

**AUSTIN ENERGY PURCHASE**

**SPECIFICATION FOR**

**RECLOSER, 3PH, ELECTRONIC,  
 DISTRIBUTION TYPE, OH, 800 -  
 1200A**

**1. History chart**

<b>Prepared By</b>	<b>Issuance/Revision</b>	<b>Approved By</b>	<b>Date Approved</b>
Obaid Rehman	New Recloser Specification	Julius Heslop	12/13/2018
Julius Heslop	Revision 1		3/27/2020
Troy Hocker	Revision 2	Josh Contreras	8/22/2022
Julius Heslop	Rev 3	Julius Heslop	7/29/2023

<b>REASON FOR REVISION</b>	<b>AFFECTED PARAGRAPHS</b>
3/27/2020: Control and Power cables to be specified at 50' in lieu of 30'. Connection on bottom of SEL control cabinet needs the cover option. SEL part number change: Provide accessory options for the SEL control cabinet, radio mounting plate. Austin Energy uses the Sierra GX450 radio. 32 pin control cable instead of 24 pin	5.5, 5.6 6.1.7 6.4.1
8/22/22: Extended amperage range from 800A to 1200A, expanded operated temp range, adding manual operating handle under the sleet hood, integrated voltage sensors, supplied with a UV Protected armored cable minimum 50 feet. Specs for 12V/24Ahr, Role based Access control shall be supported by the control,	1.1, 3.0, All of Section 5 6.1.2,6.1.3,6.5.2,6.5.11,6.5.13,6.5.15,6.5.17 8, 9
6/23/23 Removal 7/28/23 IT request of Verizon APN controlled breaker to be disabled.	5.2.5 & 6.5.1 6.4.1 & 6.5.15

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein.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 Recloser with rated maximum voltage of 15kV, a continuous operating current of at least 800A and up to 1200A, and a minimum 12.5 kA symmetrical interrupting rating. The Recloser is designed for distribution pole mounted installations. The Recloser will be utilized to improve system coordination, reduce momentary outages, improve reliability, and simultaneously isolate permanent faults. All the unit's protection and metering functions shall be electronically controlled.

### 1.2 Classification

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

## 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 Recloser. In case of any conflict between any of the standards mentioned in this specification and the contents of this document, Austin Energy'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 Recloser 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 Recloser.
  - 2.4 The Recloser manufacturer must be ISO-9001-latest revision certified.

## 3.0 FUNCTIONAL REQUIREMENTS

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

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

## 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)	12.5kA
4.1.4	Nominal Continuous Current (A, RMS)	800A – 1200A
4.1.5	Frequency (Hz)	60 Hz
4.1.6	Number of Phases	3

4.1.7	Basic Insulation Level (BIL, kV)	125 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
4.1.13	Weight of Recloser	300 lbs. Maximum

## 5.0 ACCESSORIES AND ADDITIONAL REQUIREMENTS

### 5.1 Construction

- 5.1.1. A manual operating handle shall be provided under the sleet hood.

Recloser shall be equipped with a mechanical interlock to prevent the recloser from closing when the yellow operating handle is in the down position. This shall be a backup to the electrical lockout function.

Pulling the yellow handle down when in the closed position shall result in a manual opening operation. With the handle in the OPEN position, the recloser is in a “lock-out” position and shall not accept an electrical close signal from the control.

Returning the yellow operating handle to the CLOSED (UP) position shall not close the recloser. The yellow operating handle must be returned to the CLOSED (UP) position for the recloser to respond to a close signal from the control. All close operations shall be initiated by the control.

The tripping lever shall open all three phases simultaneously. The manual tripping lever shall be suitable for operation with a hot-line stick in accordance with IEEE C37.60. The tripping lever shall be yellow in color and be able to provide an indication of the lever’s status both locally and remotely in SCADA.

- 5.1.2. The mechanism cabinet shall be manufactured from painted aluminum or stainless steel. Color shall be ANSI 70 gray.

### 5.2 Mechanism

- 5.2.1. The recloser mechanism shall consist of a single-coil (mono-stable) magnetic actuator capable of fast opening and closing operations with no recharging delay. Operating power is not required to hold the unit open or closed. Capacitors in the associated recloser control shall be used to store the necessary energy for operating the recloser’s magnetic actuator. Spring operated or high voltage solenoid mechanisms are prohibited.
- 5.2.2. The design shall permit multiple open-close operations after the loss of primary control voltage to allow dead line operation. The contractor shall indicate the source of the power of the solenoid operation, either from the controller or battery system. The Recloser assembly shall be supplied with Dead Line operation, which its close and trip power shall be supplied from the controller or batteries.
- 5.2.3. The reclosers shall contain no high voltage closing coils. The recloser shall be capable of operating fully from the actuator operating power supplied by the controller. The control shall be powered from 120 Vac or 240 Vac and from 24 Vdc internal control battery (backup power).
- 5.2.4. Control shall be programmable for three-phase trip / three-phase lockout (electronically ganged) mode; single-phase trip /single-phase lockout mode. The poles of the Recloser shall be modular and independently driven to facilitate maintenance. A motor operated mechanism prohibited.
- 5.2.5. A minimum of 1 set of tools for every one unit ordered shall be supplied, at no additional cost to Austin Energy.

5.2.6. The Recloser must have an external manual bypass.

The bypass switch model must provide a durable, rugged light weight switch for line sectionalizing or isolating equipment on distribution circuits. These Ultra SIL polymer-insulated switches or Austin Energy approved equivalent shall be constructed to ensure stable high current capability and full thermal capacity under the required load and short circuit conditions.

The three-phase bypass switch must incorporate the features of a hook-stick operated single-phase bypass switch into a convenient three-phase solution on a crossarm, single lifting point, 90 degree stop pin, loadbreak hooks.

The switches can be mounted in vertical, underhung, pole-mounted or single/double fiberglass cross arm configurations. A variety of terminal connections and options are available to customize the switch for the user's needs.

5.3 Solid Dielectric Module

1.1.1.1 The solid polymer module shall be highly resistant to ozone, tracking, and ultraviolet rays. A 3<sup>RD</sup> party supplied independent test report shall be included, with delivery. All polymer modules must meet or exceed IEC 60099-4 Level IV creep requirements at 15 kV 125 kV BIL.

5.3.1. The reclosers shall utilize environmentally friendly cycloaliphatic epoxy as the dielectric insulating medium. The use of SF6 gas or oil for insulation or interruption is prohibited. Foam insulation systems are not allowed.

5.3.2. Cycloaliphatic epoxy shall be utilized as the dielectric insulating medium and be highly resistant to ozone, oxygen, moisture, contamination, and ultraviolet light. No coatings or UV protective covers are acceptable. The cycloaliphatic epoxy shall provide a non-brittle, non-flexible and a high resistance to damage as a dielectric insulating medium. The cycloaliphatic epoxy shall provide complete encapsulation of the internal vacuum interrupter. The encapsulation shall also be completely bonded to the source and load side bushing terminals. All insulating material shall meet or exceed IEC 60099-4 Level IV creep requirements

The recloser bushings shall be designed utilizing alternating minor and major skirts to increase creepage distance.

5.4 Vacuum Interrupters

The recloser shall make use of Axial-Magnetic vacuum interrupters to ensure high fault-interrupting capability, provide fast low energy arc interruption and minimize heat generation.

Current interruption shall occur in vacuum interrupters, providing minimum and even contact wear, long life and maximum reliability and quality.

5.5 Current Sensing

Three current transformers shall be provided for protection, instrumentation, metering and shall be capable of accurately monitoring full fault duty and providing accurate oscillographic data up to the full interrupting rating of the unit. The self-shorting current transformers shall be embedded in the Recloser and shall not be damaged or open-circuited by disconnecting the controller from the energized Recloser. CT accuracy shall be  $\pm 1.0\%$ .

5.6 Voltage Sensing

Integrated Voltage Sensors

When specified, each recloser shall include integrated voltage sensors for source and load side voltage sensing.

The source and load side voltage sensor shall utilize a high-voltage resistor. This shall be within each interrupter module for source side connections, and the load side sensor shall be encapsulated in insulation and connected to load side recloser terminal.

The integrated voltage sensors and recloser control system shall support a voltage sensing magnitude accuracy of 2% or better and a phase degree accuracy of  $\pm 1.5^\circ$  over the full rated ambient temperature range of the recloser and control. Accuracy shall apply when the following conditions are met:

1. Over the range of 50% to 100% of the rated maximum voltage of the recloser
2. Ratio of load to source voltage magnitudes is between 0.5 and 2.0, inclusive
3. Phase angle difference between load and source voltages is no greater than 30 degrees
4. The integrated voltage sensing option (source and load) shall be compatible with paired recloser control.
5. The load side voltage sensor shall be available as a field service kit.

## 5.7 Mounting Frame

- 5.7.1 The reclosers shall be provided with a galvanized frame for pole mounting suitable for a site-ready design in accordance with ASTM A123 or ASTM A153 standards. The mounting frame shall have four available mounting locations to allow oil or dry control power transformer mounting.

One mounting frame can be used to accommodate two main site-ready configurations: In-line Parallel, and Tri-Mount Perpendicular. These configurations are defined as below:

1. In-line Parallel: Three single-phase units mounted on the front of the pole frame in a line with the recloser bushings parallel with each other (facing away from the pole).
2. Tri-Mount Perpendicular: One single-phase unit is mounted on the front of the frame, and a single-phase unit is mounted on the left and right side of the frame. The two outside phases (i.e. A-phase and C-phase) are facing 90 degrees away from the center phase (towards the respective right or left side of the frame).

The mounting frame shall have an integrated junction box as part of the frame to allow connection of each recloser phase unit to a central location before combining into a 32, 37, or 42 pin control cable.

The integrated junction box shall be a heater-less design and utilize air vents to prevent moisture collection.

- 5.7.2 Each mounting frame shall be supplied with six (6) Austin Energy approved polymer 10 kV (8.4 kV MCOV) Heavy Duty Surge Arresters as specified. There shall also be an assembled frame for mounting (6) Potential Transformers (PT), (3) on the source side and (3) on the load side. Control power for the controller shall be supplied by source side potential transformers or control power transformer. The voltage transformer shall have solid dielectric bushings which shall be resistant to impact, ozone tracking, and damage from UV light.

- 5.7.3 The six polymers 10 kV (8.4 kV MCOV) Heavy Duty Surge Arresters shall be one of the following arresters listed or equivalent:

5.7.3.1 Eaton catalog number UHS10050A1A1A1A

5.7.3.2 Eaton catalog number URT10050A1A1A1A

5.7.3.3 Ohio Brass catalog number 213709-7214

- 5.7.4 The Recloser and all components shall be mounted and ready to install from the contractor.

- 5.7.5 Lifting lugs shall be provided in accordance with IEEE C37.60.

## 5.8 Control Cable

The Recloser 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 recloser 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.

#### 5.9 Control Power

The Recloser is to be supplied with a UV protected armored cable at a minimum length of 50 feet.

### 6.0 ELECTRONIC CONTROLS

#### 6.1 Cabinet Construction

6.1.1 The control cabinet shall be IP44 NEMA Type 4X enclosure in accordance with NEMA 250 constructed of aluminum or stainless steel. A grounding plate shall be mounted to the interior base of the cabinet connected to a single exterior grounding clamp (suited for 1/0-#14 stranded wire). The enclosure shall be designed and tested to withstand weather conditions associated with the outdoor equipment. The control cabinet shall meet/exceed the requirements of UL 50 and ANSI C57.12.31.

6.1.2 The 12 VDC shall be available via terminal block in control cabinet with one (1) A min. capacity.

6.1.3 The electronic control and communication surge suppressor shall be prewired and mounted suitably in the control cabinet. Any additional modules required to meet the relay functions under Section 6.5.3 shall be prewired and mounted suitably in the control cabinet.

6.1.4 Convenience receptacle rated at 120VAC at 5A capable of powering diagnostic equipment/laptop shall be provided.

6.1.5 Low voltage cabinet shall have current and voltage test switches for secondary current and voltage injection.

6.1.6 The Recloser Control cabinet shall have an access from the ground level.

6.1.7 Connection on the bottom of the control cabinet must have the locking sleeve option

#### 6.2 Electrical Wiring

6.2.1 The Recloser Controller cabinet internal electrical wiring (wire shall be typed SIS or TFE) shall be point-to-point, without splices, tee connections or double lugs. Wiring bundles shall be supported and mounted with cable ties.

6.2.2 The Recloser Control shall have appropriate protection from overvoltage and overcurrent from its various voltage and current inputs as well as from its control power.

#### 6.3 BATTERIES

6.3.1 The Recloser assembly shall be supplied and shipped with DC storage batteries. The batteries shall be of the sealed lead acid type. These batteries shall be of a nominal physical size such that they shall fit in the same Recloser cabinet provided by the supplier. Battery shall be designed for a minimum life expectancy of no less than 5 years. If the battery by the supplier does not meet Austin Energy's performance requirements, Austin Energy reserves the right to require an alternative battery from the supplier at no cost to Austin Energy.

6.3.2 The Supplier will supply safety covers for battery terminals. The battery shall be rated for 12V/24 Ahr. If the voltage on the battery drops below a user defined percentage of nominal voltage, the SCADA master station shall receive an alarm for low battery voltage. Under low battery voltage, the recloser shall not close electronically. The DC power supply shall be sized to power full communications with the SCADA master station, run the radio and the control for at least 72 hours with no presence of AC power (Amstron 12V/24Ahr AGM #2XAP-12220EV).

6.3.3 The battery shall have a quick disconnect connector between the battery and the control. Batteries shall not emit corrosive gases.

#### 6.3.4 Battery Backup

6.3.4.1 The battery shall be charged by a temperature-compensated charging circuit, allowing the battery to charge at an optimal rate, extending battery life.

6.3.4.2 The battery charger shall be an integral component in the control, allowing the battery to be remotely monitored and tested.

6.3.4.3 The battery shall have a programmable, automatic daily load test performed to determine the battery life.

#### 6.4 Communication Hardware

6.4.1 The primary means of communication to the Recloser 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 (The ability to remotely reset the breaker over the Verizon APN must be disabled. Austin Energy is allowed to control the breaker over any other network.).

6.4.2 Following 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

6.4.3 Two suppressors and two coax cable shall be provided for each antenna

#### 6.5 Control Features (Hardware and Software)

6.5.1 The controller for the Recloser switch shall be programmable.

6.5.2 Overcurrent Protection/Time-Current Curves (TCC)

6.5.2.1 The overcurrent protection feature shall allow the user to program the control with TCC curves for each operation selected. (TCC1, TCC2, TCC3, TCC4).

6.5.2.2 Time-current curves shall be available for fast and delayed operations.

6.5.2.3 Each time-current curve shall be selectable from 55 standard recloser curves, which includes IEC, IEEE and SEL curves (U1 thru U5).

6.5.2.4 The time-current curves shall include the following modifications for phase, ground and negative sequence protection (51 P/G/Q):

6.5.2.4.1 Time Multiplier with a range of 0.1 to 25

6.5.2.4.2 Time Adder with a range of 0 to 30 seconds

6.5.2.4.3 Minimum Response Time with a range of 0.01 to 1.0 seconds

6.5.2.4.4 High Current Trip (HCT) with a range of 1 to 32 multiples of minimum trip

6.5.2.4.5 HCT Time Delay with a range of 0.01 to 0.150 second.

6.5.2.4.6 Reset coefficient with a range of 0.000001 to 30.0

6.5.3 Relay functions

- Custom programmable overcurrent protection
- Sequence Coordination/Cold Load Pick-up
- 59N(Three-phase overvoltage)
- Fault Location
- HIZ (High Impedance Fault Detector)
- 50/51/67 P/G/Q (Three-phase directional overcurrent protection)

- 32P/N(Reverse Power)
- 46 (Phase Balance)
- 81(Frequency)
- 27 (Under-voltage)
- 25 (Sync Check)
- 79(Reclose)
- 85 (Transfer Trip capability) – Shall utilize Mirror Bit protocol, which can be accommodated by an SEL 651 R-2.
- SEL 651R-2 shall be provided with an Ethernet port.
- Mirrored bit

- 6.5.4 Complete metering capabilities and the ability to monitor this information remotely in SCADA – phase voltages & currents (including demand currents), sequence voltages & currents, power (including demand), Active power per phase, Reactive power per phase, frequency and energy & power factor, the Recloser control shall report all metered quantities in primary quantities (current in A primary & voltage in kV primary).
- 6.5.5 Flexible control logic and integration
- 6.5.6 Selective load shedding
- 6.5.7 Control logic – control shall include user programmable logic functions for protection, control, and monitoring.
- 6.5.8 Auto-reclosing control – minimum four shot control per IEEE C37.60 and IEEE C37.61
- 6.5.9 Event reporting and sequential events recorder
- 6.5.10 Battery charging and monitoring shall be incorporated into the control which will monitor and report the state of the battery and the battery voltage both locally and remotely in SCADA.
- 6.5.11 The front panel shall be designed for ease of use, clear identification and purpose of function keys, LED indicators, Close, Trip/Lockout and Hot Line Tag.
1. A backlit 7-line x 21-character display shall be provided.
  2. The control programming section shall provide the user LED status indication. Each LED shall be rated for visibility in bright sunlight.
  3. The control shall have a total of fifteen (15) programmable membrane buttons with LEDs available. As a minimum, programmable status LEDs shall include:
    - a. Frequency Trip
    - b. Voltage Trip
    - c. Above Minimum Trip
    - d. Phase Fault (A, B and C)
    - e. Ground Fault
    - f. Recloser Lockout (A, B and C)
    - g. Recloser Open (A, B and C)
    - h. Recloser Closed (A, B and C)
    - i. Alarm
    - j. Control OK
    - k. AC Power
    - l. Battery
    - m. Phase Voltage (A, B and C)



- n. Phase Voltage (X, Y and Z)
- o. User Programmable (1 through 5)
- p. Communication Activity (TX and RX)
- q. Data Ports (PC and USB Drive)

Each option button with integrated option button LEDs shall be programmable

The HMI navigational keys shall include UP, DOWN, LEFT, RIGHT ARROW keys, as well as ENTER, EDIT and ESCAPE keys.

Control shall provide function shortcut keys via the front panel keypad.

Manual TRIP, CLOSE and Hot line tag ON/OFF shall be operated by separate membrane buttons as standard. Hot Line Tag LED shall be clearly visible on front panel.

Hot line tag button shall have a minimum surface area of one square inch (6.45 cm<sup>2</sup>)

A protective guard or bezel shall be installed around the perimeter of the TRIP AND CLOSE membrane buttons to prevent accidental operation.

The TRIP button shall be green, and the CLOSE button shall be red. Alternative contrasting colors shall be made available.

The default front operating panel shall include the following membrane buttons with LED indicators:

1. Ground Trip Blocked
2. A Phase Select
3. B Phase Select
4. C Phase Select
5. Non-Reclosing
6. Supervisory OFF
7. Alternate Profile Select
8. Push Buttons Locked
9. (7) Option Buttons

6.5.12 Communication software shall include DNP 3.0 Level 2 protocol and Modbus protocol. The control must be supplied with messaging according to IEC61850 Type 1, Class P1 for fast tripping purposes. Each Recloser unit shall be individually addressable by any of the above protocols. Control shall be programmed from the front or rear panel using a standard cable such as RJ-45, RX-232 Serial or USB. The control must include an optional LC fiber optic connector.

6.5.13 The control shall support Role-Based Access Control (RBAC) which will allow at least ten local user accounts and passwords to grant appropriate access permissions to authorized personnel.

The control shall maintain an audit log in non-volatile memory. This information will be retrieved using the application software.

An optional door switch alarm shall be available to monitor control cabinet access. A form 'C' dry contact monitors detection of door open/closed and the presence of the switch.

The control shall provide Transport Layer Security (TLS) for communications channel encryption and authentication for SCADA and remote application software connections.

The control shall support Remote Authentication Dial-In User Service (RADIUS) protocol to access centralized Authentication and Authorization information for Role-Based Access Control.

The control firmware shall be digitally signed to verify integrity and authenticity of applied firmware updates.

The control shall support DNP3 Secure Authentication, Version 5 as defined in IEEE Std 1815-2012.

6.5.14 The controller must be Field Re-Programmable. The unit must include a “flash” boot loader that will support re-programming of the main control unit firmware.

6.5.15 Local singular push button and Remote (SCADA) control of the following functions:

- An open/close control which allows the operators to open or close the Recloser.
- A ground trip control which gives the operator the ability to turn on or off trip commands asserted by protection curves for the ground phase.
- A reclosing trip control which gives the operator the ability to allow the Recloser to have multiple shots, or to lockout on one shot.
- A fast curve enabled to control which gives the operator the ability to enable or disable the fast protection curve.
- Identify a fault on each phase.
- A loss of source (AC) power
- Open/close state of the Recloser (on Non-Verizon network)
- Status of the hotline tag control
- The lockout state of the Recloser
- Status of the control for ground trip
- Status of the control for reclosing
- Status of the control for fast curve enabled
- Ability to switch alternate profiles
- Status of alternate profile selected
- Change Recloser, Sectionalizer, Switch operating modes
- Status of operating mode selected
- Select between single phase and three phase tripping modes
- Status of tripping mode selected
- Initiate battery test
- Status of battery test
- A loss of battery power
- Acknowledge Alarms
- Reset alarms

6.5.16 A remote enable control that allows the Recloser to be controlled remotely or exclusively locally

6.5.17 Local control of the following function:

- A hotline tag control which gives the operator the ability to prevent the Recloser from closing. The Recloser can be opened; however, it shall not close while this control is enabled.
- The control shall have inputs for 6 voltage signals. These signals may come from either 120V PT inputs or embedded voltage sensors in the Recloser pole.
- All software and firmware including operation and communication software shall be provided with the latest version at the time of the delivery. Proper software programming instructions shall be provided.

- The controller shall have a minimum of two (2) serial communication ports in the form of RS-232 and RS-485. All ports shall be capable of sending data at 19,200 baud.
- The controller shall have one (1) HMI communication port.
- The Recloser I/O module shall have a minimum of 8 digital inputs, eight digital outputs, and a fiber-optic communications port.
- The control shall include three (3) USB 2.0-compatible ports for local connection to the control. USB 2.0-compatible Device port shall be used as device connection to a laptop or a PC. Two USB 2.0-compatible Host ports shall be used to accommodate USB external drives and other that allow the user to upload settings files directly to the control from the storage device

## 7.0 SAMPLE, TRAINING, & TESTING REQUIREMENTS

- 7.1 The Recloser shall be tested in accordance with ANSI/IEEE C37.60, section 7, before shipment. Two (2) Copies of certified Production Test reports shall be furnished to verify the correctness of control wiring and proper functioning of all equipment. These test reports shall be submitted to Austin Energy Standards no later than two (2) weeks prior to the agreed delivery date.
- 7.2 The calibration curves and test data shall be supplied for U3 and U4 curves across the full range of settings for current and time dial per ANSI C37.60 section 7.1 and section 6.11.2.
- 7.3 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 recloser and software programming. All training shall be provided at no cost to Austin Energy. A sample(s) for test and evaluation is required at no cost to Austin Energy for each recloser submitted for approval

## 8.0 EQUIPMENT IDENTIFICATION

Each Recloser 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:  
 Recloser Maximum Rated kV:  
 Maximum Interrupting Rating:  
 Purchase Order Number:

## 9.0 SERVICE, MAINTENANCE AND RELIABILITY

- 9.1 No field calibration shall be required to maintain the accuracy of the Recloser switch.
- 9.2 The Recloser manufacturer shall provide diagnostic and troubleshooting software at no cost.
- 9.3 The Recloser manufacturer shall provide two (2) copies of software for installation, operation, and related field operation manuals at the time of shipment.
- 9.4 All manufacturers furnishing distribution reclosers under these specifications shall have at least ten (10) years' experience in the manufacture and sale of distribution reclosers.
- 9.5 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.
- 9.6 If any defect in the equipment supplied, or failure to comply with this specification, shall appear within the period of 18 months from date of final acceptance of the equipment, the Vendor shall be notified. The Vendor shall thereupon correct without delay and at Vendor's own expense, the defect or failure of compliance, by repairing the defective part or parts, by supplying a non-defective replacement or replacements, and/or by correcting a deficient design as required. The Vendor shall further replace or repair all other similar equipment if such defect may reasonably be expected to develop or occur in said similar equipment. Removal and installation cost of the defective parts or equipment shall be at Vendors expense. In the event the Vendor shall correct any defects or failure of compliance by repair, replacement, or correction as required above,

then with respect to the equipment corrected, the aforesaid warranty period shall begin from the date of completion of installation of such correction and acceptable therefore, provide same is not unreasonably delayed by Austin Energy. This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein. Retain for future reference.