



SEL-710 Relay Guideform Specification

Motor protection shall be provided by a microprocessor-based relay equipped with the following protection monitoring, control, automation, and reporting functions. Self-checking functions shall be included. Specific requirements are as follows.

The relay shall include the following protection functions.

- Motor Thermal Overload Model (49)
 - Provides integrated thermal protection for locked rotor starts, running overload, imbalance current/negative-sequence current heating, and repeated or frequent starting
 - Processes the stator and rotor models simultaneously
 - Supports high-inertia starts (requires voltage option and full-load slip setting)
 - Has settable or learned motor-stopped cooling time constant
 - Allows settable or learned starting thermal capacity
 - Provides ambient temperature biasing via external RTD input
- Phase, neutral, residual, and negative-sequence overcurrent elements (50P/50N/50G/50Q)
- Motor differential current (87)
- Current imbalance (46)
- Over- and underfrequency (81)
- Phase reversal (47)
- Load-loss (undercurrent) (37)
- Load-jam
- Antibackspin timer protection
- Starts-per-hour (notching or jogging device) (66)
- Minimum-time-between-starts (66)
- Start motor timer
- Star-Delta starting
- Two-speed motor protection
- Forward/Reverse start protection
- Speed switch input (stall)
- Breaker/Contactor failure

When voltage inputs are specified, the relay shall provide the following protection elements.

- Over- and undervoltage (59, 27)
- Underpower (37)
- Reactive power (VAR)
- Power factor (55)
- Voltage-based over- and underfrequency (81)
- Loss of potential (60)



The relay shall offer the following temperature input features.

Availability of as many as 12 RTD inputs in an external module (SEL-2600 series) or 10 RTD inputs with an internal card, which, when included, shall have the following features:

- Optical fiber transmission of RTD temperatures (using SEL-2600 series) to relay: range > 400 m
- Separately field-selected RTD types: Pt100, Ni100, Ni120, or Cu10
- Noise immunity (50 Hz and higher) on RTD inputs up to 1.4 Vac peak
- One contact input (with SEL-2600 series)

RTD inputs to the motor relay shall support the following:

- Thermal overload model biasing
- Temperature alarms and trips (49)
- RTD open- or short-circuit indication

Capability of one PTC (positive temperature coefficient) thermistor input (49)

The relay shall offer the following programmable automation features.

- 32 local control logic points, 32 remote control logic points, 32 latching logic points, 32 counters, 32 math variables, 32 logic variables, and 32 timers
- SELOGIC[®] programming language with Boolean and Math equations capability for logic and control capability

Communications/integration support shall include the following.

- ASCII, Modbus[®] RTU, DeviceNet, Telnet, FTP, and Modbus[®] TCP/IP, IEC 61850 protocols
- Digital Relay-to-Relay Communications. The relay shall have eight transmit and eight receive logic elements for dedicated relay-to-relay communications. These elements shall be available for use in control logic.
- One front-panel EIA-232 port and one rear-panel EIA-232 or EIA-485 port, one fiber-optic serial port, and one copper Ethernet port
- Capability for an additional rear-panel EIA-232 or EIA-485 port
- Windows[®]-based PC software for settings and retrieving reports

The relay shall offer the following front-panel visualization features.

- The front panel shall be capable of displaying measured values, calculated values, I/O status, device status, and configuration parameters on a front-panel LCD display.
- The display shall have a capability to show rotating custom messages and data. Thirty-two display messages shall be provided.
- The front panel shall also have a minimum of six user-programmable LEDs and four user-programmable pushbutton controls with eight programmable LEDs.

Monitoring and reporting hardware functions shall offer the following.

- Motor start reports (up to as many as five of the latest starts)—Start data including currents, voltages (option), calculated % slip, and % rotor thermal capacity used are sampled at a settable rate for 720 sets of the motor start data
- Motor start trends—Starting time, maximum start current, minimum start voltage (option), and maximum start % rotor thermal capacity use averages for each of the past 18 months, together with number of starts in each month
- Load-Profile Monitoring—Provide periodic snapshot (selectable rate from every 5 to 60 minutes) of as many as 17 selectable analog quantities
- Motor operating statistics—Starts, running time, peak/average data, and trip/alarm counters
- Event summaries—Fault type and trip data including time of tripping
- Event reports—15-cycle length (as many as 28 reports) or 64-cycle length (as many as 5 reports) with 16-samples/cycle resolution



- Sequential Events Recorder (SER)—As many as 1024 time-tagged, most recent input, output, and element transitions
- Data stored in nonvolatile, flash memory

Hardware features shall offer the following.

- Operating temperature range of -40° to $+85^{\circ}\text{C}$
- Power supply input operating voltage range of 24–48 Vdc, 110–250 Vdc, or 110–240 Vac
- Demodulated IRIG-B time synchronization input capability or PTC input capability
- Optional 10 internal RTD inputs or 12 external RTD inputs
- 5 A or 1 A, ac current inputs IA, IB, IC, and IN with optional 2.5 mA sensitive IN input
- 300 V maximum, three ac voltage inputs and three phase motor differential current inputs
- Flexible, configurable I/O including digital I/O and analog I/O
- Electromechanical or solid-state (optional) digital outputs
- Optoisolated digital inputs
- Jumper-selectable current (up to ± 20 mA range) or voltage (up to ± 10 volts range) analog inputs
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- Relay front panel shall meet the requirements of NEMA 12/IP65

