



SEL-352 Relay Guideform Specification

The microprocessor-based relay shall be applied on a per-breaker basis and provide a combination of functions including protection, monitoring, control, and automation. Relay self-checking functions shall be included. Specific requirements are listed below:

Six Voltage Measurements. The relay shall measure three-phase voltage quantities on both sides of a circuit breaker.

Three Current Measurements. The relay shall measure three-phase current quantities through the circuit breaker. The relay shall provide instantaneous overcurrent elements with fast reset times, even in the presence of subsidence current after the breaker opens.

Failure While Tripping Faults. The relay shall provide five different protection schemes to detect failure of a circuit breaker to clear a fault. Protection scheme logic shall be provided for simple and complex breaker arrangements, consisting of one or two circuit breakers.

Failure While Tripping Load. The relay shall provide two different protection schemes to detect failure to trip load or line-charging current.

Failure to Close (Pole Disagreement Detection). The relay shall include logic to detect a failure of one or two breaker poles to close.

Failure While Open (Breaker Pole Flashover Detection). The relay shall detect when an open breaker pole flashes over.

Failure to Complete a Trip or Close (Resistors Still Inserted). The relay shall model the energy accumulated in breaker trip and close resistors if they are left in service following a breaker operation. A trip output shall occur when resistor energy reaches a preset level.

Loss-of-Dielectric Pressure. The relay shall include protection logic that uses dc input from breaker dielectric gas pressure switches.

Motor-Operated Disconnect (MOD) Trip and Power Circuit Breaker Isolation Security Logic. The relay shall trip the MOD to isolate the failed breaker when phase current drops below a settable value. When a MOD is not installed, the relay logic shall provide indication of "Safe to Disconnect" condition to personnel.

Retripping. The relay shall provide a choice of instantaneous or time-delayed retripping of the protected circuit breaker.

Point-on-Wave (POW) Closing. The relay shall include scheme logic to control at what point on the voltage waveform the circuit breaker closes.

Point-on-Wave (POW) Opening. The relay shall provide the logic to control at what point on the voltage waveform the circuit breaker opens under normal breaker operating conditions.

Synchronism Check. The relay shall measure angle and frequency differences between voltage sources on either side of an open circuit breaker. Two user-selectable settings shall be provided to supervise automatic and manual closing of the breaker.

Trapped Charge Polarity Detection. The relay shall include detection of trapped charge polarity for use with point-on-wave close logic.

Circuit Breaker Monitor. The relay shall include a breaker wear monitor with user-definable wear curves, operation counters, and accumulated interrupted currents per phase.

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

Event Reporting and Sequential Events Recorder (SER). The relay shall be capable of automatically recording disturbance events of 15, 30, or 60 cycles with settable prefault duration and user-defined triggering. Events shall be stored in nonvolatile memory. The relay shall include an SER that stores the latest 512 entries.

Distributed Network Protocol (DNP). The relay shall incorporate certified DNP3 Level 2 Slave protocol communications capability. The DNP capability shall include automatic dial-out for settings-based DNP events and virtual terminal support with full ASCII capability.

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

Auxiliary Inputs/Outputs. The relay shall include fully programmable optoisolated inputs and output contacts.

Metering. The relay shall include metering capabilities for ac current through the breaker, voltage across and on both sides of the breaker, and three-phase real and reactive power of the system at the breaker.



Communication. The relay shall include three independent EIA-232 serial ports and one EIA-485 serial port for external communications. The communications ports shall operate at a speed of 300–19200 bits per second. Three-level password protection shall be included to provide secure remote communications.

Internal Real-Time Clock. The relay shall include a real-time clock, with battery backup, synchronizable to demodulated IRIG-B input, to provide accurate time stamps for event records.

Low-Level Testing. The relay shall include a low-level test interface to permit relay testing with low energy test equipment.

Ambient Temperature Compensation. The relay shall provide the ability to set temperature compensation times for point-on-wave breaker control based upon measured ambient temperature.

Control Voltage Compensation. The relay shall provide the ability to set control voltage compensation times based upon measured control voltage. The control voltage compensation will be used with point-on-wave breaker control operations.

