Generator and Motor Protection Overview

SEL-400G NEW

Provide unsurpassed protection, integration, control, and monitoring features for all types of generators, including hydropower, pumped-storage hydropower, large steam turbines, and combustion gas turbines.

SEL-700G

Provide utility and industrial generator protection with an autosynchronizer, flexible I/O, and advanced communications.

SEL-300G

Implement comprehensive primary and backup generator protection for large and small machines.

SEL-2664S

Protect high-impedance grounded generators from ground faults at standstill, during startup, and while running.

SEL-2664

Combine the SEL-2664 with other SEL generator protection devices to continuously monitor field-to-ground resistance and protect critical components, including rotor and stator windings.

SEL-2600

Measure and transmit data from up to 12 resistance temperature detector (RTD) inputs and one contact input over a single fiber-optic link.

SEL-700BT NEW

Ensure motor bus system process continuity by allowing the quick transfer of load to an auxiliary feeder during primary feeder line faults.

SEL-710-5

Provide protection, including optional arc-flash detection, for a full range of medium-voltage, three-phase induction, and synchronous motors.

SEL-849

Provide current-, voltage-, and thermal-based protection; arc-flash detection; and power metering in motor protection applications.

Applications	SEL-400G	SEL-700G	SEL-700GT	SEL-700GW	SEL-300G	SEL-700BT	SEL-710-5	SEL-849
Generator Protection	■	■	+		■	■		
Induction Motor Protection							■	■
Synchronous Motor Protection							+	
Motor Bus Transfer Protection						■		
Feeder Protection				■				■
Breaker Failure Protection	■	■	■		*ƒ*	■	■	■
Equipment Thermal Monitoring	■	■	+	+	+	■	+	■
Generator Intertie Protection			■					
Synchronism Check	■	+	■		+	■		
Integrated Synchronizer	+	+	+			■		
Instrumentation and Control								
Breaker Wear Monitor	■	■	■	■	■	■	■	
Demand Meter	■	■	■	■	■	■	■	■
Load Profile Report	■	■	■	■		■	■	■
RTD Inputs	■	+	+	+	+	+	+	
Ethernet	+	+	+	+		+	+	■
IEC 61850 Edition 2	+	+	+	+		+	+	+
IEC 60870-5-103		+	+	+		+	+	
Parallel Redundancy Protocol (PRP)	+	+	+	+		+	+	■
DNP3 Serial	■	+	+	+		+	+	+
DNP3 LAN/WAN	+	+	+	+		+	+	+
Simple Network Time Protocol (SNTP)	+	+	+	+		+	+	■
Built-In Web Server	+	+	+	+		■	+	■
IEEE 1588 Precision Time Protocol (PTP)	+	+	+	+		+	+	
EtherNet/IP		+	+	+		+	+	+
Modbus TCP	+	+	+	+		+	+	+
Modbus RTU Outstation		■	■	■	+	■	■	■
Synchrophasors With IEEE C37.118 Protocol	■	■	■	■				
Mirrored Bits® Communications	■	■	■	■		■	■	

Protection	SEL-400G	SEL-700G	SEL-700GT	SEL-700GW	SEL-300G	SEL-700BT	SEL-710-5	SEL-849
21P Phase Mho or Compensator Distance	■	+			■			
24 Overexcitation (Volts/Hertz)	■	■	+		■			
27/59 Under-/Overvoltage	■	■	■		■	■	■	+
27I/59I Inverse-Time Under-/Overvoltage	■	■	■			■	■	
32 Directional Power	■	■	■		■			+
37 Underpower							■	+
40 Loss of Field	■	■	+		■			
46 Current Unbalance	■	■	+		■	■	■	■
47 Phase Reversal							■	■
49 Thermal	■	■	+				■	■
49R Thermal Overload (Resistance Temperature Detector [RTD])	■	■	■	■	■	■	+	
50 (P,N,Q) Overcurrent (Phase, Neutral, Negative Sequence)	■	■	■	■	■	■	■	■
50Q Negative-Sequence Overcurrent		■	■	■	■	■	■	■
51 (N,G) Time Overcurrent (Neutral, Ground)	■	■	■	■	■	■	■	■
51 (P,Q) Time Overcurrent (Phase, Negative Sequence)	■		■	■		■	■	■
55 Power Factor		*ƒ*	*ƒ*		*ƒ*		■	+
60 Loss of Potential	■	■	■		■	■	■	+
64G 100 Percent Stator Ground	■	+			■			
64F Field Ground	■	■	+		■			
67 (N,G) Directional Overcurrent (Neutral, Ground)	■	■	■			■		
78 Out of Step	■	+			■		■	
81 Over-/Underfrequency	■	■	■		■	■	■	+
87 Current Differential	■	+			+		+	
REF Restricted Earth Fault	■	■	+					
Arc-Flash Detection							+	■
Separate Neutral Overcurrent	■	■	■		■	■	■	■
Broken Rotor Bar Detection							■	

■ Standard feature + Model option *ƒ* May be created using settings

Generator and Motor Protection Applications

Generator protection

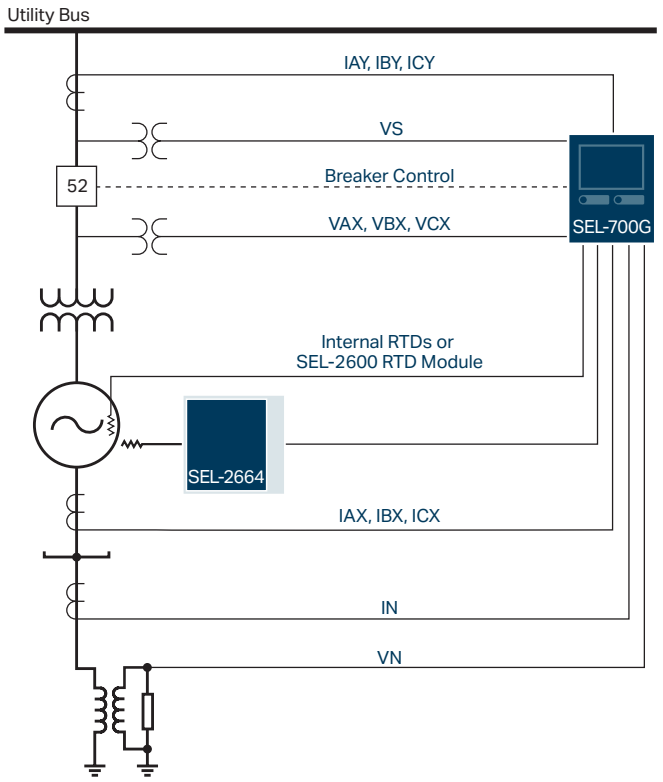
Numerous current, voltage, frequency, distance, power, and out-of-step elements in SEL generator protection relays provide comprehensive protection for large, medium, and small generators.

Unit protection

Apply sensitive percentage-restrained current differential elements and an unrestrained element, along with synchronism-check and volts-per-hertz elements, to protect both the generator and the step-up transformer. Harmonic-blocking elements protect the unit transformer bushing and end windings while maintaining security for inrush and through-fault conditions.

Stator/field ground protection

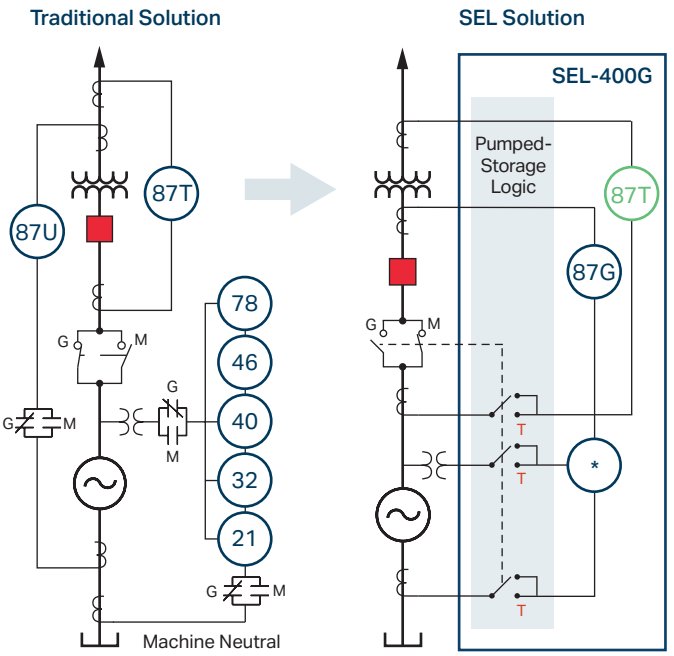
With SEL generator relays, adding the neutral voltage connection provides 100 percent stator ground protection for most machines, based on third-harmonic voltage measurements. Connecting the neutral current input provides protection for solidly grounded or resistance-grounded machines. State-of-the-art voltage injection allows you to monitor field ground resistance.



Pumped-storage hydropower protection NEW

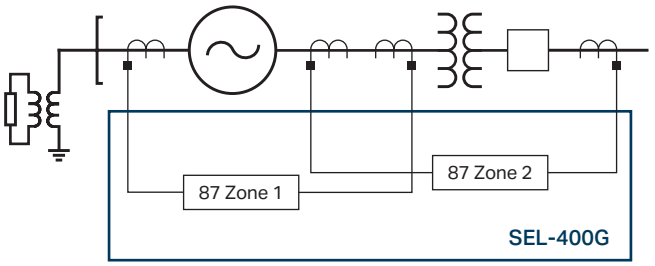
Internal logic in the SEL-400G Advanced Generator Protection System provides pumped-storage hydropower protection without additional equipment to compensate for the phase transposition between pumping and generating. The SEL-400G switches protection element phase currents and voltages at the correct times to ensure protection during pumping and generating. This eliminates the need for separate generation and motor protective relays or external relays to switch the CT/PT wiring, reducing complexity and expenses. Two separate differential zones, with independent frequency tracking and multiple sets of current inputs, eliminate the need to disable protective functions during starting and dynamic braking.

The SEL-400G handles the switching of all the protection elements and connections in the relay when operating in motor or generator mode. Traditionally, this required extensive external switching, which is prone to error. With two differential elements, the relay can also protect the transformer.



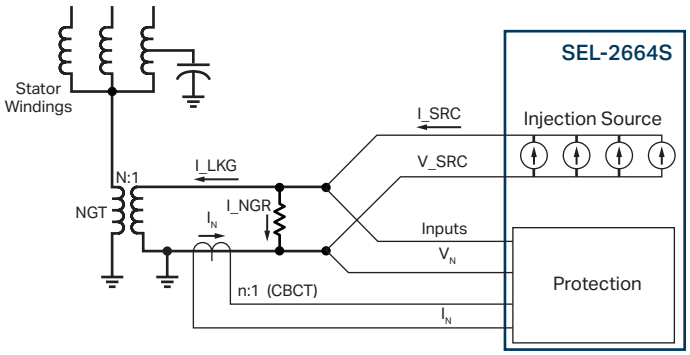
Dual differential zone protection NEW

The SEL-400G Advanced Generator Protection System has two independent, universal differential elements, which provide protection for two independent protection zones. This allows separate generator and step-up transformer protection in a single device.



Injection-based stator ground protection

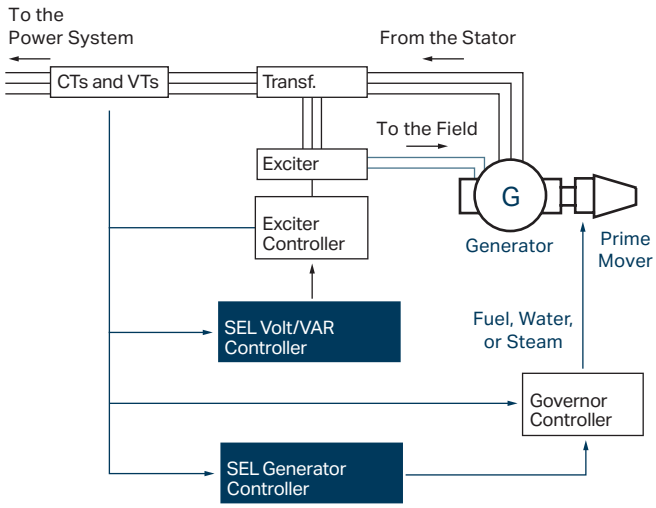
Frequency injection takes advantage of capacitive coupling between the stator winding and the ground. An injected signal passes through this higher impedance capacitive coupling to the ground. If a fault exists at any point in the stator winding, the injected signal will have a much lower impedance path to the ground. By monitoring the impedance to the ground using the injected signal, you can determine if a fault condition exists anywhere along the entire length of the winding. The SEL-2664S Stator Ground Protection Relay injects four frequencies to ensure that the machine is protected at all times, including during startup or over-speed conditions.



Automatic generator control

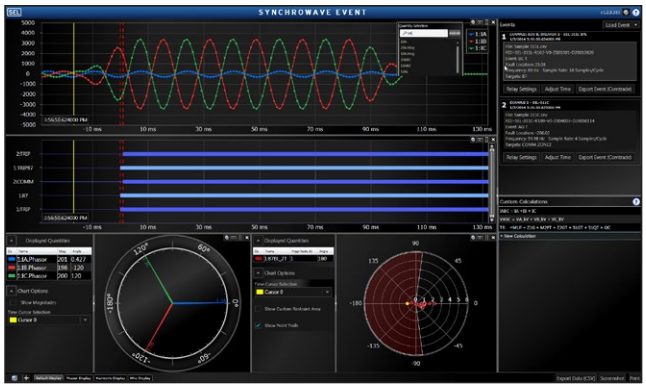
SEL's generation control system regulates generator power outputs and manages utility interties to maximize system stability, minimize electrical disturbances, and mitigate load-shedding requirements. The SEL-700G Generator Protection Relay in combination with the SEL POWERMAX® Power Management and Control System can balance generation loading, control tie line power flow, and maintain bus voltage.

The automatic MVAR and voltage control system maintains MVAR flows on interties and system bus voltages by controlling load tap changers, generator field and large synchronous motor exciters, synchronous and static condensers, and capacitor banks.



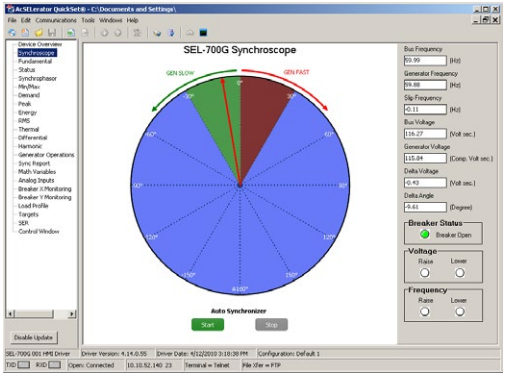
Advanced generator monitoring and reporting

With SEL software and generator relays, you can view autosynchronizer, Sequential Events Recorder (SER), and 180-cycle oscillographic event reports to analyze generator startup, shutdown, or system faults. You can also measure electrical, thermal, and generator run-time quantities. The breaker monitor function in the SEL-400G Advanced Generator Protection System and in the SEL-700G Generator Protection Relay lets you record accumulated breaker contact wear using manufacturer specifications for defining breaker operation limits. The relay's circuit breaker monitor tracks the total number of close/open operations and interrupted current to determine the percent of contact wear.



Automatic synchronization

SEL synchronizing systems measure the voltage and frequency of generator and utility systems, sending correction pulses to adjust the governor and exciter as necessary and automatically close the breaker on synchronization. This process enables safe, secure, unattended synchronization of generation with the power system. Users can also visualize and synchronize system parameters on SEL devices available with a color touchscreen display.

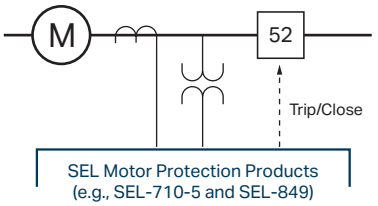


Synchronized phasor measurement

Combine the SEL-700G Generator Protection Relay or SEL-400G Advanced Generator Protection System with an SEL IRIG-B time source to measure the system angle in real time. The SEL-700G offers a timing accuracy of ±10 µs, and the SEL-400G is accurate to 1 µs. You can measure instantaneous voltage and current phase angles in real time to improve system operation with synchrophasor information. With SEL-5078-2 SYNCHROWAVE® Central Software, you can view system angles at multiple locations for precise system analysis and system-state measurement.

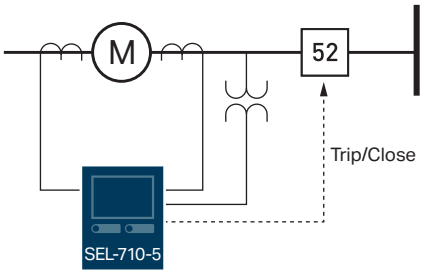
Motor protection

Protect a wide variety of low- and medium-voltage three-phase induction and synchronous motors using the SEL family of motor protection relays. Phase and neutral current elements feed accurate thermal models that track motor thermal characteristics during the stop/start/run cycles of the motor. One common application is a current-based protection scheme for across-the-line motor starting. Adding the voltage option to certain SEL motor relays enables the slip-dependent AccuTrack™ Thermal Model.



Differential motor protection

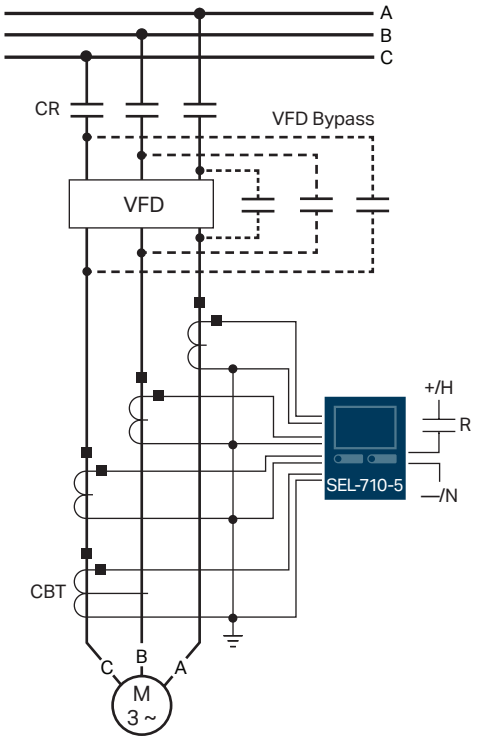
Use optional differential elements to protect the windings in high-value or critical-process motors.



Variable-frequency drive (VFD) motors

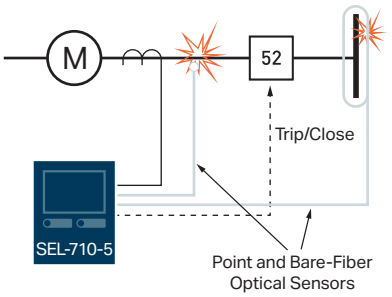
The SEL-710-5 Motor Protection Relay can protect VFD-fed motors, with an enhanced thermal model that tracks key motor characteristics during the stop/start/run cycles of the motor. VFDs are widely used to control the speed of ac motors for conveyor systems, blower speeds, electrical propulsion systems, and other applications that require variable speed.

When VFDs operate induction motors at low speeds, they may lack sufficient airflow to provide adequate cooling. The SEL-710-5 monitors this condition and dynamically compensates for the reduced cooling to provide thermal protection for the motor.



Arc-flash mitigation

Arc-flash mitigation improves worker safety by reducing the incident energy of the arc flash. Supervised by phase overcurrent elements, SEL relays with arc-flash detection provide secure and fast arc-flash mitigation. The fast response, in as little as 2–4 ms using high-speed, high-current interrupting output contacts, also reduces equipment damage and maintains process continuity.

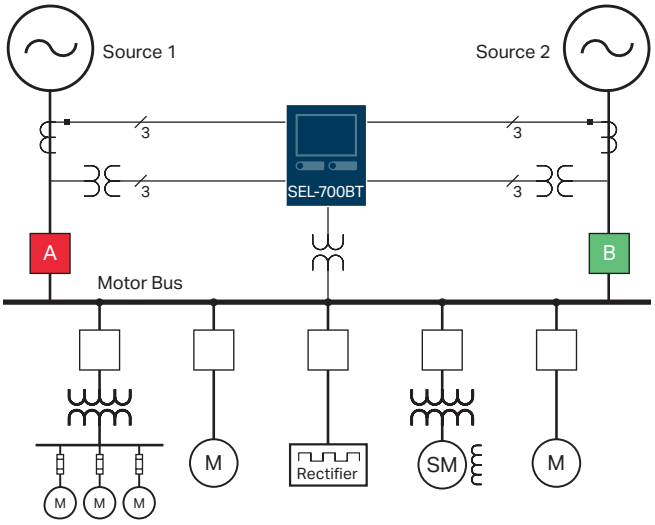


Fast motor bus transfer NEW

Preserve critical process operations and reduce equipment damage with the SEL-700BT Motor Bus Transfer Relay, which features built-in logic for the following transfer modes:

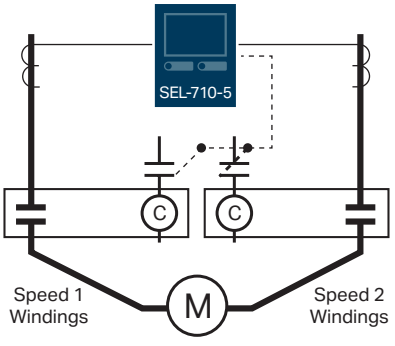
- Fast transfer mode, which switches the motor bus to an alternate source with no intentional delay.
- In-phase transfer mode, which uses phase angle and voltage measurements to safely connect the alternate source by minimizing transient torques and process interruptions.
- Residual voltage and fixed-time transfer modes, which restore power safely in cases where fast and in-phase bus transfers do not occur.

You can manually transfer motor bus loads, or the relay can automatically select one of the transfer modes based on system conditions, maximizing speed, ensuring processes continuity, and minimizing transient torque on machines and equipment.



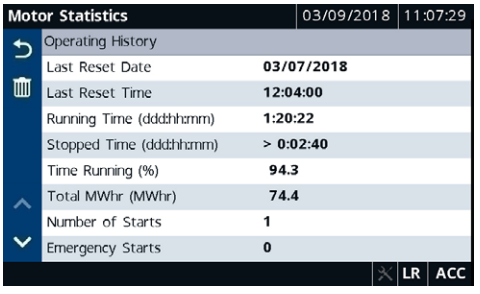
Flexible motor starting

Take advantage of your SEL relay's ability to control multiple contactors, and apply motor protection in configurations for two-speed motors, full-voltage reversing, and star-delta (reduced-voltage) starting. This diagram shows interlocking contactors for a two-speed start.



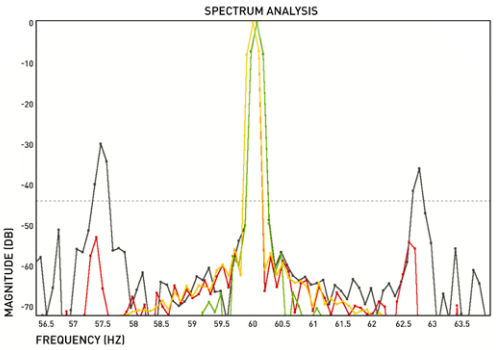
Asset monitoring

Track the operating characteristics of your motor and accompanying devices with the built-in asset-monitoring capability. The SEL-710-5 Motor Protection Relay can track items, such as vibration, motor start current, motor start times, motor stop times, broken rotor bars, incipient faults, and excessive wear on molded case circuit breakers, in one easy-to-read report via the ASCII terminal or the touchscreen display. This enables you to reduce production losses from unexpected equipment failures and to lower maintenance costs by switching to predefined maintenance schedules.



Broken rotor bar detection and spectral analysis

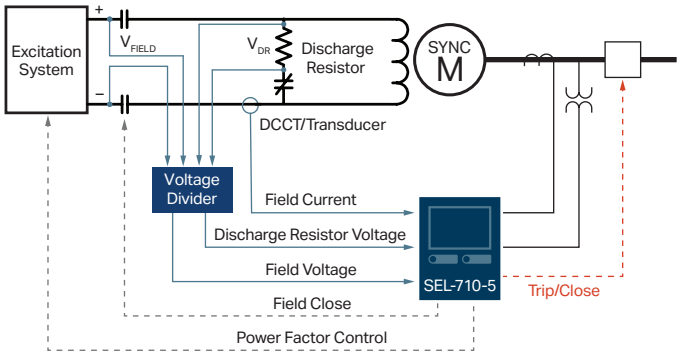
Broken rotor bar detection is an optional feature in the SEL-710-5 Motor Protection Relay. Fully loaded induction machines with broken rotor bars display unique frequency signatures as side-bands to the fundamental frequency. The magnitude of resulting side-band frequencies correlates to the number of broken rotor bars. The image shows a spectrum of a running motor with three broken rotor bars. The SEL-710-5 lets you catch rotor bar damage before it causes catastrophic damage to the motor.



Synchronous motor protection

Select the SEL-710-5 Motor Protection Relay with the synchronous motor protection option to start and protect synchronous motors. With the SEL-710-5, you can monitor field voltage and current and effectively respond to loss-of-field, field resistance, out-of-step, power factor, and reactive power issues.

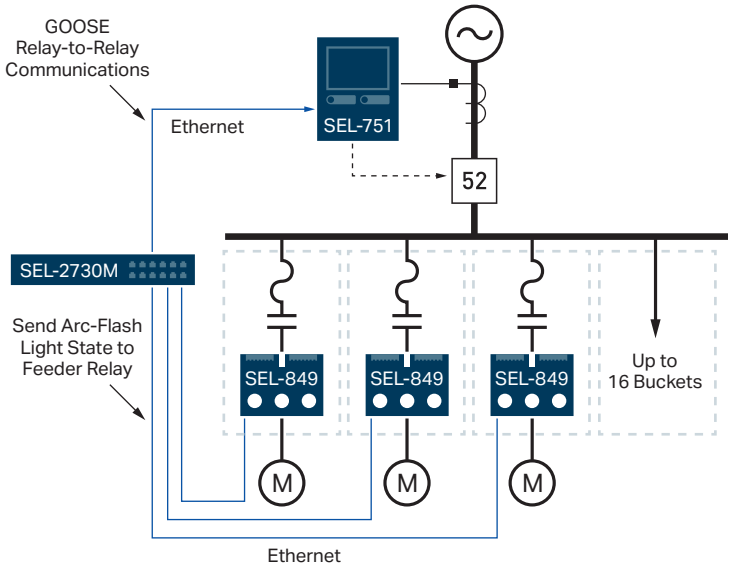
Shown here is a brush-type synchronous motor application where the field winding is connected to the relay through a voltage divider module.



Centralized motor control

Create fully integrated motor control solutions with SEL motor relays, which include communications and protocol options that simplify device integration. This application shows SEL-849 Motor Management Relays in motor control center (MCC) buckets networked through an SEL-2730M Managed 24-Port Ethernet Switch. The relays share arc-flash detection data with the feeder relay using IEC 61850 GOOSE messaging.

For turnkey applications that require a smart integrated MCC, the SEL MOTORMAX® Low-Voltage Motor Management and Protection System combines motor protection, network management, and real-time automation control. MOTORMAX is a customizable motor management and control system that scales to fit any application. It delivers high-performance motor protection as well as high-speed reporting of motor status, alarms, and operating conditions at the HMI, allowing you to see the bigger picture.



SEL-400G

Advanced Generator Protection System NEW

Starting price
$12,000 USD

selinc.com/products/400G

The SEL-400G offers unsurpassed protection, integration, control, and monitoring features for all types of generators, including hydro, pumped-storage hydro, large steam turbines, and combustion gas turbines. The relay combines generator, generator bus, and generator step-up (GSU) transformer protection in one package. The SEL-400G also includes SEL Grid Configurator to help you quickly create, manage, and deploy settings for SEL power system devices.

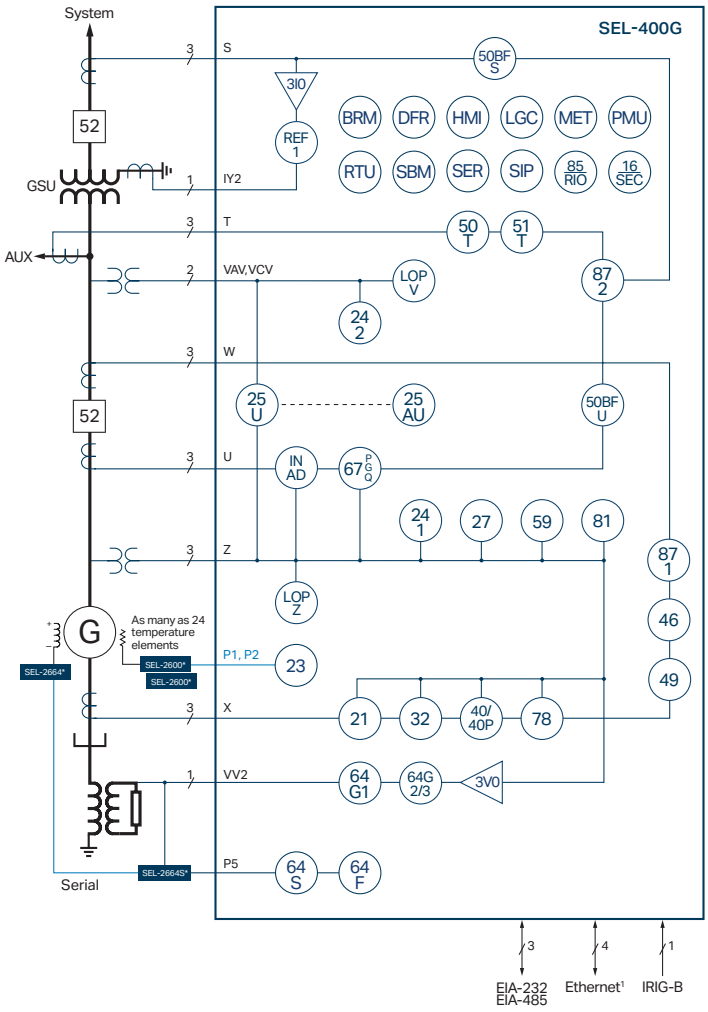
Numerous current and voltage inputs on the SEL-400G enable complex generator protection schemes or protection of other equipment, such as transformers. It detects ground faults across 100 percent of the stator winding and also detects stator winding turn-to-turn faults.

Two independent universal differential elements provide protection for two independent protection zones, which allows protection of both the generator and GSU transformer with a single SEL-400G.

The wide-range frequency tracking (5 to 120 Hz) enables protection during startup when frequencies are low because the generator is not spinning fast. In addition, pumped-storage logic enables pumped-storage hydro protection without the need for external relays to switch CT wiring, which lowers costs and improves reliability.

1. EIA-232 front serial port is quick and convenient for system setup and local access.
2. Front-panel display allows operators to control and view the status of disconnects and breakers.
3. User-selectable mimic screens show the system configuration in one-line diagram format.
4. Easy-to-use keypad aids simple navigation.
5. Front-panel, tricolor LEDs indicate custom alarms and provide fast and simple information to assist dispatchers and line crews with rapid power restoration.
6. Programmable operator pushbuttons with user-configurable labels allow front-panel customization.
7. Choose from a horizontal panel-mount or rack-mount chassis.
8. Communications protocols include FTP, Telnet, synchrophasors, DNP3 LAN/WAN, the Parallel Redundancy Protocol (PRP), the IEEE 1588 Precision Time Protocol Version 2 (PTPv2),** and IEC 61850 Edition 2.
9. Use three rear EIA-232 ports for Mirrored Bits® communications, DNP3, SCADA, and engineering access.
10. The 18 current and 6 voltage channels can be configured for a variety of applications.
11. Power supply options include: 24–48 Vdc; 48–125 Vdc or 110–120 Vac; or 125–250 Vdc or 110–240 Vac.

**For PTPv2 implementation, Ports 5A and 5B must be ordered as an option.



ANSI Functions

21	Phase Distance
23	RTD Temperature—SEL-2600
24	Volts/Hertz
25	Synchronism Check
25A	Autosynchronizer
27	Undervoltage
32	Directional Power
40	Loss of Field
40P	Capability-Based Loss of Field
46	Current Unbalance
49	IEC 60255-Compliant Thermal Model
50BF	Breaker Failure Overcurrent
50N	Neutral Overcurrent
50 (P,G,Q)	Overcurrent (Phase, Ground, Negative Sequence)
51N	Neutral Time Overcurrent
51 (P,G,Q)	Time Overcurrent (Phase, Ground, Negative Sequence)
59	Overvoltage
64G1	Stator Ground (Fundamental Neutral Overvoltage)
64G2	Third-Harmonic Difference/Undervoltage
64G3	Third-Harmonic Ratio
64F	Rotor Ground—SEL-2664
64S	Stator Ground (Harmonic Injection)—SEL-2664S
67 (P,G,Q)	Directional Overcurrent (Phase, Ground, Neg. Seq.)
78	Out of Step
81 (O,U)	Over- and Underfrequency
81A	Accumulated Frequency
85 (O,U)	Over- and Under-Rate-of-Change of Frequency
85 RIO	SEL Mirrored Bits Communications
87 (U,R,Q)	Universal Differential (Unrestrained, Restrained, Negative Sequence)
DFR	Event and Disturbance Reports
HMI	Operator Interface
INAD	Inadvertent Energization
LGC	Expanded SELogic® Control Equations
LOP	Loss of Potential
MET	High-Accuracy Metering
PMU	Synchrophasors
REF	Restricted Earth Fault
RTU	Remote Terminal Unit
SER	Sequential Events Recorder

Additional Functions

16 SEC	Access Security (Serial, Ethernet)
BRM	Breaker Wear Monitor
LDP	Load Data Profiling
SBM	Station Battery Monitor
SIP	Software-Invertible Polarities

*Optional feature [1]Copper or fiber-optic

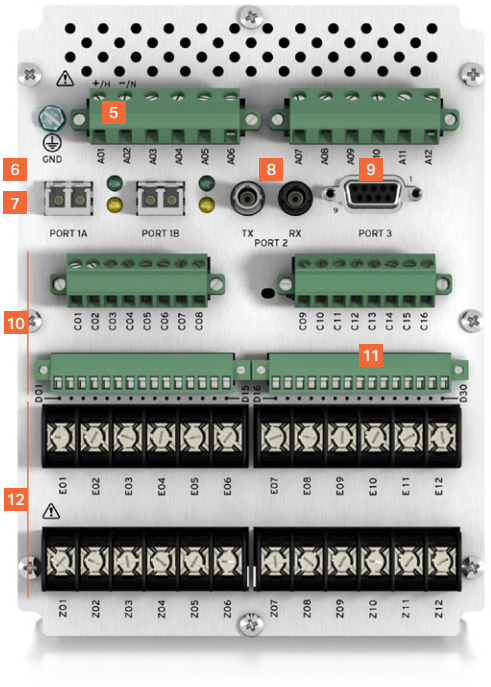
SEL-700G

Generator Protection Relay

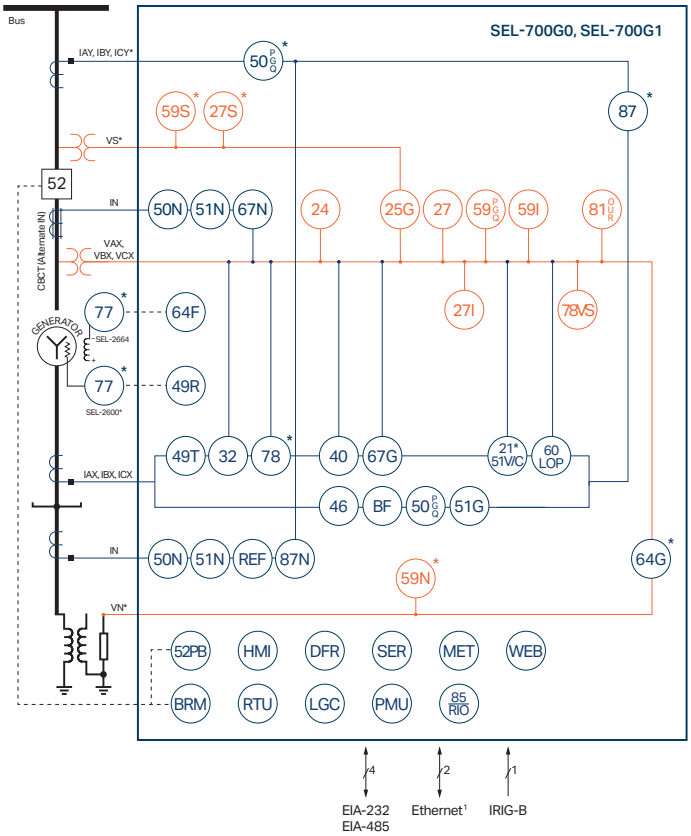
Starting price
$2,590 USD

selinc.com/products/700G

The SEL-700G provides comprehensive primary and backup generator protection. With an autosynchronizer, flexible I/O, built-in web server, and advanced communications, it is the right solution for utility and industrial generator protection.



1. The 5-inch, 800 × 480 display offers direct navigation via a capacitive touchscreen.
2. Folders and applications provide quick access to bay screens, metering and monitoring data, reports, settings, and more.
3. Programmable front-panel LEDs with user-configurable labels alert operators to faulted phases, the relay's status, and element operation.
4. Programmable operator pushbuttons with user-configurable labels allow front-panel customization.
5. Power supply options include 24–48 Vdc or 110–250 Vdc/110–240 Vac.
6. An integrated web server enables direct relay access for metering and monitoring data without the need for external PC software.
7. A wide variety of communications protocols and media provide flexibility to communicate with other devices and control systems.
8. Fiber-optic serial port.
9. Mirrored Bits® communications provides fast and reliable relay-to-relay communication.
10. Positions for optional expansion cards.
11. Optional RTD inputs.
12. Voltage and current inputs.



Model Comparison Table

You can customize the SEL-700G for specific applications by selecting preconfigured model options.

Model	Application
SEL-700G0 or SEL-700G0+	Basic generator protection
SEL-700G1 or SEL-700G1+	Full generator protection
SEL-700GT	Intertie protection
SEL-700GT+	Intertie and generator protection
SEL-700GW	Basic dual-feeder protection

ANSI Functions

21C/51VC	Compensator Distance, Voltage Restrained/Controlled Time Overcurrent
24	Volts/Hertz
25G	Synchronism Check
27	Undervoltage
27I	Inverse-Time Undervoltage
27S	Synchronism Undervoltage
32	Directional Power
40	Loss of Field
46	Current Unbalance
49R	Thermal Overload (Resistance Temperature Detector [RTD])
49T	Thermal Model
50N	Neutral Overcurrent
50 (P,G,Q)	Overcurrent (Phase, Ground, Negative Sequence)
51 (P,G,Q)	Time Overcurrent (Phase, Ground, Negative Sequence)
51N	Neutral Time Overcurrent
59I	Inverse-Time Overvoltage
59N (64G1)	Neutral Overvoltage
59S	Synchronism Overvoltage
59 (P,G,Q)	Overvoltage (Phase, Ground, Negative Sequence)
60	Loss of Potential
64F	Field Ground
64G	100% Stator Ground
67 (P,G,Q)	Directional Overcurrent (Phase, Ground, Negative Sequence)
67N	Directional Neutral Overcurrent
78	Out of Step
78VS	Vector Shift
81 (O,U,R)	Frequency (Over, Under, Rate)
87	Three-Phase Current Differential
87N	Neutral Current Differential
REF	Restricted Earth Fault

Additional Functions

52PB	Pushbutton Trip/Close
85 RIO	SEL Mirrored Bits Communications
BF	Breaker Failure
BRM	Breaker Wear Monitor
DFR	Event Reports
ENV	SEL-2600 RTD Module*
HMI	Operator Interface
LDP	Load Data Profiling
LGC	SELogic® Control Equations
MET	High-Accuracy Metering
PMU	Synchrophasors
RTU	Remote Terminal Unit
SER	Sequential Events Recorder
WEB	Web Server

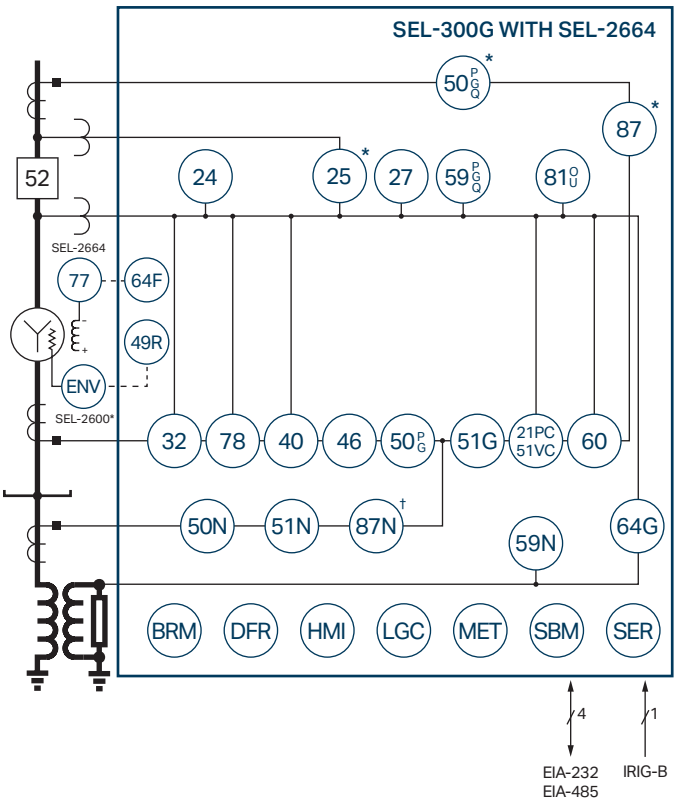
*Optional feature [1]Copper or fiber-optic

SEL-300G
Generator Relay

Starting price
$3,210 USD

selinc.com/products/300G

The SEL-300G provides proven primary and backup protection for utility and industrial generators, meeting IEEE turbine protection standards. High-speed protection for all types of phase and ground faults limits equipment damage and speeds up repairs. Current and voltage elements protect large and small generators against faults, and optional differential protection provides sensitive and fast protection for generators and unit transformers. In addition, harmonic blocking improves security when transformers are in the generator differential zone. The SEL-300G provides 100 percent stator ground fault protection, using fundamental and third-harmonic voltage signals to protect high-impedance grounded generators. Adding the SEL-2664 Field Ground Module lets you detect field ground faults whether the generator is operating, stopped, or de-energized.



ANSI Functions

21PC/51VC	Phase Mho or Compensator Distance Voltage Restrained/Controlled Time Overcurrent
24	Volts/Hertz
25	Synchronism Check*
27	Undervoltage
32	Directional Power
40	Loss of Field
46	Negative-Sequence Overcurrent
49R	Thermal Overload
50N	Neutral Overcurrent
50 (P,G,Q)	Overcurrent (Phase, Ground, Negative Sequence)*
51G	Ground Time Overcurrent
51N	Neutral Time Overcurrent
59N	Neutral Overvoltage
59 (P,G,Q)	Overvoltage (Phase, Ground, Negative Sequence)
60	Loss of Potential
64F	Field Ground
64G	100 Percent Stator Ground
78	Out of Step
81 (O,U)	Over-/Underfrequency
87	Three-Phase Current Differential*
87N	Neutral Current Differential†

Additional Functions

BRM	Breaker Wear Monitor
DFR	Event Reports
ENV	SEL-2600 RTD Module*
HMI	Operator Interface
LGC	SELOGIC® Control Equations
MET	High-Accuracy Metering
SBM	Station Battery Monitor
SER	Sequential Events Recorder

*Optional feature †Available in models that do not specify 87 element

SEL-2664S

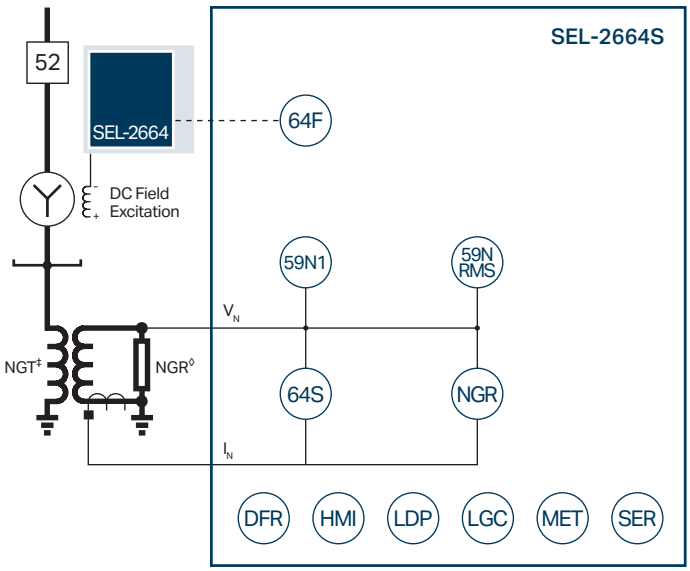
Stator Ground Protection Relay

Starting price
$9,320 USD

selinc.com/products/2664S

The SEL-2664S uses multisine frequency injection and neutral overvoltage-based protection to protect high-impedance grounded generators from ground faults at standstill, during startup, and while running. Up to four individual injected frequencies eliminate protection blind spots during generator startup.

Use the SEL-2664S as a standalone protection device or with the SEL-400G Advanced Generator Protection System, SEL-300G Generator Protection Relay, or SEL-700G Generator Protection Relay. For complete ground fault protection on both the rotor and stator, you can add the SEL-2664 Field Ground Module to the SEL-2664S.



‡Neutral grounding transformer
◊Neutral grounding resistor

ANSI Functions

59N	Stall-Speed Switch
64F	Undervoltage*
64S	Undercurrent/Underpower*

Additional Functions

DFR	Event Reports
HMI	Operator Interface
LDP	Profile Report Monitoring
LGC	SELOGIC® Control Equations
MET	Metering
NGR	Neutral Grounding Resistor Open/Short
SER	Sequential Events Recorder

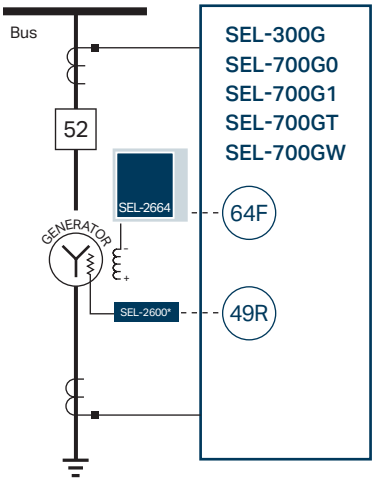
*Optional feature

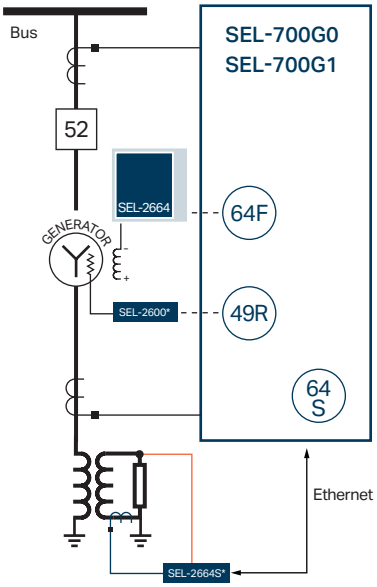
SEL-2664
Field Ground Module

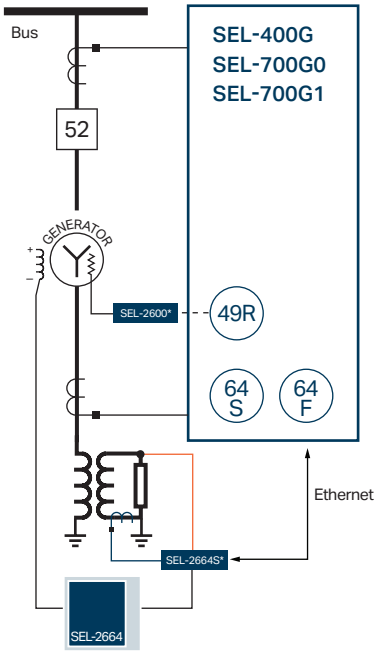
Starting price
$1,560 USD

selinc.com/products/2664

The SEL-2664 integrates with the SEL-300G Generator Relay or SEL-700G Generator Protection Relay to protect all the critical components in your generator. You can add the SEL-2664 to the SEL-2664S Stator Ground Protection Relay for complete ground fault protection on both the rotor and stator. Or, you can combine the SEL-2664, SEL-2664S, and SEL-400G Advanced Generator Protection System for an advanced solution.







ANSI Functions

49R	Thermal Overload (Resistance Temperature Detector [RTD])
64F	Field Ground
64S	Stator Ground (Harmonic Injection)

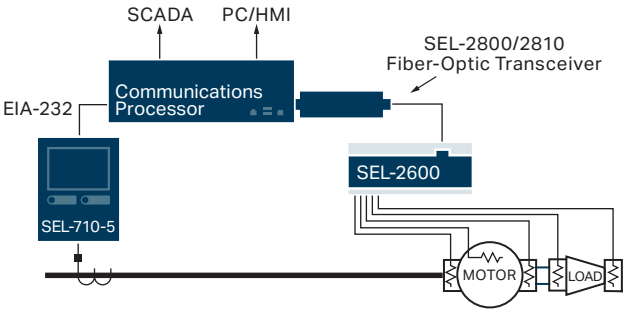
*Optional feature

SEL-2600
RTD Module

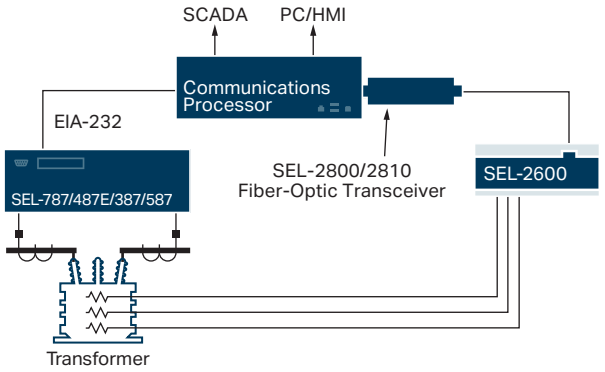
Starting price
$820 USD

selinc.com/products/2600 | Select models typically ship in 2 days

The SEL-2600 transmits data from up to 12 resistance temperature detector (RTD) inputs and a single contact input over a fiber-optic link. One module can accommodate multiple RTD types—copper, nickel, and platinum—to reduce equipment costs. With a flexible panel mount and inexpensive fiber-optic communications, you can place the rugged module near equipment to avoid costly cable installation.

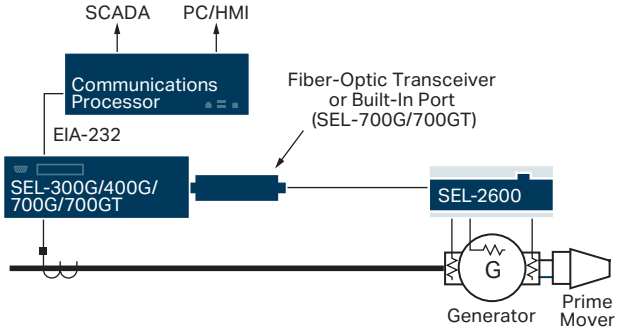


Motor protection with the SEL-710-5.



Transformer protection with the SEL-787, SEL-487E, SEL-387, or SEL-587.

(Note: SEL-387 and SEL-387A relays accept direct SEL-2600 RTD Module connection using SEL-2800 or SEL-2812 Fiber-Optic Transceivers.)



Generator protection with the SEL-300G, SEL-400G, SEL-700G, or SEL-700GT.

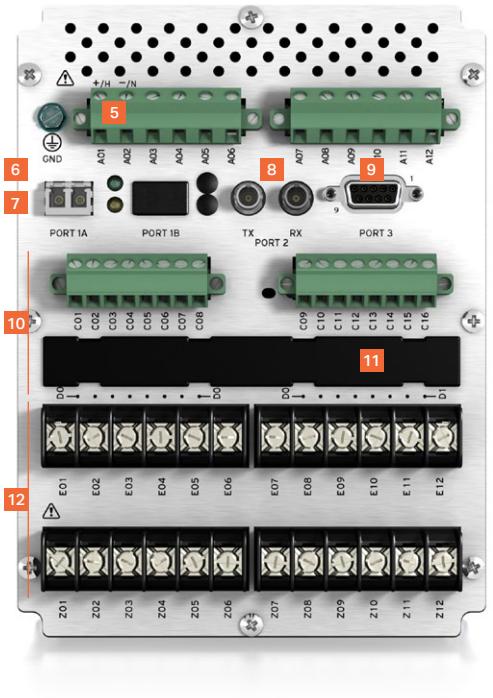
SEL-700BT

Motor Bus Transfer Relay NEW

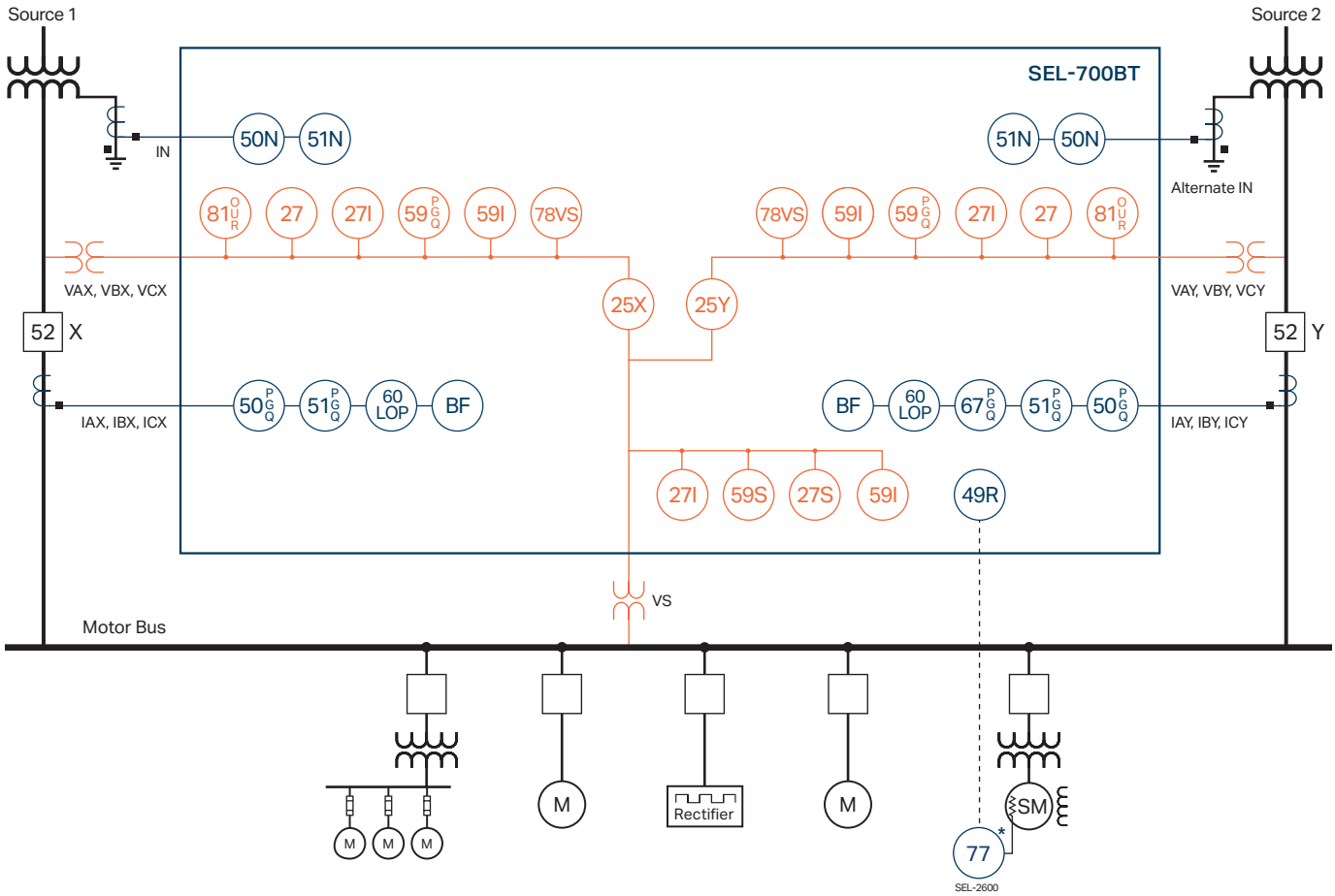
Starting price
$6,200 USD

selinc.com/products/700BT | Select models typically ship in 2 days

The SEL-700BT is a single-relay fast motor bus transfer (MBT) solution. Ensure process continuity by transferring critical loads from a primary source to an auxiliary feeder during faults in the primary feeder line. The relay allows automatic and manual transfers of motor buses to keep processes running without requiring a cold start. The SEL-700BT selects from fast, in-phase, residual, and fixed-time bus transfer based on system conditions.



1. The 5-inch, 800 × 480 display offers direct navigation via a capacitive touchscreen.
2. Folders and applications provide quick access to bay screens, metering and monitoring data, reports, settings, and more.
3. Programmable front-panel LEDs with user-configurable labels alert operators to faulted phases, the relay's status, and element operation.
4. Programmable operator pushbuttons with user-configurable labels allow front-panel customization.
5. Power supply options include 24–48 Vdc or 110–250 Vdc, 110–240 Vac.
6. An integrated web server enables direct relay access for metering and monitoring data without the need for external PC software.
7. A wide variety of communications protocols and media provide flexibility to communicate with other devices and control systems.
8. Fiber-optic serial port.
9. Mirrored Bits® communications provides fast and reliable relay-to-relay communication.
10. Positions for optional expansion cards.
11. Optional RTD inputs.
12. Voltage and current inputs.



ANSI Functions

25G	Synchronism Check
27	Undervoltage
27I	Inverse-Time Undervoltage
27S	Synchronism Undervoltage
49R	Thermal Overload
50N	Neutral Overcurrent
50 (P,G,Q)	Overcurrent (Phase, Ground, Negative Sequence)
51N	Neutral Time Overcurrent
51 (P,G,Q)	Time Overcurrent (Phase, Ground, Negative Sequence)
59I	Inverse-Time Overvoltage
59S	Synchronism Overvoltage
59 (P,G,Q)	Overvoltage (Phase, Ground, Negative Sequence)
60LOP	Loss of Potential
67 (P,G,Q)	Directional Overcurrent (Phase, Ground, Negative Seq.)
77	Field Device*
78VS	Vector Shift
81 (O,U,R)	Over-/Underfrequency, Rate-of-Change of Frequency

Additional Functions

85 RIO	SEL Mirrored Bits Communications
BF	Breaker Failure
BRM	Breaker Wear Monitor
DFR	Event Reports
HMI	Operator Interface
LDP	Load Data Profiling
LGC	SELogic® Control Equations
MET	High-Accuracy Metering
SER	Sequential Events Recorder
WEB	Web Server

*Optional feature

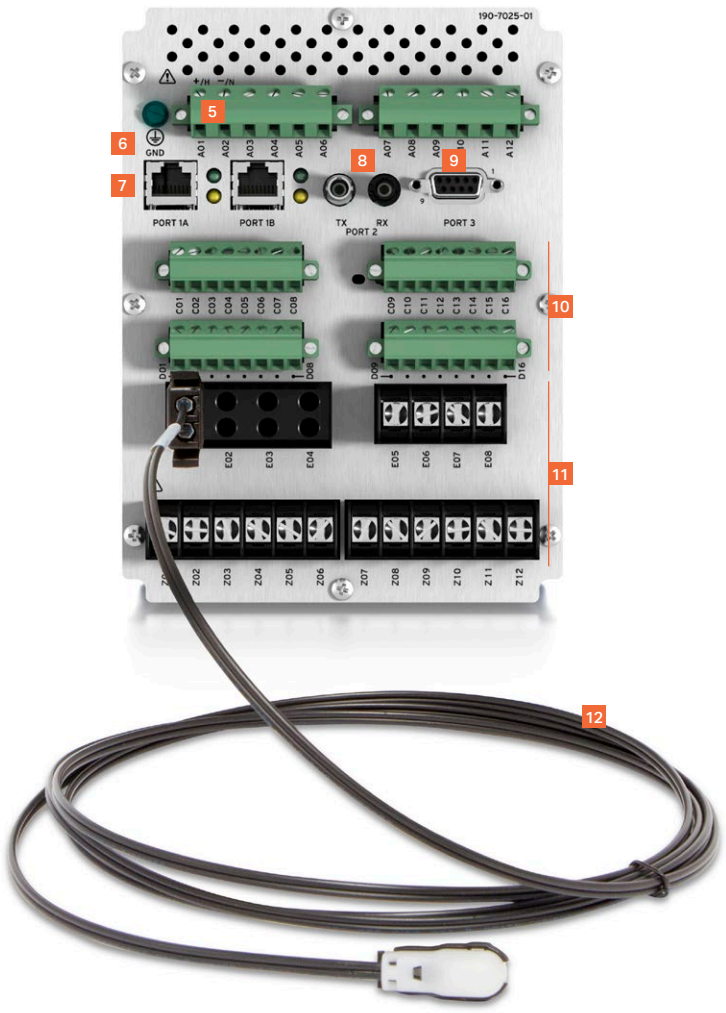
SEL-710-5

Motor Protection Relay

Starting price
$3,110 USD

selinc.com/products/710-5

A single SEL-710-5 can protect asynchronous (induction) and synchronous motors. Features include broken rotor bar detection, incipient-fault detection, predictive-maintenance capability, and variable-frequency drive (VFD) support as well as options for arc-flash detection (AFD), differential protection, and synchronous motor protection. The synchronous option supports power factor regulation and includes, at no additional cost, a voltage divider accessory to interface with the motor excitation system. Together with the SEL AccuTrack™ Thermal Model, these features provide a solution for all your motor protection applications.



1 The 5-inch, 800 × 480 display offers direct navigation via a capacitive touchscreen.

2 Folders and applications provide quick access to bay screens, metering and monitoring data, reports, settings, and more.

3 Programmable front-panel LEDs with user-configurable labels alert operators to faulted phases, the relay's status, and element operation.

4 Programmable operator pushbuttons with user-configurable labels allow front-panel customization.

5 Power supply options include 24–48 Vdc or 110–250 Vdc/110–240 Vac.

6 An integrated web server enables direct relay access for metering and monitoring data without the need for external PC software.

7 A wide variety of communications protocols and media provide flexibility to communicate with other devices and control systems.

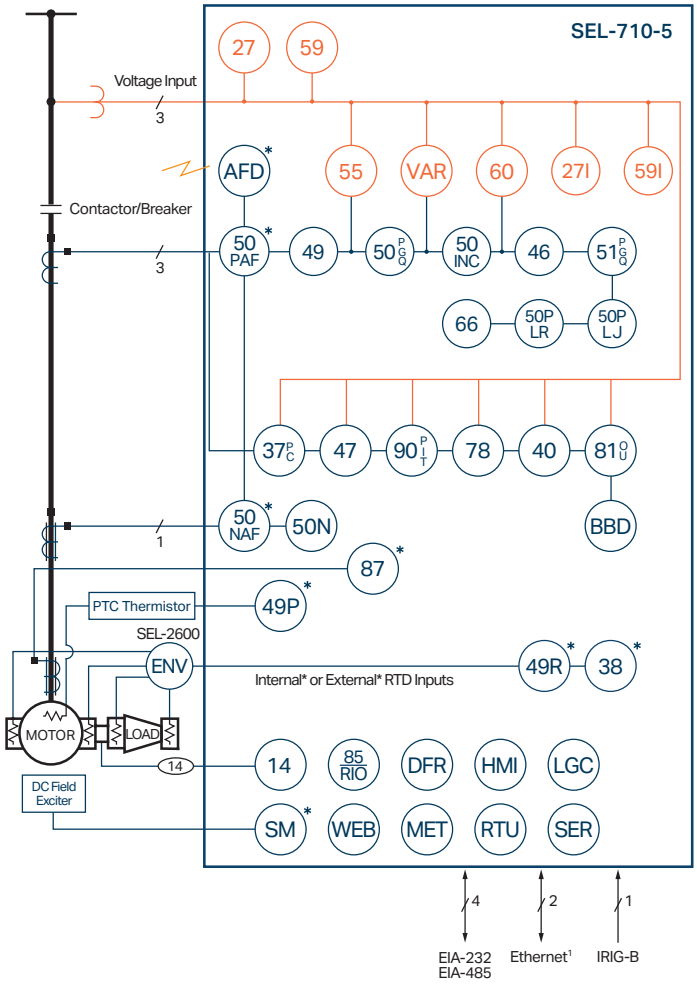
8 Port options include demodulated IRIG-B for precise-time input or a PTC input to protect against overcurrent conditions.

9 Mirrored Bits® communications provides fast and reliable relay-to-relay communication.

10 Card slots include positions for optional I/O, arc-flash detection, or synchronous motor inputs/differential current inputs.

11 CT and PT inputs are located on one card, allowing for more I/O in other slots.

12 Optional optical point sensor for AFD. Bare-fiber optical sensors are also available.



ANSI Functions

14	Speed Switch
27	Phase Undervoltage
27I	Phase Undervoltage With Inverse Characteristic
37 (P,C)	Underpower/Undercurrent
38	Bearing Temperature*
40	Loss of Field
46	Current Unbalance
47	Phase Reversal
49P	Positive Temperature Coefficient (PTC) Overtemperature*
49R	Resistance Temperature Detector (RTD) Thermal*
49	Rotor and Stator Thermal Models
50 (P,G,Q)	Overcurrent (Phase, Ground, Negative Sequence)
50INC	Incipient Cable Fault Detection
50NAF	Arc-Flash Neutral Overcurrent*
50PAF	Arc-Flash Phase Overcurrent*
50P LR	Locked Rotor
50P LJ	Load Jam
50N	Neutral Overcurrent
51 (P,G,Q)	Time Overcurrent (Phase, Residual, Negative Sequence)
55	Power Factor
59	Phase Overvoltage
59I	Overvoltage With Inverse Characteristic
60	Loss of Potential
66	Starts Per Hour
78	Out of Step
81 (O,U)	Over-/Underfrequency
87	Current Differential*
90 (P,I,T)	Load Control (Power, Current, Thermal Capacity)

Additional Functions

50/51	Adaptive Overcurrent
85 RIO	SEL Mirrored Bits Communications
97FM	Frequency Component Analyzer
AFD	Arc-Flash Detector[2]
BBD	Broken Rotor Bar Detection
DFR	Event Reports—Motor Starts, Motor Operating Statistics
ENV	Optional SEL-2600 RTD Module
HMI	Operator Interface
LDP	Load Data Profiling
LGC	SELogic® Control Equations
MET	High-Accuracy Metering
RTU	Remote Terminal Unit
SDTM	Slip-Dependent AccuTrack™ Thermal Model
SER	Sequential Events Recorder
SM	Synchronous Motor Control and Protection[2]
VAR	Reactive Power
VFD	Variable-Frequency Drive Support
WEB	Web Server

*Optional feature [1]Copper or fiber-optic

[2]Mutually exclusive optional features

SEL-849

Motor Management Relay

selinc.com/products/849

Select models typically ship in 2 days

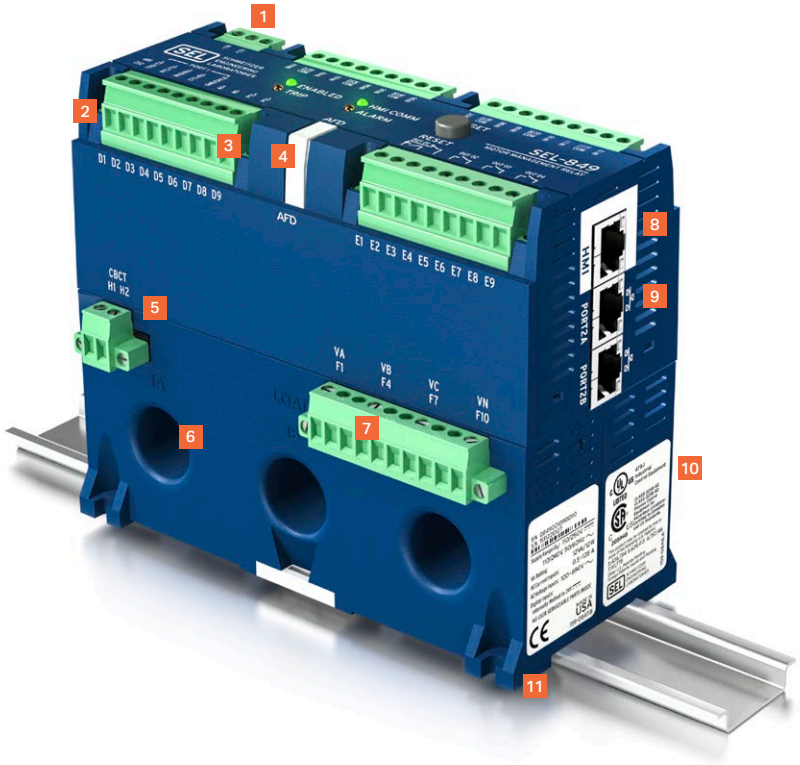
Starting price

SEL-849: $730 USD

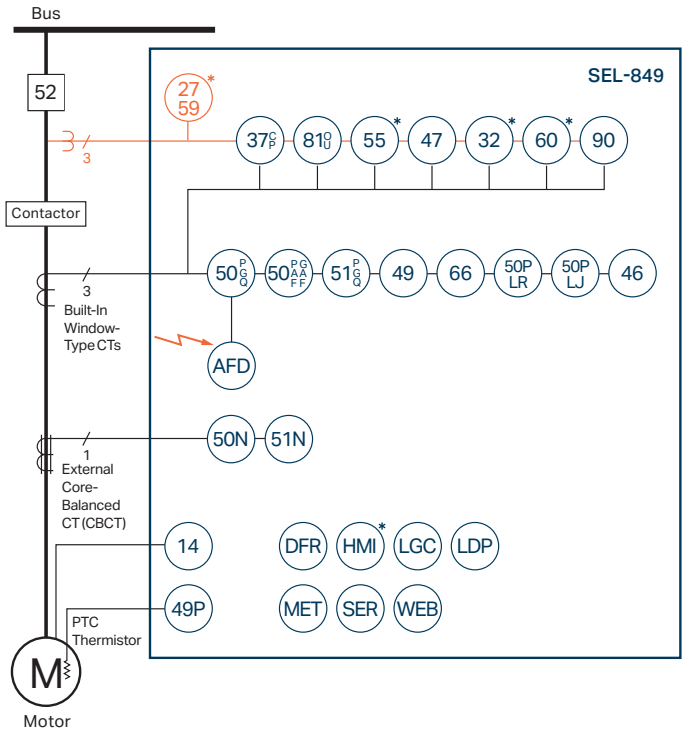
SEL-3421: $190 USD

SEL-3422: $130 USD

The SEL-849 offers current-, voltage-, and thermal-based motor protection; arc-flash detection; and power metering for low- and medium-voltage industrial applications. It provides all basic motor protection features, including protection for short-circuit, load loss, load jam, frequent starting, unbalanced current, and phase reversal conditions. You can easily install the SEL-849 inside a motor control center (MCC) and add the optional SEL-3421 and SEL-3422 Motor Relay HMIs to the front of the MCC.



1. Power supply options: 110–240 Vac, 125–250 Vdc; or 24–48 Vdc
2. EIA-232 or EIA-485 serial port
3. Analog output and PTC (thermistor) input
4. Optical arc-flash sensor
5. Input for separate CBCT
6. Window-type CTs, 0.5–256 A range
7. Direct-connect voltage inputs (up to 690 Vac)
8. Port for remote HMI with HMI power supply
9. EIA-232/EIA-485 or single or dual Ethernet port(s), Modbus RTU, Modbus TCP, IEC 61850, EtherNet/IP, DNP3, and Parallel Redundancy Protocol (PRP)
10. An integrated web server that enables direct relay access for metering and monitoring data without the need for external PC software
11. DIN rail or surface mount
12. Large LCD display for navigation, relay control, and diagnostics
13. Context-adjusted navigation keys
14. Two fixed and eight programmable tricolored LEDs
15. Fundamental motor controls
16. Simple HMI for status and control
17. Configurable label for programmable LEDs



ANSI Functions

14	Speed Switch
27	Undervoltage*
32	Directional Power*
37C	Undercurrent
37P	Underpower*
46	Current Unbalance
47	Phase Reversal
49	Thermal Model
49P	Positive Temperature Coefficient (PTC) Overtemperature
50G AF	Arc-Flash Residual Overcurrent
50N	Neutral Overcurrent
50P AF	Arc-Flash Phase Overcurrent
50 (P,G,Q)	Overcurrent (Phase, Ground, Negative Sequence)
50P LJ	Load Jam
50P LR	Locked Rotor
51N	Neutral Time Overcurrent
51 (P,G,Q)	Time Overcurrent (Phase, Residual, Negative Sequence)
55	Power Factor*
59	Phase Overvoltage*
60	Loss of Potential*
66	Starts Per Hour
81 (O,U)	Over-/Underfrequency*
90	Load Control

Additional Functions

AFD	Arc-Flash Detector
CC	Conformal Coating*
DFR	Event Reports—Motor Starts, Motor Operating Statistics, Sequential Events Recorder
HMI	Operator Interface*
LDP	Load Data Profiling
LGC	SELOGIC® Control Equations
MET	Metering—RMS Voltage and Current, Frequency, Power, Power Factor, Energy, Maximum/Minimum, Thermal, Thermal Capacity Used
SER	Sequential Events Recorder
VFD	Variable-Frequency Drive Support
WEB	Web Server

*Optional feature