



Document Title:  
**FCI Intelligent and Automatic Reset Type**

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**Management Approval (If apply)**

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**Related/Referenced Documents**

N/A.

**Version History**

Version	Date	Revision
01	Jan. 24, 2022	Initial release
02	Oct. 17, 2023	Revision of Section 8.3 to specify LED indicator for item 032-82528. General format revision.
03	Oct. 1, 2024	General format modifications, TOC updated, and sections order rearranged.



Document Title: FCI Intelligent and  
Automatic Reset Type  
Document No.: 4350.007  
Department: Distribution

## Item Version History

Warehouse Catalog #	Asset Suite	Version	Date
032-82528	82528	3	10/1/2024
032-82529	82529	3	10/1/2024



## 1. Introduction

This is a general specification that covers the minimum requirements for the insulating cover for fuse cutout 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 electrical and mechanical characteristics of the equipment/material.

## 2. Special Requirements

- 2.1. Samples shall be furnished as requested by LUMA Energy. Vendors that have supplied this equipment/material to LUMA on previous orders, will not have to furnish samples at bid opening. The equipment/material will be received at the LUMA's general warehouse (011) at Palo Seco, Puerto Rico. Shipping will include transportation and unloading at the indicated warehouse.
- 2.2. Any changes or updates to the supplier's approved designs, procedures, quality routines and/or inspection layout must be communicated to the LUMA Distribution Materials Section in writing.
- 2.3. The purchaser reserves the right to refuse shipment and to determine the acceptability and rejectability of FCIs received. The supplier will be liable for all costs incurred for shipments that are refused, rejected, or replaced.

## 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 documents on time and duly certified by the manufacturer will cause 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. Markings

- 4.1. The FCIs must be shipped with the targets in the fault condition.
- 4.2. Each FCI shall be permanently identified with supplier's catalog number, trip current value, minimum reset value, and manufacturing date.

- 4.3. FCIs must be individually boxed with the outside of each box marked with the LUMA warehouse item number, the supplier's name, and the supplier's catalog number.
- 4.4. If FCIs are stored outdoors open to the elements, packaging must prevent equipment from being damaged by rain, snow, ice, wind, etc.
- 4.5. 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.
- 4.6. All materials, elements, parts, and hardware crates shall be shipped on flatbed trailers and stored in such a way so that they can be unloaded by finger lifts. Deliveries in containers or closed platforms where finger lifts cannot be used will not be accepted.
- 4.7. A copy of each detailed packing list must be sent to LUMA Energy personnel in charge of the requisition, prior to the delivery.

## **5. Packaging**

All equipment/material 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. Number Per Package (Logistics)**

One (1) per package or as requested by LUMA Energy.

## **7. Acceptance Criteria**

- 7.1. Test required: certified by external laboratories.
- 7.2. Product shall be manufactured in accordance with the latest issue below (section 7.3). When conflicts occur between purchaser's specifications and the latest issue below, the purchaser's specification shall prevail.
- 7.3. The following standards must form a part of this specification unless otherwise stated:
  - a. ANSI/IEEE Std 495 Guide for Testing Faulted Circuit Indicators
- 7.4. Certified design test reports shall be provided.
- 7.5. If any other standard different from the ones indicated in this document are used, the supplier must provide information showing compatibility with the required ones.

## **8. Description**

- 8.1. Material and Make-Up
  - a. Materials for the FCI must withstand the environmental and operating conditions as defined in ANSI/IEEE Std. 495.
  - b. FCI shall be compatible with bare or non-shielded insulated conductors.

## 8.2. Current Sensor

- a. The current sensor portion of the FCI must be capable of being installed on an energized cable or wire. All FCIs must have provisions for installation with a hook stick.
- b. LUMA prefers that FCI be self-powered without the need of external power supplies or photocells. Batteries are acceptable but must have a minimum operating life of 10 years.
- c. The FCI unit must be able to automatically select the current trip value based on sampled load current or load tracking method. The load tracking must be initiated at a maximum of 50 amps. The minimum fault current value must be 100 amps.
- d. FCI must automatically reset after the specified minimum current of at least 3 amps. LUMA prefers if the unit also offers an automatic reset option after a minimum of 4 hours after a detected fault occurs.
- e. The FCI must have capability for inrush restraint to eliminate false tripping of the unit.

## 8.3. Integral Targets

- a. The target must be mounted as part of the current sensor portion of the FCI.
- b. For non-communication enabled units, the face target indicator shall be able to be viewed from 30 feet. The target shall be LEDs to enhance the indication visibility.
- c. For communication enabled units, the standard face target indicators must be large enough to be viewed from 30 feet. The target could be made of mechanical-colored flags or LEDs.
- d. The target should display the following colors depending on the device condition:
  1. Permanent fault condition: Red
  2. Momentary fault condition: YellowOther colors combinations must be submitted to the Distribution Materials Section for evaluation and approval.

## 8.4. Counters

- a. LUMA prefers that the FCI unit has the capacity to display a counter of the quantity of faults.
- b. The counter shall be mounted as part of the current sensor portion of the fault counter.
- c. The size of the counter must be large enough to view when installed on an overhead wire.
- d. The counter must display a pointer with a scale of 0 to 10 to reflect fault counts.

- e. The counter must reset to zero with the use of a tool supplied by the supplier.

#### 8.5. Environmental conditions

- a. Temperature & Humidity: Materials for the FCI must withstand the environmental and operating conditions as defined in ANSI/IEEE Std. 495 over the anticipated 40-year life of the installation. Equipment supplied must be adequate for an operating temperature range of 0°C to 50°C (32°F to 122°F), with humidity up to 100%.
- b. Wind conditions: All mounting equipment must be designed and constructed to withstand sustained hurricane-force wind velocities complying with the applicable construction codes, standards or LUMA Energy's design criteria for PR.
- c. Pollution: The equipment must be designed and constructed for the corrosive environment of a distribution 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. The insulator contamination levels for the equipment should be adequate to prevent flashover. All exposed material must be made of materials with anti-corrosive capabilities.

#### 8.6. Communication Accessories and Features

- a. **This section will only apply to the units requested with this capability, as per Table 1.**
- b. The FCI System shall allow for DNP 3.0 SCADA communications via a communication gateway.
- c. Up to 150 FCI can communicate with 1 gateway via 10-mile line of site protocol.
- d. Ability to receive SCADA commands sent via DNP3 through the communication gateway to the FCI devices.
- e. The DNP 3.0 mapping for SCADA shall include, as a minimum, the following:
  - 1. Status and control
  - 2. FCI function – status and control
  - 3. Primary voltage
  - 4. Primary current
  - 5. Battery test and status (if equipped)
  - 6. Fault Indication
  - 7. All events shall be timestamped with local time.
- f. The communication module must accept radial/serial Ethernet-based radios, cellular, or fiberoptic interface.

## **9. Qualification and Testing Requirements**

- 9.1. At the time of request for quotation, the supplier must submit a certified report of the design tests performed demonstrating full compliance to ANSI/IEEE 495-2007 (or latest). The test report shall include description, details, results, and pertinent data of samples tested. Retesting is required for a change in any product.
- 9.2. At the time of request for quotation, the purchaser may require the supplier to submit a copy of their Quality Control Manual to show how the supplier has incorporated the measures to produce a quality product in their operation. The quotation shall include SPC data in graph form containing routine test results for the last 1000 fault indicators produced.
- 9.3. Suppliers will be required to submit product samples for inspection by LUMA's Material Specifications Section. This inspection will verify that the supplier's product meets the requirements of applicable specifications.
- 9.4. FCIs for overhead conductor applications shall not generate radio frequency interference, RFI, through an operating voltage of 15kV.
- 9.5. The supplier shall review the LUMA Construction Standard, 4451-007, and must verify, in writing, compatibility with respect to their product.

## **10. Nameplate Information**

Each FCI must be permanently identified with the LUMA's warehouse item number, appropriate catalog number, supplier's catalog number, trip current value, minimum reset value, and date code.

## **11. Guarantee**

- 11.1. In reply to the purchaser's request for quotation, suppliers must respond to the terms and conditions for the FCIs being proposed to include warranty period and coverage. FCIs shall be designed and manufactured to provide a life expectancy of a minimum of 40 years. Replacement costs associated with premature fault indicator failure due to inadequate design or faulty manufacturing shall be the responsibility of the supplier.
- 11.2. Replacement costs associated with FCI failure due to inadequate design, faulty manufacturing, or software errors are to be the responsibility of the supplier.
- 11.3. Non-conformance observed during sampling will require the supplier to bring the FCIs into compliance with the specification 14 days after notification. The units to be brought into compliance with the specification must be shipped to the supplier at the Supplier's expense.



## 12. Inspection

The acceptance of any equipment/material 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 equipment/material were found later to be defective.

## 13. Proposal Information

13.1. Submitted proposals shall include:

- a. Technical information
- b. Any exceptions taken to this specification.
- c. Copies of sample nameplates
- d. Lists of special and standard maintenance tools
- e. List of recommended spare parts

## 14. Table 1: Warehouse Identification Table

Warehouse Number	Asset Suite Catalog	Auto Reset Value	Minimum Conductor Range (in.)	Inrush Restraint	Communication Enabled
032-82528	82528	3 Amps	0.375 – 1.00	Yes	No
032-82529	82529	3 Amps	0.375 – 1.00	Yes	Yes

— End of Specification —



## Appendix

## Appendix 1: Table of Compliance

Criteria	Description	Pass/Fail (P / F)	Comments
Specification	The Proponent complies with the corresponding specification document (4350.007).		
Industry Standards	The Proponent complies with the industry standards established in the specification document.		
Technical Information	Tech. info., tests & drawings provided.		
Material and Make-Up	Materials for the FCI must withstand the environmental and operating conditions as defined in ANSI/IEEE Std. 495.		
	Compatible with bare or non-shielded insulated conductors.		
Current Sensor	The current sensor portion of the FCI must be capable of being installed on an energized cable or wire.		
	LUMA prefers that FCI be self-powered without the need of external power supplies or photocells. Batteries are acceptable.		
	The FCI unit must be able to automatically select the current trip value based on sampled load current or load tracking method.		
	FCI must automatically reset after the specified minimum current of at least 3 amps.		
	The FCI must have capability for inrush restraint.		
Integral Targets	The target must be mounted as part of the current sensor portion of the FCI.		
	<ul style="list-style-type: none"> <li>For non-communication enabled units, The target shall be LEDs to enhance the indication visibility.</li> <li>For communication enabled units, the target could be made of mechanical-colored flags or LEDs.</li> </ul>		
	The target should display the following colors depending on the device condition: <ul style="list-style-type: none"> <li>Permanent fault condition: Red</li> <li>Momentary fault condition: Yellow</li> </ul>		
Counters	LUMA prefers that the FCI unit has the capacity to display a counter of the quantity of faults.		
Environmental Conditions	Comply with requirements regarding temperature and humidity, wind conditions, and pollution.		
Communication	The FCI System shall allow for DNP 3.0 SCADA communications via a communication gateway.		
	Up to 150 FCI can communicate with 1 gateway via 10-mile line of site protocol.		
	The DNP 3.0 mapping for SCADA shall include the requested features as per Section 8.6.e.		
	The communication module must accept radial/serial Ethernet-based radios, cellular, or fiberoptic interface.		

**NOTE: This table is only a checklist for reference. The compliance shall be with the complete document. Marking a PASS in the table won't be accepted as a compliance without the technical information required to certify it.**










# 4350.007 OH FCI Intelligent and Automatic Reset Type (10-1-2024)

Final Audit Report

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