



SEL-387E Relay Guideform Specification

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

Percentage Differential Protection. The relay shall incorporate restrained differential protection for as many as three windings with fixed or variable percentage, using one or two settable slopes with adjustable intersection point and minimum pickup values.

CT Phase Angle Compensation. The relay shall incorporate full “round-the-clock” current compensation, in 30-degree increments, to accommodate virtually any type of transformer and CT winding connection.

Harmonic and DC Elements. The relay shall incorporate second-, fourth-, and fifth-harmonic and dc elements, with the choice of either harmonic blocking or harmonic restraint to prevent restrained differential element operation during inrush or overexcitation conditions; an independent fifth-harmonic alarm element shall be included to warn user of overexcitation condition.

Unrestrained Differential Protection. The relay shall include unrestrained differential protection to produce rapid tripping for severe internal faults.

Restricted Earth Fault Protection. The relay shall incorporate restricted earth fault (REF) protection for the detection of ground faults in wye-connected windings.

Overcurrent Fault Protection. The relay shall incorporate three groups of three-phase current inputs that can be independently enabled for overcurrent protection. Eleven overcurrent elements per group shall be included to provide phase, negative-sequence, residual, and combined terminal protection.

Combined Currents. The relay shall incorporate an element to provide inverse-time phase and residual overcurrent protection based on summation of currents from Windings 1 and 2.

Overexcitation Volts/Hertz Protection. The relay shall incorporate volts/hertz protection to detect and provide an output when user-settable volts/hertz thresholds are exceeded.

Voltage Inputs. The relay shall include three phase voltage inputs for independent enabling of 13 over-/undervoltage elements, 6 frequency elements, and 2 levels of volts/hertz protection, including definite time, inverse time, and user-programmable curves.

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

Communication. The relay shall include three EIA-232 and one EIA-485 serial port to provide flexible communications to external computers and control systems. The relay shall operate at a speed of 300–19200 baud. Three-level password protection shall be included to provide remote security communication.

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 include 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.

Trip and Close Variables. The relay shall include four trip variables and three close variables to permit separate control of as many as three breakers and a separate lockout device.

Setting Groups. The relay shall include six selectable setting groups to permit adaptation to changes in application.

Metering. The relay shall include metering capabilities for real-time current, voltage, power, energy qualities, and differential quantities, as well as phase demand and peak demand current values. Harmonic content from the fundamental to the 15th harmonic for all 12 analog inputs shall also be included.

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

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

Through-Fault Event Monitor. The relay shall provide for the capability of reporting fault current level, duration, and date/time for overcurrent events through the differential protection zone. A settable I^2t alarm indicates an excess of accumulated through-fault energy.



Event Reporting and Sequential Events Recorder (SER). The relay shall be capable of automatically recording disturbance events of 15, 29, or 60 cycles with settable prefault duration and user-defined triggering. Events shall be stored in nonvolatile memory. The relay shall also include an SER that stores the latest 512 entries.

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 be able to display custom messages.

IEC 61850 Ethernet Communications. The relay shall provide IEC 61850-compliant communications. The IEC 61850 capability shall include GOOSE messaging and defined logical node data points.

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.

