T-Light™ LCU (Light Control Unit) NEMA LoRa

User Manual

Models: LCUN2LUS and LCUN2LEU

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About Telematics Wireless Products

Telematics Wireless products have been evaluated as Information Technology Equipment (ITE), which may be installed in Central Offices, Telecommunication Centers, offices, computer rooms, and similar commercial type indoor or outdoor locations.

Telematics Wireless is an associate member of the TALQ Consortium, and its products are ELEXON approved. The T-Light™ Wireless Light Control Unit (LCU) is also certified by Intertek.

Description

The T-Light™ Wireless Light Control Unit (LCU) and its communication interface with the T-Light management software are key components in the Telematics Wireless Smart Lighting System. The LCU is a wireless control unit installed in one of the following locations:

- On top of the luminaire fixture (External)
- In the luminaire fixture (Internal)
- In the base of the pole (Internal)

The LCU handles the collection and transmission of luminaire data and the execution of commands on the luminaire from the Smart Lighting System Control Management Software (CMS).

Smart Lighting System Overview

The Smart Lighting System collects data from and manages the operation of remote street luminaires. The System consists of the following components:

- **LCU** – Located on top of or inside the luminaire cover, or in the light pole, the LCU sends sensor data and executes scheduled and unscheduled luminaire control commands, such as on/off and dim, received from the CMS Application Server.

- **LoRa Gateway – the gateways forward message to/from Network Server to end devices.**

- **LoRa Network Server – forward message to appropriate Application Server and selects best gateway to send message for transmission to end devices.**

- **CMS** – Web-based backend application server provides real-time management: receives LCU communications from the LoRa network server and sends luminaire control commands to the LoRa network server for transmission to LCUs.

  CMS usually contains a database of static and dynamic LCU information: ambient light values, lighting and dimming schedules, power usage, status, etc.

Figure 1 – System Topology

LCU NEMA LoRa

The LCU NEMA LoRa is an external luminaire control device that is installed on top of the luminaire cover into a standard NEMA socket. Control features offer On/Off and dimming level operations. Monitoring features include identification of lamp and electrical issues and measurement of electrical parameters.

The LCU NEMA uses standard NEMA socket "twist and lock" installation on top of a pole or luminaire cover, according to ANSI C136.10 and C136.41 specifications.

Standard Features

- Light sensor - Operates as a photocell with the integrated microcontroller and is used as a backup light control in the event of microcontroller failure.
- Energy meter - Continuous measurement collection and aggregation.
- Integrated RF antenna.
- Real Time Clock (only when connected to the system or when unit received its time zone from the system and operates with GPS)
- Network data is protected by AES 128 encryption.
- Relay Control for LED driver/ballast power.
- Uses unlicensed frequency.
- Built in GPS receiver for auto-commissioning
- "Auto Detection and Verification" Software

"Auto Detection and Verification" Software

The LCU NEMA includes the Telematics "Auto Detection and Verification" software that automatically detects and stores the ballast type (1-10V or DALI) in the LCU. The ballast type is then retrieved during the commissioning process, thereby eliminating the need to enter it manually into the CMS (auto detection process also occur each time the power turns on from off state)

Optional Features

- Built-in GPS receiver for full auto-commissioning.

LCU LoRa Supported Data Transfer

With the proper matching of LED driver, the following data information will be provided.

- Current
- Voltage
- Lamp energy (kWh)
- Metered/Active power (Watt)
- Power Factor
- Lamp Burning hours
- LED Driver Temperature (depend on LED driver characteristics)

Technical Specifications

Feature	Specification
Dimming – Ballast/Driver Communication Protocols (different configurations depend on part number ordering information)	DALI Analog 0-10V
Operating Input Voltage	110-277V AC @50-60Hz
Load Current	10A
Internal Surge Protection	350J (10kA)
MTBF	>1M hours
Isolation	3.75kVac/5mA/5Sec
Power Consumption	Up to 2W

LoRa RF Radio Characteristics

Parameter	Value	Unit
Operating Frequency: EU868 US915 AS923 KR920	 863-870 902-928 920-925 920-923	 MHz MHz MHz MHz
Network Topology	Star of Starts	
Modulation EU868 US915 AS923 KR920	 LoRa125, LoRa250, FSK LoRa125, LoRa500 LoRa125, LoRa250, FSK LoRa125	
Maximum Transmitter output power EU868 US915 AS923 KR920	 Up to 16 (EIRP) Up to 21 (conducted) Up to 16 (EIRP) Up to 14 (EIRP)	 dBm dBm dBm dBm
Antenna Gain (Typical)	0	dBi
Antenna Type	built in Antenna	

(1) The RF characteristics are derived from LoRa™ specifications

Environment

Operating Temperature	-40° F to 161.6° F (-40° C to +72° C)
IP Rating	IP 66 per IEC 60529-1

LCU NEMA Dimensions

Model	Measurements
External – NEMA	3.467 in D x 4.173 in H (88 mm D x 106 mm H)
Weight	225 g

Figure 2 - LCU NEMA Enclosure

LCU NEMA Electrical Structure

LCU NEMA Contacts/Wiring

Following is a wiring diagram for a NEMA receptacle with dimming pads for use with the LCU NEMA:

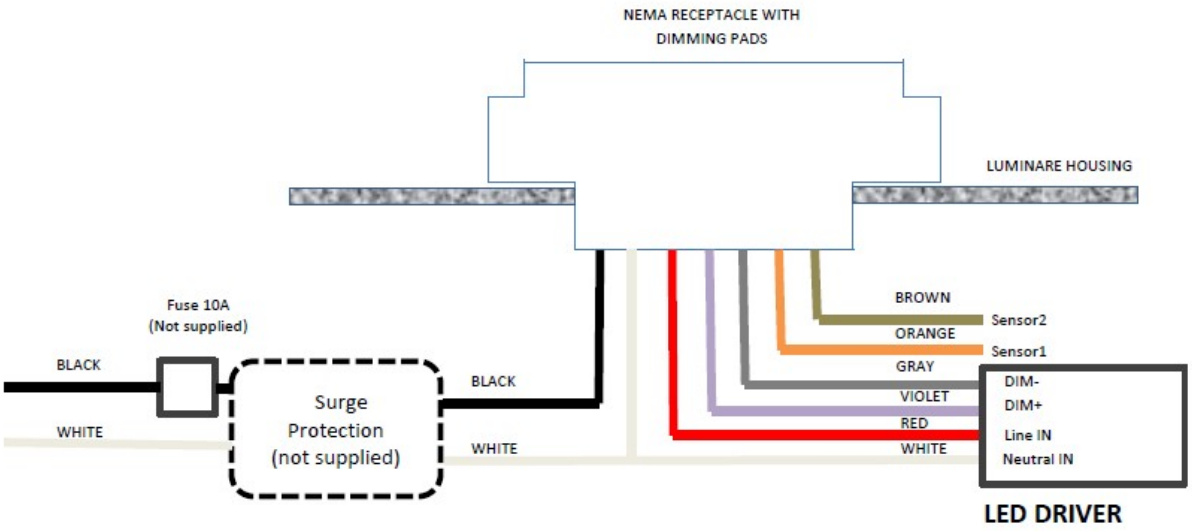

Figure 3 - NEMA Receptacle Wiring Diagram for use with LCU NEMA

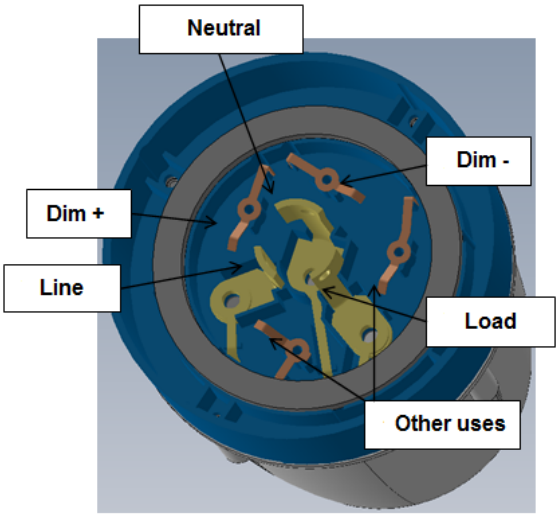

Figure 4 - LCU NEMA 7-Pin Contact Interface

LCU NEMA Contact Details

#	Wire Color	Name	Purpose
1	Black	Li	AC Line In
2	White	N	AC Neutral
3	Red	Lo	AC Line Out: Load
4	Violet	Dim+	DALI(+) or (+)0-10V or PWM or RS485-A
5	Gray	Dim-	Common GND: DALI(-) or (-) 0-10V or RS485-B
6	Brown	Reserved 1	Digital IO or Analog In or RS485-A (optional)
7	Orange	Reserved 2	Digital IO or RS485-B (optional)

LCU NEMA Pinout

		LED Driver		
Model	**Pin 1-2** **Black-White**	**Pins 3-2** **Red-White**	**Pins 5-4** **Gray-Violet**	**Pins 6-7** **Brown-Orange**
External NEMA 7-pin	Main AC Line IN Main AC Neutral IN	AC for lamp Line OUT Neutral IN	Dimming – 0-10V Analog, DALI, PWM, Modbus RS485	For future user purposes, for example, sensors, Modbus RS485, GPIO-digital or analog

Standards Compliance

Region	Category	Standard
All	Quality Management Systems	ISO 9001:2008
	Locking Type	ANSI C136.41
	IP Rating	IP 66 per IEC 60529-1
Europe	Safety	IEC 61347-2-11(IEC 61347-1)
	EMC/Radio	ETSI EN 300220-1&2, ETSI EN 301489-1&3
United States	Safety	UL916 CSA C22.2#205
	EMC/Radio	47CFR FCC Part 15

LoRa Certification

The LCU has LoRa Module certified with LoRa Alliance™.

Regulation Information

FCC Part 15 Regulation Class B device

The digital circuit of this device has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

FCC interference Notice

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

FCC Radiation Hazard Warning

WARNING! *To comply with FCC RF exposure compliance requirements, the device should be located at a distance of at least 20 cm from all persons during normal operation. The antennas used for this product must not be co-located or operated in conjunction with any other antenna or transmitter.*

WARNING! *Changes or modifications to this equipment not expressly approved by the party responsible for compliance (Telematics Wireless Ltd.) could void the user's authority to operate the equipment.*

Installation Requirements

Mandatory Customer-Supplied Equipment

System integrity for the LCU NEMA is ensured with the mandatory installation of customer-supplied voltage and current surge protection equipment.

Mandatory Voltage Surge Protection

***Warning**: To prevent damage due to power network voltage surges, it is mandatory that you also provide and install a surge protection device to protect the LCU and the luminaire driver.*

Mandatory Current Surge Protection

***Warning**: To prevent damage due to power network current surges, it is mandatory that you also provide and install a 10 amp slow-blow fuse or circuit breaker to protect the LCU and the luminaire driver.*

Location

The LCU NEMA is installed on the top surface of the luminaire cover utilizing a standard (twist and lock) NEMA socket.

Post-Installation Commissioning

The serial numbers and GPS coordinates of the LCU NEMA units must be added to the CMS Equipment Inventory as part of the commissioning process. The level of automation in the Commissioning process depends on the optional equipment installed in the LCU NEMA:

- GPS – Commissioning is fully automated. Commissioning is complete after the CMS Administrator executes the relevant command.
- No GPS – Commissioning is a partially manual process:
  - Installer obtains the GPS coordinates of the LCU NEMA with a handheld GPS device.
  - Installer records the serial number and GPS coordinates.
  - CMS Administrator imports the recorded values into the CMS Equipment Inventory, one by one or by batch.

Contact Details

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