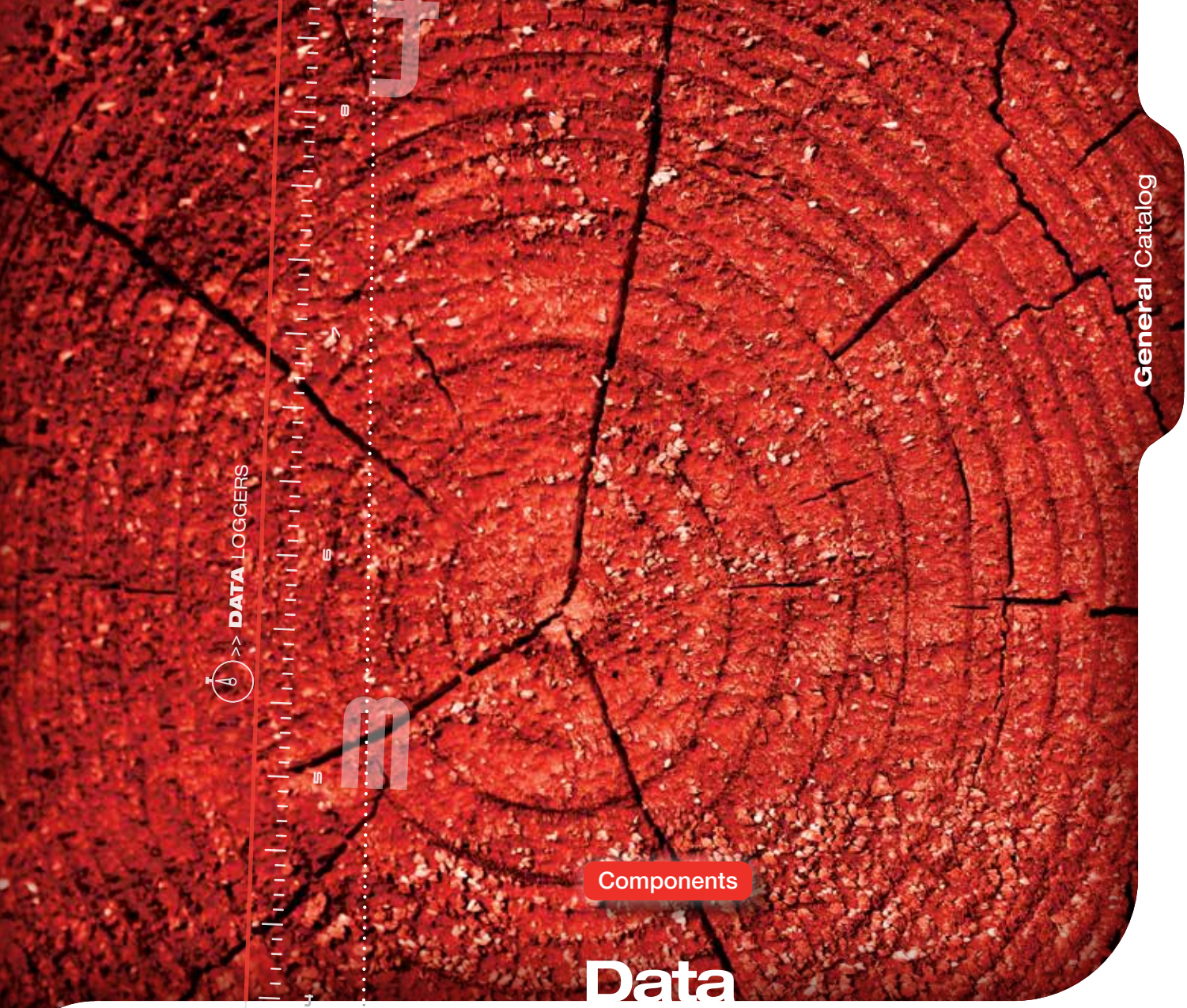


General Catalog

>> DATA LOGGERS

Components

Data Loggers Overview

data loggers

LSI LASTEM

Milano
ITALY

LSI LASTEM s.r.l.

40 years of experience in environmental technology

Since 1972, LSI LASTEM Srl of Milano (Italy) develops, manufactures and delivers worldwide the most complete range of high quality environmental monitoring systems. LSI LASTEM instruments suits virtually any type of application, guaranteeing accurate and reliable measurement of environmental parameters both for portable and long term monitoring, outdoors and indoors. Our comprehensive range of products includes sensors, data acquisition systems, software and installation accessories.

Products

Instrumentation for indoor and outdoor environmental monitoring applications

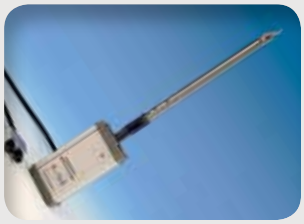
LSI Lastem catalogue features one of the most complete ranges of instruments available on the market. We supply our products as complete, turn-key solutions or as components for third-party integration.

METEOROLOGICAL SENSORS

Our broad range of sensors covers virtually any meteorological parameter, including wind, temperature, relative humidity, solar radiation, rain, atmospheric pressure, evaporation, visibility and more.

INDOORS SENSORS

A full set of sensors for high-end indoors monitoring applications including solutions for temperature, relative humidity, air speed, light, radiative quantities, pressure, gas concentration and more.



DATA LOGGERS and SOFTWARE

A complete range of data loggers for environmental applications, featuring low power consumption, protection against severe environmental conditions and extensive set of signal supported and communication protocols.

Systems

LSI Lastem knowledge and expertise, the result of 40 years of business in the environmental market, has helped customers put together an incredible number of application-specific monitoring solutions.

INDOORS APPLICATIONS

Indoor Environmental Quality

Since his inception, indoor environmental assessment has been LSI Lastem's core business. Over the years, we implemented the most complete range of systems to measure the critical quantities defining health and comfort of building occupants.

Heat stress and thermal comfort

State-of-the-art systems for the measurement of thermal comfort and heat/cold stress in health and safety applications according to relevant ISO standards. Over the years this application has become a true LSI LASTEM's specialty.

HVAC

Complete solutions for thermal comfort and indoor air quality monitoring in order to regulate HVAC (Heating, Ventilation Air Conditioning) systems performances and attain a better thermal sensation with optimal energy expenditures.

Buildings assessment/Wall insulation

Complete systems for testing building environmental performances as function of energy saving capacity and related environmental comfort (Green Building Rating Tools) - including wall thermal transmittance, thermal comfort, indoor air quality and ventilation, light controls.

Controlled Atmosphere Processing Environments

Monitoring of ambient temperature, relative humidity, air speed, pressure, IAQ and other parameters relevant for optimal storing and processing purposes in clean rooms, white chambers, laboratories, warehouses, caves and green houses.

Museums and heritage

Practicing on Italy's immense cultural and artistic heritage and in cooperation with the most renowned restoration institutes, LSI Lastem has implemented monitoring solutions for the critical environmental and chemical parameters affecting conservation of artworks in museums, archeological sites and natural caves.

ENVIRONMENT AND POLLUTION

Air Quality Monitoring
Meteorological measurements for the analysis of the atmosphere dynamics and data correlation for air quality networks, stack emissions and gas analyzers systems.

Landfills and waste plants monitoring
Monitoring of meteorological parameters in environmental-hazardous plants such as landfills and waste treatment plants. Solutions for odours dynamics, rain quantity and deepwater level&quality.

Compost and biofilters
Systems to monitor the compost maturation process and bio-filtration activity. We provide solutions for temperature, oxygen and water content monitoring, for on-line (wireless or cabled) and portable applications.

METEOROLOGICAL APPLICATIONS

AWS and Synoptic Meteorological systems
Complete surface weather observation systems according to WMO standards for general or specific meteorological observations, operating individually or in networks.

Road and transportation monitoring systems
Meteorological measurements systems for roads, railroads, seaports and airports-including specific parameters such as wind, visibility, precipitation intensity and type, road-surface conditions and present weather.

Hydrology systems
Meteorological systems to control water both as a resource and as a hazard in hydrological networks and water-basin management – including measures of rain intensity, level and quality of water and snow.

Agrometeorology
Climate is the single most important factor for crops growth and health. We offer a complete range of application-specific monitoring for leaf wetness, evapotranspiration, soil water content and photosynthetic-active radiation.

Wind energy
From site assessment to wind turbine control, our complete meteorological catalogue with its full range of anemometers and data logger, gives wind energy professionals one of the most complete arrays of solutions available on the market.

Solar energy
As Italy evolved into a premium solar energy market, we became the preferred choice for plant owners, EPC contractors and monitoring systems producers as we developed a unique knowledge of the application to go along with our meteorological and radiometric know-how.

The LSI LASTEM Story

40 years of experience in environmental technology

www.lsi-lastem.com

1972 - Laboratori di Strumentazione Industriale (LSI) Spa is organized in Milano by former members of a previously existing electronic research company (LRE) and begins the production of electrical thermometers. Soon afterwards, the company adds systems to measure relative humidity through the psychrometric method and hot-wire anemometers to his portfolio.

1975 - The company introduces graphic recorders for the online printing of the measured values and a line of converters for the connection of sensors to industrial systems. In just a short time, the range of products and measured quantities is remarkably increased with the introduction of sensors for the measurement of different types of temperature radiant, contact and of liquids, along with luxmetric sensors and hygrometers.

1979 - Introducing the LASTEM logo, the company begins the production and distribution of his line of sensors and data acquisition systems specific for meteorological applications. LASTEM Srl is now operative.

1980 - LSI is the first company in Italy to produce instruments for the measurement and storage of the thermal environments parameters requested in the health and safety regulations in working environments.

1985 - LSI and LASTEM transfer their head offices from Viale Liguria (Milan) to the current Settala (MI) headquarters, consisting in three twin buildings.

1990 - After the consolidation of computer technology and storage possibilities, LSI develops a series of PC-compatible acquisition systems and software.

1995 - A new concept of measurement is then started: multi-measurement system - one single system able to measure not just a few parameters, but a whole range of quantities which, altogether, can solve a specific application need.
The multi-measurement concept has been a company mainstay since, widening the range of sensors for the measurement of environmental quantities such as gas concentration, thermic flows, lux and radiation.

2000 - LSI further develops its range, with a new sensor line equipped with data transmission via radio to data acquisition systems.

2004 - Aiming at offering a more complete range of services and better quality standards to his clients, LSI creates the new “After-Sale Services” division, designed to offer support and service after the purchase of the instruments: Telephonic Assistance, Data Collection, Repair Service and External Assistance.

2006 – LSI and LASTEM are united under the same brand and logo, with the new LSI LASTEM name.

2010 – A new concept of multi-position measurement is started: thanks to radio technology applied to data loggers and sensors, the multi-measurement concept is extended to a multi-position concept. Now LSI Lastem can develop complex systems producing simultaneous measurement of a number of parameters in different positions of the targeted environment.

LSI LASTEM Headquarters
Settala (MI) ITALY

www.lsi-lastem.com


| photo | 3 twin-building structure

LSI LASTEM headquarters in Settala, near Milano, Italy is a 1325 m^2, 3 twin-building structure that's been home to our company since 1985. Here, a team of 30 professionals is employed in engineering, production, aftersales, marketing and administration departments.

R&D
Each and every LSI Lastem product is designed, developed and tested here. Our skill set includes physics, mechanics, electronics, firmware and software engineering.


Mechanical Shop
The backbone of LSI Lastem products takes shape in our in-house shop. Our expert craftsmen produce here sensor bodies, supports and mechanical components.


Sensors assembly division
Given our extensive range of sensors, this is always one of the busiest areas of the company. After completion, sensors are moved in the nearby calibration laboratories for testing.


Data Loggers Assembly division
Data Loggers are the absolute core of our systems. Here they are assembled, configured and tested – the latter activity lasts for a 7-day period.


adquarters

Settala (MI) ITALY

Calibration Laboratories

To ensure consistent and dependable performance, we calibrate each sensor against traceable standards in a specific calibration facility. Our laboratory is accredited by ACCREDIA Italian Accreditation System, the National Body for accreditation activities, equivalent to ISO/IEC 17025.

Aftersales

We have a skilled, dedicated team for aftersales services. Their duties include repairs, calibrations, on-site installations and maintenance. In addition, we perform data management services to our customer - data download, validation and web publication.

Training

We have always believed in the benefit of offering training for our customers to make the use of our system more productive and easier. That's why we have a dedicated room for our year-round training seminars.

Index

Data Loggers
General catalogue

LSI LASTEM designs and manufactures a wide range of data loggers for environmental applications. With very low power consumption, expanded signal capacity and protections against severe environmental conditions, LSI LASTEM data loggers are the ideal solution for measurements in meteorological, air quality, indoor and outdoor environmental monitoring applications. The different features of LSI LASTEM instruments suits virtually any environmental monitoring procedure, guaranteeing accurate and reliable monitoring of physical parameters both for portable and continuous application, outdoors and indoors.
LSI LASTEM data loggers can send and receive data to each other, allowing for MASTER/SLAVE or NETWORK architectures and design of multi-measurement and multi-positions monitoring systems.
Data logger flexibility and input range makes the use of third party sensors and transducers just as easy as the ones from LSI LASTEM production (see Indoor sensors, Meteorological sensors catalogues).

Our Data logger series includes three main families:

- **M-Log** Mini Data logger
- **E-Log** Environmental Data logger
- **R-Log** Radio Data logger
- **X-Log** Expert Data Logger

M-Log – Mini Data Logger

www.lsi-lastem.com

Highlights

- N.4/8 analog inputs, n.1 digital input, n.1 RS232 input;
- Very low power consumption (< 4 mW);
- N.50 total channels for acquisition and calculations;
- 2 MB Flash data memory;
- LSI-LASTEM, Modbus RTU, TTY communication protocols;
- N.2 RS232 serial ports (1200 bps to 115.2 kbps);
- Built-in calculation library for derived quantities;
- Built-in mathematical calculations library;
- Digital outputs for external device activation over programmable logics and/or events;
- Sampling rate 1 sec. to 12 hrs;
- Elaboration time-base 1 sec. to 24 hrs;
- PC connection via RS232/radio/modem PSTN/GSM/GPRS/Ethernet;
- Display and keyboard;
- Compatibility with CommNET, GIDAS and XPanel softwares.

M-Log is a compact data logger for environmental monitoring, suitable for both indoor and outdoor purposes. It can be mounted on a tripod for portable applications or installed inside an IP65 box for long-term outdoor applications. Small and flexible, while powerful and durable, M-Log can be used in virtually unlimited environmental applications.

Main Features

Inputs

N. 4 (8 single-ended) inputs for analogue signals (voltage, current and resistance).
N. 1 digital input. It can be configured for frequency or digital on/off signals.
N.1 input for RS232 sensors

Models with mini-Din inputs and sensors self-recognition feature and models with terminal input board are available

Derived environmental and mathematical calculations

M-Log has an internal library of derived environmental quantities. These calculated quantities can use inputs from monitoring measures, user-defined constants and other derived quantities.
This library also includes mathematical calculations (see *Calculated Quantities - p. 22*)

Sampling rate

Programmable for each sensor (1 sec -12 hrs). M-Log manages up to n.4 channels from sensors and n.16 derived quantities in 1 sec.

Data storage

M-Log stores statistical elaborations with time bases from 1 sec. to 24 hrs:
- instant values
- arithmetical average, minimum, maximum, standard deviation
- totalization and integration time measurements
- wind elaborations:
  resulting/prevailing direction, resulting speed, direction standard deviation (sigma-theta), calm percentage.

Memory structure is circular.

Output actuation at event/time

M-Log (ELO007-008) has three digital outputs to power up external systems or alarm devices. Outputs are activated according to user-defined actuation logics.
- Greater/less than, within a range;
- Wind alarm;
- Alarm for beginning of precipitations;
- Flood Alarm;
- Scheduled event;
- Snow level alarm;
- Error state of the unit.

Sensors power supply actuation

M-Log can feed sensors requiring power supply for their operation, with user-defined warm-up time.

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). LSI-LASTEM supplies 2-15-40 Ah rechargeable battery packs and 1,5-V, D-shaped disposable battery packs. Batteries can be recharged using main power supply or solar panels.

Power supply

M-Log runs at 12 Vdc input voltage power supply and features an extremely low power consumption (< 4 mW).

Serial ports for data communication

M-Log is equipped with two RS232 serial ports. Both of them can be used for local or remote communication for data download or real-time update of instantaneous and diagnostic values.
Serial Port n. 2 can also be used to connect sensors with RS232 output (***see "Protocols" table).***

Direct connection to PC
M-Log can be directly connected to a PC with the following interfaces:
- USB, using included adapter;
- RS485 line drivers: distances up to 1 km, using DEA504 converter;
- Ethernet, using DEA550 converter (ELO007 features a built-in RJ45 port);
- Bluetooth, using DEA300 adapter.

Remote connection to PC
M-Log can be remotely connected to a PC with the following interfaces:
- Telephone network: GSM and GPRS: GSM/GPRS modem;
-Long distances UHF radio communication;
CommNetEG software can help managing both direct and remote connections with automatic/ scheduled communications.

Data communication in ASCII format using GPRS/ FTP and TCP/IP protocols
M-Log can send instant or statistical data using programmable scheduled time in spontaneous mode by GPRS modem and FTP protocol or by TCP/IP converter (over LAN or WAN). See “Data communications and protocols types” scheme.

Installation
M-Log can be easily mounted on stands, placed on portable tripods or wall-arm for indoor applications.

For outdoor applications M-Log is normally installed in IP65 protection box, either LSI LASTEM ELF series (see Accessories) or third party’s, for protection against shocks, water, dust and atmospheric agents; the IP65 box normally hosts also power supply systems, communication devices, additional batteries and, when present, barometric sensors.

RS-232 ports
M-Log has two RS-232 communication ports. COM1 is used to connect the unit to a local or remote PC (using different communication systems) for its setup (using 3DOM program) or for data communication. Even COM2 can be used for data communication using LSI LASTEM protocol (CISS) or sending out instant values using MODBUS RTU and TTY protocols. Furthermore using COM 2 it is possible to receive signals from sensors having RS232 output. Communication protocols are described in the “Protocols” table.

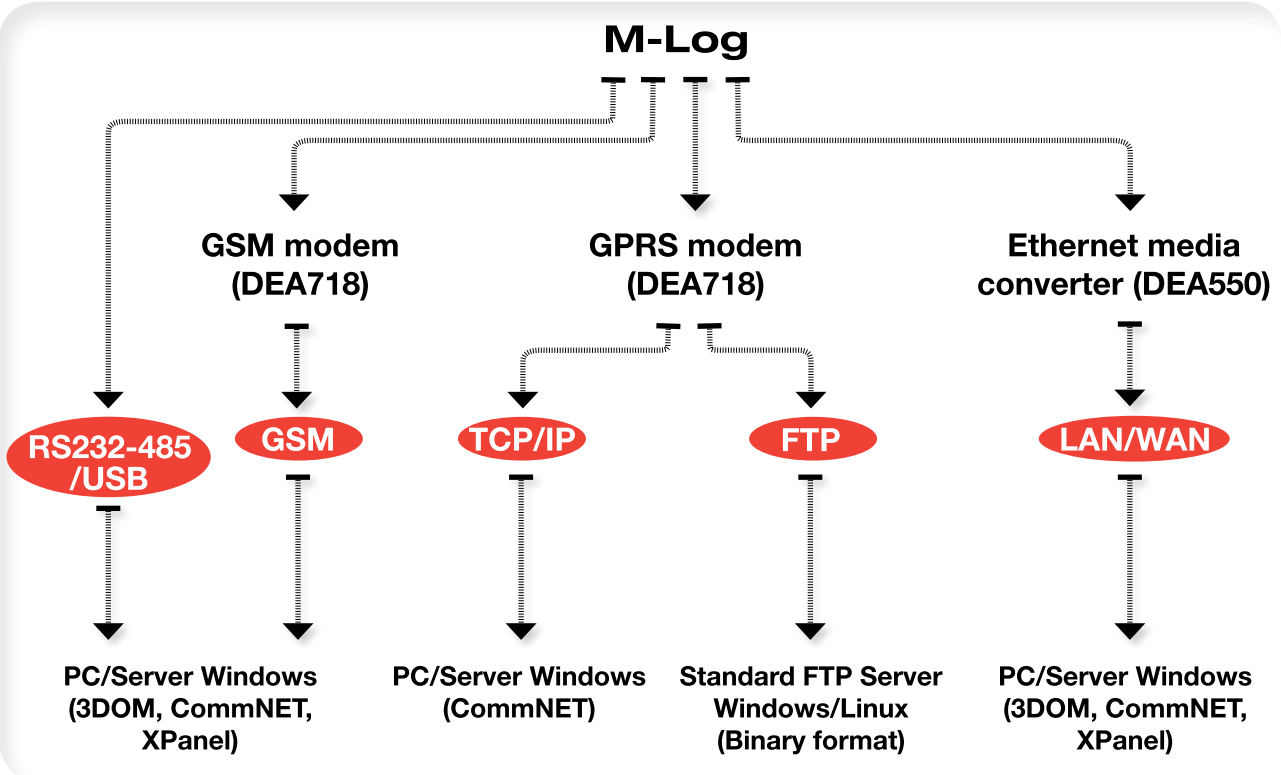
Modbus RTU Master
Mlog specific versions (see “Protocols” table) support input of MODBUS RTU protocol. This feature permits to connect sensors having serial output using MODBUS RTU protocol.

Modbus RTU Slave
Mlog specific versions (See “Protocols” table) support output of MODBUS RTU protocol. This featur permits to obtain instant or statistical (ave/min/max/tot) values in entire format or floating points over a running statistical base.

Order numb.	ELO007	ELO008	ELO009	ELO010
Inputs	Terminals		Mini-Din	
Analog inputs	N. 4 (n. 8 single ended)		N. 4	
Digital input	N. 1 (on/off or frequency/counter)			
Sensors self-recognizing	NO		YES	
Digital output actuation on event	YES		NO	
RS232 ports	N. 1	N. 2	N. 2	N. 1
Ethernet port RJ45 connector, TCP/IP socket server	N. 1	-	-	N. 1
Display back-light	NO		YES	
Tripod use	NO		YES	
GPRS communication	NO	YES	NO	

Protocols		ELO007 ELO008 ELO009	ELO008	ELO008
Protocol	**Description**	**Standard vers.**	**P1 vers.**	**P2 vers.**
Input (data input):				
CISS	LSI LASTEM property	Com.1+2	Com.1+2	Com.1+2
Modbus RTU Master	Modicon Modbus RTU mode	Com.2		
GILL	Gill format, polar, continuous	Com.2		
Climatronic	AIO weather station Terminal mode	Com.2		
Hydrolab			Com.2	
Aeroqual	AQM binary		Com.2	
Lufft	UMB binary			Com.2
Output (data output)				
CISS	LSI LASTEM property	Com.1+2	Com.1+2	Com.1+2
Modbus RTU Slave	Modicon Modbus RTU mode	Com.2		
GPRS / FTP (Binary)	Binary format	Com.1	Com.1	Com.1
TTY ASCII	CSV ASCII format	Com.2	Com.2	Com.2

Data communications and protocols types



Common features		Range	Resolution	Accuracy (@ 25°C)
Analogue inputs	Voltage	-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
		0 ÷ 6000 Ω	0.19 Ω	±1.5 Ω
	Thermocouples	E-IPTS 68	< 0.1°C	±1.5°C
		J-IPTS 68	< 0.1°C	±1.2°C
		J - DIN	< 0.1°C	±0.1.2°C
		K-IPTS 68	< 0.1°C	±1.9°C
		S-IPTS 68	0.22°C	±4.9°C
		T-IPTS 68	< 0.1°C	±1.4°C
	Inputs number (see MODELS)	N. 4 (n. 8 single-ended)		
	ESD protections	±8 kV contact discharge IEC 1000–4-2		
	Max input signal	1.2 Vdc		
	EMC filters	on all inputs		
	Temperature error (@ -10÷30°C)	300 ÷ 1200 mV < ±0.01% FSR; ±39 mV < ±0.01% FSR ±78 mV < ±0.01% FSR		
Digital inputs	Inputs number	N. 1		
	Functions	Frequency (Max 5 kHz); ON/OFF (0 ÷ 3 Vdc)		
	Max error	3 Hz @ 5 kHz		
	Protection	Transient voltage suppressor 600 W, <10 µs		
Digital outputs (see MODELS)	Outputs number	N. 3 (n. 1 sensors power-up, n. 2 on events)		
	Max current on each output	150 mA		
	Protection	Thermal and over current (> 0.15 A)		
Power supply	Power supply	8 ÷ 14 Vdc		
	Power consumption	Display ON: 60 mA, OFF: 20 mA		
	Power consumption (Stand-by)	Stand-by: 0,2 mA (n.9 months battery life)		
	Protections	Transient voltage suppressor: 600 W, t = 10 µs; on polarity inversion		
Battery	Type	2 A (4.2 V) Lithium rechargeable		
	Recharging time	~ 8 hrs		
Other features	Internal clock	Accuracy 30 s/month (T=25°C)		
	Display	LCD 4 x 20 car		
	Keyboard	N. 8 keys		
	Processor	1 RISC 8 bit, clock 16 MHz		
	ADC resolution	16 bit		
	Sampling time	80 ms (rejection 50 Hz)		
	Data memory	Flash EEPROM 2 Mb		
	Environmental limits	-20 ÷ 60 °C, 15 ÷ 100 % RH (not condensing)		
	Protection	IP 40		
	Weight	500 g		
	Dimensions	140 x 120 x 50 mm		
RS232 ports (see MODELS)	Speed	1200 ÷ 115200 bps		
	Type	9 pin/Female/Male/DTE/DCE		

E-Log – Environmental Data Logger

www.lsi-lastem.com

Highlights

- N.8/16 analog inputs, 4 digital inputs, n.1 RS232 input;
- Inputs extension using MASTER/SLAVE units;
- Available with built-in ZigBee radio;
- Very low power consumption (< 4 mW);
- N.99 channels for acquisition or calculation;
- 8 MB Flash data memory;
- LSI-LASTEM, Modbus RTU, TTY communication protocols;
- Modbus RTU Master feature;
- Spontaneous data transmission in ASCII format by TCP protocol;
- N.2 RS232 serial ports;
- Built-in calculation library for derived quantities;
- Built-in mathematical calculations library;
- Outputs actuation over programmable events to activate external devices;
- Sampling rate 1 sec. to 12 hrs;
- Elaboration time-base 1 sec. to 24 hrs;
- PC connection via RS232/radio/modem PSTN/GSM/GPRS/Ethernet;
- Display and keyboard;
- Compatibility with CommNET, GIDAS and XPanel programs.

LSI Lastem E-LOG has been explicitly designed for environmental applications. It features specific inputs and calculations for environmental sensors while maintaining an all-time-low power consumption. E-LOG stores data sampled from connected sensors and supports a wide range of communication protocols.
Rugged and durable, E-LOG ensures prolonged data-logging in even the most severe environments, while the 16-bit design of the A/D converter ensures data accuracy and reliability of measurements in meteorological and hydrological applications, for air quality and outdoor environmental monitoring.

Main Features

Inputs

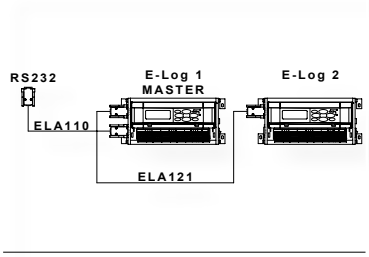
N.8 differential (n.16 single-ended) inputs for analog signals (voltage, current and resistance).
N.4 digital inputs programmable as frequency or on/off digital inputs
N.1 RS 232 input for sensors with serial interface.
The number of inputs can be increased using MASTER/SLAVE design. MASTER E-Log can manage up to 99 total channels.

Built-in radio

The ELO515 series is equipped with a built-in ZigBee radio. The Zigbee Radio network allows connecting of several LSI LASTEM devices, including E-Logs, radio sensors (S-Log) and R-Log-SLAVE units.

Derived environmental and mathematical calculations

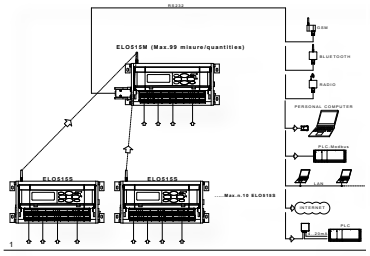
E-Log has an internal library of derived environmental quantities. These calculated quantities can use inputs from monitoring measures, user-defined constants and other derived quantities This library also includes mathematical calculations. (see *Calculated Quantities*)



Inputs extension: MASTER/SLAVE units by cable

Data storage

E-Log stores inside its 8 Mb Flash EEPROM memory statistical elaborations with time bases from 1 sec. to 24 hrs:
-instant values;
-arithmetical average, minimum, maximum, standard deviation;
-totalization and integration time measurements;
-wind elaborations:
resulting/prevailing direction, resulting speed, direction standard deviation (sigma-theta), calm %.
Memory structure is circular.



Inputs extension: MASTER/SLAVE units by radio

Output actuation at event/time

E-Log has seven digital outputs to power up external systems or alarm devices. Outputs are activated according to user-defined actuation logics:
- Greater/less than, within a range;
- Wind alarm;
- Alarm for beginning of precipitations;
- Flood Alarm;
- Scheduled event;
- Snow level alarm;
- Error state of the unit.

Sampling rate
Programmable for each sensor (1 sec -12 hrs). E-Log manages up to n.12 channels from sensors and n.8 derived quantities in 1 sec

Sensors power supply actuation
E-Log can feed sensors requiring power supply for their operation, with user-defined warm-up time.

Battery
Batteries are normally included in ELF enclosures (see Accessories). LSI-LASTEM supplies 2-15-40 Ah rechargeable battery packs and 1.5-Volt, D-shaped disposable battery packs. Batteries can be recharged using main power supply or solar panels.
Models ELO310 and ELO515 come with an internal 1.2 Ah battery.

Power supply
E-Log runs at 12 Vdc input voltage power supply. It has an extremely low power consumption (< 4 mW).
LSI-LASTEM offers a wide range of power supply systems and battery packs according to the requested power source and autonomy.

Serial ports for data communication
E-Log is equipped with two RS232 serial ports. Both of them can be used for local or remote communication for data download or real-time update of instantan eous and diagnostic values.
COM2 port can also be used to connect sensors with RS232 output.
In models equipped with built-in radio, COM2 port is not available.

Direct connection to PC
E-Log can be directly connected to a PC with the following interfaces:
- USB: using included adapter;
- RS485: distances up to 1 km, using DEA504 converter;
- Ethernet: using DEA550 converter;
- Bluetooth: using DEA300 adapter.

Remote connection to PC
E-Log can be remotely connected to a PC with the following interfaces:
- Telephone System: GSM modem;
- GPRS net: GSM/GPRS modem;
- Long distances UHF radio communications.

CommNetEG program can help managing both direct and remote connections with automatic/ scheduled communications.

Data communication in ASCII format using GPRS and TCP/IP protocols
E-Log can send ASCII data using programmable scheduled time in spontaneous mode by GPRS modem and FTP protocol or by TCP/IP converter (over LAN or WAN). See “Data communications and protocols types”

Installation
E-Log is normally installed in IP65 protection portable or fix box wall or pole mounting (see ELF series in Accessories part) for protection against shocks, water, dust and atmospheric agents; the IP65 box normally hosts also power supply systems, communication devices, additional batteries and, when present, barometric sensors.

RS-232 ports
E-Log has two RS-232 communication ports. COM1 is used to connect the unit to a local or remote PC (using different communication systems) for its setup (using 3DOM program) or for data communication. Even COM2 can be used for data communication using LSI LASTEM protocol (CISS) or sending out instant values using MODBUS RTU and TTY protocols. Furthermore using COM 2 it is possible to receive signals from sensors having RS232 output. Communication protocols are described in the “Protocols” table.

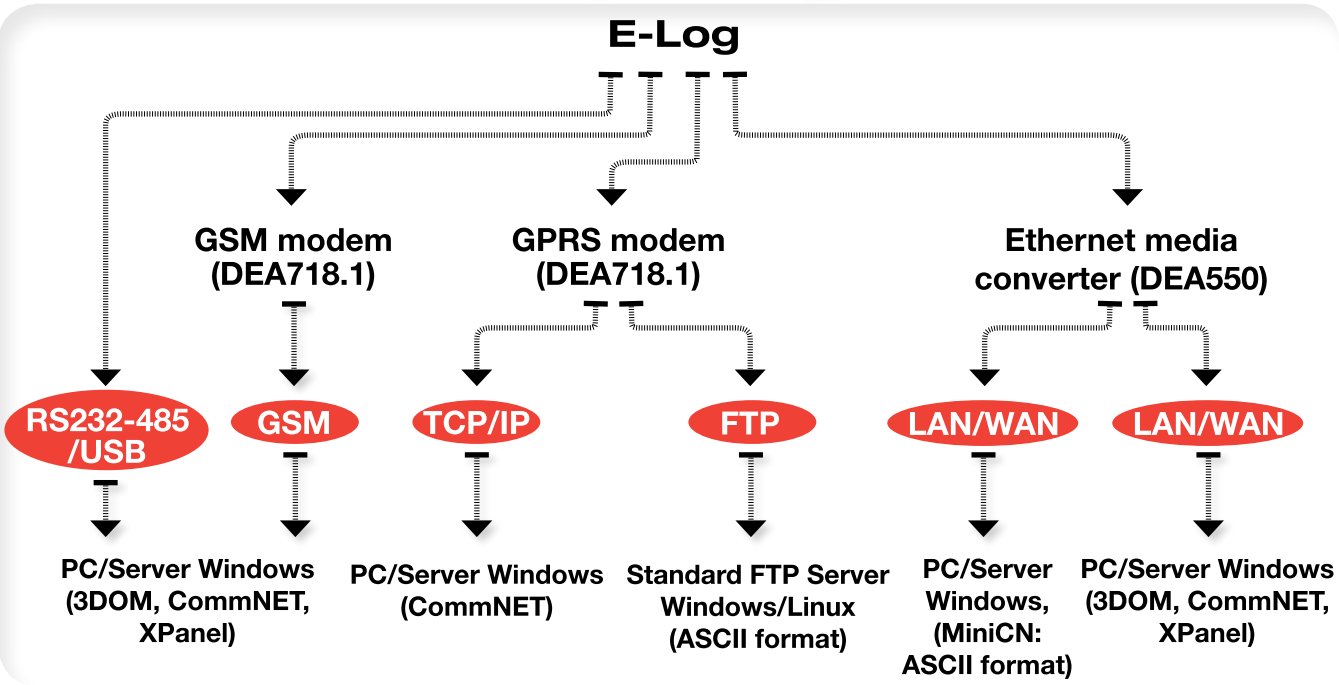
Modbus RTU Master
E-log specific versions (see “Protocols” table) support input of MODBUS RTU protocol. This feature permits to connect sensors having serial output using MODBUS RTU protocol.

Modbus RTU Slave
E-Log specific versions (See “Protocols” table) support output of MODBUS RTU protocol. This feature permits to obtain instant or statistical (ave/min/max/tot) values in entire format or floating points over a running statistical base.

Order numb.	ELO105	ELO305	ELO310	ELO515
Built-in 2.4 GHz radio	NO			YES
RS232 port	N. 2			N.1
LCD 4 x 20 chars. display	NO	YES		
n.8 keys keyboard	NO	YES		
Tripod use	NO		YES	
Internal 1.2 Ah battery	NO		YES	

Protocols		ELO105 ELO305 ELO310	ELO515	ELO305	ELO305
Protocol	**Description**	**Standard vers.**	**Standard vers.**	**P1 vers.**	**P2 vers.**
Input (data input):					
CISS	LSI LASTEM property	Com.1+2	Com.1+2	Com.1+2	Com.1+2
ZigBee	IEEE 802.15.4		Com.2 (radio Master)		
Modbus RTU Master	Modicon Modbus RTU mode	Com.2		Com.2	Com.2
GILL	Gill format, polar, continuous	Com.2		Com.2	Com.2
Climatronic	AIO weather station Terminal mode	Com.2			
Biral	SWS050 – SWS100 SWS200 –SWS250	Com.2			
Hydrolab				Com.2	
Aeroqual	AQM binary			Com.2	
Lufft	UMB binary				Com.2
Output (data output)					
CISS	LSI LASTEM property	Com.1+2	Com.1+2	Com.1+2	Com.1+2
ZigBee	IEEE 802.15.4		Com.2 (radio Slave)		
Modbus RTU Slave	Modicon Modbus RTU mode	Com.2		Com.2	Com.2
GPRS / FTP (ASCII)	CSV ASCII format	Com.1	Com.1	Com.1	Com.1
TTY ASCII	CSV ASCII format	Com.2		Com.2	Com.2

Data communications and protocols types



Common features		Range	Resolution	Accuracy (@ 25°C)
Analogue inputs	*Voltage*	-300 ÷ 1200 mV	40 µV	±160 µV
		±78 mV	3 µV	±30 µV
		±39 mV	1.5 µV	±15 µV
	Pt100	-50 ÷ 70 °C	0.003 °C	±0.1°C
		-50 ÷ 600 °C	0.011 °C	±0.3°C
		0 ÷ 6000 Ω	0.1 Ω	±1.5 Ω
	Thermocouples	E-IPTS 68	< 0.1 °C	±0.6 °C
		J-IPTS 68	< 0.1 °C	±0.6 °C
		J - DIN	< 0.1 °C	±0.6 °C
		K-IPTS 68	< 0.1 °C	±0.5 °C
		S-IPTS 68	0.22 °C	±2.0 °C
		T-IPTS 68	< 0.1 °C	±0.5 °C
	Inputs number	N. 8 (n. 16 single-ended)		
	ESD protections	±8 kV contact discharge IEC 1000–4-2		
	Max input signal	1.2 V		
	EMC filters	on all inputs		
	Temperature error (@ -10÷30°C)	300 ÷ 1200 mV < ±0.01% FSR; ±39 mV < ±0.01% FSR ±78 mV < ±0.01% FSR		
Digital inputs	*Inputs number*	n.4		
	Programmable functions	N. 2 frequency inputs (optoelectronic sensors, max 10 kHz) N. 2 frequency inputs (max 1 kHz) N. 4 logic state inputs ON/OFF (0 ÷ 3 Vdc signals)		
	Max error	3 Hz @ 5 kHz		
	Protection	Transient voltage suppressor 600 W, <10 µs		
Digital outputs	*Output number*	N. 7 (n. 4 sensors power-up, n.3 on events)		
	Max current on each output	150 mA		
	Protection	Thermal and over current (> 0.15 A)		
Power supply	*Power supply*	8 ÷ 14 Vdc		
	Power consumption	Display ON: 60 mA, OFF: 20 mA		
	Power consumption (Stand-by)	Stand-by: 0.2 mA		
	Protections	Transient voltage suppressor: 600 W, t = 10 µs; on polarity inversion		
Radio (see MODELS)	*Type*	ZigBee		
	Frequency	ISM 2.4 GHz direct sequence channels		
	Power	10 mW (+10 dBm)		
Other features	*Internal clock*	Accuracy 30 s/month (T=25°C)		
	Display (see MODELS)	LCD 4 x 20 car		
	Keyboard (see MODELS)	n.8 keys		
	Processor	1 RISC 8 bit, clock 16 MHz		
	ADC resolution	16 bit		
	Sampling time	80 ms (rejection 50 Hz)		
	Data memory	Flash EEPROM 8 Mb		
	Environmental limits	-20 ÷ 60 °C, 15 ÷ 100 % RH (not condensing)		
	Protection	IP 40		
	Weight	500 g		
	Dimensions	140 x 120 x 50 mm		
RS232 ports (see MODELS)	*Speed*	1200 ÷ 115200 bps		
	Type	9 pins/Female/Male/DTE/DCE		

R-Log – Radio data logger

www.lsi-lastem.com

Highlights

- For portable use or continuos system;
- Multi-position measuring system using wireless communication from MASTER to SLAVE units;
- N.4 analog inputs, n.1 digital inputs;
- Inputs extension using MASTER/SLAVE units via radio;
- Wireless connection to Radio sensors;
- ZigBee radio 2.4 GHz frequency;
- N.50 channels for acquisition or calculation;
- 2 MB flash data memory;
- Derived quantities calculation;
- Math calculations;
- Outputs actuation over programmable events to activate external devices;
- Sampling rate 1 sec. to 12 hrs;
- Elaboration rate 1 sec. to 24 hrs;
- PC connection via RS232/radio/modem PSTN/GSM/GPRS/Ethernet
- Display and keyboard;
- Compatibility with CommNET, GIDAS and XPanel programs.

R-Log data logger is a line of devices for environmental measurements in indoor and outdoor applications; it gives the utmost flexibility in terms of multiple measurement design. It can manage a large variety of sensors and, thanks to its radio technology, it's also a multi-position measurement system.
The two features make the system extremely flexible in terms of typology, position and number of managed sensors.

Main Features

MASTER/SLAVE logic

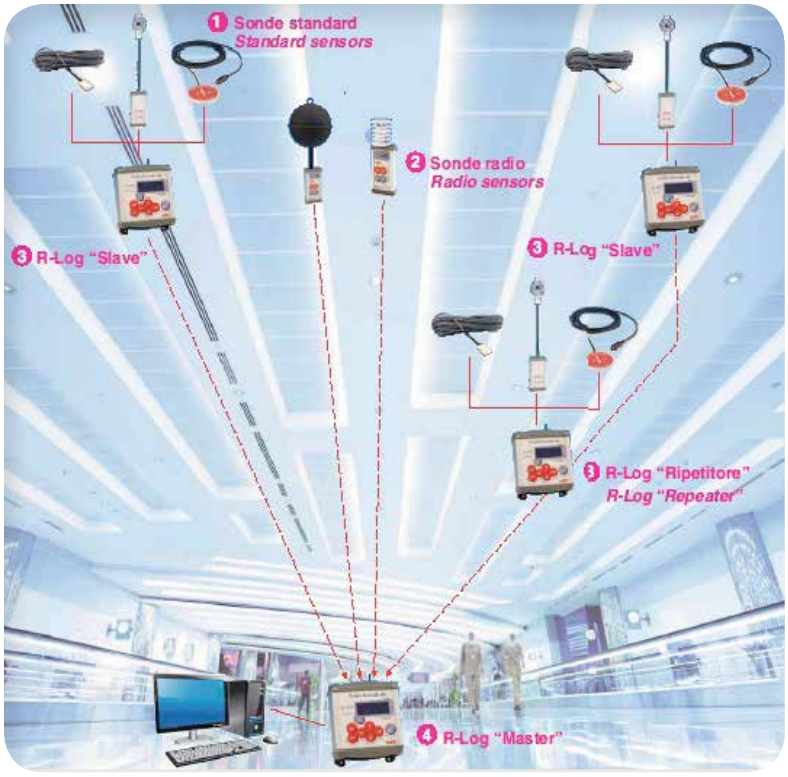
R-Log MASTER can be connected to cabled sensors to its physical inputs and, using radio communication, to one or more SLAVE units. The R-Log series includes SLAVE satellite units with physical inputs for cabled sensors and SLAVE radio sensor (S-Log).

1.Standard sensors
More than 70 different probes available for connection by cable to SLAVE and MASTER units.

2. Radio sensors
Sensors for measurement and data transmission of quantity by radio.

3. SLAVE satellite units
Direct radio communication, or through repeaters, to MASTER units.

4. MASTER data logger
Storage of values measured by "standard" sensors directly connected to its physical inputs, and storage of values received via radio from SLAVE units and radio sensors.



Portable applications

R-Log is very suitable for short and long terms portable environmental applications. Each MASTER and SLAVE units can be mounted on tripods in specific locations or inside portable IP65 ELF enclosures. The MASTER unit stores all the measurements in its memory using a multi-survey logic.

Continuous applications

R-Log can be used also for long-term continuous installations. Each MASTER and SLAVE unit can be mounted on wall arms or inside ELF enclosures. MASTER units can also be connected to a local or remote PC for real-time data display or download (via TCP/IP or GPRS/GSM).

R-Log network

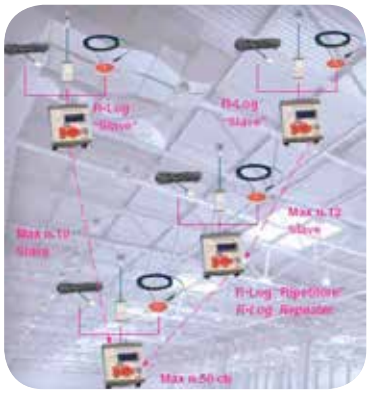
R-Log MASTER receives measures by radio from SLAVE units. R-Log MASTER can stores up to 55 channels including sensors directly connected to its physical inputs and measures from SLAVE units. When a PC is connected to R-Log MASTER, it can read and download measures only from this system.
When the network includes more than 55 channels, it is possible to use R-Log sub network or “Communicators” unit instead of MASTER data logger – an interface between SLAVE units and PC for direct data download.

R-Log sub-network

One or more Log MASTER can be connected in a local network via TCP/IP to one or more PCs. In this case each PC can read and download measures from each R-Log Master. It is also possible to use TCP/IP Communicators, in this case every PC can read and download data from each R-Log SLAVE linked to the Communicator.

Multi-parameter measurements

R-Log allows the management of a wide quantity and variety of sensors. Every MASTER module can manage up to 55 channels, including sampled and calculated quantities.
The range of sensors supplied by LSI LASTEM includes more than 70 different models for the measurement of environmental quantities. R-Log is also able to acquire signals coming from third-party sensors having compatible electrical output.



Data storage

R-Log MASTER stores statistical elaborations with time bases from 1 sec. to 24 hrs:
- instant values
- arithmetical average, minimum, maximum, standard deviation
- totalization and integration time measurements
- wind elaborations: resulting / prevailing direction, resulting speed, direction standard deviation (sigma theta), calm percentage.

R-Log SLAVE units have backup data memory.

Sampling rate

Programmable for each sensor (1 sec -12 hrs). R-Log manages up to n.5 channels from sensors and n.8 derived quantities in 1 second.

Sensors power supply actuation

R-Log can feed sensors requiring power supply for their operation, with user-defined warm-up time.

Inputs

MASTER and SLAVE units have the same number and type of inputs:
- N. 4 inputs (n.8 single-ended) for analogue signals (voltage, current and resistance);
- N. 1 digital input. It can be configured as input for frequency signals or as on/off input.

Direct connection to PC

MASTER units can be directly connected to a PC with the following interfaces:
- USB, using included adapter.
- RS485 line drivers: distances up to 1 km, using DEA504 converter
- Ethernet, using DEA550 converter
- Bluetooth, using DEA300 adapter

Remote connection to PC

MASTER units can be remotely connected to a PC with the following interfaces:
- Telephone System: GSM modem
- GPRS net: GSM/GPRS modem.
- Long distances UHF radio communications

CommNetEG program can help managing both direct and remote connections with automatic/ scheduled communications.

Derived environmental and mathematical calculations

R-Log has an internal library of derived environmental quantities. For their calculation R-Log can use inputs from monitoring measures, user-defined constants and other derived quantities This library also includes mathematical calculations (see ***Calculated Quantities***).

Models with mini-Din inputs and sensors self-recognition feature and models with terminal input board are available

Installation

R-Log can be installed in IP65 protection box, such as LSI LASTEM ELF series (see Accessories), for protection against shocks, water, dust and atmospheric agents; the IP65 box normally hosts also power supply systems, communication devices and additional batteries
R-Log can also be mounted on a tripod or wall arm.

Output actuation at event/time

R-Log (ELR515-516) has three outputs to power up external systems or alarm devices. Outputs are activated according to user-defined actuation logics:
- Greater/less than, within a range;
- Wind alarm;
- Alarm for beginning of precipitations;
- Flood Alarm;
- Scheduled event;
- Snow level alarm;
- Error state of the unit.

MASTER data loggers can also activate outputs using measurements from SLAVE units. SLAVE units can activate their outputs using only their own measurements.

Power supply and battery

R-Log runs at 12 Vdc input voltage power supply. It has an extremely low power consumption (< 4 mW).
LSI-LASTEM offers a wide range of power supply systems and battery packs according to the requested power source and autonomy.

Radio distance

The distance between MASTER and SLAVE is 300 m (Line-of-sight) and it may decrease in presence of obstacles. LSI LASTEM supplies SLAVE units with “repeater” feature to increase radio distance.

Wall mounting, tripod and IP65 box mounting accessories.

MASTER UNITS

Order numb.	ELR510M	ELR515M	ELR516M
Inputs numb.	4 analog, 1 digital	4/8 analog, 1 digital	
Inputs type	Mini-DIN	Terminals	Terminals
Sensors auto-recognizing	YES	NO	NO
RS232 port	YES	YES	NO
Ethernet port RJ45 connector, TCP/IP socket server	NO	NO	YES
Digital outputs	NO	YES	YES
GPRS	NO	YES	NO

SLAVE UNITS

Order numb.	ELR510S	ELR515S
Inputs numb.	4 analog, 1 digital	4/8 analog, 1 digital
Inputs	Mini-DIN	Terminals
Sensors auto-recognizing	YES	NO
Digital outputs	NO	YES

REPEATER UNITS

Order numb.	ELR510R	ELR515R	EZB321.1	EZB322
Measuring inputs	YES		NO	
Inputs numb.	4 analog 1 digital	4/8 analog 1 digital	-	-
Inputs type	Mini-DIN	Terminals	NO	
Sensors auto-recognizing	YES	NO		
Power supply	8÷14 Vdc			85÷265 Vac Univ. AC input
Battery	2A (4,2 V) Lithium rechargeable			NO
Operative temperature	-20÷60°C			0÷70°C
Protection	IP40			

COMMUNICATOR UNITS

Order numb.	EZB311.1	ELR312.1
RS232 port	YES	NO
Ethernet port RJ45 connector, TCP/IP socket server	NO	YES

continued

Common features		Range	Resolution	Accuracy (@ 25°C)
Analogue inputs	*Tension*	-300 ÷ 1200 mV	40 µV	±160 µV
		±78 mV	3 µV	±30 µV
		±39 mV	1.5 µV	±15 µV
	Pt100	-50 ÷ 70 °C	0.003 °C	±0.1°C
		-50 ÷ 600 °C	0.011 °C	±0.3°C
		0 ÷ 6000 Ω	0.1 Ω	±1.5 Ω
	Thermocouples	E-IPTS 68	< 0.1 °C	±0.6 °C
		J-IPTS 68	< 0.1 °C	±0.6 °C
		J - DIN	< 0.1 °C	±0.6 °C
		K-IPTS 68	< 0.1 °C	±0.5 °C
		S-IPTS 68	0.22 °C	±2.0 °C
		T-IPTS 68	< 0.1 °C	±0.5 °C
	Inputs number (see MODELS)	N. 4 (see Models)		
	ESD protections	±8 kV contact discharge IEC 1000–4-2		
	Max input signal	1.2 V		
	EMC filters	on all inputs		
	Temperature error (@ -10÷30°C)	300 ÷ 1200 mV < ±0.01% FSR; 39 mV < ±0.01% FSR ±78 mV < ±0.01% FSR		
Digital inputs (see MODELS)	*Output number*	N. 3 (n. 1 sensors power-up, n. 2 on events)		
	Max current on each output	150 mA		
	Protection	Thermal and over current (> 0.15 A)		
Digital outputs (see MODELS)	*Output number*	N. 3 (n. 1 sensors power-up, n. 2 on events)		
	Max current on each output	150 mA		
	Protection	Thermal and over current (> 0.15 A)		
Power supply	*Power supply*	8 ÷ 14 Vdc		
	Power consumption	Display ON: 60 mA, OFF: 20 mA		
	Power consumption (Radio ON)	TX ON: 180 mA, RX ON: 30 mA		
	Power consumption (Stand-by)	Stand-by: 0.2 mA (n. 9 months)		
	Protections	Transient voltage suppressor: 600 W, t = 10 µs; on polarity inversion		
Battery	*Type*	2 A (4.2 V) Lithium rechargeable		
	Recharging time	~ 8 hrs		
	Battery life	Standby: 9 months, Radio OFF: 48 hrs, Radio ON: 24 hrs		
Radio	*Type*	ZigBee		
	Frequency	ISM 2.4 GHz direct sequence channels		
	Power	10 mW (+10 dBm)		
Other features	*Internal clock*	Acc. 30 sec/month (T=25°C)		
	Display	LCD 4 x 20 car		
	Keyboard	N. 8 keys		
	Processor	1 RISC 8 bit, clock 16 MHz		
	ADC resolution	16 bit		
	Sampling time	80 ms (rejection 50 Hz)		
	Environmental limits	-20 ÷ +60 °C, 15 ÷ 100 % RH (not condensing)		
	Protection	IP 40		
	Weight	500 g		
	Dimensions	140 x 120 x 50 mm		
RS232 ports (see MODELS)	*Speed*	1200 ÷ 115200 bps		
	Type	9 pins/Female/Male/DTE/DCE		

M/E/R-Log Calculated Quantities

LSI LASTEM data loggers (M/E/R-Log models) have an internal library for calculated environmental quantities. These quantities can use inputs from monitoring measures, user-defined constants and other derived quantities.

Calculated Quantity	User defined parameters	Input from sensors	ELO007-ELO008 ELO105-ELO305 ELO310-ELO515 ELR515-ELR516	ELO009 ELO010 ELR510
Planar radiant asymmetry, planar radiant mean temperature, (ISO7726) planar temperature	sensor orientation (hot/ cold wall), hot/ cold floor)	net radiation (W/m2), radiometer temperature (°C)		●
People dissatisfied by radiant asymmetry (ISO7730)	sensor orientation (hot/ cold wall), hot/ cold floor)	net radiation (W/m2), radiometer temperature (°C)		●
People dissatisfied by floor temperature (ISO7730)		floor surface temperature (°C)		●
People dissatisfied by vertical air temperature (ISO7730)		Ankles air temperature H10 cm (°C), air temperature H110 cm (°C).		●
People dissatisfied by draught (ISO7730)		Turbulence Index (TU calculated by BSV106), air temperature (°C), air speed (m/s)		●
Evaporation		water level height (mm)	● (no ELR515)	
Daylight factor IESNA Lighting handbook		indoor illumination (lx), outdoor illumination (lx),		●
Operative temperature (ISO7730)		Air temperature (°C), radiant temperature (°C)		●
Pressure at Sea level	Altitude (m)	atmospheric pressure (hPa), air temperature (°C)	●	
Air flow (mass, volume) "1997 Ashrae Foundamentals Handbook"- fluid flow	pipes size (cm2), pipe factor	air speed (m/s), temperature (°C)+pressure (hPa) (for flow mass kg/hr)		●
Number of air changes "1997 Ashrae Foundamentals Handbook"- fluid flow	room volume (m3), pipe size (cm2)	air speed (m/s)		●
Dew-point (ISO7726)		Temperature (°C) and relative humidity (%), or dry/wet temperature (°C)	●	●
Psychrometric relative humidity	calculus with formula xx or yy, Psychrometric constant (hPa)	dry/wet temperature (°C)	●	●
Mean radiant temperature with natural/forced convection (ISO7726)		Radiant temperature (°C), air temperature (°C), air speed (m/s)		●
WBGT Index (ISO7243)		indoor/outdoor (°C) air temperature, radiant temperature (°C), wet temperature with natural ventilation (°C)		●

X-Log – Expert Data Logger

www.lsi-lastem.com

Highlights

- Built-in internet stack with web server
- Setup and data display by any web browser
- Data-Push to up to three different FTP sites
- Internal FTP site for easy access to storage data
- N.8 analogues inputs, N.4 digital inputs
- Extension modules for additional input
- N.2 RS232 ports, expandable using USB
- N. 1 Ehernet 10/100 Mbps port
- N. 2 USB ports
- N. 4 analogue outputs 0÷2 Vdc
- N. 4 open collector outputs
- SMS messages over n.4 programmable events
- 32 MB internal memory. Additional external memory up to 8 GB (pen-driver)
- Data output protocols: FTP, HTTP, Telnet, Serial
- PC connection via Ethernet LAN, RS-232/RS-485, radio modem, GSM/GPRS/UMTS, satellite modem.

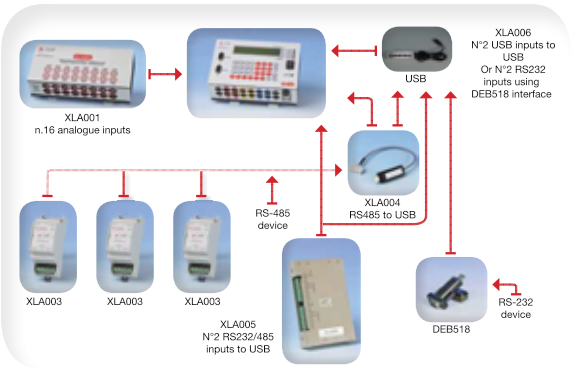
X-Log represents the flagship of the LSI LASTEM data logger range. It has been developed taking into account the most advanced features required by data acquisition systems in today's environmental applications.
X-Log features a built-in web server. This allows configuration, real-time data download and display from any PC or device connected to internet. X-Log runs on a 32-bit platform and open-source Linux operating system; this technology allows a wide range of extremely advanced features described in this document.

Main Features

Inputs

a- N. 8 analogue inputs (Pt100 / Resistance / 0÷2 Vdc). N.4-12 bit resolution, N.4-24 bit resolution. Expandable to 20 analogue inputs with XLA001 input extension module.
b- N. 4 digital inputs. Programmable as frequency (max.1000 Hz), counters or on/off status
c- N.2 RS-232 ports. Available as communication ports or inputs for serial sensors.
d- N.2 USB hot plug ports. For the following:
- Obtain n.2 additional RS232/485 ports (with XLA005 module).
- Connect XLA004 module to convert signals from RS485 devices (RS485 bus) into USB.
- Connect external memory (pen-drive).

It is possible to increase the input number using expansion modules. X-Log can manage up to 128 total channels. The following extension modules are available:
- **XLA001**: N.16 analogue differential inputs 24 bit resolution module (0÷2 Vdc, resistance).
- **XLA003**: N.1 input interface to convert Pt100, thermopile (µV), voltage (max 0÷2 Vdc), micro-voltage (0÷100 mV), currents or digital (frequency or counter) signals into RS485. One or more RS485 signals can be received by XLA004 interface connected to the USB port.



Sensor interface

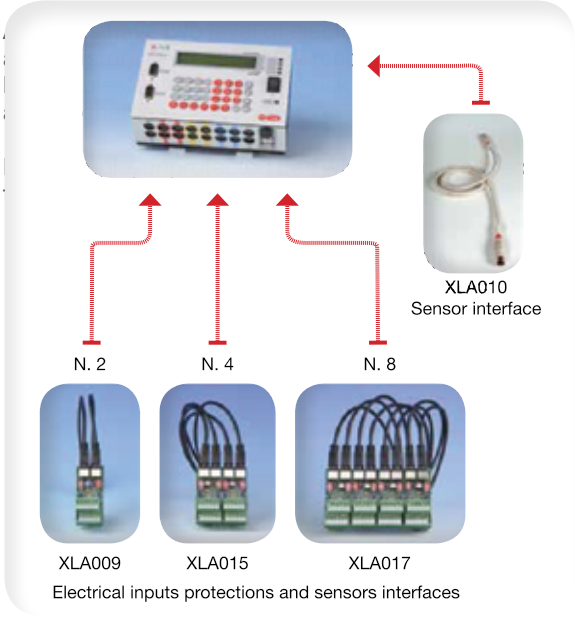
X-Log inputs and XLA001 extension inputs module are all equipped with Mini-DIN connectors. For the connection to free wire sensors, one or more terminal boards are required:

XLA009	Terminal board for n.2 sensors (analogue and digital)
XLA015	Terminal board for n.5 sensors (analogue and digital)
XLA017	Terminal board for n.8 sensors (analogue and digital)

All inputs have two level of electrical protection (diode and varistor). Protections are recommended in case of long cables or when there is risk of electrical disturbs and discharges.

For a simple, unprotected free wire sensor connection, the XLA010 interface is available

XLA010	L = 50 cm cable with mini-DIN connector for free-wires sensors



Electrical inputs protections and sensors interfaces

Input of SDI-12 sensors

DEA507 interface is available to connect SDI-12 sensor to X-Log. DEA507 can be connected directly into RS232 port or to USB port by means XLA005 interface.

Data storage

For every channel, it is possible to obtain statistical elaborations (one or more) having 3 s÷24 hrs time bases

- Instant value
- Average/min/max/standard deviation
- Time Max/Time Min
- Totals: sum or integration time
- Wind elaborations: wind direction trigonometric average (sine/cosine method), standard deviation and Turbulence.

Memory

X-Log has 32 MB of internal memory and up to 8 GB external memory. 4 GB pen driver unit (XLA010 industrial-grade) is included which each X-Log. The external memory can be continuously connected to X-Log, for real-time data storing, or can be used to download the data from the internal memory without the need of a PC. The pen drive can also contain files for on-field firmware upgrade of X-Log.

Acquisition time

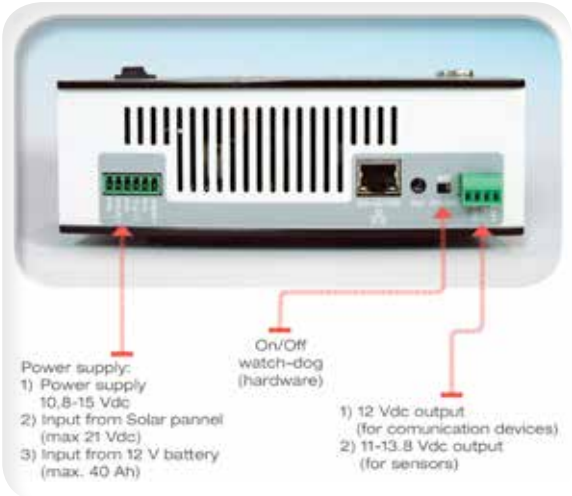
Programmable for each sensor from 3 s to 24 hrs. X-Log can scan all inputs within 1 s.

Battery

X-Log is not equipped with internal battery. Battery is mounted inside XLF enclosures (see Accessories). X-Log measures, as any sensor connected, percentage of battery charge and power supply levels.

Power supply

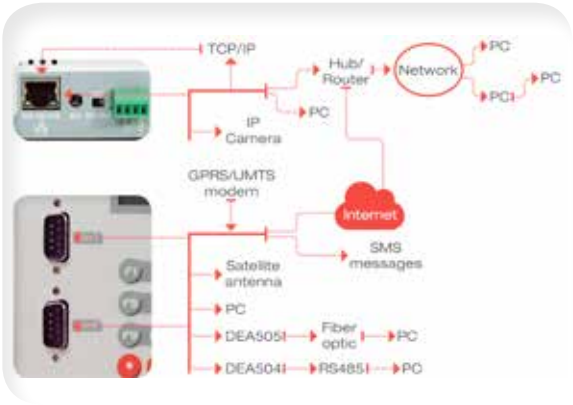
X-Log runs at 12 V, (50 mW power consumption). Solar panels (up to 40 W) can be directly connected without external charge regulators as X-Log adjusts the current flow when the battery is fully charged.



Data communication

Several communication modes are available:

- TCP/IP: X-Log is equipped with a TCP/IP port for connection to PC, using TCP/IP cable (included), or local LAN or external WAN (Extra NET).
- GPRS/UMTS: modem can send both data and SMS alarm messages (up to 4 configurable messages).
- Satellite: X-Log supports the following satellite modems: Iridium, Inmarsat and GOES.
- RS232 port: to send serial data string in the available formats (see Data format). Using DEA504 module it is possible to convert RS232 into RS485



Data communication time rate

X-Log send the stored data with a programmable time rate. Time rate can change automatically when X-Log detects user-defined alarm conditions, i.e. in order to receive more frequent data updates in case of dangerous events.

Data format

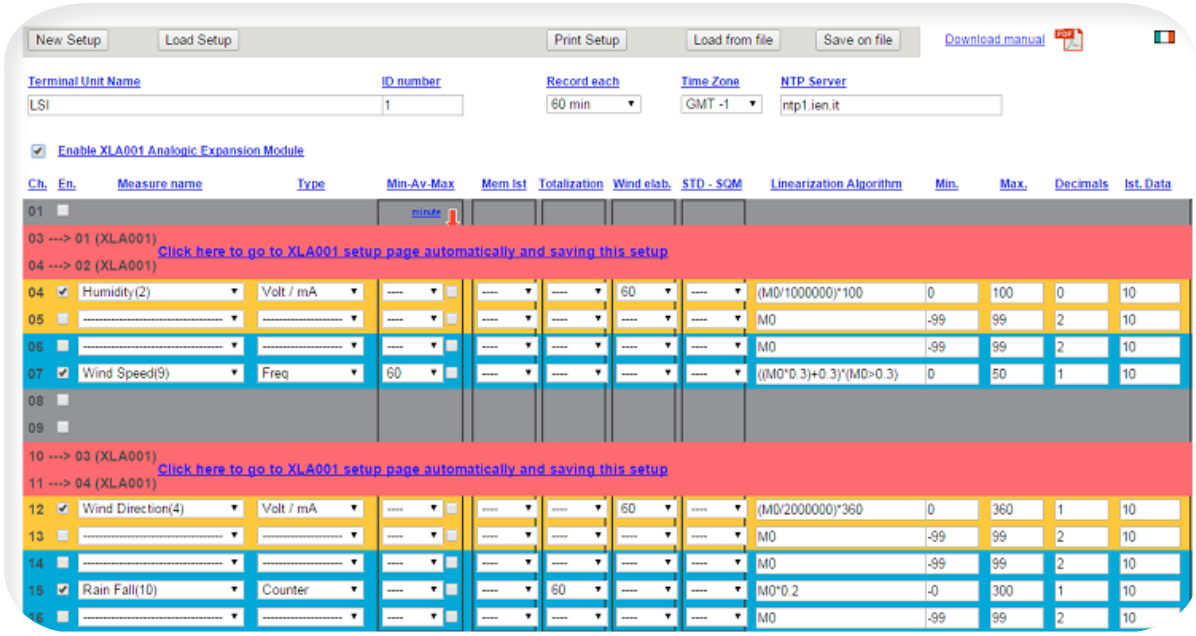
- Text (ASCII)
- AES Encrypted. It is a crypted data format with a double 128 bit Hash key. It is useful when data are sensible and the output should not be readable or modifiable. Decoding of data is possible using private and public key and a software tool. This format is only available on the external memory
- SYNOP, METAR. They are formats typically used by Meteorological offices

Setup using built-in-Web server

X-Log setup is made through its own built-in web server. Any Internet browser connected to X-Log IP address will show the setup pages. Setup options include:

- Sensors/Channels configuration. For each sensor it is possible to configure relevant parameters, including range, calibration curve and validation limits
- Derived quantities: channels calculated using specific formulas applied to measurements (see Derived Quantities)
- Communication parameters, including time rate of data transmission
- Output parameters: electrical outputs (see ON/OFF outputs) and SMS (see SMS)
- Internal watch: time zone and adjustment by NTP protocol (Network Time Protocol)
- Analogue outputs: 0÷2 Vdc output setup. They can be addressed to four different channels

Setup can be performed even without internet connection, by simply connecting X-Log to a local PC by a TCP/IP cable (included). Every setup file can be saved and uploaded.



Data output communication protocols

X-Log supports the following data output communication protocols:

Output (data output)	Description
FTP	(Client+Server): File Transfer protocol. X-Log can send ASCII data to up to three FTP servers by GPRS and TCP/IP. X-Log has an internal FTP site where data are loaded and from where data are downloaded using the X-Com application supplied with X-Log.
HTTP	Hyper Text Transfer Protocol
Telnet	Admin access for X-Log maintenance and control
NTP	Network time protocol for watch synchronization

IP Camera

X-Log can be connected to most IP cameras by TCP/IP port. Each frame (jpg) is stored inside X-Log memory and sent to PC using communication devices and logics.

SMS messages

When X-Log is connected to a GPRS/UMTS modem, it can send out SMS messages to four different numbers. SMS message are generated using programmable logics in case of events. Each SMS includes measurements from four different channels and include the following information:

- Alarm, pre-alarm status
- Message text
- Measurement value

ON/OFF outputs

X-Log has four independent open collector output for relais command (Vmax=50V, Imax=200mA) to activate external devices. Each activation is user programmable according to the following logics:

- Greater/Less than, inside/outside a range of programmable values
- Activiation duration (min)
- Pulse duration (sec)

Analog outputs

X-Log has n.4 analogue (0-2 Vdc 12 bit resolution) outputs. They are coupled to measures and channels.

Memory download

Data downloading from X-Log memory, following modes are available:

- Connection to X-Log by Internet web browser. X-Log shows measurement (instant values) in table and chart formats (n.4 double axis charts, corresponding to the first n.8 configured channels and wind rose)
- Using LSI LASTEM X-Com application supplied together with X-Log. X-Com runs on any web browser and allows the following:
  - Download of data from: X-Log memory, removable memory (pen drive) when connected to PC, FTP sites where X-Log uploaded data.
  - Export data to Excel file with customized column names.
  - Perform monthly and yearly data back-up
  - Data download: manually or automatically
- Using LSI LASTEM online service (X-Storage) which provides an Internet site for each X-Log unit. The web site displays instant and historical data and allows download of the last 60 days memory. In this case X-Log should be connected to an LSI LASTEM FTP site by GPRS or TCP
- Automatic data push in ASCII format to an FTP site, from where the user can manage the information.

Installation

X-Log can be installed inside portable of fixed IP65 enclosures (see XLF in accessory list for LSI LASTEM's enclosures). IP65 enclosure hosts the power supply system (battery, charger), communication device, terminal boards and, when necessary, the pressure sensor. Different enclosure models are available having different battery size (4-15-40 Ah), chargers, power supply systems (220/110 Vca) or solar panels.

Model

	X-Log data logger
XLO001	X-Log – Data logger, 12 inputs, 32 MB internal memory, 12 Vdc power supply. Complete with USB pen driver 4 GB (industrial grade), TCP/IP cable and X-Com program.

Technical specifications

Features		Range	Resolution	Accuracy (@ 25°C)
Analogue inputs	*Power*	0÷100 mV	140 nV @24bit	300 nV
		0÷2 V	3 µV @24bit	8 µV
		0÷2 V	1 mV @12bit	1.5 mV
	Pt100		1/100 °C	3/100 °C
	Input number	N.4 @ 12 bit N.4 @ 24 bit N.2 @10 bit for power and battery survey (N.1 and N.16@ 24 bit inputs expansion modules availability)		
	ESD protections	±3 kV contact discharge IEC 1000–4-2		
	Max input signal	2.048 V		
	EMC filters	Over all inputs		
Digital inputs	*Inputs number*	4		
	Function	N.4 frequency (max 1000 Hz)/logic On/Off status		
	Accuracy	2 Hz @ 1 kHz		
	Protection	Transient voltage suppressor 600 W, <10 µs		
Analogue outputs (alternative to digital outputs)	*Number*	N.4 range 0 ÷ 2 Vdc		
	Risolution	12 bit		
Digital outputs	*Number*	4 open collectors for relé control		
	Max current available	Vmax=50V, Imax=200 mA		
	Protection	Thermal and over current		
Communication ports	*RS-232*	N.2 DCE ports (1200 ÷ 115200 bps), DB-9 connector		
	USB	N.2 USB Host port		
	LAN	N.1 Ethernet RJ-45 10/100 Mbps port		
Memory	*Internal*	32 MB		
	External	Pen-drive (industrial grade) up to 8 GB (-40÷60 °C) hot plug		
Power supply	*Power supply*	10.5 ÷ 15 Vdc		
	Power consumption	1 W in opertative mode < 0.25 W in stand by mode		
	Protection	Transient voltage suppressor: 600 W, t = 10 µs; on polarity inversion		
Other	*Internal watch*	Quarz with backup battery Accuracy 30 s/months (@T = 25 °C) Adjustment using NTP protocol		
	Display	LCD 2 x 24 char.		
	Keyboard	N.32 keys		
	Processor	ARM9 (166MHz) 32 bit		
	Operative System	Linux Embedded		
	Environmental limits	-30÷70 °C, 15÷100 % RH (without condensation)		
	Mechanical protection	IP 40		
	Weight	800 g		
	Dimensions	177 x 118 x 60 mm		

Accessories
for LSI Lastem dataloggers - MODELS

www.lsi-lastem.com

LSI LASTEM data loggers share common accessories for their installation, communication to PC and power supply.

Supports for indoor use

Whenever M-Log (see Compatibility) or R-Log data loggers are used in indoor applications, they can be mounted on a stand together with a range of sensors. Stands are available for mounting on a portable tripod or on a wall arm.

Order numb.			
BVA311		Stand for n. 4 probes and one data logger. Fastening to BVA304 tripod	
		Dimensions	850x610x150 mm
		Compatibility	M-Log: ELO009-010 only R-Log: all models
BVA312		Stand for n. 4 probes and one data logger. Fastening to BVA313 stand	
		Dimensions	400x20x6 mm
		Compatibility	M-Log: ELO009-010 only R-Log: all models
BVA313		Wall installation arm for BVA311and BVA313 stand	
		Dimensions	850x680x150 mm
		Weight	1,3 Kg
		Compatibility	M-Log: ELO009-010 only R-Log: all models
BVA304		Tripod for BVA311 stand	
		Dimensions	Max 140x100x100 cm
		Weight	1,6 Kg

Power supply devices

Whenever data loggers (see Compatibility) are not used with ELF box, we recommend recharging of internal batteries using one of the available power supply unit.

Order numb.		
BSC015		Power supply and battery charger. Indoors use.
		Voltage 110÷230 Vac -> 9 Vdc (1.8 A)
		Connector To 12 Vdc power supply socket
		Protection IP54
		Compatibility M/R-Log: all models.
DEA260		Power supply and battery charger. Indoors use.
		Voltage 110÷230 Vac -> 14 Vdc (0.6 A)
		Connection To 12 Vdc power supply socket
		Protection IP54
		Compatibility E-Log: all models. ELA200 battery
DEA260.1		Power supply and battery charger. Indoors use.
		Voltage 110÷230 Vac -> 14 Vdc (0.6 A)
		Connection Free wire to 12 Vdc power supply terminal
		Protection IP54
		Compatibility E-Log: all models
DEA261		Power supply system 110÷230 Vac / 12 Vdc. Indoor uses for X-Log Other features, see DEA260.1
		Compatibility X-Log
DEA251		Power supply and battery charger. Outdoor use
		Voltage 230 Vac -> 12 Vdc
		Connection Free wire to 12 Vdc power supply terminal
		Protection IP65
		Compatibility X/E-Log: all models M-Log: ELO007-008 R-Log: ELR515-516

Batteries

External batteries are available to run E-Log or to increase battery life of M-Log, and R-Log. Batteries are normally mounted inside ELF boxes and connected to the data logger using its terminal inputs. ELA200 battery can be used without the ELF case and is suitable for indoor use. Most ELF boxes come with a included battery, only ELF345 and ELF340 do not, so an external battery has to be purchased for this type of box (MG0558, MG0560).

Order numb.			
MG0558		Pb 18 Ah battery	
		Weight	
		Mounting	Inside ELF345 box
MG0560		Pb 44Ah battery	
		Weight	
		Mounting	Inside ELF345 box
ELA200		Rechargeable external additional battery, 2 Ah for E-Log. Connection. Recharging using DEA260 power unit.	
		Connection	to the 12 Vdc power supply socket
		Recharging	by DEA260 power unit
		Compatibility	X/E-Log
ELA201		Rechargeable external additional battery, 2 Ah for R/M-Log. Same features as ELA200	

RS232 cables, USB interface, Bluetooth modules

To connect data loggers to PC via RS232 cable or Bluetooth. In every set of M-Log, E-Log and R-Log MASTER, ELA105 serial cable and DEB515 USB adapter are included.

Order numb.			
ELA100		Serial cable L. 15 m	
		Connector	9 PIN DTE
		Compatibility	M-Log: all models. E-Log: all models R-Log: ERL510-515, EZB311.1
ELA105		Serial cable L = 1.8 m. It is included in every M-Log, E-Log and R-Log (MASTER) package	
DEB518		USB interface. Included in every M-Log, E-Log and R-Log (MASTER) package	
DEA300		Bluetooth module Bluetooth 2.0+EDR, class 1, range 100 m for point-to-point connections	

RS485, TCP/IP modules

In order to connect long cable (up to 1 Km) between data logger and PC it is possible to use RS485 interfaces. TCP/IP connection on the Ethernet network permit to send data from data logger to PC within the Ethernet local network or connected by Internet. Those devices can be mounted inside the ELF box.

Order numb.		
DEA504		RS232-to-RS485 interface with surge protection.
DEA504.1		RS232-to-RS485 interface. Optoisolated version.
ELA105		Cable L. 1.8 m to connect DEA504/DEA504.1 to PC. It is included in every M-Log, E-Log and R-Log (MASTER) package.
DEA604		Mini Gender charger DB9M-DB9M. It is required to connect R/M-Log to DEA504 only
MN1510		Cable 4x2xAWG24/I-S/FTP-CMX Cat.5 for DEA504 connection.
DEA550		Ethernet protocol converter
		Serial speed — 75 bps÷230 Kbps
		Hardware flow control — RTS/CTS
		Software flow control — Xon/Xoff
		Network interface — 10/100 Base-Tx Ethernet with RJ45 Ethernet connector
		Address — Support static and dynamic IP address
		Operative temperature — 0 ÷ +50°C
		Power supply — 9÷30 Vdc
DEA505		Fiber-optic interface

Reed relay

Data logger version equipped with terminal inputs, can use digital output to switch-on/off external devices. Output value is equal to the data logger power supply (normally 12 Vdc). In order to convert the output into a dry, ON/OFF contact, LSI LASTEM supplies a reed relay that can be easily mounted in ELF boxes.

Order numb.		
DGD010		Relays system for data logger output actuation
		Exchange — 250 Vac – 2A max.
		

Inputs expansion modules for X-Log

It is possible to add expansion modules in order to increase the X-Log number of inputs and/or convert signals from different sensors on the market into standard signals compatible to X-Log.

Order numb.		
XLA001		Analogue inputs expansion module for X-Log. This unit increases the analogue inputs number from n.8 to n.20
	Input number	n.16
	Inputs	Pt100, 0÷2Vdc
	Resolution	24 bit
	Connection to X-Log	Using n.4 analogue 24 bit resolution inputs on X-Log
XLA003		Conditioning module to convert one analogue or digitals signals into RS485. It is possible to install many modules on the same RS485 bus
	Input number	N.1
	Input type	Pt100, Thermopiles Voltages: up to 0÷2Vdc Currents: 0÷20mA or 4÷20mA Frequency: up to 1000Hz Pulses counter: min. 1ms
	Output type	RS485 or Voltage (0÷2Vdc)
	Resolution	18 bit
	Accuracy	< 2µV
	Power supply	10÷30Vdc, (4mA@12Vdc)
	Connection to X-Log	To USB port: using XLA004 device To RS232 port: using DEA504 device To analogue input: using 0÷2Vdc output configuration
	Operative temperature	-40°C÷80°C
	Configuration	By PC using XLA004 device
XLA004		RS485/USB interface to connect RS485 bus devices (XLA003) to USB port. Required to configure input/output of the XLA003 device
XLA005		USB interface with N.2 RS-232/485 inputs. Useful to increase the number of serial sensors without using X-Log RS232 ports
XLA006		USB interface to connect n. 2 USB devices to one USB port. For RS232 sensors it is possible to use DEB518. RS232 to USB Port (nota GC: no interface).
XLA007		SDI-12 interface module
	Input	SDI-12
	Output	RS232
DEB518		RS232 to USB interface.

GSM/GPRS modem, Router 3G UMTS, GPS module

For long distance connections, a GSM/GPRS modem are available. Using GPRS it is possible to send (push mode) data to FTP servers, or using CommNET program (E/M/R-Log only) to an LSI LASTEM GIDAS database or web sites. By GSM it is possible to retrieve stored data data using 3DOM or CommNET programs (pull mode) (E/M/R-Log only). Those devices can be mounted inside the XLF and ELF boxes.

Order numb.		
DEA718		GSM-850 / EGSM-900 / DCS-1800 / PCS-1900 MHz Quad-Band. GPRS class 10
		Operative temperature: -20÷+70°C
		Power supply: 9÷24 Vdc from data logger
		Power consumption: Sleep: 8 mA During communication: 110 mA
		Compatibility: M-Log, R-Log
DEA718.1		Same features as DEA718. Compatible with E-Log, X-Log, datalogger for GPRS communications.
ELA110.1		Connection cable between X-Log, E-Log and modem DEA718.1
ELA112		Connection cable between R/M-Log and modem DEA718
DEA555		3G UMTS industrial cellular router with Din-rail mounting. Works on 2G / 3G cellular networks providing wireless TCP/IP connection.
		Interface: N. 1 Ethernet, n. 1 RS232
		Antenna: DIN-rail mounting kit and 5 m cable
		Power supply: 9÷48VDC
		Power consumption: Communication: 300mA @ 12V (max) Idle: 120mA @ 12V (max)
XLA025		GPS module, NMEA protocol. RS-232 output to X-Log GPS module is compatible to X-Log only, it measures the device position and send the information to X-Log channel.
		Connection to X-Log: To USB port: using XLA005 or XLA006+DEB518 devices To RS232 port
		Compatibility: X-Log

Input electrical protection boards

To protect data logger inputs from electrical disturbs and discharges, protection boards are available. Protections are recommended anyway in case of long cables or in case of risk of electrical discharges on sensors and cables. Different models are available: for X-Log and for M/R/E-Log (free inputs versions), having different number of inputs (2, 4, 8 inputs). Protection units are always required to connect free wire sensor to X-Log.

Order numb.

XLA009

Interface for n.2 free wires sensors
Electrical protection and Mini-DIN connectors for X-Log inputs

Input	N.2 terminals
Output	N.2 Mini-DIN connector to X-Log
Protections	Gas diodes and varistors
Compatibility	X-Log

XLA015

Interface for n.4 free wires sensors
Electrical protection and Mini-DIN connectors for X-Log inputs
Other features: See XLA009

ELA015

Interface for n.4 free wires sensors
Electrical protection for M/R/E-Log free wire inputs

Input	N.5 terminals
Output	N.5 terminals to M/R/E-Log
Protections	Gas diodes and varistors
Compatibility	M-Log: ELO007-008 R-Log: ELR516-515 E-Log: all models

XLA017

Interface for n.8 free wires sensors
Electrical protection and Mini-DIN connectors for X-Log inputs
Other features: See XLA009

ELA017

Interface for n.8 free wires sensors
Electrical protection for M/R/E-Log free wire inputs
Other features: See ELA017

Long distance VHF radio (160 MHz band e 868 MHz band)

VHF radio makes connections over ranges of a few kilometers easy and free of costs. With VHF radios, you can connect data loggers between them using MASTER/SLAVE design or connect data loggers to a PC. Those devices can be mounted inside the XLF and ELF boxes.

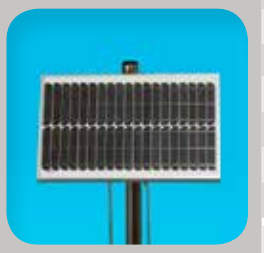
Order numb.		
DEC015		160 MHz Radio modem PC or data logger side, VHF-500 mW erp, including Yagi antenna
	Operating band	169.400÷169.475 MHz
	Output power	500 mW ERP
	Channel numb.	3@CH 25 kHz, 6@CH 12.5 kHz (2005/928/CE standard)
	Radio data rate (Tx/Rx)	4800 bps @12.5 kHz 9600 bps@25 kHz
	Power supply	8÷36 Vdc
	Power consumption	30 mA (Rx), 300 mA (Tx)
	Operative temp.	-30÷+70°C
	Antenna	N. 3 elements Yagi. Cable L = 10 m
	Line-of-sight	7÷10 Km
DEC010		160 MHz radio modem PC side, VHF-200 mW erp, including vertical antenna.
	Main feature	See DEC015
	Output power	200 mW ERP
	Antenna	Vertical dipole antenna. Cable L = 5 m
DEC018		868 MHz Radio modem PC or data logger side, VHF-500 mW erp, including Yagi antenna
	Operating band	169,400÷169,475 MHz
	Output power	500 mW ERP
	Channel numb.	3@CH 25 kHz, 6@CH 12,5 kHz (2005/928/CE standard)
	Radio data rate (Tx/Rx)	4800 bps @12,5 kHz 9600 bps@25 kHz
	Power supply	8÷36 Vdc
	Power consumption	30 mA (Rx), 300 mA (Tx)
	Operative temp.	-30÷+70°C
	Antenna	N. 6 elements Yagi. Cable L = 10 m
	Line-of-sight	2÷3 Km
DEC019		868 MHz radio modem PC side, VHF-200 mW erp, including vertical antenna.
	Main feature	See DEC015
	Output power	200 mW ERP
	Antenna	Vertical dipole antenna. Cable L = 5 m
ELA110		Null modem cable DB9M/DB9M for radio (data logger side)
ELA105		Serial cable L = 1.8 m (PC side). It is included in every M-Log, E-Log and R-Log (MASTER) package
DEA260.1		Power supply 220Vac/12Vdc for DEC010 and DEC019 on PC side

Solar panel

For applications where mains power supply is not available or where double source of power is required, it is possible to power the data logger with photovoltaic panels. In these cases it is advisable to mount the the data logger inside the X/ELF345 box. When using a solar panel an external battery model MG0558 (18 Ah) or MG0560 (44 Ah) is required. mounted inside the X/ELF345 box and chosen according to the required power autonomy and available hours of sunshine. Solar panel is mounted on poles by means of tiltable support. Alternatively, X/ELF226 box mounts a compact 5 W solar panel on its front panel.

Order numb.

DYA101



50 Watt solar panel

Power	50 W
Votltage at max. power	17,30 W
Max current	2,32 A
Dimensions	63x54 cm
Weight	4,5 Kg
Cable	L = 5 m

DYA064

Tiltable arm for installation of solar panel on lateral side of poles diam. 45÷65 mm

Carrying cases

Carrying case to contain data loggers and its accessories during transportation.

Order numb.

BWA314

Shockproof, air tight carrying case (52x43x21 cm) for data logger and sensors

BWA316

Shockproof, air tight carrying case (60x43x21 cm) for data logger and sensors

BWA047

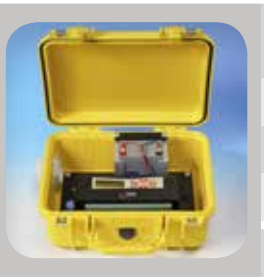
Soft bag for data loggers

BWA048

Bag for BVA304 and BVA311-312 supports

Shockproof cases for portable applications

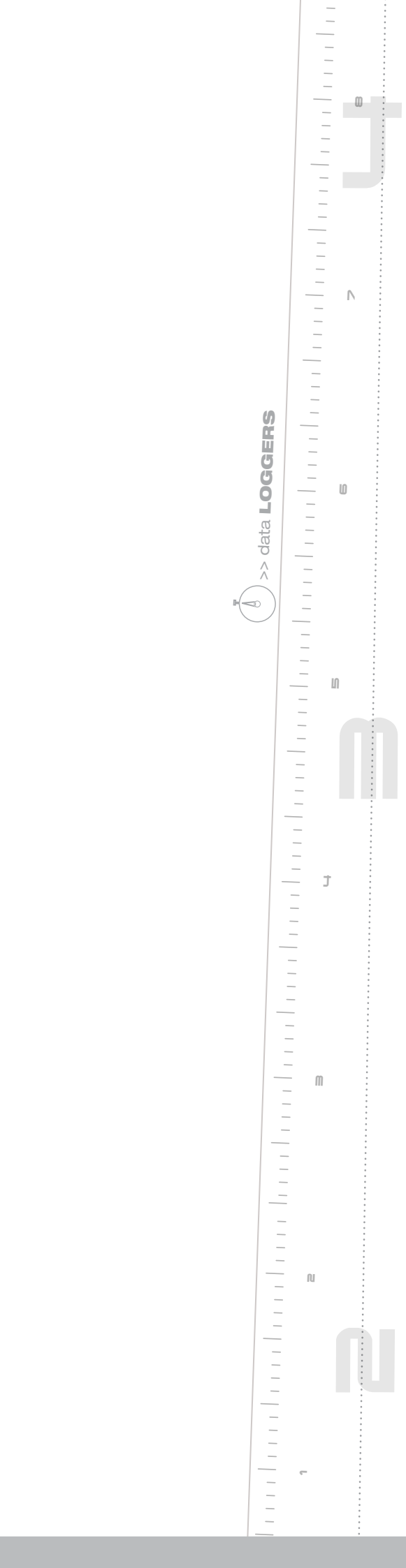
For portable applications, data loggers can be mounted inside IP65 protection cases for protection against shocks, water, dust and atmospheric agents; each case contains also a specific power supply system. The case has also room for communication devices to be chosen from the above list.

Order numb.		
ELF410		Portable shockproof IP65 case. Complete with battery pack (n. 8 1,5 V D-shaped batteries not included)
	Dimension	340x270x140 mm
	Weight	5 Kg
	Compatibility	M-Log, E-Log, R-Log
ELF412		Portable shockproof IP65 case. Complete with (4 Ah) rechargeable battery. Battery charger 230 Vac/13,8 Vdc not included.
	Dimension	340x270x140 mm
	Weight	6 Kg
	Compatibility	M-Log, E-Log, R-Log
DEA260		
	Battery charger	230 Vac/13,8 Vdc. IP54 for indoor use
ELF432		Portable IP65 enclosure, 18 Ah rechargeable battery and power battery charger. Power supply 110-230 Vac / 13.8 Vdc.
	Dimension	520x430x210 mm
	Weight	12 Kg
	Compatibility	M-Log, E-Log, R-Log
XLF432		Portable IP65 enclosure, 18 Ah rechargeable battery and power battery charger. Power supply 110-230 Vac / 13.8 Vdc. Other features, see ELF432
	Compatibility	X-Log

IP65 boxes for long-term operation

For continuous, long-term or outdoors operation the data loggers are normally installed inside IP65 protection boxes for protection against water, dust and atmospheric agents; each case contains also a specific power supply system. The case has also room for communication devices to be chosen from the above list. Each box can be supplied with an arm for pole or wall installation.

Order numb.			
ELF340		IP65 box. Includes 230VAC/24-13,8 V (50W) power pack, 2Ah battery and fitting for accessories	
		Dimension	500x400x160 mm
		Weight	7,5 Kg
		Compatibility	M-Log, E-Log, R-Log
ELF344		IP65 box complete with (2 Ah) rechargeable batteries and power supply/charger (220 Vca/13,8 Vdc) 150 W for heated sensors Other features: see ELF340	
XLF340		IP65 box. Includes 230VAC/24-13,8 V (50W) power pack, 2Ah battery and fitting for accessories. Other features: see ELF340	
		Compatibility	X-Log
XLF348		IP65 enclosure for XLA001 inputs extension module for X-Log	
		Compatibility	XLA001
ELF345		IP65 box. Complete with solar panel regulator. Fitting for 18 or 44 Ah battery	
		Dimension	500x400x160 mm
		Weight	8 Kg (battery not included)
		Compatibility	M-Log, E-Log, R-Log
XLF345		IP65 box. Complete with solar panel regulator. Fitting for 18 or 44 Ah battery. Other features: see ELF345	
		Compatibility	X-Log
MG0558		*Battery*	18 Ah
MG0560		*Battery*	44 Ah
ELF346		IP65 box complete with (4 Ah) rechargeable batteries and solar panel 5 W mounted on the front panel.	
		Dimension	500x400x160 mm
		Weight	8 Kg
		Compatibility	M-Log, E-Log, R-Log
XLF346		IP65 box complete with (4 Ah) rechargeable batteries and solar panel 5 W mounted on the front panel. Other features: see ELF346	
		Compatibility	X-Log
DYA074		*Support*	For IP65 box Ø 45÷65 mm pole installation
DYA082		*Support*	For wall installation IP65 box
DYA081		*Key lock*	For IP65 boxes



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