AUSTIN ENERGY PURCHASE

SPECIFICATION FOR

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RECLOSER: FAULT-INTERRUPTING SYSTEM, 3PH, ELECTRONIC, DIST, OH, 800A

1. History chart

Prepared By	Issuance/Revision	Approved By	Date Approved
Cruz Lara	New Fault-interrupting system Specification	Josh Contreras, Kevin Chandra, Troy Hocker	4-30-2024

REASON FOR REVISION	AFFECTED PARAGRAPHS
New Spec	

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein. Retain for future reference.

1.0 SCOPE AND CLASSIFICATION

1.1 Scope

This specification applies to 3 phase distribution circuit Fault-interrupting system with a rated maximum voltage of 15kV, a continuous operating current up to 800A and a 16 kA symmetrical interrupting rating. The fault-interrupting system shall be an outdoor, three-pole device incorporating vacuum fault interrupters, individually operated by magnetic latching actuators, an integral power module(s), an integral protection and control module, an integral communication module, and integral sensors. All metallic housing components shall be stainless steel or corrosion-resistant non-painted materials, and all components shall be mounted on a unitized stainless steel base.

1.2

This The Fault-interrupting system will be installed on a 12.47 kV wye configured, 3 phase, 4 wire, and solidly grounded neutral circuit distribution system. The Fault-interrupting system will be installed below an altitude of 1000 meters. The Fault-interrupting system shall have an operating temperature range of -40 ºC to +70 ºC.

2.0 APPLICABLE STANDARDS

2.1 The equipment supplied in accordance with this specification shall comply with the applicable provisions of the latest IEEE and ANSI, RUS, and IEC standards relating to Fault-interrupting system. In case of any conflict between any of the standards mentioned in this specification and the contents of this document, AE's specification shall govern. The applicable standards include, but are not limited to, the following:

2.2 ANSI/IEEE C37.60 use the latest revision American National Standards Requirements for Overhead, Pad Mounted, Dry Vault, and Submersible Automatic Circuit Fault-interrupting system and Fault Interrupters for AC Systems.

2.3 ANSI C37.61/IEEE Std 321 use latest revision IEEE Standard Guide for the Application, Operation, and Maintenance of Automatic Circuit Fault-interrupting system.

2.4 The Fault-interrupting system manufacturer must be ISO-9001-latest revision certified.

3.0 FUNCTIONAL REQUIREMENTS

The Fault-interrupting system shall consist of three separate single-phase Fault-interrupting modules suitable for pole or substation applications for use on distribution systems. This Fault-interrupting system solution shall allow three modes of operation for maximum overcurrent protection flexibility (single-phase trip, single-phase lockout; three-phase trip, three-phase lockout, Single phase trip three- phase lock out).

The Fault-interrupting system shall have the ability to be operated remotely via cellular control or fiber if required. The Fault-interrupting system shall have a programmable electronic controller that allows the operating characteristics to be changed without de-energizing the Fault-interrupting system. The Fault-interrupting system shall have the ability to operate as a Fault-interrupting system, a Sectionalizer, or a switch without requiring additional/different hardware or software. Each operating mode must be activated by remote connection through interface software, or SCADA activation.

The integral power modules(s) shall provide all control power for the fault-interrupting system in standalone (Non-communicating) applications. No batteries shall be require (but AC line must be available) for basic operation other than for communication modules, but ac line voltage must be available to the integral power module(s).

The unitized base shall be furnished with a single-point lifting means to facilitate installation.

The unitized base shall include provisions for mounting and grounding three surge arresters on each side. No additional grounding connections shall be required for the surge arresters.

Polymer-housed metal-oxide surge arrestors shall be factory-installed and wired on both sides of the fault-interrupting system. AE approved arresters…

Eaton catalog number UHS10050A1A1A1A
Eaton catalog number URT10050A1A1A1A
Ohio Brass catalog number 213709-7214

Lifting Lugs Shall be provided in accordance with IEEE C37.60

Appropriate venting shall be provided to prevent gas and moisture buildup within the unitized base. Vents and seals shall prevent insects, dust, wind-driven rain, and fluid from pressure-washing from entering the base, protection and control module, and communication module.

The fault-interrupting system shall be furnished in the disconnect style, in the upright-crossarm mounting configuration, with two phases on one side of the pole and one phase on the other side of the pole. The integral three-pole group-operated disconnect shall provide a visible air gap and can be operated with a hot stick from below the unit. It shall be interlocked to permit operation only when the fault interrupters are open. The disconnect shall be capable of the full load-current capacity of 900 amps continuous and the fault-current capability of the unit. The disconnect shall include:
(1) Wiping contacts to prevent operational difficulties arising from corrosion or frost
(2) Bearings
(3) Low-resistance contacts indicating the open and closed positions of the disconnect

The control power shall be derived from an integral power module fed from one phase on one side of the fault-interrupting system.
or
The control power shall be derived from two integral power modules, each fed from a different phase on both sides of the fault-interrupting system.

The fault-interrupting system shall be capable of being opened without control power from any source.

Wildlife protection shall be furnished for the fault-interrupting system to reduce wild-life-related nuisance outages.

The manufacturer shall supply all internal wiring for the fault-interrupting system.

4.0 PERFORMANCE REQUIREMENTS

4.1 Ratings

4.1.1	Nominal System Voltage (kV, RMS)	12.47 kV
4.1.2	Rated Maximum Voltage (kV, RMS)	15.5 kV
4.1.3	Interrupting Current (kA, RMS, Symmetrical)	16kA
4.1.4	Nominal Continuous Current (A, RMS)	800A
4.1.5	Frequency (Hz)	60 Hz
4.1.6	Number of Phases	3
4.1.7	Basic Insulation Level (BIL, kV)	110 kV
4.1.8	Power Frequency Withstand –Dry (kV)	50 kV for 1 minute
4.1.9	Power Frequency Withstand –Wet (kV)	45 kV for 10 seconds
4.1.10	Arc Extinction Medium	Vacuum
4.1.11	Insulating Medium	Solid dielectric
4.1.12	Mechanical Operations (Open-Close)	10,000 minimum

5.0 Fault Interrupters

Each fault interrupter shall be furnished with a magnetic latching actuator providing a Close-Open (pulse) of 2 milliseconds or less.

The fault-interrupter housing shall be molded from cycloaliphatic epoxy resin.

The fault interrupter and actuator shall have been tested and rated for at least 10,000 mechanical close-open operations.

A color-coded Open/Close indicator shall be provided for each fault interrupter, on the underside of the unitized base, that indicates green for open and red for closed. The indicator shall be readily visible from the ground.

Mechanical loading from jumpers to the fault-interrupter terminal pads shall not exceed 90 lbs. (40.8 kg) in-line, and 30 lbs. (13.6 kg) perpendicular to the terminal pads, per IEEE Standard ANSI C37.32-1996 Section 8.8.2.2

5.1 MAGNETIC LATCHING ACTUATORS, OPERATING MECHANISM, AND EXTERNAL CONTROL LEVERS

The magnetic latching actuators shall be capable of electrically opening and reclosing the fault interrupters as well as performing circuit testing using PulseClosing® Technology.

The actuator shall use direct-drive magnetic actuation or solenoid actuation. No solenoid shall remain energized when either in the Open or Closed position.

Circuit testing using PulseClosing Technology shall rapidly close and open the interrupters to produce a current pulse of 2- to 8-millisecond duration. Detection algorithms shall analyze the current pulse to determine whether a fault is present. The fault-interrupting system shall not close if the fault is still present.

The operating mechanism shall provide three-phase tripping of the vacuum interrupters and three-phase lockout. The unit shall be configurable to allow single-phase or three phase operation.

An external OPEN/CLOSE/READY lever shall be provided, allowing manual three-phase tripping of the vacuum interrupters using a standard or extendible hookstick. Control power shall not be required.

When the interrupters have been tripped by means of the OPEN/CLOSE/READY lever, electrical closing of the interrupters by the magnetic latching actuators shall be mechanically blocked until the lever is returned to its Ready position. The OPEN/CLOSE/READY lever shall have provision for tagging or locking in the Open position.

The magnetic latching actuators shall be electrically interlocked with the integral disconnect, when furnished, such that the magnetic actuators can only be operated when the disconnect is in the fully open or fully closed position. The disconnect shall be mechanically interlocked such that it can only be operated when the fault interrupters are open.

An external lever shall be provided to allow manual application of a hot line tag to mechanically prevent reclosing functions and allow quick-trip operation while hot-line work is being performed. The lever shall have a provision for tagging or locking in the hot line tag active position. It shall only be possible to remove a manually applied hot line tag using this lever. If the lever is operated to give a second “remove” command, it shall also remove a hot line tag applied by a SCADA or secure Wi-Fi command.

The unit shall incorporate a ground-defeat mechanism, mechanically and electronically, to allow defeat of the ground relay during paralleling operations.

5.2 Control and Communication

A control group, consisting of a protection and control module and a communication module, shall be located in the base of the fault-interrupting system. The modules shall be removable while the unit is energized with a module-handling fitting attached to a standard 8-foot (244-cm) hookstick.

The communication module shall communicate, via a secure Wi-Fi connection, to a user-furnished laptop computer within range. Required configuration software shall be provided with the fault-interrupting system. The unit shall not transmit a Wi-Fi signal until an encrypted wake-up message is sent by the securely recognized laptop. All wireless communications shall be adequately encrypted with user-definable encryption keys and be password protected for security purposes. The control program shall permit the selection of local or remote operation. It shall also indicate the Open/Closed position of each fault interrupter, phase voltages and currents, the reason for a phase trip, etc. When local operation has been selected, the control program shall command local electrical opening and closing of the fault interrupters.

The primary means of communication to the Fault-interrupting system to provide SCADA information transportation shall be via Sierra Wireless GX450 radio, antenna, suppressor, and coax cables (or Standards Engineer approved equal). Sierra Wireless GX450 devices shall be provided by others.

BELOW is the detail for the part number for antenna, suppressor and coax cables.

No.	Description	Manufacturer	Part Number
1	Antenna	Embedded Antenna Design	FCMO35303-SMSM-2K
2	Suppressor	Terrawave	TW-LP-RPSMA-P-BHJ
3	Coax cable	Embedded Antenna Design	RG58-SF-SM-1M

Trip curves shall be permanently resident in control memory, even upon loss of all ac or dc power. Trip curves shall be selectable from a library of industry-standard recloser time-current characteristic curves.

The control program shall provide a minimum of four protection profiles, a hot line tag protection profile, and two closing profiles. The closing profiles shall close without testing and shall persist for a user-determined time. The transition from the active protection profile to a new protection profile shall be displayed. The transition between protection profiles shall not be limited.

The control program shall feature selectable programming for a minimum of four cycles for recloser control (i.e. three openings) with separate and different programmable timing for each cycle.

The control program shall indicate the position of the integral disconnect.

The communication module shall include an integrated Global Positioning System clock for 1 millisecond accurate event time-stamping of events.

A status light on the protection and control module shall provide local indication of normal operation, Wi-Fi connection and disconnection, and loss of control voltage. The status light shall also provide local indication that the OPEN/CLOSE/READY lever has been moved from the

Ready position to the Open position, from the Open position to the Ready position, and from the Ready position to the Closed position.

A hot line tag light on the protection and control module shall provide local indication of hot line tag application or removal.

The communication module shall include provision to mount a Sierra Wireless RV55 radio and include 2 compatible antennas.

4.11 A non-volatile memory module installed in the unitized base shall back up configuration data and site-specific information such as the device identifier, sensor-calibration data, and operation counter reading. If the protection and control module is replaced, site-specific information shall be loaded in the new module, and as an option the module shall be fully configured automatically upon insertion in the base. Sensor-calibration data and the operation counter reading shall not change when new set points are loaded in the memory module.

The standard control group with battery backup shall provide wide-area network capability for SCADA applications when furnished with a suitable radio. User-replaceable batteries in the communication module shall support operation for a minimum of 72 hours after loss of ac line voltage on both sides of the fault-interrupting system, permitting extended dead-line switching and SCADA communication.

The control shall include the following protection and control elements:
(a) Simultaneous independent directional phase, ground, and negative-sequence time-overcurrent elements
(b) Simultaneous independent directional phase, ground, and negative-sequence instantaneous-overcurrent elements
(c) Simultaneous independent directional phase, ground, and negative-sequence definite-time elements
(d) Directional blocking overcurrent elements
(e) Intelligent fuse-saving overcurrent elements
(f) Overvoltage/undervoltage elements
The protection and control elements shall enable sequence coordination, phase-unbalance detection, and synchronization check functions, and include a cold-load pickup modifier

5.3 CONTROL CABLE

If applicable - The Fault-interrupting system is to be supplied with a UV protected armored cable at a minimum length of 50 feet. The receptacle panel on the bottom of the integrated junction box shall use twist lock receptacle interface for each Fault-interrupting system junction box cable, and for the main 32, 37, and 42-pin control cable to the control.

The connector must meet all interoperability requirements and performance specifications for MIL-DTL-38999 class W, excluding EMI specifications.

The control cable must include a 32, 37, or 42 pin receptacle on end connecting to controller cabinet base. The cable must have weatherproof connectors for controller base.

5.4 Sensors

Voltage and current sensors shall be integrally molded into the fault-interrupter housings.

The sensors shall provide three-phase monitoring of line current and three-phase monitoring of system line voltage on both sides of the fault-interrupting system.

Total system voltage sensing accuracy shall be within ±0.5% across the tested temperature range of -40°C (-40°F) to +50°C (+122°F).

Total system current-sensing accuracy shall be within ±0.5% for metering up to 800 amps and ±2% across the full fault-detection range up to 24.8-kA asymmetrical interrupting and across the tested temperature range of -40°C (-40°F) to +50°C (+122°F).

6.0 TRAINING, & TESTING REQUIREMENTS

6.1 The Fault-interrupting system shall be tested in accordance with ANSI/ IEEE C37.60, section 7, before shipment

6.2 Comprehensive training shall be provided for field and engineering personnel including maintenance, repair, operation functions, and technical training for engineers covering the operation of the Fault-interrupting system and software programming. All training shall be provided at no cost to AE. A sample(s) for test and evaluation is required at no cost to AE for each Fault-interrupting system submitted for approval.

8.0 EQUIPMENT I D E N T I F I C A T I O N

Each Fault-interrupting system shall have an attached nameplate containing, as a minimum, the following information:

Manufacturers' Name:
Manufacturers' Model Number:
Manufacturers' Serial Number:
Control Voltage in Volts:
Date of Manufacturing:
Fault-interrupting system Maximum Rated kV:
Maximum Interrupting Rating:

9.0 SERVICE, MAINTENANCE AND RELIABILITY

9.1 No field calibration shall be required to maintain the accuracy of the Fault-interrupting system switch.

9.2 All manufacturers furnishing distribution Fault-interrupting systems under these specifications shall have at least ten (15) years' experience in the manufacture and sale of distribution Fault-interrupting systems.

9.3 The manufacturer shall notify Austin Energy of any software and firmware upgrades and provide upgrades to Austin Energy free of charge for the life of the product.

9.4 If any defect in the equipment supplied within 2 years, the Vendor shall be notified. The Vendor shall thereupon correct without delay and at Vendor's own expense by repairing the defective part or parts, by supplying a non-defective replacement or replacements, and/or by correcting a deficient design as required.

9.5 Shall come with a 10 year Warranty