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01	Dec. 05, 2022	Initial release for Items 032-83900.
02	Apr 04, 2022	Removal of equipment image and suggested manufacturers. General revision
03	Nov 04, 2025	Added item 032-87806, 002-87813, 002-87813. Changed Document Number (Legacy Number: 4350.204) to new Engineering Records nomenclature number 4300.50.204.



Item Version History

Warehouse Catalog #	Asset Suite #	Version	Date
032-83900	83900	3	Nov 04, 2025
032-87806	87806	1	Nov 04, 2025
002-87813	87813	1	Nov 04, 2025

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1. Introduction

This is a general specification that covers the minimum requirements for Overhead Line Sensors for Cellular Communications to be used in the distribution system in Puerto Rico. Further information will be provided by LUMA Energy at the time of order placement and will provide information on site-specific conditions, quantity, and other requirements. This document includes the general characteristics of the product.

2. Special Requirements

Samples shall be furnished as requested by LUMA Energy. Vendors that have supplied this product to LUMA on previous orders will not have to furnish samples at bid opening. The product will be received at LUMA's general warehouse (O11) at Palo Seco, Puerto Rico. Shipping will include transportation and unloading at the indicated warehouse.

3. Literature

- 3.1. Descriptive and technical literature must be supplied by the vendor at time of bidding. This literature must include, but is not limited to, details of material, drawings, documented testing, and instructions for use and installation. **The literature must be an official document from and certified by the manufacturer.** Failure to submit duly certified documents by the specified deadline will result in bidder disqualification.
- 3.2. If required by LUMA, final drawings and documentation shall be submitted by the vendor before the manufacturing and shipping process for approval.

4. Compatible with

For compatible manufacturer and model see Table 1. These models are examples of the product described in this document and do not represent a preference. LUMA will evaluate equally any model not listed here during any acquisition event.

5. Markings

- 5.1. Containers shall be marked outside with LUMA Energy's purchase order and item number.
- 5.2. Individual package(s) shall be clearly marked with manufacturer name and item information (part number, serial number, quantity, etc.).
- 5.3. Packaging labels and tags shall be waterproof.
- 5.4. Additionally, each device will also be permanently identified with the trip current value and minimum reset value, (when applicable).
- 5.5. Each device must be supplied with a unique MAC address or serial number to facilitate configuration software. The supplier must provide the list of these MAC addresses per shipment.
- 5.6. The supplier shall include installation instructions in a USB Drive, or any other medium agreed upon by the purchaser. Warning Label shall be placed on the equipment for special handling and storage requirements.

6. Packaging

- 6.1. All products shall be packaged and marked in such a way as to facilitate handling and protection from damage and that the receiving warehouse can readily identify it and send it, in one complete unit, to a field location without opening crates or boxes to sort items and/or parts.
- 6.2. A list of all parts included in the container and/or package must be provided at delivery time so the receiving personnel can verify that everything requested is present, avoiding any delay in the receiving process.
- 6.3. The devices are stored outdoors open to the elements, packaging must protect the equipment from environmental exposure, including rain, snow, ice, and wind.

7. Number Per Package (Logistics)

Standard package: One (1) unit per package or as requested by LUMA.

8. Acceptance Criteria

- 8.1. Test required: certified by external qualified laboratories.
- 8.2. Product shall be manufactured in accordance with the latest issue below (section 8.3). When conflicts occur between purchaser's specifications and the latest issue below, the purchaser's specification shall prevail.

8.3. Latest applicable codes, standards, and other regulations:

a. ANSI/IEEE Standard 495-2007 Guide for Testing Faulted Circuit Indicators

8.4. If any other standards different from the ones indicated in this document are used, the supplier must provide information showing compatibility with the required ones.

9. Description

This section outlines the technical requirements for overhead line monitoring sensors intended for use in medium-voltage distribution systems. The devices must be capable of detecting and reporting electrical and environmental conditions in real time, supporting grid reliability, fault detection, and operational visibility.

Two types of sensors are considered under this specification:

- Line-powered sensors designed for circuits with moderate to high current levels.
- Battery-powered sensors suitable for low-load or de-energized circuits.

9.1. Line-Powered Overhead Line Sensor.

a. Material and Make-Up

1. Must comply with ANSI/IEEE Std. 495-2007.
2. Compatible with bare or non-shielded insulated conductors.
3. Conductor diameter range: 0.375 to 1.0 inch.

b. Current Sensor

1. Must support hot-stick installation on energized lines.
2. Self-powered by the magnetic field of the conductor with minimum current of 7–10 A.
3. No external power or batteries required.
4. Must include logic to prevent false tripping.

c. LED Indications

1. Integrated LED for fault indication.
2. Visible from 1000 feet.
3. Red for permanent faults; other colors subject to approval.

d. Environmental Conditions

1. Operating range: 0°C to 50°C, 100% humidity.
 2. Must be designed to withstand sustained hurricane-force winds in accordance with applicable Puerto Rico building codes.
 3. Designed for tropical, corrosive, high-salinity environments.
- e. Sensing and Characteristics
1. Must measure:
 - a. Load current and direction
 - b. Fault current (with magnitude)
 - c. Voltage presence
 - d. Power (W, VA, Var)
 - e. Power factor
 - f. Phase angles
 - g. Voltage harmonics
 - h. Sags and surges
 - i. High current
 - j. Voltage thresholds/loss
 2. GPS location and timestamp
 3. Waveform capture (≥ 130 samples/cycle)
 4. Phase identification
 5. Must send alarms for:
 - a. Permanent/momentary faults
 - b. Disturbances
- f. Communication
1. Supports DNP 3.0 via gateway.
 2. Cellular or mesh communication.
 3. OTA firmware updates.
 4. Integration with SCADA, OMS, and analytics platforms.

- 9.2. **Battery-Powered Low-Load Overhead Line Sensor**
Line sensor designed for low-amperage and lateral distribution feeders
- a. **Material and Make-Up**
 - 1. Must comply with ANSI/IEEE Std. 495-2007.
 - 2. Compatible with bare or non-shielded insulated conductors.
 - 3. Conductor diameter range: 0.375 to 1.0 inch.
 - b. **Current Sensor**
 - 1. Must support hot-stick installation.
 - 2. Battery-powered circuits with low or no current.
 - 3. Minimum battery life: 10 years.
 - 4. Field-replaceable and recyclable batteries.
 - 5. Must include logic to prevent false tripping.
 - c. **LED Indications**
 - 1. Integrated LED for fault indication.
 - 2. Visible from 1000 feet.
 - 3. Red for permanent faults; other colors subject to approval.
 - d. **Environmental Conditions**
 - 1. Operating range: 0°C to 50°C, 100% humidity.
 - 2. Must be designed to withstand sustained hurricane-force winds in accordance with applicable Puerto Rico building codes.
 - 3. Designed for tropical, corrosive, high-salinity environments.
 - e. **Sensing and Characteristics**
 - 1. Must measure:
 - a. Load current and direction
 - b. Fault current (with magnitude)
 - c. Voltage presence
 - d. Power (W, VA, Var)
 - e. Power factor

- f. Phase angles
 - g. Voltage harmonics
 - h. Sags and surges
 - i. High current
 - j. Voltage thresholds/loss
- 2. GPS location and timestamp
 - 3. Waveform capture (≥ 130 samples/cycle)
 - 4. Phase identification
 - 5. Must send alarms for:
 - a. Permanent/momentary faults
 - b. Disturbances
- f. Disturbances Communication
 - 1. Supports DNP 3.0 via gateway.
 - 2. Cellular communication interface.
 - 3. OTA firmware and configuration updates.
 - 4. Integration with SCADA, OMS, and analytics platforms.

9.3. Arc Shield Plate

- a. Purpose: Designed to provide physical mitigation against electrical arc events by deflecting or containing arc energy away from adjacent components. This feature is intended for use when necessary and is considered optional.
- b. Construction: Manufactured from durable materials such as aluminum or arc-resistant composite compounds, ensuring resilience under high-energy fault conditions.
- c. Operational Characteristics: Passive, non-electrical device; it does not store energy or interact electrically with the system.

10. Inspection

- 10.1. Upon inspection of incoming products, the purchaser reserves the right to refuse their shipments and to determine the acceptability or rejection of the product received. The supplier shall be liable for all costs incurred for a product that is rejected.

10.2. The acceptance of any product shall in no way relieve the vendor from his responsibility to meet all the requirements of this specification, and it would not prevent subsequent rejection if such products were found later to be defective or out of compliance.

11. Proposal Information

11.1. Submitted proposals must include:

- a. Technical information, drawings, and tests.
- b. Table of Compliance completed by the bidder with reference (see Appendix 1).

12. Table 1: Warehouse and Asset Suite Identification Number

Warehouse Catalog #	Asset Suite #	Types of sensors	Compatible Manufacturer & Model
032-83900	83900	Overhead Line Sensors Line-powered sensors	Sentient energy MM3 ai
032-87806	87806	Overhead Line Sensors Battery-powered sensors	Sentient energy ZM1
002-87813	87813	Arc Shield Plate for CFCLs	Arc Shield

- End of Specification -

Appendix

Appendix 1: Table of Compliance

Line	Description	Pass/Fail (P / F)	Comments
1	The Proponent complies with the corresponding specification document 4350.50.204		
2	The Proponent complies with the industry standards established in the specification document. (IEEE).		
3	<ul style="list-style-type: none"> Line-Powered Overhead Line Sensor Battery-Powered Low-Load Overhead Line Sensor Arc Shield Plate for CFCIs 		
4	<ul style="list-style-type: none"> Materials for the Line Sensor must withstand the environmental and operating conditions as defined in ANSI/IEEE Std. 495-2007. Line Sensors shall be compatible with bare or non-shielded insulated conductors. Must be compatible with conductor overall diameter 0.375 inch to 1.0 inch. 		
5	<ul style="list-style-type: none"> The current sensor portion of the device must be capable of being installed on an energized cable or wire. All devices must have provisions for installation with a hook stick. The line sensor shall be able to operate self-powered in a current range of 10 to 600 amps, minimum. The device and application software must have the capability to eliminate false tripping of the unit. 		
6	Must be able to measure and send alarms as per Section 7.5.		
7	<ul style="list-style-type: none"> The LED must be mounted as part of the current sensor portion of the device for fault indication. The LED indicators must be visible from 1000 feet. The target or LED must display a red color for a permanent fault condition. Other colors must be submitted to the LUMA Energy for evaluation and approval. 		
8	<ul style="list-style-type: none"> Temperature & Humidity: Equipment supplied must be adequate for an operating temperature range of 0°C to 50°C with humidity up to 100%. Wind conditions: All mounting equipment must be designed and constructed to withstand sustained hurricane-force wind velocities. Pollution: The equipment must be designed and constructed for the corrosive environment of an electrical system in a tropical zone close to sea or exposed to strong sea winds and it must provide reliable performance in environments with high exposure to salt, minerals, chemicals, or wind-borne particulate. 		
9	Must be able to measure and send alarms as per Section 7.5.		

NOTE: This table is only a checklist for reference. The compliance must be with the complete document. Filling out the table with “PASS” won’t be accepted as a compliance without the technical information required to certify it.











4300.50.204 Overhead Line Sensors for Cellular Communications

Final Audit Report

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