



NOJA Power OSM-40.5kV Recloser

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Section 1 Scope

This specification covers the minimum requirements for an electronically controlled, solid dielectric insulation and vacuum interruption recloser with fault isolation and system restoration for use on mesh network sub-transmission system up to 40.5kV. The three phase recloser shall consist of a single three phase unit with a central recloser controller and communication cabinet.

Section 2 General

- 2.1 The recloser shall be three phase, outdoor, and shall be manufactured to meet all applicable requirements of the latest IEEE and IEC Standards in Section 3 and suitable for operation under the specified Environmental Conditions in Section 4.
- 2.2 Recloser shall be shipped preassembled at the factory. No field assembly shall be required.
- 2.3 The recloser shall be furnished with terminal lugs, channel bases, and provisions for mounting. All exposed bolts, nuts, washers, pins, etc. shall be stainless steel.
- 2.4 The recloser shall be suitable for mounting on composite, steel, and wooden poles, or substation steel structures (provided by others) with provisions for a 3/0 AWG grounding connector at the base and a top cover with line terminal connector. Grounding terminal pads shall be provided on both sides of the recloser frame.
- 2.5 The recloser insulation system shall be solid dielectric electrical grade aromatic epoxy resin. Polycarbonate insulation is not acceptable. SF6 gas insulation is not acceptable.
- 2.6 There shall be zero solid dielectric insulation material exposed to solar radiation. The insulation system shall be fully encapsulated in stainless steel and silicone rubber.
- 2.7 The insulation bushings shall be of DIN profile, with a plug on silicon rubber bushing boot.
- 2.8 The recloser shall be rated for a 30-year life in an outdoor environment within the operating temperature range. Accelerated aging/salt fog type test reports for the insulator, pollution, and dielectric performance shall be provided by the vendor.
- 2.9 Each recloser shall have sufficient cantilever strength to withstand sustained hurricane-force wind velocities as defined in Section 4 Environmental Conditions of this specification.
- 2.10 The recloser shall be pole mount site ready with arresters, combined bracket, and auxiliary voltage transformer. The auxiliary voltage transformer shall be equipped with two (2) by three (3) meter (9.8 feet) water block XLPE cable tail kit.
- 2.11 The recloser operating mechanism shall utilize one magnetic actuator per phase, providing a layer of redundancy and increased reliability of operation should a single actuator fail to operate.
- 2.12 The recloser shall be no active electronics in the recloser high voltage tank assembly, to provide increased reliability and resilience against lightning.



- 2.14 The recloser actuator shall be powered by capacitors which are contained in the low voltage control cabinet connected via the control cable, ensuring that all low voltage recloser components are easily serviceable without necessitating a maintenance outage.
- 2.15 The recloser manual trip and lockout handle shall be made of stainless steel. The manual trip and lockout shall be hook-stick operable, and actuation of the manual trip should instigate a mechanical block interlock disabling any remote or local electrical close operations until the handle is reset.
- 2.16 The recloser actuators, linkages and insulation system shall be housed within powder coated 316 grade stainless steel enclosure.
- 2.17 The recloser arrangement shall be of the Dead Tank design.
- 2.18 The recloser assembly tank shall be rated, type tested and certified for arc fault containment and venting to IEC 62271-200 for operator and public safety.
- 2.19 The recloser tank shall provide integral mounting points for surge arrestors. Test reports shall be provided by the vendor verifying electrical grounding performance of these mounting points under lightning impulse conditions.
- 2.20 The recloser shall be supplied with six (6) integral Capacitive Voltage Sensors and three (3) dual core Current Transformers (CTs), capable of reading network voltage to provide protection and automation capabilities.
- 2.21 The recloser controller shall be microprocessor based, with integral RTU, GPS, Wi-Fi and 4G/3G Modem. External Modems are not acceptable.
- 2.22 The recloser shall be capable of peer-to-peer communication to achieve auto change over schemes including source quality monitoring.
- 2.23 The recloser shall support IEC 61499, supporting device interoperability and distributed automation system design.
- 2.24 The recloser shall be capable of operation as a sectionalizer or recloser mode.
- 2.25 The recloser system shall provide DNP3 Secure Authentication V5 to address Cybersecurity requirements. Test reports verifying compliance shall be made available on request to the procurement staff.
- 2.26 The recloser shall be provided with a NOJA Power RC20 recloser controller equipped with GPS, Cellular Comms, Wi-Fi, Gigabit Ethernet and Synchrophasors PMU.
- 2.27 The recloser shall have high voltage electrical terminals shall be equipped with four (4) NEMA pads with a total of six (6) terminal lugs provided for the three phase recloser.
- 2.28 The recloser shall have a total of six (6) Wildlife protectors that shall be provided and designed appropriated for the recloser with UV stable wildlife protectors for both source and load terminals The wildlife protector's electrical ratings shall be validated per testing based upon IEEE Std 1656.
- 2.29 The recloser magnetic actuator and corresponding linkage assembly shall be housed within a high impact, UV stable, air insulated, poly-carbonate enclosure. A contact



position indicator and housing designed with air vent. Lifting provisions shall be provided for each mechanism assembly.

- 2.30 The recloser shall be supplied with one (1) mechanically protected control cable with the following requirements:
 - 2.30.1. Weather tight environmental connectors on both ends that mate with the corresponding recloser mechanism and the control to allow easy and quick connection of the cables.
 - 2.30.2. Cable length shall be a minimum of 22.9 feet (7.0 meters) and contain a protective armor jacket.
- 2.31 The recloser manufacturer shall have at least fifteen (15) years of experience in manufacturing solid dielectric reclosers.
- 2.32 The recloser manufacturer of the recloser shall be completely and solely responsible for the performance of the recloser as well as the complete integrated assembly as rated.
- 2.33 The recloser manufacturer shall furnish certification of ratings of the reclosers upon request.
- 2.34 Each recloser shall be provided with a nameplate label. Ratings and information listed on nameplate shall indicate the following:
 - a) Manufacturer's Name
 - b) Catalog Number
 - c) Date of Manufacturer
 - d) Serial Number
 - e) Rated Voltage (Maximum)
 - f) Impulse Level (BIL)
 - g) Continuous Current RMS
 - h) Interrupting current RMS

Section 3 Standards

- 3.1 The recloser shall comply with requirements of the applicable industry standards that include the following minimum requirements:
 - 3.1.1. IEEE C37.60-2018 / IEC 62271-111:2019 Automatic circuit reclosers and fault interrupters for alternating current systems up to 38 kV
 - 3.1.2. IEEE C37.04-2018 IEEE Standard for Ratings and Requirements for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1000 V
 - 3.1.3. IEEE C37.06-2009 IEEE Standard for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis - Preferred Ratings and Related Required Capabilities for Voltages Above 1000 V



- 3.1.4. IEEE C37.09-2018 IEEE Standard Test Procedures for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1000 V
- 3.1.5. IEC 62217: 2012 Polymeric HV insulators for indoor and outdoor use - General definitions, test methods and acceptance criteria
- 3.1.6. IEEE C37.90.1-2012 IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
- 3.1.7. IEEE C37.90.2-2004 IEEE Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
- 3.1.8. IEEE C37.90.3-2001 IEEE Standard Electrostatic Discharge Tests for Protective Relays
- 3.1.9. IEEE Std 1656-2010, IEEE Guide for Testing the Electrical, Mechanical, and Durability Performance of Wildlife Protective Devices on Overhead Power Distribution Systems Rated up to 38 kV
- 3.1.10. IEEE 693-2018, IEEE Recommended Practice for Seismic Design of Substations
- 3.1.11. IEC 62271-111-2021, High-voltage switchgear, and control gear – Part 111: Overhead, pad-mounted, dry vault and submersible automatic circuit reclosers and fault interrupters for alternating current systems up to 38kV
- 3.1.12. IEC 62271-200-2021, High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
- 3.1.13. IEC 61499-2012, Function blocks – Part 1: Architecture
- 3.1.14. The recloser manufacturer shall be ISO 9001, ISO 14001, 45001 and 50001 certified.

Section 4 Environmental Conditions

- 4.1 Temperature and Humidity: Recloser supplied shall be adequate for an operating temperature range of 5°C to 40°C (41°F to 104°F), with humidity up to 100%.
- 4.2 Wind conditions: The recloser shall be designed and constructed to withstand sustained hurricane-force wind velocities up to 160 mph (257.5 km/h) with an overload factor of 1.1.
- 4.3 Pollution: The recloser shall be designed and constructed for the corrosive environment of an outdoor substation in a tropical zone close to sea or exposed strong sea winds and shall provide reliable performance in environments with high exposure to salt, minerals, chemicals, or wind-borne particulate.
- 4.4 Seismic: Recloser, including its support structure shall maintain its structural integrity due to seismic events at LUMA Energy project specific site locations, identified as “High” per the IEEE Std 693 standard definition. The vendor shall provide test certificates showing



that a recloser of equal, or similar, type and rating has been shake-table tested in accordance with IEEE Std 693.

Section 5 Recloser and Controller Electrical Ratings

- 5.1 The recloser shall contain the following electrical ratings and characteristics as listed in Table 1.

Table 1. Recloser Electrical Ratings

Description	Rating
Nominal Voltage Class (kV)	38
Maximum Rated Voltage (kV)	40.5
Power Frequency (Hz)	60
Impulse Level (BIL) Voltage, kV – Phase to Phase and Phase to Ground	200
Impulse Level (BIL) Voltage, kV – Across the Interrupter	170
60Hz Withstand Voltage, kV RMS, One Minute (dry)	70
Continuous Load Current (A)	800
Interrupting Current, kA rms Symmetrical	16
Making Current: Peak, Asymmetrical kA	42
Short Circuit Current, kA Symmetrical, 3 seconds	16
Mechanical Endurance (Operations)	30,000
Operating Temperature	-40°C to +55°C -40°F to 131°F



- 5.2 The recloser electrical ratings and design type testing shall be verified through direct three phase high power testing. No synthetic circuit testing and/or single-phase validation testing shall be allowed.

Section 6 Testing Requirements

- 6.1 Each individual recloser be subject to routine testing according to harmonized standard IEEE C37.60/IEC62271-111 for Reclosers.
- 6.2 The recloser shall be paired with the RC20 recloser controller and validated under the requirements of IEEE C37.60-2018/IEC 62271-111:2019.
- 6.3 Each recloser shall be supplied with a test certificate for its serial number stating the performance of the unit under routine testing in adherence to IEEE C37.60/IEC62271-111 for Reclosers.

Section 7 Packing, Shipping, and Storage

- 7.1 All parts and material shall be protected with wooden crate, properly sized, and fabricated to protect the unit from damage during sea freight transportation and subsequent storage.
- 7.2 Each recloser shall be shipped in its own single wooden crate, which shall be prepared for long-term storage in upright position. Desiccant bags shall be provided to assist in keeping the interior of the wooden crate moisture-free.
- 7.3 Conducting parts, insulators and base must be supplied fully assembled inside wooden crates. Additional materials shall be packed in weatherproof boxes and identified with weatherproof labels.
- 7.4 All materials, elements, parts, and hardware wooden crates shall be shipped in Conex boxes for transference from shore-to-ship and ship-to-shore for transportation on truck 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.
- 7.5 A copy of each detailed packing list must be sent to LUMA Energy personnel in charge of the requisition, prior to the delivery.

– End of Specification –

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