



Teslights Hybrid Lighting SCALAMAX Protocol LX10 Gateway Series

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Warning

This guide is for persons who have received training and are qualified to work with electricity and electrical metering equipment. All applicable national and local electrical codes and standards must be followed. Failure to follow proper procedures may result in serious bodily harm including death.



Disclaimer

The product described herein may be changed or enhanced from time to time. This information does not constitute commitments or representations by Teslights LLC, and is subject to change without notice.

Images shown are a representation only. They may not match exactly with the real equipment.

1. Overview

1.1. Head end

The Head end is the element that manages the energy efficiency of the system. It is accessible through various interfaces, whether wired or wireless.

It can be managed autonomously, through a web interface, or through Centralized Control Software (CMS), Smart FireFly®.

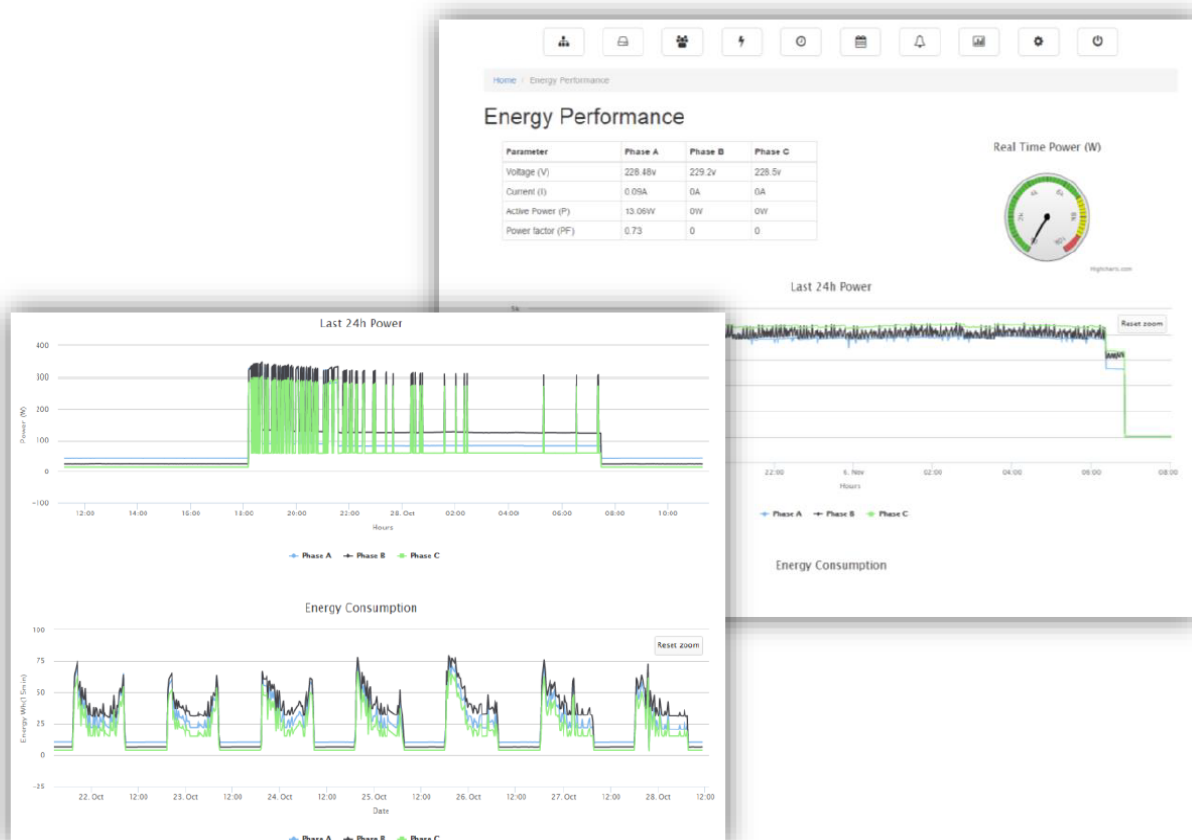
The header incorporates a complete Linux system and an internal power supply with three-phase rectifier, which ensures its operation in both single-phase and three-phase boxes, even in the event that one of the phases loses power.

Typically it is installed inside an electrical panel, from where it gives energy to all the lights of the same circuit. This is responsible for managing the network through an external MR-4850 or MR-4859, which will control the lighting switches on and off.

The equipment has a Linux Operating System embedded in a microprocessor based system. Allows remote updating of the Software.

It has a system of alerts by SMS / email, to warn of failures.

The header measures the consumption of the electrical panel (Voltage, Current, Power and Power Factor, of each phase). The measured consumption is stored in memory and can be consulted remotely.



1.2. Head end LX10 Series

The LX10 series consists of two devices with common main features and an optional one.

The entire LX10 series includes:

- Three-phase electrical consumption total measurement of the electrical panel where it occurs. This feature allows a complete analysis of the power grid.
- RS-485 communication port
- 10/100 Mbps Full-Duplex Ethernet port and Auto MDI/MDIX function with RJ45 connector for connectivity to IP devices such as computers, cameras, audio systems, etc.
- Real Time Clock, which ensures the upkeep of the date and time at startup after a state of disconnection..

The optional functionality is:

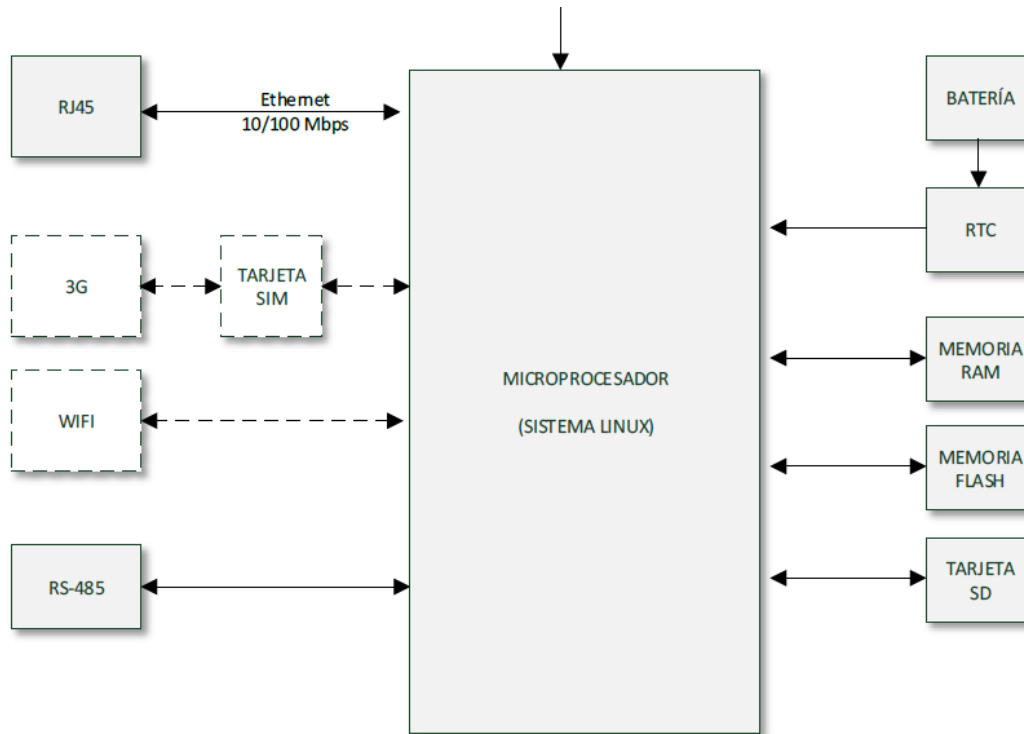
- 3G/GPRS communication modem, which allows communication with the system remotely. WIFI incorporated.

These are the LX-10x Series models:

Modelo	Funcionalidad
	3G / WIFI
LX-11	
LX- 12	X

1.3 Block Diagram

This is the Head end block diagram:



The Head end can be powered from a single-phase or a three-phase power line and can work even if one or two phases lose supply. An AC/DC power supply and DC/DC devices generate all the voltages required by the internal circuits.

For measurement of electrical power measurement, this voltage is sensed inside the equipment. A connector is also available for the connection of 3 external current transformers that sense the current intensity of the three phases, outside the head. With these parameters, the electrical power supplied by the electrical panel is calculated.

The microprocessor manages the entire system and has a RAM and a Flash memory. It includes a real time clock (RTC) that allows to know the date and time at all times, even after prolonged disconnection from the mains, through a support battery, which allows the system to save all the data in memory before shutting down in the event of power failures.

The available wireless communications are 3G, which has an external antenna, and requires an accessible SIM card from the outside and WIFI, in the case of the model with both functionalities.

Ethernet communication 10/100 Mbps is incorporated through an RJ45 connector.

1.4 Connectors

The equipment has the following connectors and terminal blocks:

Power line supply connector with the following inputs:

- | | |
|------------|------------------|
| - Earth: | Earth connection |
| - Neutral: | Neutral input |
| - Phase 1: | Phase 1 input |
| - Phase 2: | Phase 2 input |
| - Phase 3: | Phase 3 input |

Current Transformers connector with the following inputs:

- | | |
|---------------|-----------------------------------|
| - CT Phase 3: | Phase 3 current transformer input |
| - CT Phase 2: | Phase 2 current transformer input |
| - CT Phase 1: | Phase 1 current transformer input |

RJ-45 connector. Ethernet port.

RS-485 connector. It is used to communicate with devices via the RS-485 bus, mainly with MR-4850 and MR-4859 devices.

3G Antenna Connector. SMA connector for a 3G antenna connection.

SIM connector. Connector for a 3G mobile phone card.

SD connector. It is a connector for SD memory that is not accessible from outside the head. It has to be opened to access. It is used to load the Microprocessor Software.

The equipment is supplied with 3 additional aerial connectors, where the voltage input cables, the current sensor cables and the RS-485 cables will be inserted.



2. Technical Specifications

Input

Input voltage range (1-phase) (V _{AC}):	100 ~ 277 VAC
Input frequency:	50 ~ 60Hz
Power factor:	> 0.80
Maximum power consumption:	15 W

Ethernet

Throughput:	10 / 100 Mbps
MDI / MDIX:	Yes
Full Duplex:	Yes

Telephony

Technology:	3G
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3. Enviromental data

Usage for open type applications:

- IEC1 60529, IP-65.
- Nema2, Type-1.

Operating temperature range:	-25 °C ~ 55°C.
Storage temperature range:	-25 °C ~ 85°C.
Maximum temperature at the case:	55 °C

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1. International Electrotechnical Commission, 3 Rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
 2. National Electrical Manufacturers Association, 1300 North 17th Street, Rosslyn, VA 22209



4. Dimensions and weight

These are the dimensions and the weight:

- Dimensions: 105 mm (Width) x 225 mm (Length*) x 30 mm (Height).
- Weight: 700 g.

The Gateway is inside an aluminum housing with plastic caps bolted to the sides.

On the aluminum you can find with laser engraved, the model, the serial number, the MAC, the electrical characteristics and the distribution of the terminals of the connectors, to facilitate its installation.



5. Approvals

Teslights LLC, certifies that the device meets the requirements of the following directives:

2006/95/CE	EN60950-1: 2006+A11: 2009 EN60529_ 1991+A1: 2000
2004/108/CE	EN55022:2006+A1:2007 EN55024: 1998+A1:2001+A2:2003 EN61000-3-2:2006 EN61000-3-3: 2008 EN61547: 1995+A1: 2000 TGN17



6. Installation guide

The Gateway is usually being installed in an electrical cabinet, and should only be accessible and manipulated by authorized technicians and persons.

Always remove power and unplug the power cord before working on the unit.

NOTE: The pictures in the following sections of the installation process may vary slightly from the supplied device. It could be a similar or an improved model.

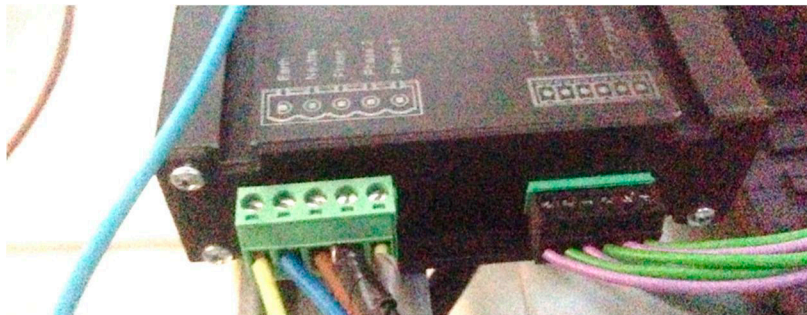
6.1. Single-phase / three-phase power input

There's an aerial connector for the power voltage input (Earth, Neutral and Three-Phases).



Note: In the photo, the input voltage connector and the input current sensors one are shown.

The European Union Low Voltage Regulation requires that all wires entering terminals to include wire ferrule terminals. They shall be well screwed at the terminal block, and make sure if you use stranded copper wires, no strand shall be loose to prevent short circuits.



Afterwards, connect the plugged into its mate.

6.2. Current transformers connection

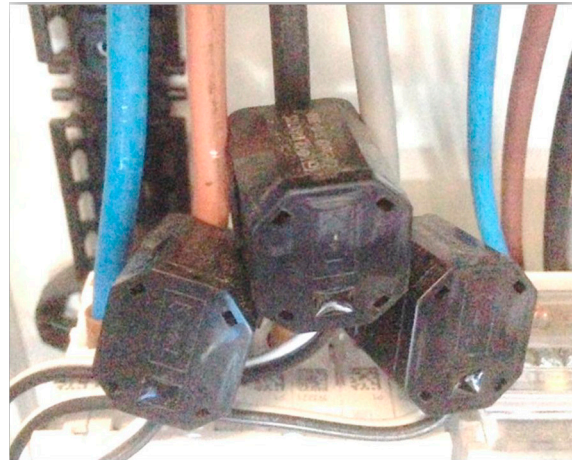
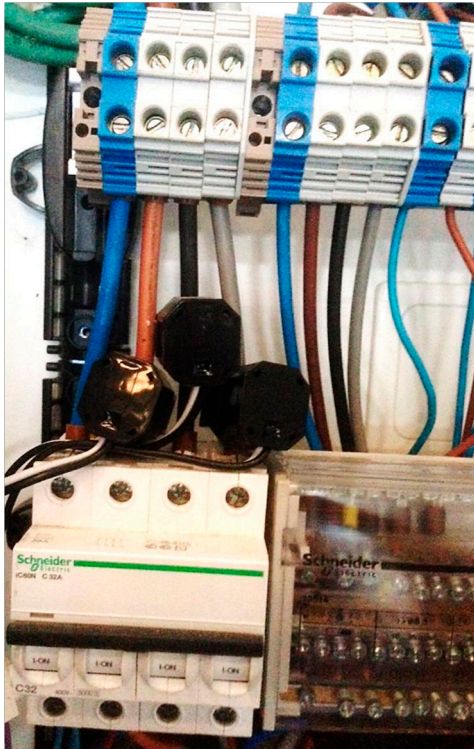
For power metering, three current transformers are provided, which will be locked around the power wires at the entrance of the electrical cabinet, right after the main circuit breaker.

The outgoing wires of these transformers will be well screwed at the current sense (CTs) connector, as always, using wire ferrule terminals.

It is very important to locate the three sensors in the same metering direction, so current sense will be coherent. Otherwise, one sensor could be positive and other/s negative.



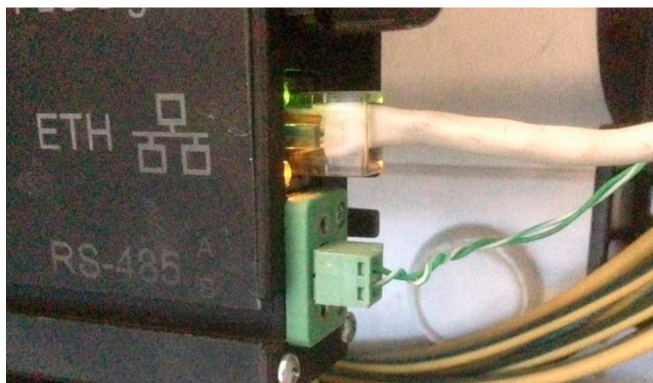
WARNING: Once the current transformers are installed, and the terminal block plugged in, it should never be unplugged without disconnecting the electrical cabinet mains voltages first. Otherwise the Gateway could be damaged.



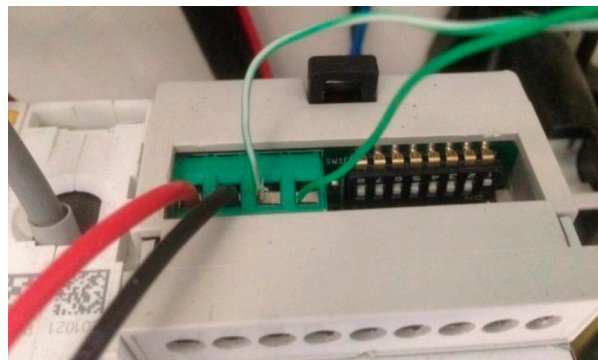
6.3. RS-485 Connection

The RS-485 interface uses two wires as a differential signal bus to communicate. The two lines/signals are called “A” and “B”. This bus can be used to link actuator devices such as the MR-4859.

Again, these wires shall be screwed into its pluggable connector.



The actuators MR-4850 or MR-4859 will have their respective A and B inputs, and it's possible to chain up to 26 such devices.



6.4 3G Antenna Installation

Header models that incorporate 3G mobile communications functionality have their antenna mounted by default.

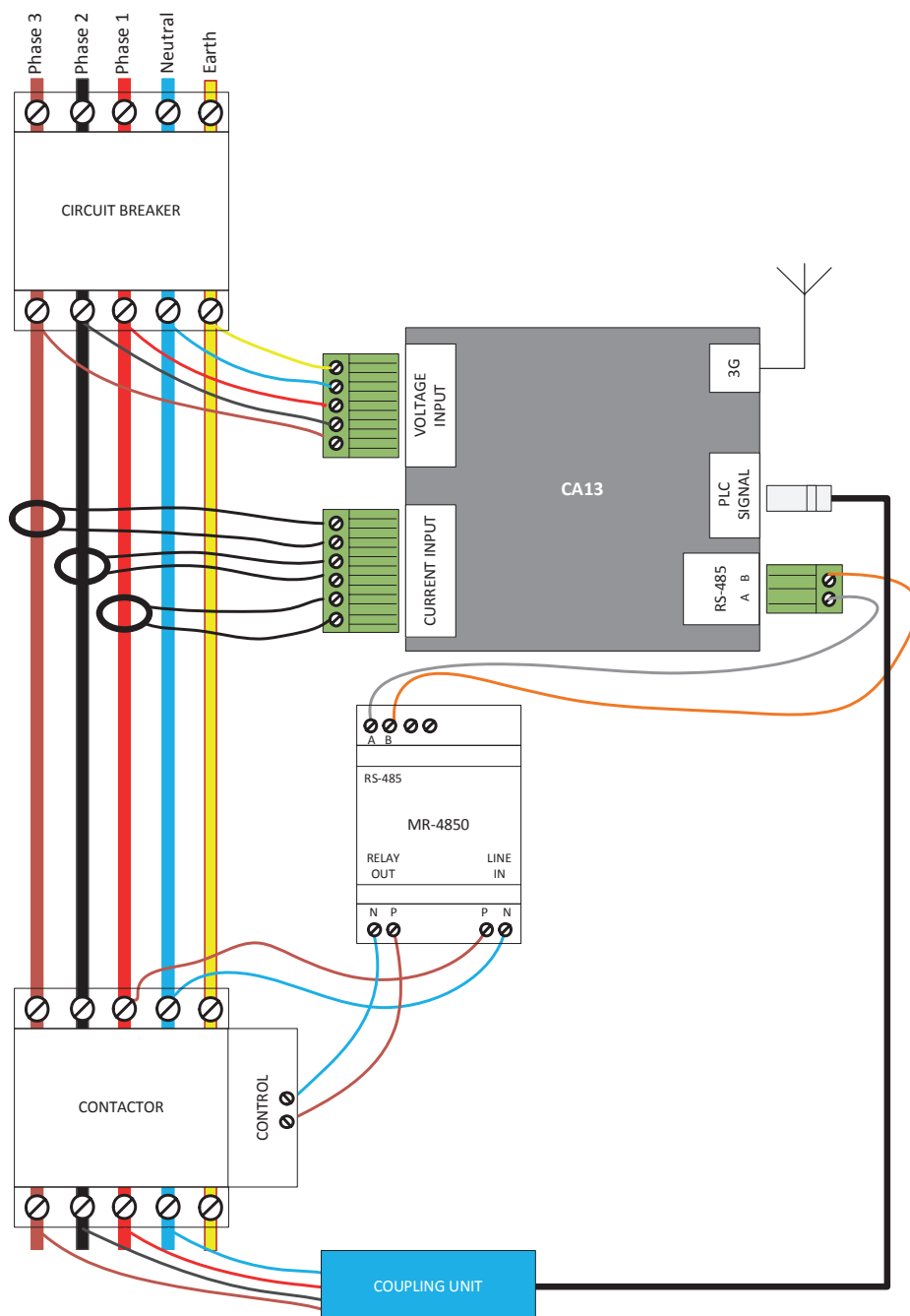
However, at times when the coverage in the electrical panel is low, or when the electrical panel are metallic and attenuate the telephony signal, this antenna can be removed and mount a higher gain even outside the electrical panel.

6.5. Installation example LX-1x Gateway with an MR-4850 actuator

The following picture illustrates how to connect an LX-1x Gateway to a MR-4850 in a three-phase electrical cabinet. The MR device controls the opening and closing of the output contactor to the streetlights.

The MR-4850 power supply is connected to the mains phase and neutral.

For installation, follow the steps in the previous sections. Regarding to the MR-4850 it is ESSENTIAL to respect the LINE IN and RELAY OUT inputs of the PHASE and NEUTRAL lines. Otherwise, both lines would short circuit inside the MR.





7. Cautions and warnings

- Do not install if the device is damaged. Inspect the enclosure for obvious defects such as cracks in the housing.
- This device does not include replaceable or interchangeable elements, so it must not be manipulated.
- If the device is installed or used in a manner not specified in this document, the safety of the device may be impaired.
- If the device works abnormally, proceed with caution. The safety of the device may be impaired.
- Do not install the device near combustible gas.
- Do not install the device in an electrical service with current or voltage outside of the specified power range.
- Do not power the device if open.
- Beware of working around this device when the main voltage is powered.
- Check that all connections are reliable and correct before powering the device to the mains voltage.
- Read instructions shown in the connection diagrams.



8. Product Limited Warranty

Teslights, LLC warrants its equipment for 1 year from the ship date against defects in material or workmanship when installed in accordance with manufacturer's instructions by qualified personnel.

This warranty does not cover installation, removal, installation or labor costs and excludes normal wear and tear. The warranty does not cover a product which has been altered from its original manufactured condition due to faulty installation, tampering, accident, neglect, abuse, force majeure or abnormal conditions of operation.

The obligation under this warranty is limited to repair and/or replacement, at Teslights, LLC option, of the manufactured product and in no event shall Teslights, LLC be liable for consequential or incidental damages.



9. Release dates

Manual	Revisión N°.	Fecha
LX10	01	12/01/2016
LX10	02	19/01/2016