ENVIRONMENTAL DATA LOGGERS

M-Log

- N.4/8 analog inputs, N.1 digital input, N.1 RS232 input (*)
- Auto-recognition of connected sensors (*)
- Input for serial sensors
- Extremely low power consumption and integrated batteries
- N.50 measurements considering channels for sensor acquisition and derived quantities
- Internal library for calculating derived quantities and mathematical calculations
- 8 MB Flash Memory
- Modbus-RTU Master/Slave, TTY protocols
- N.2 RS232 ports
- Switched power supply outputs to trigger external devices with programmable logics or events (*)
- Sensors acquisition rate from 1 second to 12 hours
- Statistic elaboration rate from 1 second to 12 hours
- Connection to the PC via RS232 (USB /Ethernet with external accessories)
- Display and keyboard

** Depending on the models. See the chapter "Models"*

M-Log is a line of compact data loggers for environmental monitoring, suitable for portable indoor applications. Small and flexible, but also powerful and reliable, M-Log can be used in a virtually unlimited range of applications.

Typically M-Log (ELO009) is used on a portable tripod for Thermal Environments measurements for the assessment of thermal comfort and stress, air quality, ventilation measurements, thermo-hygrometric measurements for assessing the energy efficiency of buildings and HVAC tests

The ELO008 model, having terminal block inputs, is more suitable for measurements in the field of environmental monitoring but in industrial situations. Typically, thanks to the Modbus-RTU protocol (Master / Slave), it is used as an interface between sensors and systems such as PLCs, as well to store processed values and sending instantaneous values to PC.

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Inputs for analog and digital sensors

Free wires terminal board (ELO008)

- N.4 differential analog inputs (N.8 single-ended, see Models)
- N.1 digital input (Pulse/Frequency)

Mini-DIN input connectors (ELO009)

- N.4 differential analogue inputs
- N.1 impulsive/frequency input

This model is able to auto-recognize the connected LSI LASTEM sensors.

Inputs for Serial sensors

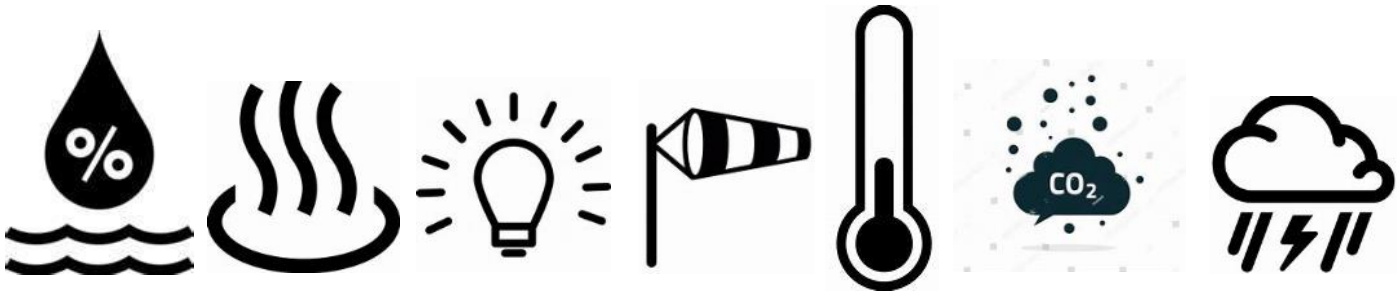
The M-Log COM-2 port can be connected to hot wire anemometers (ESV306-307) or to sensors with Modbus-RTU protocol output.

Measurements

M-Log units can be connected to a wide range of sensors for evironmental quantities, as:

- Air temperature and Relative Humidity
- Black globe temperature
- Wet temperature
- Surface and materials temperatures
- Air speed
- Light
- Pollutance (indoor air quality)
- Thermal flow and Radiant asymmetry
- Meteorological quantities

LSI LASTEM supplies a wide range of compatible sensors, read the LSI LASTEM's catalogues. Having terminal inputs, using ELO008 model, it is possible to use third-parties sensors



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Sensors acquisition rate

Acquisition rate is programmable individually for each sensor (from 1 second to 12 hours). M-Log manages 4 channels from analog inputs and 8 derived quantities in 1 second. To limit energy consumption from sensors requiring power supply, it is possible to set an advanced power supply from the acquisition event (warm-up) that is interrupted immediately after the acquisition itself.

Data elaboration

The raw measured values can be stored directly as instantaneous values, or be stored as statistical processing (n.1 base, from 1 second to 12 hours):

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

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 table). M-Log manages up to 50 channels between acquired, derived and calculated quantities.

Data memory

Internal memory (8 MB) allows to store data typically for several weeks. The registration structure is circular. In the model (ELO009) with Mini-DIN inputs the data is stored in “surveys” with progressive numbering and date/time start/end.

Data communication (devices)

It is possible to transfer data to a PC via RS232, USB (with adapter included), or via Ethernet through an external converter (see Accessories).

Data communication protocols

M-Log uses a proprietary binary type protocol to transmit data using LSI LASTEM communication programs: 3DOM and CommNET.

Switched power supply outputs

N.3 independent electrical outputs to supply external sensors and devices that can be activated with configurable logics depending on the data acquired:

- Greater/less than, within a range
- Wind alarm
- Scheduled event
- Error state of the unit

These outputs become relay outputs with a special external module (MG3023).

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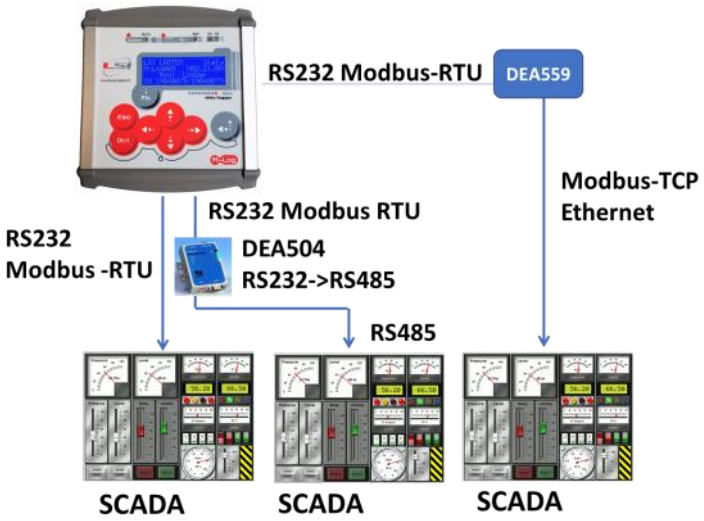
Data communication protocols (Modbus SLAVE)

In the M-Log model (ELO008) it is possible to send data to Modbus Master devices via:

- Modbus RTU: on RS232 or RS485 (using external adapter DEA504)
- Modbus Encapsulated TCP on Ethernet (using external adapter DEA509)
- Modbus TCP over Ethernet (using DEA553 adapter)

The data transmitted with the Modbus protocol can concern instantaneous values, but also mobile statistical values*.

*Mobile data are values whose statistical basis corresponds to the last observation period. Example: mobile temperature average over 10 minutes (each minute the value is updated always considering the average value of the last 10 minutes).



Built-in Temperature sensor

Built-in Temperature sensor (accuracy 0,5°C).

Peripherals

M-Log is equipped with the following peripherals:

- N.1 RS232 DCE port
- N.1 RS232 DCE-DTE port

Data Logger 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, RS485 or Ethernet with external optional devices.

Display

M-Log is equipped with a back-lit LCD display (4x20 chrs) (see Models). The following information are listed:

- Real-time measurements list
- Dignostic

Clock synchronization

The internal clock (accuracy 1 min/month) is updated through the keyboard or through the 3DOM configuration program.

Power supply

M-Log runs at 8÷14 Vcc and can charge, through battery charger (BSC015) the internal rechargeable lithium battery (see Models).

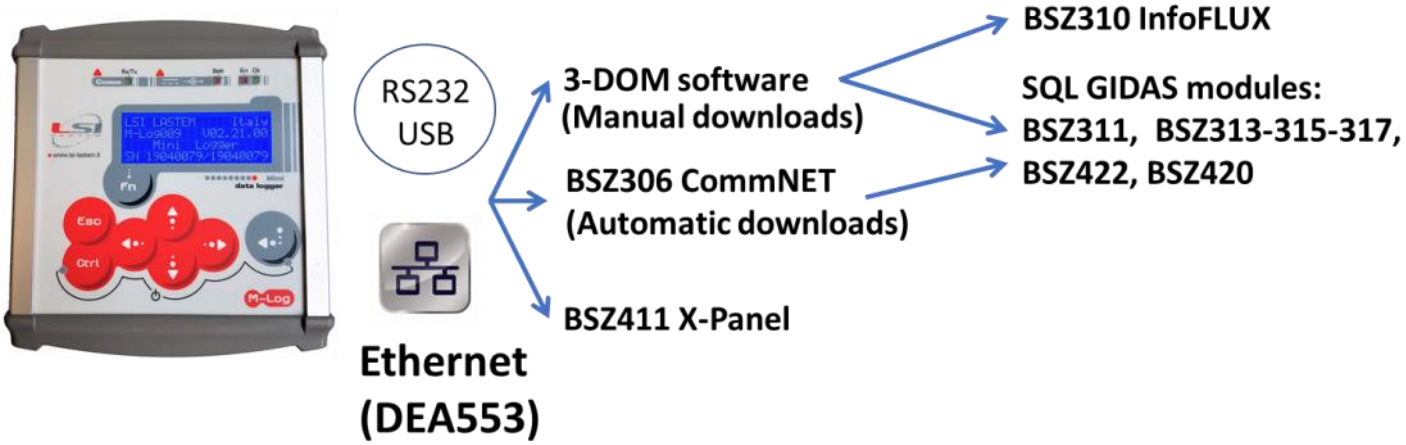
Power consumption and battery duration

M-Log has a very low power consumption (standby < 4 mW), 140 mW during measurements. It allows a battery duration (using internal Lithium battery) of 3 months using sensors without own power consumption starting from fully charged battery.

M-Log comes with an internal (2 Ah, 4.2 V) Lithium rechargeable battery. For long-term operation, additional batteries are normally included in ELF enclosures (see Accessories).

Software

M-Log



The data acquired by M-Log are downloaded to a PC using the 3DOM program in manual mode. 3DOM saves the data in TXT text format, or in SQL-Gidas format. From the latter, they can be managed with all the LSI-LASTEM applications that use this type of database (see Software catalog). Through the X-Panel program it is possible to view the data in dynamic form in real-time.

Installation

In portable applications, M-Log (ELO009) is mounted on a tripod (BVA304) through a stand where also the probes can be fixed (see Accessories). The ELO008 model, through its DIN connection, can be fixed inside a portable IP66 case (ELF432) where there is also a battery power system and a battery charger system.

M-Log (ELO009) tripod mounting using a stand.

IP66 ELF432 enclosure for portable monitoring applications.

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Models M-Log

PN	ELO008	ELO009
		
Description	M-Log data logger. N.5 inputs by terminal block	M-Log data logger. N.5 inputs by Mini-DIN connector
Inputs type	Terminal block	Mini-Din
Analog inputs	N.4 differential (N. 8 single ended)	N.4 differential
Digital inputs	N.1 (on/off or frequency/counter)	N.1 (on/off or frequency/counter)
Sensor's auto-recognition	NO	YES
Switched power supply outputs	YES	NO
Back-lit display	NO	YES
Threaded slot for tripod fixing	NO	YES
Internal battery	YES 2Ah rechargeable (4.2 V). Lithium	
Plug for power battery charger	YES	
Included accessories	RS232/USB adapter, RS232 cable, DIN-bar mounting, 3DOM program	RS232/USB adapter, RS232 cable, 3DOM program

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		Range	Resolution	Accuracy (@ 25°C)
Analog inputs	Volt	-300÷1200 mV	40 µV	±100 µV
		±78 mV	3 µV	±35 µV
		±39 mV	1,5 µV	±25 µV
	Pt100	-50÷125°C	0,003°C	±0,05°C
		-50÷600°C	0,013°C	±0,11°C
	Resistances	80÷140 Ω	0,0013 Ω	±0,02 Ω
		80÷320 Ω	0,005 Ω	±0,05 Ω
		0÷6000 Ω	0,19 Ω	±1,5 Ω
	Thermo-couples	E-IPTS 68 -200÷1000°C	< 0,1°C	±1,5°C
		J-IPTS 68 -50÷600°C	< 0,1°C	±1,2°C
		J – DIN -50÷600°C	< 0,1°C	±1,2°C
		K-IPTS 68 -150÷1350°C	< 0,1°C	±1,9°C
		S-IPTS 68 0÷1600°C	0,22°C	±4,9°C
		T-IPTS 68 -200÷200°C	<0,1°C	±1,4°C
	Inputs number	N.4 differential (ELO008: N.8 single-ended)		
	ESD protection	±8 kV contact discharge IEC 1000–4-2 ±1,2 kV air-gap discharge IEC 1000–4-2		
	Channel to Channel crosstalk	-93 dB		
	Max input signal	3 V		
	EMC filter	EN61326-1 2013		
	Temperature error (@-10÷30°C)	300÷1200 mV < ±0,01% FS; ±39 mV < ±0,01% FS ±78 mV < ±0,01% FS		
Digital inputs	Inputs number	N.1		
	Mode	• Sensors with optoelectronics (freq. max 10 kHz) • Frequency input (freq. max 5 kHz) • Logic state input ON/OFF (they acquire signals 0 ÷ 3 Vdc)		
	Max input frequency	5 kHz		
	Accuracy	3 Hz @ 5 kHz		
	Protection	Transient voltage suppressor 600 W, <10 µs		

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Switched power supply outputs	Outputs number	N.3 N.2 for sensors and external devices N.1 on pin9 RS232-1 port (communication devices)
	Max total current	On a single output: 0,7 A On all outputs: 1,2 A
	Protection	Thermal and over current (> 0,15 A)
Power supply	Power supply	8÷14 Vdc
	Power consumption (@ 12 V)	During acquisition: 115 mW (136 mW display on) Stand-by: <4 mW
	Protection	• Internal overcurrent, short-circuit • Max actuator current, with external load: 1,5 A • Transient voltage suppressor: 600 W, t >10 µs; • Polarity inversion
Battery	Type	2 A (4,2 V) LiIon rechargeable
	Recharging time	About 8 hrs
RS232 ports	Speed	1200 ÷ 115200 bps
	Type	DE-9 pin/male/female/DTE/DCE
Others	EMC	EN61326-1 2013
	Watch	Accuracy: 30 s/month (@ 25°C)
	Display	LCD 4 x 20 car
	Keyboard	n. 8 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
	Data memory	8 Mb
	Environmental limits	-20 ÷ 60 °C, 15 ÷ 100 % RH (without condensation water)
	Protection grade	IP 40
	Weight	500 gr
	Dimensions	140 x 120 x 50 mm