X-Log – Expert Data Logger

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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.

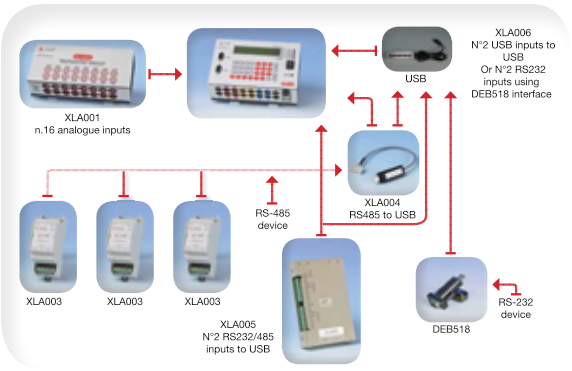
X-Log represents the flagship of the LSI LASTEM data logger range. It has been developed taking into account the most advanced features required by data acquisition systems in today's environmental applications.
X-Log features a built-in web server. This allows configuration, real-time data download 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

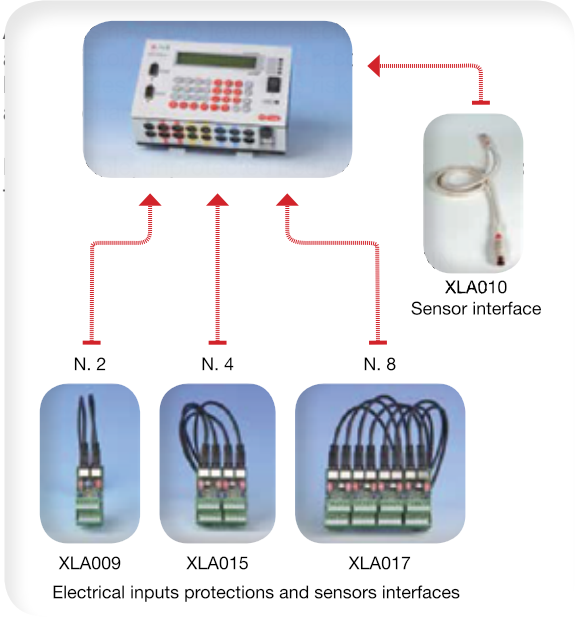
X-Log inputs and XLA001 extension inputs module are all equipped with Mini-DIN connectors. For the connection to free wire sensors, one or more terminal boards are required:

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

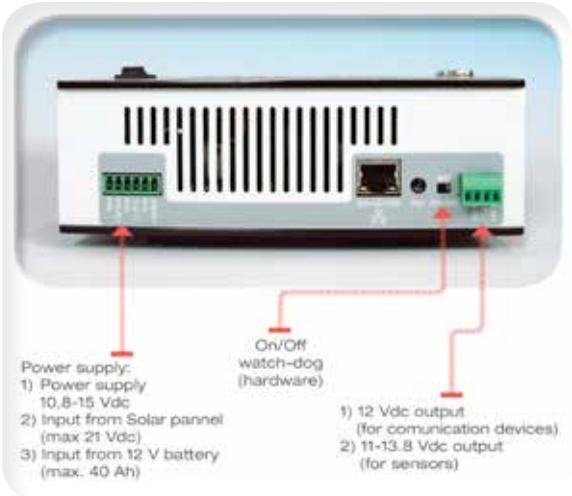
Programmable for each sensor from 3 s to 24 hrs. X-Log can scan all inputs within 1 s.

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

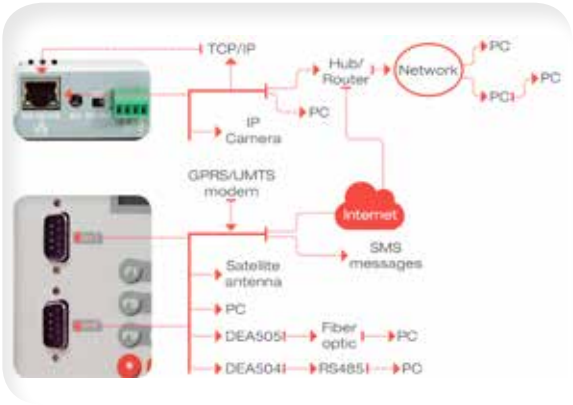
X-Log runs at 12 V, (50 mW power consumption). Solar panels (up to 40 W) can be directly connected without external charge regulators as X-Log adjusts the current flow when the battery is fully charged.



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

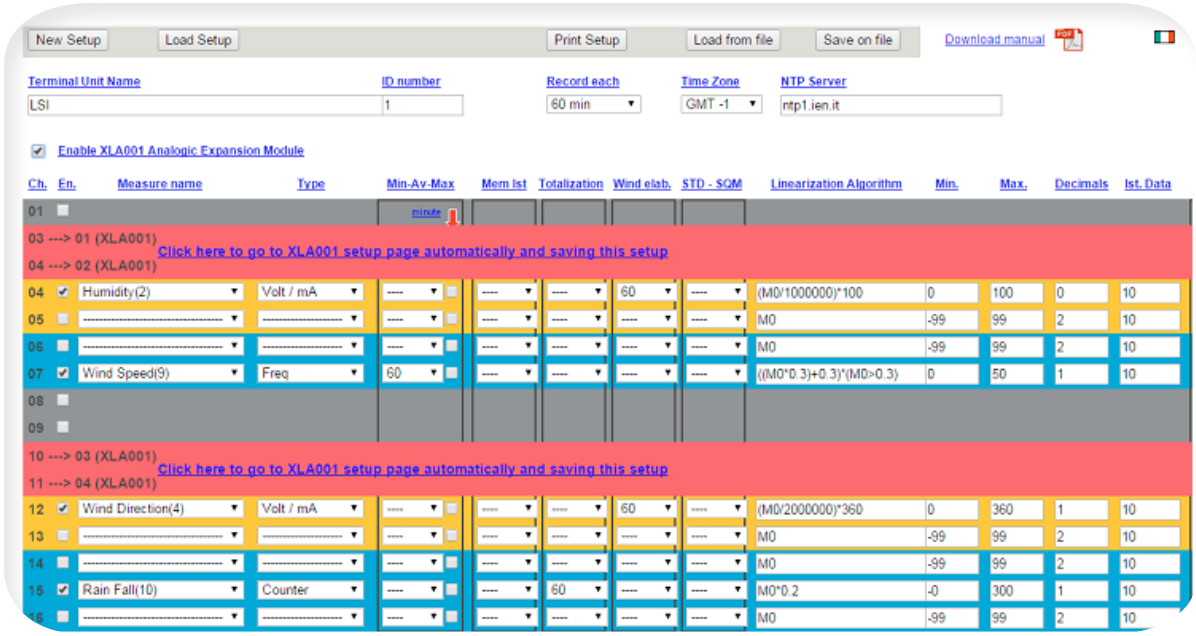
- Text (ASCII)
- AES Encrypted. It is a crypted data format with a double 128 bit Hash key. It is useful when data are sensible and the output should not be readable or modifiable. Decoding of data is possible using private and public key and a software tool. This format is only available on the external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

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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		