IEC 61000-4-2 level 4: <ul style="list-style-type: none"> <li>15 kV (air discharge)</li> <li>8 kV (contact discharge)</li> </ul> IEC 61000-4-5 MIL STD 883G, method 3015-7: class 3B <ul style="list-style-type: none"> <li>25 kV HBM (human body model)</li> </ul>			

<b>Switched power supply outputs</b>	Number	N.7 (with programmable switching-on time before sensor acquisition)
	Max total current	On a single output: 1.1 A Total for all outputs: 7.7 A
	Voltage clamping	+33 V
	Protections	On each output: PTC overcurrent protections (resettable) max 1.1 A
	Protections (power)	Peak pulse power: <ul style="list-style-type: none"> <li>• 600 W (10/1000 <math>\mu</math>s)</li> <li>• 4 kW (8/20 <math>\mu</math>s)</li> </ul>
	Protections (complies standards)	IEC 61000-4-2 level 4: <ul style="list-style-type: none"> <li>• 15 kV (air discharge)</li> <li>• 8 kV (contact discharge):</li> </ul> IEC 61000-4-5 MIL STD 883G, method 3015-7: class 3B <ul style="list-style-type: none"> <li>• 25 kV HBM (human body model)</li> </ul>
<b>Power supply</b>	Power supply	8...30 Vdc
	Power consum. (@ 12 V)	During acquisition: 115 mW Stand-by: <4 mW
	Voltage clamping	+33 V
	Protection	From reverse polarity
	EMC filter	YES (AEC-Q200)
	Protections (power)	Peak pulse power: <ul style="list-style-type: none"> <li>• 600 W (10/1000 <math>\mu</math>s)</li> <li>• 4 kW (8/20 <math>\mu</math>s)</li> </ul>
	Protections (complies standards)	IEC 61000-4-2 level 4: <ul style="list-style-type: none"> <li>• 15 kV (air discharge)</li> <li>• 8 kV (contact discharge):</li> </ul> IEC 61000-4-5 MIL STD 883G, method 3015-7: class 3B <ul style="list-style-type: none"> <li>• 25 kV HBM (human body model)</li> </ul>
<b>RS-232-485 ports</b>	Number/type PN:MDMMB1110	N.2 RS-232 ports (N.1 for system setup and data display by PC, N.1 for Modbus-RTU output)
	Number/type PN:MDMMB1110.1	N.1 RS-232 for system setup and data display by PC N.1 RS-485 for Modbus-RTU output (with isolated 12V@160 mA)
	Speed	1200...115200 bps
	Type	Db-9 pin/male/female/DCE
	Voltage clamping	$\pm$ 15 V
	Protections (power)	Peak pulse power: <ul style="list-style-type: none"> <li>• 600 W (10/1000 <math>\mu</math>s)</li> <li>• 4 kW (8/20 <math>\mu</math>s)</li> </ul>
	Protections (complies standards)	IEC 61000-4-2 level 4: <ul style="list-style-type: none"> <li>• 15 kV (air discharge)</li> <li>• 8 kV (contact discharge):</li> </ul> IEC 61000-4-5 MIL STD 883G, method 3015-7: class 3B <ul style="list-style-type: none"> <li>• 25 kV HBM (human body model)</li> </ul>

<b>Others</b>	Standard	EN 61326-1 2013 , EN 61010-1 2013, EN 50581 2013
	Watch	Accuracy: 30 s/month (@ 25°C)
	Keyboard	N.4 keys
	Processor	2 RISC 8 bit, clock 16 MHz
	A/D converter	18 bit resolution (rounded to 16 bit)
	Sample duration	(rejection 50/60 Hz): 80 ms@rejection 50 Hz
	Environm.limits	-30...70°C, 15...100 % RH (without water condensation)
	Physical protection	Conformal coating on the electronic board to protect the board's components against moisture, dust, chemicals, and temperature extremes
	Protection grade	IP 40
	Weight	0.72 kg
	Dimensions	242 x 108 x 80 mm