



# SEL-300G Relay Guideform Specification

Protection, control, and monitoring for the generator shall be provided by a microprocessor-based package.

The relay shall provide protection over the operating frequency range of 20–70 Hz. Protection functions shall include the following:

- Two-zone, positive-sequence impedance mho element for loss-of-field detection (40).
- 100% stator ground fault detection based on measurement of neutral overvoltage plus neutral and terminal third-harmonic voltage differential with settable sensitivity (64G).
- DC field ground protection (64F) based on switched dc voltage injection method.
- Out-of-Step protection based on single or double blinders (78).
- Overexcitation detection based on volts/hertz measurement. One definite-time and a composite definite/inverse-time element shall be provided (24).
- Negative-sequence overcurrent elements, including definite-time and inverse-time operating characteristics (46).
- Two sensitive directional power elements with flexibility to provide antimotoring, over-power, or low-forward power indication (32).
- Two-zone mho phase distance, compensator distance, voltage restrained, or voltage controlled phase time-overcurrent element for backup protection (21P/21C/51V/51C).
- Residual and neutral instantaneous, definite-time, and inverse-time nondirectional overcurrent elements (50/51).
- Phase, positive-sequence, negative-sequence, and residual overvoltage elements (59).
- Inadvertent energization protection (50/27).
- Unit breaker failure protection (50BF).
- Supervision of voltage-based protection functions by loss-of-relaying-potential detection logic (60).
- Six over-/underfrequency elements (81).
- Percentage restraint and unrestrained phase current differential elements as an option (87), ground differential (87N) provided when 87 is not selected.
- Synchronism checking (25) element available as an option.
- RTD-based thermal protection with ambient temperature or load-current biasing.
- Two independent relay setting groups.

The relay shall include metering and monitoring functions to indicate the following:

- Measured current and voltage magnitudes and phase angles. Third-harmonic neutral and terminal voltage magnitudes (VN3, VP3). Volts/Hertz, percent of nominal.
- Single- and three-phase real and reactive power (MW, MVAR) and power factor (PF).
- Single- and three-phase real and reactive directional energy (MWh, MVARh).
- System frequency and station battery voltage.
- Demand quantities: phase, negative-sequence, residual, and neutral currents, MW and MVAR.
- Maximum and minimum log for Ia, Ib, Ic, Ig, In, Va, Vb, Vc, Vn, 3 $\phi$  MW, and MVAR.
- Unit breaker contact wear based on current interrupted and close-to-open operations.
- DC battery voltage monitoring and metering.

The relay shall provide access to the above data via a front-panel LCD display and the following serial ports:

- Three EIA-232 serial ports, one located on the relay front panel.
- One isolated EIA-485 serial port.



Serial ports shall support ASCII, Binary (Fast Meter, Fast Operate, Unsolicited Fast SER Protocol), and Modbus<sup>®</sup> communication. Serial port relay setting entry shall be possible using an off-the-shelf PC-based terminal emulation package.

The relay shall provide the following:

- Sixteen of each: local, remote, and latch bits
- Six configurable optoisolated control inputs.
- Seven programmable output contacts.
- A self-test ALARM contact.
- Output contacts rated for tripping duty per IEEE C37.90 standards.
- Programmable output contacts flexible to support AND, OR, and INVERT Boolean operations of internal relay elements and logic outputs.
- Available options to increase the contact I/O count.
- Available options for high-current interrupting contact outputs.
- Available options for quick disconnect of CT, PT, I/O, and power supply inputs (Connectorized<sup>®</sup>).

The relay shall retain in nonvolatile memory:

- A sequence of events record consisting of the 512 latest time-tagged events.
- Two 180-cycle, eight 60-cycle, fifteen 30-cycle, or twenty-nine 15-cycle event reports containing voltage and current measurements, contact input and output status, and relay element conditions. Record formats displaying 4 and 16 samples per cycle shall be available.

The relay shall accept IRIG-B time code synchronization and include a battery-backed time clock to retain date and time during deenergization.

The relay shall include extensive self-testing and an alarm output contact indication of self-test warning or failure conditions or removal of dc power.

The relay shall be capable of being set by Microsoft<sup>®</sup> Windows<sup>®</sup>-based graphical and ASCII terminal interfaces.

