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| | Document Title: 38kV - 40.5kV Three Phase Line Recloser System | |
| | Document Type: Equipment Specification | Document No.: 4752.334 |
| Department: Transmission Engineering | Version: 01 | Effective Date: Sep 16, 2023 |

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## Version History

| Version Number | Issue Date | Revision Comments |
|---|---|---|
| **01** | **9/12/2023** | **First Issue** |
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1. GENERAL

**1.1 Description**

This specification covers the requirements for an electronically controlled, three-phase automatic circuit recloser with solid dielectric insulation and vacuum interruption for electrical distribution systems up to 40.5kV.

QUALITY ASSURANCE

1.1.1 Manufacturer qualifications: The chosen manufacturer shall have at least 15 years of experience in manufacturing solid dielectric reclosers. The manufacturer of the recloser shall be completely and solely responsible for the performance of the recloser(s) as well as the complete integrated assembly as rated.

1.1.2 The manufacturer shall furnish certification of ratings of the recloser(s) upon request.

1.1.3 The recloser shall comply with requirements of the latest revisions of applicable industry standards, including:

a) IEEE C37.60/ IEC 62271-111

b) IEC 62271-1

c) IEC 62271-200

1.1.4 The recloser manufacturer shall be ISO 9001, 14001, 45001 and 50001 certified.

**1.2 DELIVERY, STORAGE AND HANDLING**

1.2.1 Reclosers shall be shipped preassembled at the factory. No field assembly shall be required.

1.2.2 The contractor, if applicable, shall handle, transfer, and move the reclosers in accordance with the manufacturer's recommendations.

2 PRODUCT

2.1 RECLOSER CONFIGURATION

The Recloser Configuration shall be pole mount site ready with lightning arresters, combined bracket, and auxiliary 120 VAC voltage transformer with hardware for mounting on galvanized steel frame, and recloser controller.

**2.2 RECLOSER CONSTRUCTION**

2.2.1 Operating Mechanism

2.2.2 The 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.

There shall be no active electronics in the recloser high voltage tank assembly, to provide increased reliability and resilience against lightning.

The actuator shall be powered by capacitors which are contained in the Low Voltage (LV) control cabinet connected via the control cable, ensuring that all LV recloser components are easily serviceable without necessitating a maintenance outage.

The 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.

The operating temperature range shall be -40 °C to +55 °C.

2.2.3 High Voltage Insulation

The insulation system shall be solid dielectric electrical grade aromatic epoxy resin. Polycarbonate insulation is not acceptable. SF6 gas insulation is not acceptable.

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.

The insulation bushings shall be of DIN profile, with a plug on silicon rubber bushing boot.

The product 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.

2.2.4 Mechanism Enclosure

The actuators, linkages and insulation system shall be housed within powder coated 304 or 316 grade stainless steel enclosure.

The switchgear arrangement shall be of the Dead Tank design.

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.

The Recloser tank shall provide integral mounting points for surge arrestors. Test reports shall be provided by the vendor verifying electrical earthing performance of these mounting points under lightning impulse conditions.

2.2.5 Smart Grid / Automation

The Recloser shall be supplied with 6 X integral Capacitive Voltage Sensors and 3 X dual core Current Transformers (CTs), capable of reading network voltage to provide protection and automation capabilities.

The Recloser Controller must be Microprocessor based, with integral RTU, GPS, Wi-Fi and 4G/3G Modem. External Modems are not acceptable.

The Recloser shall be capable of Peer-to-Peer communication to achieve Auto Change Over Schemes including source quality monitoring.

The Recloser shall support IEC 61499, supporting device interoperability and distributed automation system design.

The Recloser shall be capable of operation as a Sectionalizer or Recloser mode.

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.

2.2.6 Electronic Control

The Recloser System shall be provided with a controller environmentally protected protection, control and automation cubicle with GPS, Cellular Comms, Wi-Fi, Gigabit Ethernet and Synchrophasors PMU

**2.3 DESIGN RATINGS**

2.3.1 Reclosers

The recloser shall be able to withstand 160mph, Category 5 hurricane winds and electrically rated according to IEEE/IEC Standards as listed in TABLE 1.

TABLE 1. Electrical Requirements

| **RATINGS** | **Type I** | **Type II** |
|---|---|---|
| Maximum Design Voltage, kV | 40.5 | 40.5 |
| Impulse Level (BIL) Voltage, kV – Phase-to-Phase and Phase-to-Ground | 200 | 200 |
| Impulse Level (BIL) Voltage, kV – Across the Interrupter | 170 | 170 |
| Continuous Load Current | 800 | 1200 |
| 60 Hz Withstand, kV RMS, One Minute (dry) | 70 | 70 |
| Interrupting Current, kA rms Symmetrical | 16 | 29 |
| Making Current: Peak, Asymmetrical kA | 42 | 63 |

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|---|---|---|
| Short Circuit Current, kA Symmetrical, 3 seconds | 16 | 29 |
| Mechanical Endurance, operation | 30,000 | 30,000 |
| Fault Break Capacity Operations | 140 | 140 |

**2.4 CABLE BUSHINGS**

Cable Bushings shall be removable silicone insulators over a DIN bushing interface.

**2.5 FACTORY PRODUCTION TESTS**

Each individual recloser be subject to routine testing according to harmonized standard IEEE C37.60/IEC62271-111 for Reclosers. Each unit shall be supplied with a test certificate for its serial number stating the performance of the unit under routine testing.

**2.6 STANDARD COMPONENTS**

The following shall be included as standard:

- Galvanized steel pole mount center bracket
- 316 Grade Stainless steel mechanism and insulation system enclosure powder coated
- 7 m long Mechanically Protected Control Cable
- Stainless Steel fasteners
- Lifting provisions
- Grounding provisions
- Stainless Steel Nameplates
- Manual Open and Lockout handle
- Dead Tank Solid Dielectric Epoxy modules with 6 internal voltage sensors and 3 CTs
- Control Cable
- Recloser Control Cubicle
- Silicone Insulators
- Provision for Lightning arrestors
- Protection, Control and Automation Cubicle with DNP3, IEC61850 and IEC 60870-1-101/104 SCADA Communications

Accessories

The following accessories shall be supplied with the recloser:

NEMA 2-hole aerial Lug

Tunnel Connector Lug

2 X 3 m Water Block XLPE Cable Tail kit for Auxiliary Voltage Transformer

Auxiliary Voltage Transformer Auxiliary Supply Cable with Mechanically Protective Conduit

Recloser controller 48 VDC Power Supply input

6 X 3 m Water Block XLPE Cable Tails, one end NEMA Aerial Lugged

Dual AC/DC Auxiliary Supply (AUX-0108)

Operations Counter

6 X Animal Guards (BGD-02 for Tunnel Connectors, BGD-06 for 2 Hole NEMA Palms)

Interior Light and Door Switch Accessory for the RC Controller

Door Switch wired to the Digital Inputs on the Control Relay

Set of 6 X Bimetal Parallel Groove Clamps

IO Module with 8 X Input and 8 X Output for copper wire-based binary signalling and control

Extended Warranty to 60 months

**2.7 LABELING**

2.7.1 Nameplates, rating labels and connection diagrams

Each recloser shall be provided with a nameplate label indicating the manufacturer's name, catalog number, date of manufacture, serial number, and ratings. Ratings listed on the nameplate shall indicate the following: Voltage rating, BIL, continuous current and interrupting current. The nameplate shall be made of stainless steel, engraved letters and designed to withstand weather conditions and last the life of the recloser.

— End of Specification —

# 4752.334 V1 38kV- 40.5kV Three Phase Line Recloser

Final Audit Report 2023-09-17

| | |
|---|---|
| Created: | 2023-09-15 |
| By: | Rosalee Rodriguez (rosalee.rodriguez@lumapr.com) |
| Status: | Signed |
| Transaction ID: | CBJCHBCAABAA9vzRTiBOv_QYx4V6GycvRWAb8zENltyD |

## "4752.334 V1 38kV- 40.5kV Three Phase Line Recloser" History

Document created by Rosalee Rodriguez (rosalee.rodriguez@lumapr.com)
2023-09-15 - 5:59:07 PM GMT

Document emailed to jeffrey.mcelray@lumapr.com for signature
2023-09-15 - 6:00:25 PM GMT

Email viewed by jeffrey.mcelray@lumapr.com
2023-09-15 - 6:07:50 PM GMT

Signer jeffrey.mcelray@lumapr.com entered name at signing as Jeff McElray
2023-09-15 - 6:08:22 PM GMT

Document e-signed by Jeff McElray (jeffrey.mcelray@lumapr.com)
Signature Date: 2023-09-15 - 6:08:24 PM GMT - Time Source: server

Document emailed to Juan Carlos Miranda (juanc.miranda@lumapr.com) for signature
2023-09-15 - 6:08:25 PM GMT

Email viewed by Juan Carlos Miranda (juanc.miranda@lumapr.com)
2023-09-15 - 6:10:18 PM GMT

Document e-signed by Juan Carlos Miranda (juanc.miranda@lumapr.com)
Signature Date: 2023-09-15 - 6:10:39 PM GMT - Time Source: server

Document emailed to oscar.venegas@lumapr.com for signature
2023-09-15 - 6:10:40 PM GMT

Email viewed by oscar.venegas@lumapr.com
2023-09-15 - 6:17:09 PM GMT

Signer oscar.venegas@lumapr.com entered name at signing as Oscar E Venegas

2023-09-16 - 8:25:34 PM GMT

Document e-signed by Oscar E Venegas (oscar.venegas@lumapr.com)

Signature Date: 2023-09-16 - 8:25:36 PM GMT - Time Source: server- Signature captured from device with phone number XXXXXXX2079

Document emailed to Frank Frentzas (frank.frentzas@lumapr.com) for signature

2023-09-16 - 8:25:37 PM GMT

Email viewed by Frank Frentzas (frank.frentzas@lumapr.com)

2023-09-17 - 2:17:55 AM GMT

Document e-signed by Frank Frentzas (frank.frentzas@lumapr.com)

Signature Date: 2023-09-17 - 2:18:16 AM GMT - Time Source: server

Agreement completed.

2023-09-17 - 2:18:16 AM GMT