



SEL-311C Relay Guideform Specification

The microprocessor-based relay shall provide a combination of functions including protection, monitoring, control, fault locating, and automation. Relay self-checking functions shall be included. Specific operational and functional requirements are as follows:

Phase Fault Distance Protection. The relay shall incorporate four zones of mho distance protection for detection of phase faults. Two zones shall be settable for either forward or reverse direction. Both positive-sequence memory polarized and compensator-distance phase distance elements shall be available.

CCVT Transient Blocking. The relay shall detect CCVT transients and block the operation of overreaching Zone 1 distance elements.

Out-of-Step Characteristics. The relay shall detect stable and unstable power swings. User settings shall determine whether the relay trips or blocks tripping.

Zero-Sequence Compensation Factor. The relay shall include two zero-sequence compensation factors, one for underreaching ground distance and one for overreaching ground distance. Magnitude and phase angle of each zero-sequence compensation factor shall be independently adjustable.

Overcurrent Fault Protection. The relay shall incorporate phase, residual ground, and negative-sequence overcurrent elements. For added security, directional elements, load encroachment logic, and torque control capability (internal and external) shall be provided.

Ground Fault Distance Protection. The relay shall incorporate four zones of mho distance and four zones of quadrilateral distance protection for ground fault protection. Two zones of each type shall be selectable for either the forward or reverse direction.

Phase Under- and Overvoltage Elements. The relay shall incorporate under- and overvoltage elements for protection and control.

Sequence Overvoltage Elements. The relay shall incorporate positive-, negative-, and zero-sequence overvoltage elements for protection and control.

Auto-Reclosing Control. The relay shall incorporate a four shot recloser with four independently set open time intervals. Independently set reset times from reclose cycle and from lockout shall be available.

Synchronism Check. The relay shall include two synchronism check elements with separate maximum angle settings. The synchronism check function shall compensate for breaker close time and allow different sources of synchronizing voltage (VA, VB, VC, VAB, VBC, VCA).

Frequency Elements. The relay shall include six over- or underfrequency elements (81).

Applications Templates. The relay shall have reduced setting step-distance, POTT, and DCB schemes available in application settings templates.

Event Reporting and Sequential Events Recorder. The relay shall be capable of automatically recording disturbance events of 15, 30, 60, or 180 cycles. Events shall be stored in nonvolatile memory. The relay shall also include a Sequential Events Recorder (SER) that stores the latest 512 entries.

Status and Trip Target LEDs. The relay shall include 16 status and trip target LEDs.

Circuit Breaker Monitor. The relay shall include a breaker wear monitor function with a user programmable breaker monitor curve per the breaker manufacturer's recommendations.

Substation Battery Monitor. The relay shall measure and report the substation battery voltage presented to the relay power supply terminals. Two user-selectable threshold parameters shall be provided for alarm and control purposes.

Fault Locator. The relay shall include a fault locating algorithm to provide an accurate estimate of fault location without communications channels, special instrument transformers, or predefault information.

Digital Relay-to-Relay Communications. The relay shall have eight send and eight receive logic elements in each of two communications ports for dedicated relay-to-relay communications.

Automation. The relay shall include 16 local control elements, 16 remote control logic points, 16 latching logic points, and 16 display messages in conjunction with a local display panel included in the relay. The relay shall have the capability to display custom messages.

Relay Logic. The relay shall include programmable logic functions for a wide range of user configurable protection, monitoring, and control schemes.



Communications. The relay shall include three independent EIA-232 and one EIA-485 serial ports for external communications. Two ports shall support relay-to-relay eight bit direct logic communication.

Terminal Communications. The relay shall allow communications from any ASCII terminal without software.

IRIG-B. The relay shall include an interface port for a demodulated IRIG-B time synchronization input signal.

Temperature. The relay shall be rated for continuous operation over a temperature range of -40° to $+85^{\circ}\text{C}$ (-40° to $+185^{\circ}\text{F}$) in order to allow mounting in an outdoor control cubicle or in case of heater or air conditioning failure.

Synchrophasors. The relay shall include operation as a phasor measurement and control unit (PMCU).

Warranty. The relay shall have a minimum 10-year worldwide warranty.

