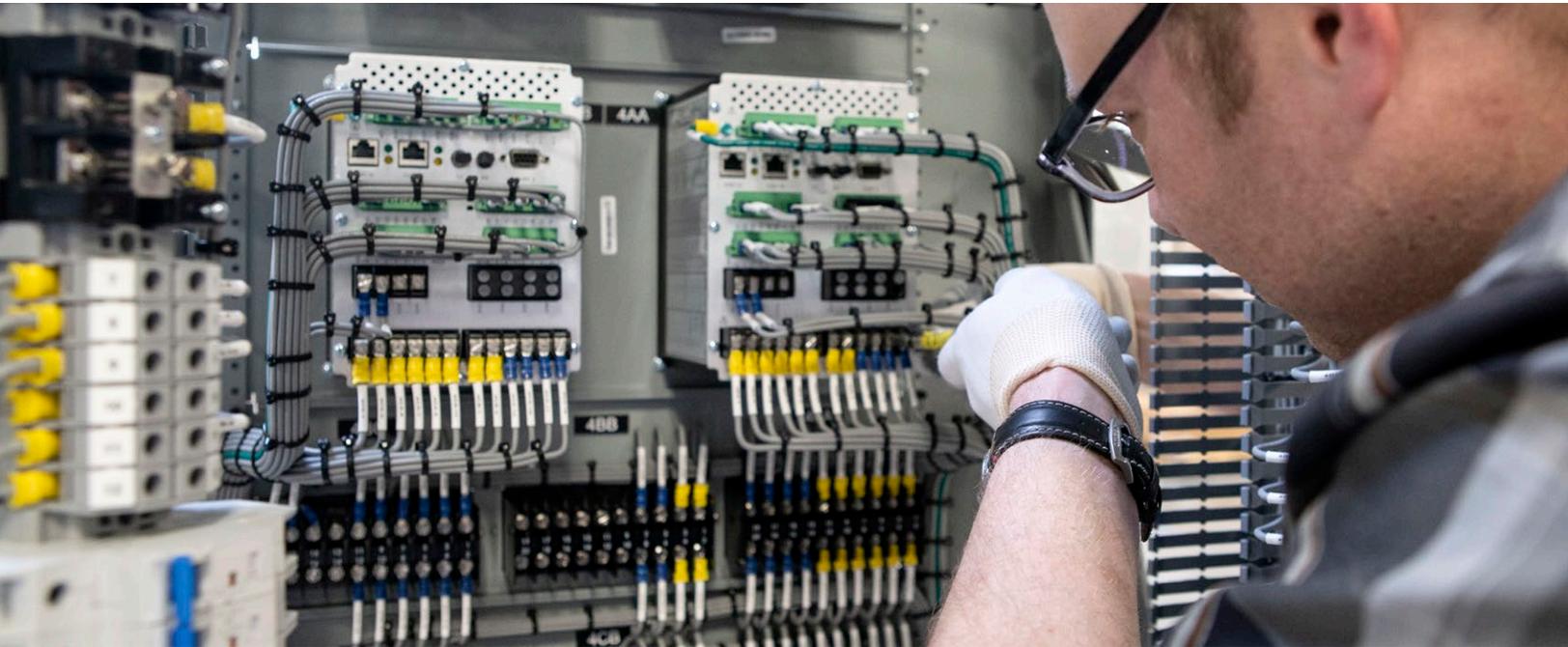


SEL-7200

Configure-to-Order (CTO) Panels and Retrofit Plates



Increased quality, faster lead times, and reduced total cost of ownership

- Choose from a set of predesigned application modules, and create a panel that's ready to ship within 4 weeks.
- A consistent, methodical design and manufacturing approach offers higher quality, reliability, and performance than traditional custom panels.
- Achieve up to a 40 percent savings in total cost of ownership versus a comparable custom panel.
- Each panel is designed with SEL best-known engineering methods and field-tested expertise.
- Predesigned and validated settings for application modules speed up deployment with guaranteed functionality.



Engineered to SEL Best-Known Practices

SEL CTO panels allow you to select from a set of predesigned application modules that you can tailor to your application. They are available through our Engineering Services (ES) division and embody SEL best-known engineering methods and field-tested expertise in mechanical design, cable management, protection, precise time, automation, communications, and metering.

Application modules support common protection and automation practices while universal wiring to terminal blocks allows customization to adapt to any common primary equipment configuration and operation practice.

The SEL Difference

SEL uses the same world-class manufacturing principles for our panels that we use for all our industry-leading products. This allows us to design, manufacture, test, and deliver top-quality and comprehensive panel systems.

Complete vertical integration and standardized application designs help us maintain competitive prices and high quality while still meeting the highest functionality requirements and offering delivery in weeks, not months.

Design Principles

SEL CTO panels provide the following:

- Fully redundant protection and breaker failure protection at all voltage levels.
- Preconfiguration for cybersecurity framework integration.
- Advanced SEL technology, such as arc-flash protection and zone-interlocked bus protection logic, that is ready to deploy.
- Simple integration to SCADA and HMI.
- Continuous monitoring to reduce the possibility of hidden failures and facilitate extended testing intervals.
- An industrial design for improved human performance.





Design Validation That Guarantees Expected Performance

We build a prototype and test each application module design to ensure it meets functional specifications. This process allows our manufacturing facility to properly document processes and test manufacturing equipment for production.

Drawing Package

SEL CTO panels come with comprehensive information using best practices for documenting protection and control circuitry. With standardization, the level of error-free detail is unmatched compared to what is practical with custom panels. SEL drawing packages are personalized to your substation project and nomenclature and include the following:

- Application-specific circuit information.
- One-line diagram customized with your primary equipment information.
- AC schematics diagrams documenting relay sensing circuits, protection functions, and space to incorporate customer primary equipment information.
- DC schematic diagrams with panel control circuits and space to include external connection points from marshalling cabinets and primary equipment.
- Comprehensive logic diagrams documenting logic settings for the application, including local/remote control and indication, target LEDs, fault protection, alarms, event report triggers, open, close, reclose, and trip.
- Panel layout drawing containing device locations, dimensions, and anchoring details.
- Wiring diagram with wiring label nomenclature.
- Nameplate drawing that includes all labels created and installed in the panel.

Panels That Ship in Weeks, Not Months

We engineer, manufacture, and test our panels to ensure adequate operation before delivery. When a panel arrives at your site, it is already verified as fully functional.

Place an order today, and we will ship your panel within 4 weeks.

Warranty and Support

SEL panels are supported by an unmatched ten-year warranty and the industry's best customer service.



Designed for Simple and Easy Installation, Commissioning, and Maintenance

All components associated with an application module are physically co-located, reducing the possibility for mistakes while simplifying the installation, commissioning, and future module additions or upgrades.

By organizing components and functionalities into application modules, SEL leverages world-class manufacturing principles to provide a more robust, consistent, and repeatable product.

All wires are cut, stripped, and crimped on state-of-the-art automated equipment, eliminating waste, guaranteeing repeatability, and ensuring the quality of each crimp. Connections are positioned within easy reach for technicians, and every wire is labeled at both ends to make connections obvious and to speed up troubleshooting.

Application modules are mechanically assembled, wired, and tested in the production line for faster production and delivery.



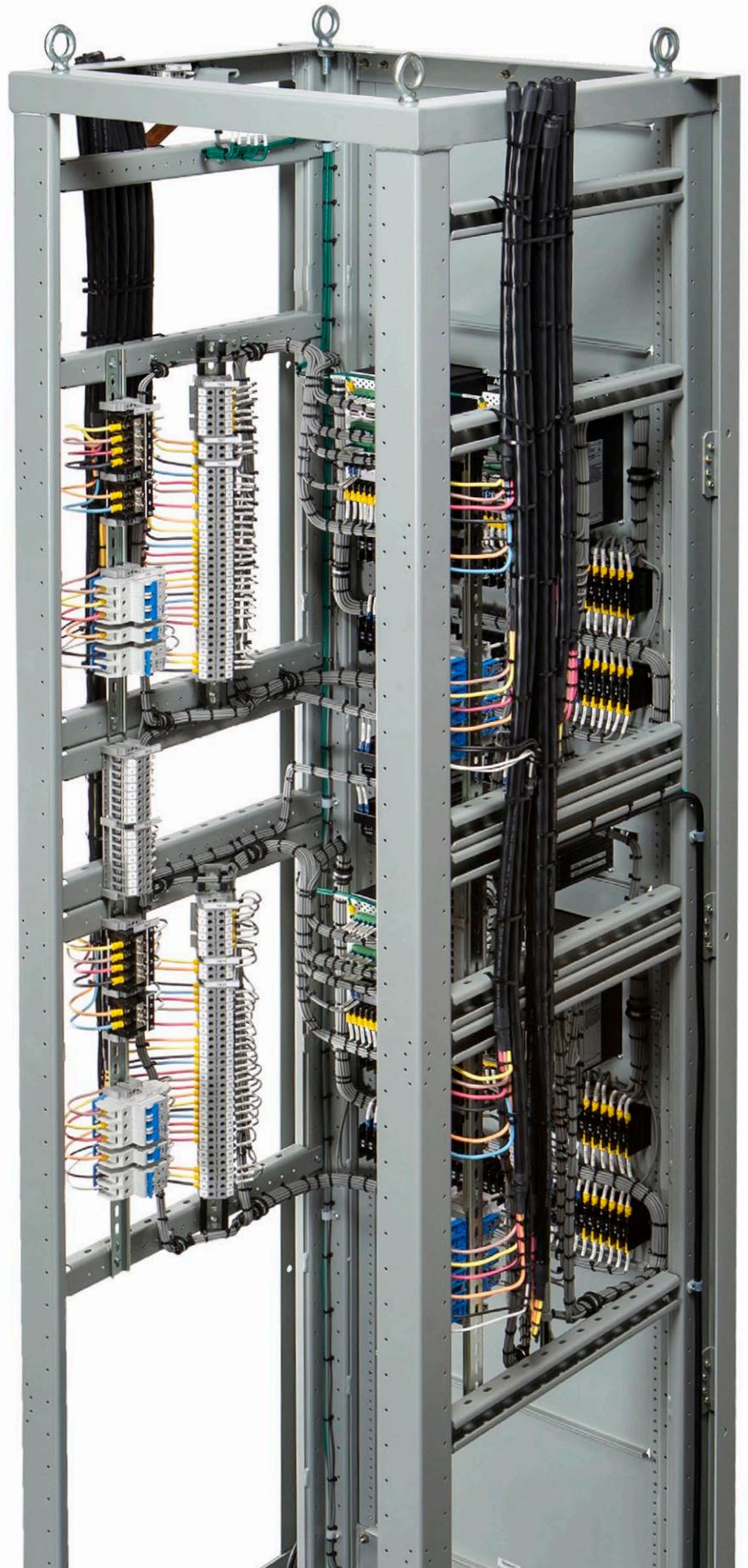
Designed and Built for Human Performance

Human error is often referenced as the main cause for events that occur in the power system. With standardized applications, co-located components, adequate space, and improved labeling, SEL CTO panels help increase safety for personnel and reduce the possibility for error.

Open-Back Rack

The SEL CTO rack is designed from the ground up for critical infrastructure protection, control, and communications equipment. The rack offers the following features:

- UL 508A compliance with 48 rack units of equipment space
- Load capacity of 1,700+ pounds and multiple anchoring options
- Dimensions of 92" tall × 28" wide × 28" deep
- EIA-compliant 19" rack with universal hole spacing
- Removable eye bolts and sockets for easy maneuvering during site installation
- ANSI 61 gray textured finish; powder coat paint
- Manufactured with no sharp edges that can damage wiring or people
- Ample field cable access from top or bottom and physical separation for field and internal wiring, with 45-degree angled terminal blocks for easier visibility and accessibility
- Copper ground bar, convenience ac outlet, and cable pass-through
- Electrical bonding of all steel members for grounding safety
- Prepunched side brackets for easy equipment installation and wire tying
- Side covers and field wire extensions available as accessories
- Customized lamicoid engraved nameplates for all equipment



Meet Your Configuration Needs

SEL CTO panels and plates provide advanced protection, control, automation, and communications for different substation applications. To configure a panel or plate, select from the available options described below (with more coming in the future).

SEL-7201 Feeder Protection Panel

SEL-7201 panels provide advanced protection and control for up to four feeders using either SEL-351S or SEL-751 Feeder Protection Modules with the following features:

- Overcurrent, voltage, frequency, breaker failure, and power elements
- Reclosing
- Sync-check
- Hot-line tagging
- Remote breaker control via communications
- Integration with zone-interlocked bus protection for the source bus (IEEE C37.234)
- Battery and breaker wear monitoring
- Sequential Events Recorder (SER)
- Load profile reporting
- Integration with advanced SEL-FT50 and SEL-FR12 Fault Transmitter and Receiver System distribution protection schemes
- Dimensions of 92" tall × 28" wide × 28" deep
- Customizable wire labels to match your existing nomenclature
- Customizable nameplates to meet your nomenclature needs
- Drawing package
- Automation and communications modules available (see page 15)





SEL-351S Feeder Protection Module

In addition to the previously listed functions, this module provides advanced feeder protection for one feeder and offers breaker-control functions via independent direct-acting pushbuttons on the relay. You can add up to four of these modules per panel.

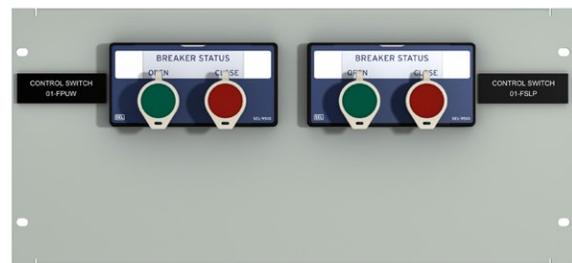


SEL-751 Feeder Protection Module

In addition to the previously listed functions, this module provides the following:

- Arc-flash detection
- Breaker control via independent direct-acting pushbuttons on the SEL-9510 Control Switch Module

You can add up to two of these modules per panel to accommodate up to four feeders.



SEL-9510 Control Switch Module

This module provides breaker control and indication for one to four breakers. You can add up to two of these modules per panel.

SEL-7202 Line Protection Panel

Using phasors and time-domain technology, SEL-7202 panels provide the most advanced and fastest protection and control for two-terminal, two-breaker transmission lines. Select between phase distance, line current differential, and/or traveling-wave protection relays to obtain the following:

- Fully redundant line current differential and/or distance protection
- Main 1 line current differential and/or distance protection; Main 2 ultra-high-speed line protection
- Pilot protection using directional comparison blocking (DCB), permissive overreaching transfer trip (POTT), and directional comparison unblocking (DCUB) schemes
- Direct transfer trip (DTT) protection
- Overcurrent and directional elements
- Breaker failure protection and reclosing for two breakers
- Adaptive autoreclose cancel logic for hybrid lines
- Sync-check
- Trip circuit monitoring
- Local/remote operation for two breakers and one line switch
- Hot-line tagging
- Digital lockout and reset logic for two breakers (86BF1 and 86BF2)
- Battery and breaker wear monitoring
- Sequential Events Recorder (SER)
- Load profile reporting
- Traveling-wave-based fault locating and line monitoring
- 1 MHz sampling for event records
- Built-in event playback testing
- Reliable control power from multiple sources using the SEL-RPM Redundant Power Module
- Dimensions of 92" tall × 28" wide × 28" deep
- Customizable wire labels to match your existing nomenclature
- Customizable nameplates for your nomenclature needs
- Drawing package
- Automation and communications modules available (see page 15)





SEL-411L Line Current Differential Protection Module

This module provides comprehensive line protection and control, including line current differential, distance, and pilot protection as primary functions. Additional functions include overcurrent protection, breaker failure protection for two breakers, reclosing, sync-check, and DTT.



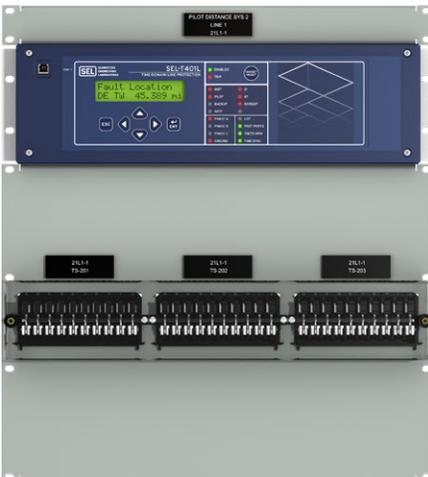
SEL-421 Line Distance Protection Module

This module provides comprehensive line protection and control, including distance and pilot protection as primary functions. Additional functions include overcurrent protection, breaker failure protection and reclosing for two breakers, sync-check, and DTT.



SEL-9510 Control Switch Module

This module provides independent local control and indication for up to three switching devices. It is also available with rotary control switches.



SEL-T401L Ultra-High-Speed Line Protection Module

This module provides easy-to-use ultra-high-speed protection using time-domain technology with traveling waves and incremental quantities as primary functions. It also includes complementary phasor-based distance protection, overcurrent protection, directional elements, and pilot protection. Trip in as fast as a quarter cycle, locate faults within a single tower span, and monitor incipient faults with this cutting-edge SEL technology.



SEL-311C Line Distance Protection Module

This module provides line protection, including distance and pilot protection as primary functions. Additional functions include breaker failure protection and reclosing for one breaker, sync-check, and DTT.



Lockout Relay Module

This module provides independent mechanical lockout for the breaker failure protection (86BF) using rotary lockout switches.



SEL-RPM Redundant Power Module

This module provides reliable dc output to power protection, monitoring, and control equipment in the panel by combining multiple ac and dc sources into a single control power output. Energy storage capacitors provide ride-through capability and support switch or breaker trip/close applications.

SEL-7203 Distribution Transformer Protection Panel

SEL-7203 panels provide advanced protection and control for distribution transformers with a single high-/low-side transformer zone boundary. These panels include the following features:

- Fully redundant differential protection
- Restricted earth fault (REF) protection
- Transformer through-fault overcurrent backup protection
- High-speed bus protection using a zone interlock (fast bus blocking) scheme with a partial differential accommodating a single bus-tie breaker
- Time-coordinated system backup protection with a partial differential accommodating a single bus-tie breaker
- Breaker failure protection
- Trip circuit monitor
- Transformer and breaker alarm monitoring
- Remote breaker control via communications
- Digital lockout and reset logic for 86T and 86BF
- Battery and breaker wear monitoring
- Sequential Events Recorder (SER)
- Load profile reporting
- Dimensions of 92" tall × 28" wide × 28" deep
- Customizable wire labels to match your existing nomenclature
- Customizable nameplates to meet your nomenclature needs
- Drawing package
- Automation and communications modules available (see page 15)





SEL-787/SEL-751 Transformer Protection Module

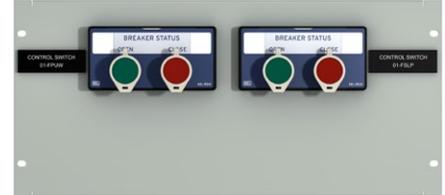
This module is always required and provides transformer differential and bus zone interlock protection using the SEL-787 Transformer Protection Relay, high-side breaker/circuit switching, motor-operated air break control, and sudden pressure tripping supervision. It also provides overcurrent through-fault and system backup protection using an SEL-751 Feeder Protection Relay and can perform direct transfer tripping if there is no local high-side interrupter.



SEL-787 Redundant Transformer Protection Module

This module is always required and provides redundant transformer differential protection, REF protection, overcurrent through-fault protection, and low-side breaker control and breaker failure protection.

If the station includes a bus-tie breaker, a version of the module that includes an SEL-751 breaker control relay is available. This relay provides breaker control with breaker failure, synchrocheck, and voltage monitor supervision. The tie breaker relay can also provide arc-flash protection if the buses are covered by arc-flash sensors.



SEL-9510 Control Switch Module

This module provides independent local control and indication for up to four switching devices.



Rotary Control Switch Module

This module provides independent local control and indication for up to three switching devices using rotary switches.



Lockout Relay Module

This module provides independent mechanical lockout for the transformer protection (86T) and/or breaker failure protection (86BF) using rotary lockout switches.

SEL-7206 Distribution Bus Differential Protection Panel

SEL-7206 panels provide optimized low-impedance bus differential protection for distribution buses with one main, one tie, and up to five feeders. These panels include the following features:

- Subcycle low-impedance bus differential protection
- Breaker failure protection
- Backup overcurrent protection for up to five feeders
- Digital lockout and reset logic for 86B
- Trip circuit monitor
- Sequential Events Recorder (SER)
- Dimensions of 92" tall × 28" wide × 28" deep
- Customizable wire labels to match your existing nomenclature
- Customizable nameplates to meet your nomenclature needs
- Drawing package
- SEL-2740S communications module available (see page 15)





SEL-487B Distribution Bus Protection Module
 This module provides subcycle low-impedance bus differential, breaker failure, and backup overcurrent protection for buses with up to five feeders. You can add up to two of these modules per panel to protect two bus segments with up to ten feeders.



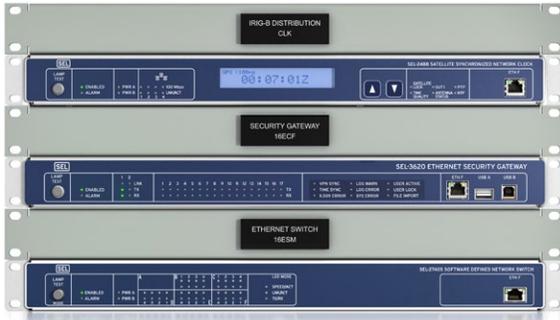
Lockout Relay Module
 This module provides independent mechanical lockout for the bus protection (86B). Available with up to two lockouts.

SEL-7207 Automation, Communications, and Cybersecurity Panel

SEL-7207 panels offer advanced time synchronization, automation, communications, and cybersecurity for your substation. These panels all include the following features and attributes:

- Satellite-synchronized clock with IRIG-B, Network Time Protocol (NTP), and Precision Time Protocol (PTP)
- Inherently cyber-secure, reliable, and high-performance Ethernet network
- Firewall, routing, and IPsec VPN endpoint
- User-based authentication and authorization
- IED password management
- Syslog
- Data concentration, system database, and SCADA communications
- Automatic event collection and processing
- Communication protocols, including DNP3 and IEC 61850
- Dimensions of 92" tall × 28" wide × 28" deep
- Customizable wire labels to match your existing nomenclature
- Customizable nameplates to meet your nomenclature needs
- Drawing package
- Option to expand serial or Ethernet ports as required for your connected IEDs

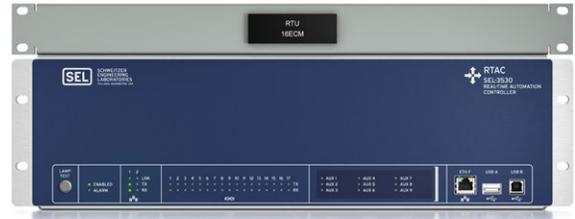




SEL Time, Cyber, and Communications Module

This module provides the following:

- Precise time synchronization via multiple protocols, including the Network Time Protocol (NTP), IRIG-B, and the Precision Time Protocol (PTP), using the SEL-2488 Satellite-Synchronized Network Clock.
- Firewall, routing, IPsec VPN endpoint, user-based authentication and authorization, IED password management, and Syslog using the SEL-3620 Ethernet Security Gateway.
- Inherently cyber-secure, reliable, and high-performance Ethernet communication using the SEL-2740S Software-Defined Network Switch.



SEL System Automation Module

This module uses the SEL-3530 Real-Time Automation Controller (RTAC) to provide the following:

- Automatic event collection and processing
- Data concentration
- System database
- SCADA communications via multiple protocols, including DNP3 and IEC 61850
- Engineering access
- Substation control



SEL Port Server Module

This module provides 16 serial ports for IED integration and communications using the SEL-3610 Port Server.



SEL SDN Ethernet Switch Module

This module provides 24 Ethernet ports for IED integration and communications as well as software-defined networking (SDN) using the SEL-2740S.

SEL-7210 Retrofit Plates

Retrofit and modernize existing panels/switchgear with an SEL-7210 feeder plate, or install a plate in new equipment, to get all the benefits of CTO panels in your project. All SEL-7210 plates offer the following features:

- Overcurrent, voltage, frequency, breaker failure, and power elements
- Reclosing
- Sync-check
- Hot-line tagging
- Remote breaker control via communications
- Integration with zone-interlocked bus protection for the source bus (IEEE C37.234)
- Battery and breaker wear monitoring
- Sequential Events Recorder (SER)
- Load profile reporting
- Integration with advanced SEL-FT50 and SEL-FR12 Fault Transmitter and Receiver System distribution protection schemes
- 15-foot pigtailed to connect to your existing terminal blocks
- Dimensions of 15.75" tall x 22.00" wide x 10.00" deep
- Customizable wire labels to match your existing nomenclature
- Customizable nameplates to meet your nomenclature needs
- Drawing package



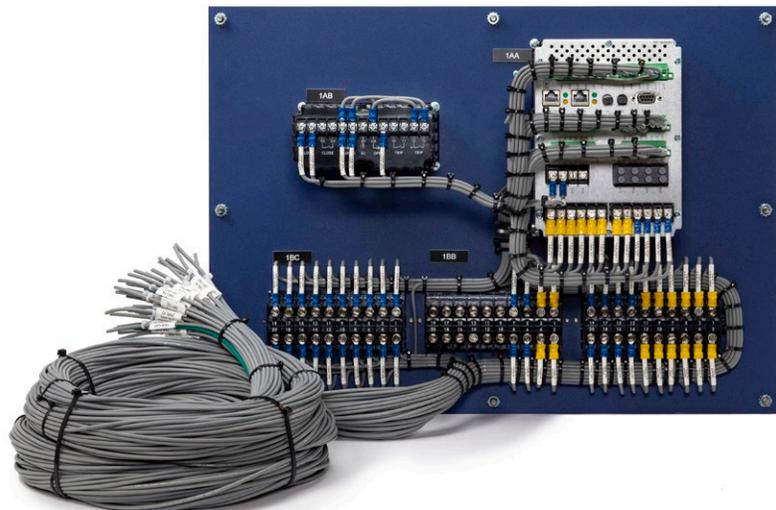
SEL-351S Feeder Retrofit Plate

This plate provides advanced feeder protection for one feeder and offers breaker control functions via independent direct-acting pushbuttons on the relay.



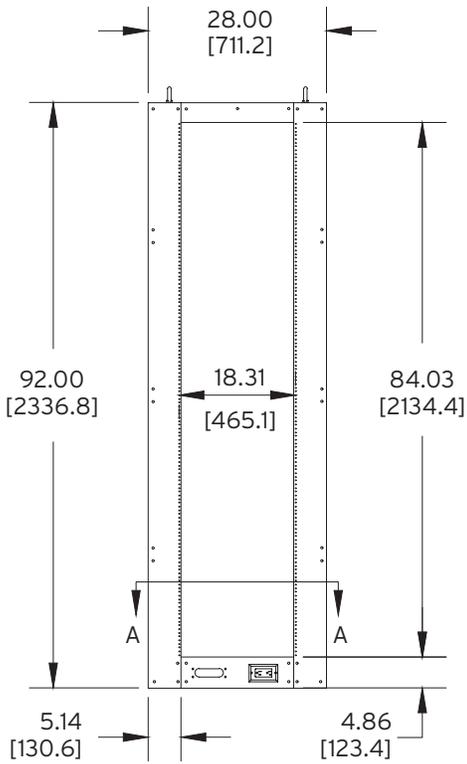
SEL-751 Feeder Retrofit Plate

This plate provides advanced feeder protection for one feeder, offers breaker control functions via SEL-9510 pushbuttons, and offers arc-flash detection.

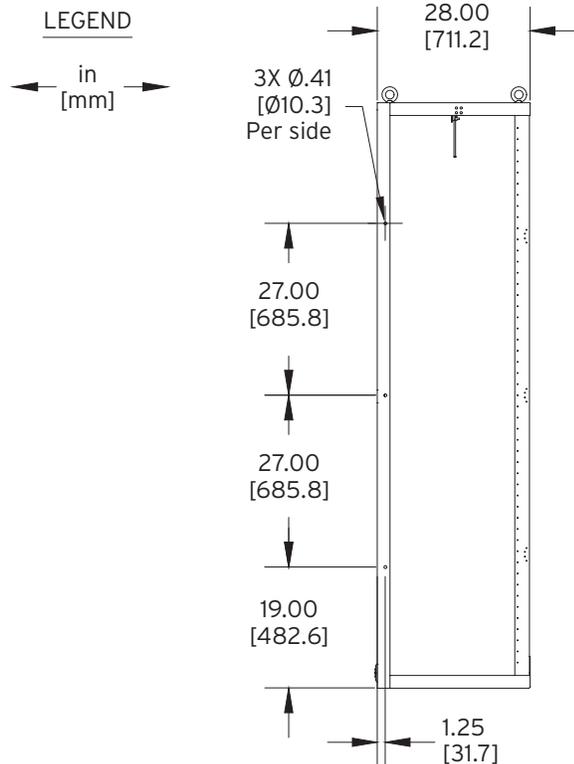


Dimensions

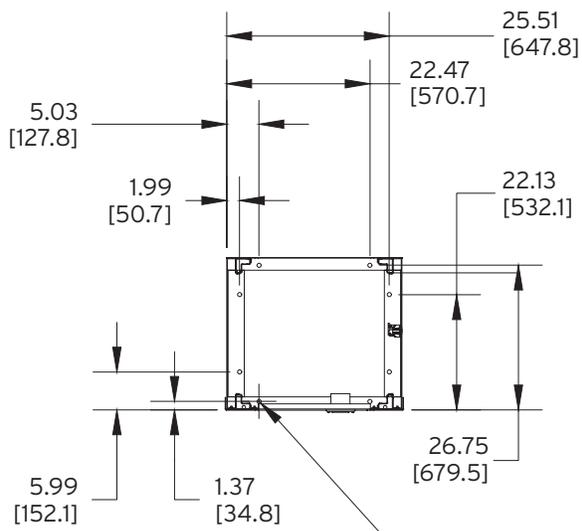
SEL CTO Panels



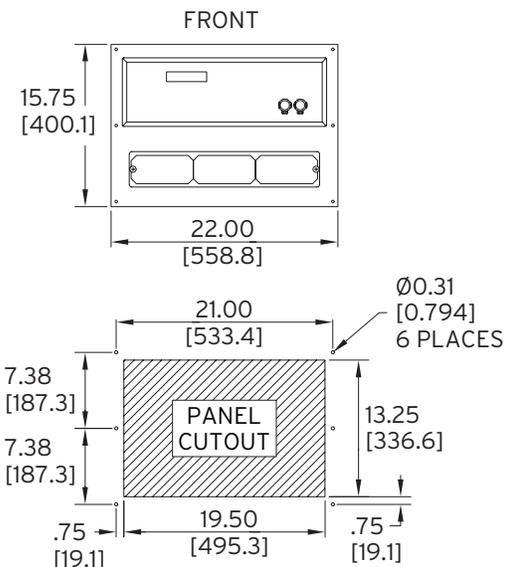
FRONT



SIDE



SEL CTO Retrofit Plate







Available Through Engineering Services

SEL ES provides complete protection, automation, communications, and power management solutions for critical electrical infrastructure worldwide. We have expertise in utility and industrial power system management, integration of distributed energy sources (DERs), and cybersecurity best practices. SEL industry-experienced engineers provide the best possible solution for every project, meeting a growing need in the electric power industry as companies deal with reduced engineering staffs and increasingly complex requirements.

Please contact our team for your next CTO panel. Our experts will work with you to understand your unique challenges and provide an innovative, economical solution. An ES expert is ready to assist in configuring a panel that meets your next project requirements.



SEL Engineering Services
+1.509.332.1890 | esinfo@selinc.com | selinc.com

© 2021 by Schweitzer Engineering Laboratories, Inc.
PF00640 • 20210430