

# WATER AND WASTEWATER SOLUTIONS





40+ YEARS OF INNOVATION

6,500+ EMPLOYEES WORLDWIDE

100% EMPLOYEE-OWNED

170+ COUNTRIES WITH SEL SOLUTIONS AND SERVICES

100+ OFFICES WORLDWIDE

# SCHWEITZER ENGINEERING LABORATORIES (SEL)

SEL is a trusted provider of complete power protection, automation, communications, and metering solutions for critical industries and utilities worldwide. From oil refineries in deserts to the world's largest water and wastewater facilities, operations around the world rely on SEL solutions to improve electrical safety and protect power infrastructure and essential equipment. Our solutions are designed and tested to operate reliably in the harshest environments, and we back that reliability with a ten-year, no-questions-asked warranty.

If you face a smaller engineering staff and increasingly complex regulatory requirements, SEL can help. SEL engineers are industry experts with experience in distribution protection and control, industrial power system management, distributed energy resource integration, and cybersecurity best practices. They can help you meet your operational needs with the following solutions and services.

## SOLUTIONS

### Protection Systems and Metering

- Feeder protection
- Motor protection
- Arc-flash mitigation
- Generator protection
- Transformer protection
- Special protection schemes
- Power quality and revenue metering

### Automation Controllers and Computing

- Pump automation controller
- Real-time automation controllers
- Communications processors
- Programmable automation controllers
- Industrial computers (compact and rack-mount)

### Communications and Cybersecurity

- WAN and LAN networking (wired and wireless)
- Transceivers and adapters
- Cybersecurity

## SERVICES

- Power protection and automation (settings, scheme design, communications architecture design and programming, fault and coordination studies, and documentation)
- Arc-flash hazard mitigation
- POWERMAX® Power Management and Control Systems
- Microgrid controls
- MOTORMAX® smart motor control for low-voltage systems
- Model power system testing (hardware-in-the-loop)
- Operation communications and networking solutions
- Cybersecurity
- Coordination studies
- Commissioning services





NORTH AMERICAN ELECTRIC UTILITIES  
CHOSE SEL AS THE BEST-IN-CLASS RELAY  
MANUFACTURER IN THESE CATEGORIES\*

TECHNOLOGY (84%)

SERVICE & SUPPORT (87%)

PRICE (82%)

## WHY OUR CUSTOMERS CHOOSE SEL



▲ SEL-751 FEEDER PROTECTION RELAY

**Reliable solutions** that are designed, built, and rigorously tested in full electrical load conditions to withstand vibrations, electrostatic discharge, and electrical transients for trouble-free operation in extreme conditions and temperatures from  $-40^{\circ}$  to  $+85^{\circ}\text{C}$  ( $-40^{\circ}$  to  $+185^{\circ}\text{F}$ ). SEL devices are UL-listed and CSA-certified, and conformal coating offers an additional barrier against contaminants and corrosive gases and fumes.

**Low cost of ownership.** SEL devices collectively have the highest mean time between failures (MTBF) in the market (over 700 years), come with no-charge configuration software, and are backed by our worldwide, ten-year product warranty.

**No-charge technical support** by a network of experienced local engineers and a knowledgeable sales force.

**Reliable operations and reduced operational costs.** Our devices protect equipment and provide actionable information that helps operators reduce power consumption, identify power quality issues, optimize equipment life cycles, and plan preventative maintenance. We offer solutions that help utilities manage onsite power sources and eliminate blackouts and associated revenue losses and equipment damage.

**Scalable solutions** that allow utilities to grow their systems from basic protection to advanced ultra-fast power management systems.

**System control.** SEL solutions are nonproprietary. Our devices let users modify, expand, and customize solutions to fit their applications.

**Power system awareness and integration into SCADA systems.** Flexible communications ports and protocols increase the visibility of the power system operation status and conditions in SCADA systems and allow custom configuration of applications. Supported protocols include serial, EtherNet/IP, Modbus, DNP3, IEC 61850, MIRRORING BITS<sup>®</sup> communications, and IEEE C37.118-2011.

**Advanced diagnostics** with millisecond time-stamped reports, Sequential Events Recorder (SER) data, and oscillographic event reports for improved situational awareness, event root-cause analysis and troubleshooting, and early warnings of system instability.

# WE PROTECT WATER AND WASTEWATER OPERATIONS



SEL provides innovative, advanced asset protection and power management solutions for complex water and wastewater applications around the world. Our solutions substantially improve plant uptime by proactively detecting electrical system anomalies before damage occurs. SEL protects feeders and motor control centers from catastrophic arc-flash events, and we extend the life of pumps and blower motors by employing thermal models that reduce equipment stress.

“WE HAVE FOUND THAT **IT IS FAR CHEAPER TO RIP OUT ALL OF THE CONTROL WIRING IN OLD PANELS AND INSTALL THE SEL-849 THAN IT IS TO PERFORM A SINGLE PANEL MAINTENANCE.** ADDED FEATURES—LIKE IMPROVED MOTOR LIFE, SAFETY, REMOTE MONITORING, NETWORK INTERFACE, OPERATION LOG—WE ARE ESSENTIALLY GETTING FOR FREE.”

**CLYDE McMORROW**  
RETIRED WATER UTILITY ENGINEER

**LARGEST** WATER PLANTS IN THE WORLD RELY ON SEL

**FILTRATION** (CHICAGO, ILLINOIS, USA)

**DESALINATION** (SAUDI ARABIA)

**WASTEWATER** (CHICAGO, ILLINOIS, USA)





▲ JUBAIL WATER AND POWER COMPANY

► **CUSTOMER**  
Jubail Water and Power Company

**PROJECT**  
Al Jubail Desalination Plant, Saudi Arabia

**SOLUTION**  
Power Protection and Industrial Communication

Al Jubail, the world's largest desalination plant, provides drinking water for six million residents in Riyadh, Saudi Arabia. Their system relies on SEL for power protection and communications.

**CUSTOMER**  
Imperial Irrigation District

**PROJECT**  
All-American Canal, California, USA

**SOLUTION**  
Power System Automation and Communication

SEL provides SCADA, cybersecurity, and HMI services for eight hydroelectric power plants located along the All-American Canal. This 80-mile (130 km) aqueduct is the largest in the world.

**CUSTOMER**  
Florida Keys Aqueduct Authority (FKAA)

**PROJECT**  
Florida Keys Water Transmission, Florida, USA

**SOLUTION**  
Energy Metering

FKAA is saving \$600,000 (USD) per year in electrical costs by using the data provided by SEL meters. The SEL accurate power metering solution helps FKAA operators make real-time process decisions that optimize energy usage.

# HARDENED, FIELD-PROVEN SOLUTIONS

We design and manufacture robust, field-proven solutions that protect the electrical infrastructure and plant assets of your mission-critical operations. Our solutions help plant operators maintain plant uptime, protect personnel and process-critical equipment, and secure communications and control networks from cybersecurity attacks with well-engineered, customizable devices that easily fit in new or retrofit applications.



PUMP CONTROL

GENERATOR  
PROTECTION





MOTOR PROTECTION  
FEEDER PROTECTION

POWER QUALITY AND  
REVENUE METERING

ARC-FLASH MITIGATION  
TRANSFORMER PROTECTION

SCADA COMMUNICATIONS

HARDENED, FIELD-PROVEN SOLUTIONS

## MAINTAIN PLANT UPTIME

Reliable power is necessary to maintain critical operations. Unscheduled downtime due to a power failure can be disruptive to utility services and can lead to a loss of revenue, equipment damages, and potential environmental violations and penalty fees. To help utilities maintain plant uptime, improve power resiliency, and manage onsite power generation resources, we offer scalable power management solutions that detect, prevent, and mitigate blackouts in plants of any size.



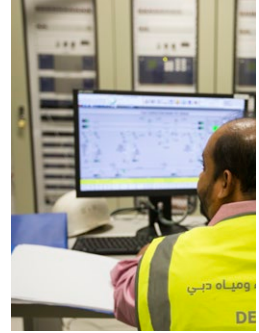
### APPLICATIONS

- Feeder protection
- Transformer protection
- Generator protection
- Power system management and diagnostics
- Real-time monitoring and control

### SOLUTIONS

- SEL-751 Feeder Protection Relay
- SEL-787 Transformer Protection Relay
- SEL-700G Generator Protection Relay
- POWERMAX for Commercial Microgrids

## IMPROVE POWER QUALITY AND REDUCE ENERGY COSTS



Power quality issues, such as voltage drop, transients, and harmonics, can be difficult to troubleshoot due to their transient nature. These disturbances can cause process equipment faults, power supply failures, motor heating, and increased energy losses. Our world-class power quality and revenue meter accurately tracks and reports energy usage, power quality, and net billing even in the presence of power anomalies.



### APPLICATIONS

- Precise power quality metering
- Accurate revenue metering
- Load profile or billing data collection
- Time-of-use (TOU) metering
- Predictive power demand control

### SOLUTIONS

- SEL-735 Power Quality and Revenue Meter
- acSELERATOR® Meter Reports  
SEL-5630 Software



HARDENED, FIELD-PROVEN SOLUTIONS

## MANAGE PUMPS WITH GREATER VISIBILITY

Repeated controller failures, proprietary systems that don't allow easy access or modification to field applications, lack of visibility for field applications, and limited diagnostics are some of the challenges utilities face with pump process controls. Our SCADA-ready pump controller solves these challenges by providing a hardened controller designed specifically to withstand harsh water and wastewater environments. The UL-listed controller comes with conformal coating to protect against environments where corrosive gases, fumes, or liquids are present. It also offers flexible I/O with expansion capabilities and provides time-stamped event logging for quick troubleshooting.



### APPLICATIONS

- Pump-down control for lift stations (simplex, duplex, and triplex)
- Booster pump station control
- Pump-up control for wells and tanks

### SOLUTION

SEL-2411P Pump Automation Controller

## PROTECT PROCESS-CRITICAL EQUIPMENT



Motors, drives, programmable logic controllers (PLCs), and other critical equipment are subject to failures without reliable protection. SEL solutions quickly detect and respond to faults before equipment damage, process upsets, and hazards to personnel occur. We offer comprehensive, industry-leading motor protection relays for low- and medium-voltage induction and synchronous motor applications. Our nonproprietary, customizable system solutions are easy to install for both retrofit and new applications. Our solutions also provide plant operators with information helpful for maintenance planning and equipment life cycle optimization.



### APPLICATIONS

- Thermal overload protection
- Voltage and current phase monitoring and protection
- Current imbalance protection
- Phase reversal protection
- Frequent-starting protection
- Load jam and loss protection
- Arc-flash mitigation

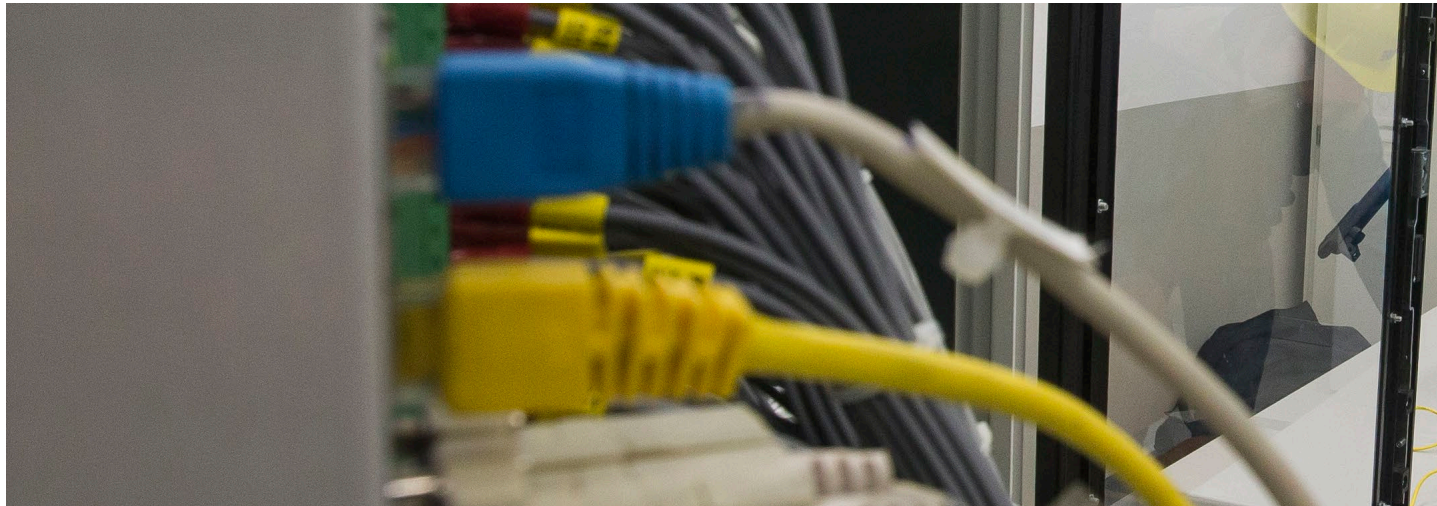
### SOLUTIONS

- SEL-849 Motor Management Relay
- SEL-710-5 Motor Protection Relay

HARDENED, FIELD-PROVEN SOLUTIONS

## IMPROVE COMMUNICATIONS AND CYBERSECURITY

Reliable and secure operational communications are fundamental to maintaining critical services. We have developed a range of innovative, technologically advanced, and field-hardened solutions to secure and protect communications and control networks in critical infrastructure. Our solutions integrate with existing IT infrastructure to secure your network.



### APPLICATIONS

- Central authentication
- Encryption
- Managed access
- High-speed network healing (5 ms)
- End-to-end security and control
- Wireless communications

### SOLUTIONS

#### WAN and LAN Networks

- SEL-3620 Ethernet Security Gateway
- SEL ICON® Integrated Communications Optical Network
- SEL-2740S Software-Defined Network Switch

#### Wireless Communications

- SEL-3061 Cellular Router



## MITIGATE ARC-FLASH EVENTS



There are numerous scenarios that can lead to arc-flash events, such as the presence of pests, a shorted motor winding failure, or accidental contact by maintenance personnel. SEL solutions securely and accurately detect and mitigate arc-flash events to protect personnel and equipment. Our arc-flash detection (AFD) technology significantly decreases the time it takes a relay to trip in response to an arc fault, which reduces hazardous arc-flash incident energy by as much as 90 percent.



### APPLICATIONS

- Arc-flash mitigation for service entrances and switchgear
- AFD in motor control centers
- AFD for remote control panels and disconnect switches

### SOLUTIONS

- SEL-849 Motor Management Relay
- SEL-710-5 Motor Protection Relay
- SEL-751 Feeder Protection Relay
- Arc-flash studies



AUTOMATION CONTROLLERS AND COMPUTING



PROTECTION SYSTEMS AND METERING

## BACKED BY UNMATCHED QUALITY AND SUPPORT

SEL invents, designs, manufactures, and supports a complete line of products for the protection, monitoring, control, automation, and metering of utility electric power systems. Our products are manufactured and tested in the United States to meet the rigorous environmental and operational demands of facilities that must operate flawlessly 24 hours a day, 7 days a week. We are committed to quality with a worldwide, ten-year, no-questions-asked product warranty and unmatched, free technical support and customer service.

When you work with SEL, you get more than our products or solutions—you get a partnership. That means we'll provide support whenever you need us, with our goal to make you the expert of your power system. No matter the issue, we will be there until it's resolved.

From mobile response teams and disaster discounts during times of tragedy to expedited deliveries and onsite technical help, we stand by you.

**"I'M ALWAYS GREETED BY A FRIENDLY VOICE AND GET THE HELP I NEED. CALL ME OLD-FASHIONED, BUT REAL CUSTOMER SERVICE REQUIRES REAL PEOPLE."**

**KEN DICKERSON**

DEEP EAST TEXAS ELECTRIC COOPERATIVE



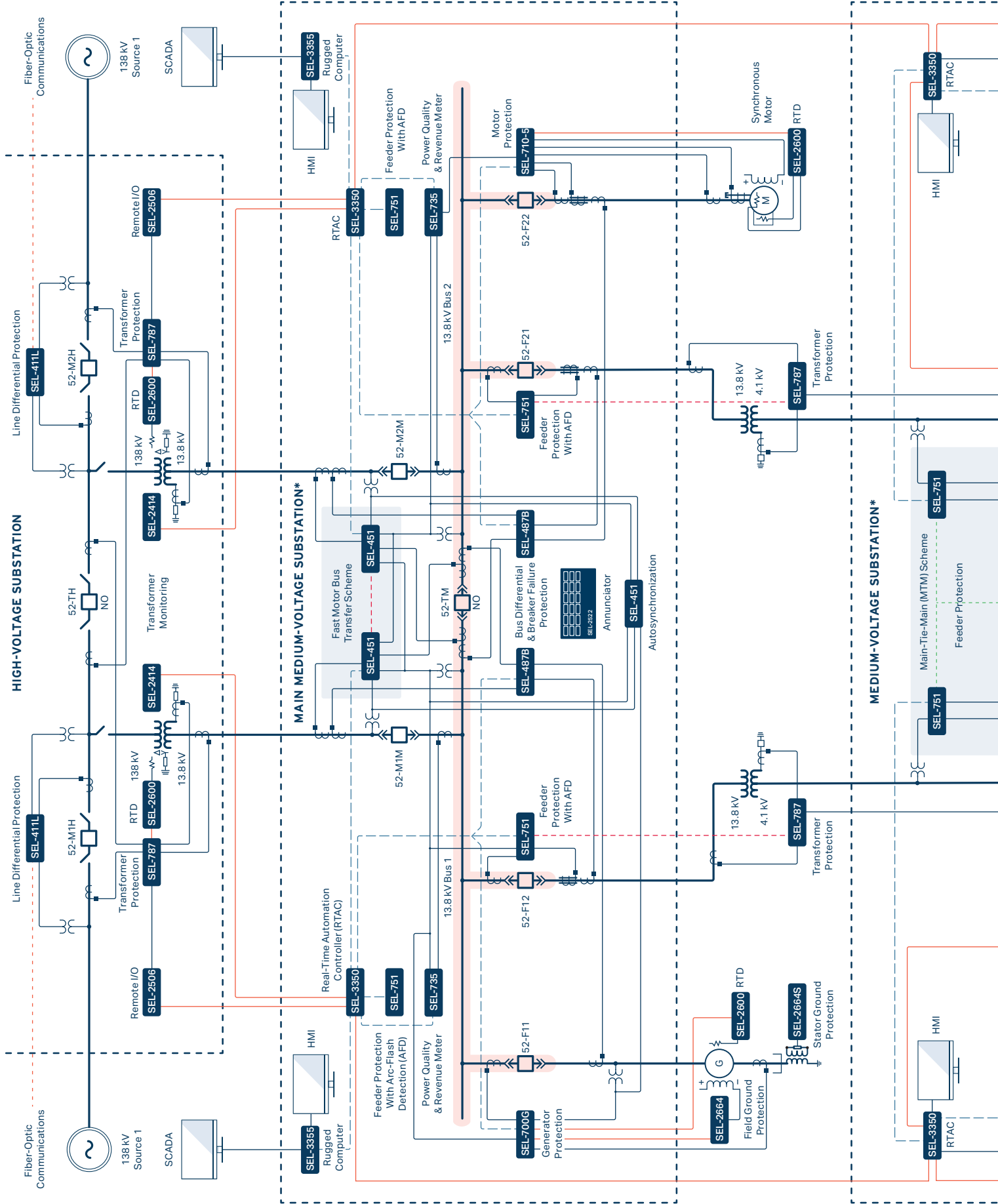
COMMUNICATIONS AND CYBERSECURITY

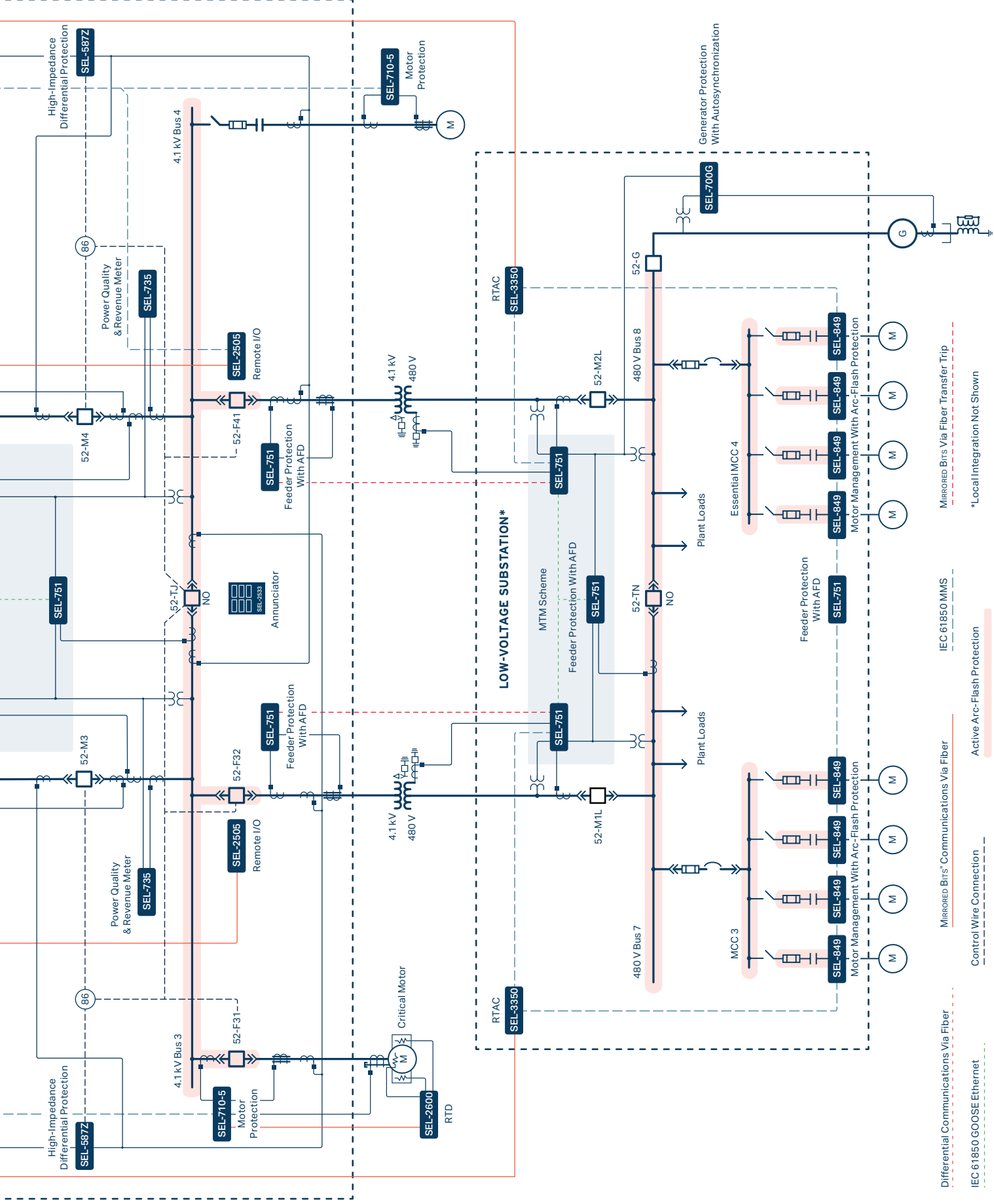
FOR A DETAILED LIST OF OUR PRODUCTS AND SOLUTIONS, VISIT [selinc.com/solutions](http://selinc.com/solutions).

READ ON TO LEARN ABOUT EXAMPLE APPLICATIONS OF SEL PRODUCTS AND SOLUTIONS AT INDUSTRIAL SITES.



# SEL SOLUTIONS POWER SYSTEMS PROTECTION ONE-LINE DIAGRAM EXAMPLE





**LOW-VOLTAGE SUBSTATION\***

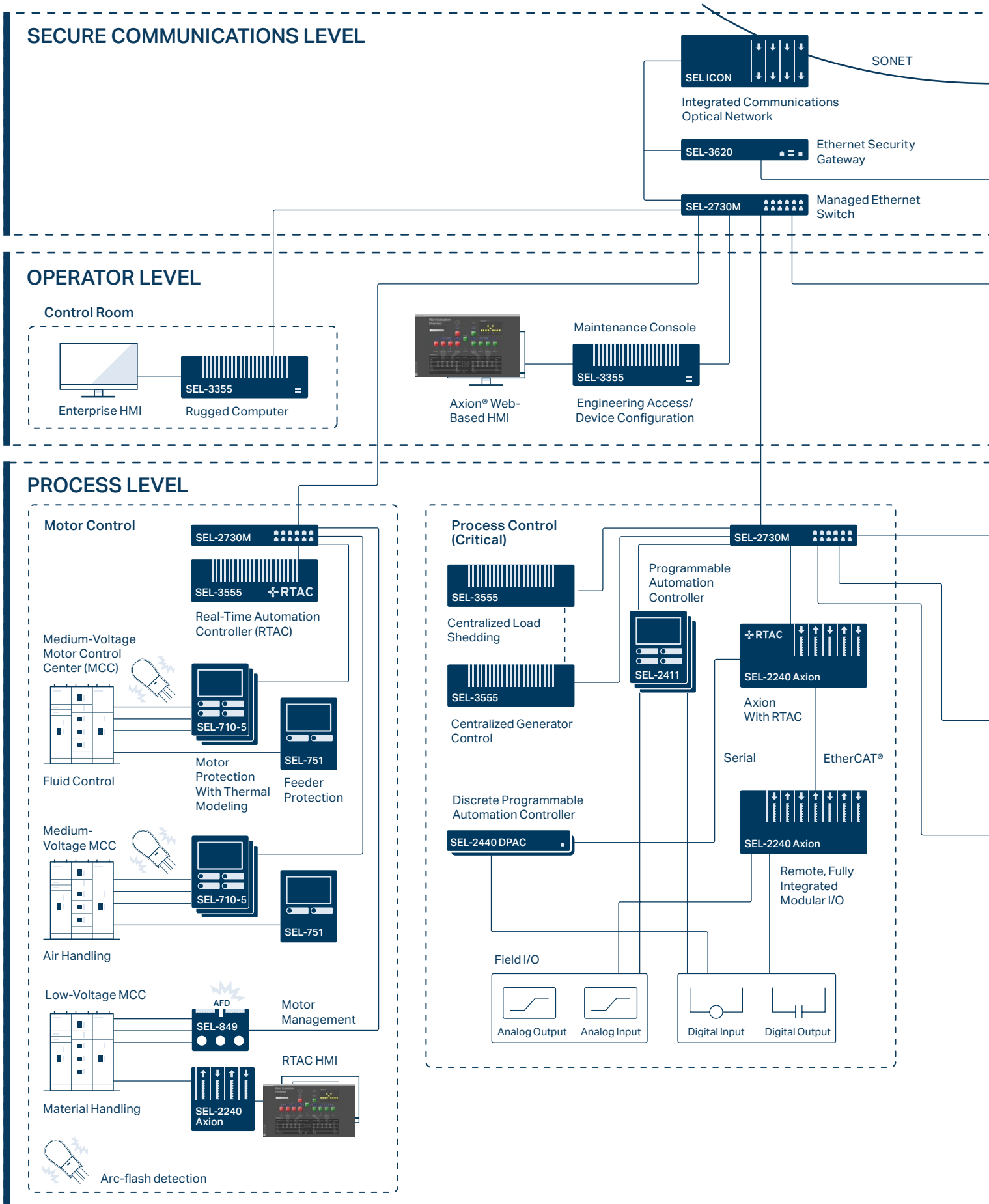
Differential Communications Via Fiber  
 IEC 61850 GOOSE Ethernet

Mirrored Btrs\* Communications Via Fiber  
 Control Wire Connection

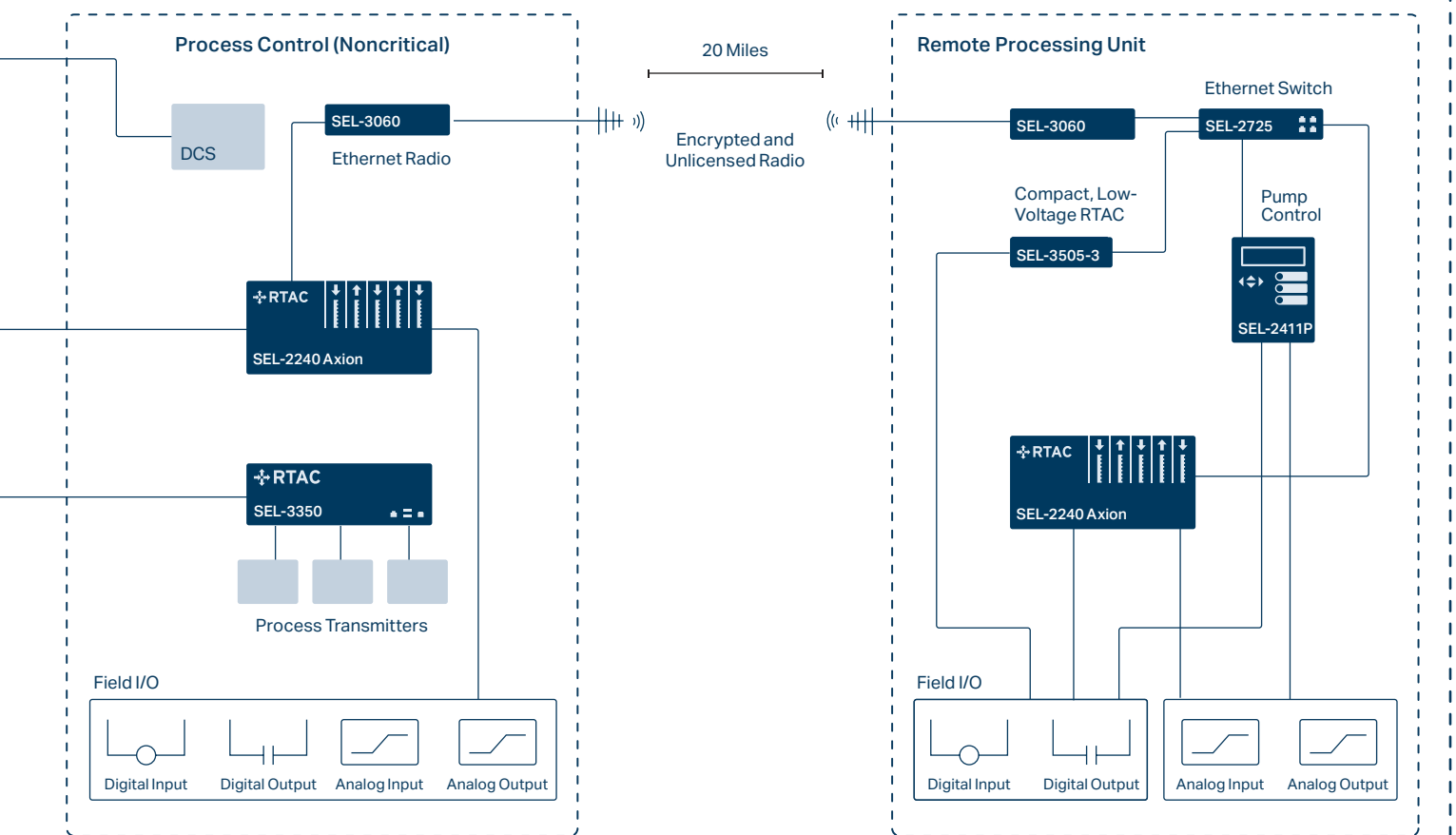
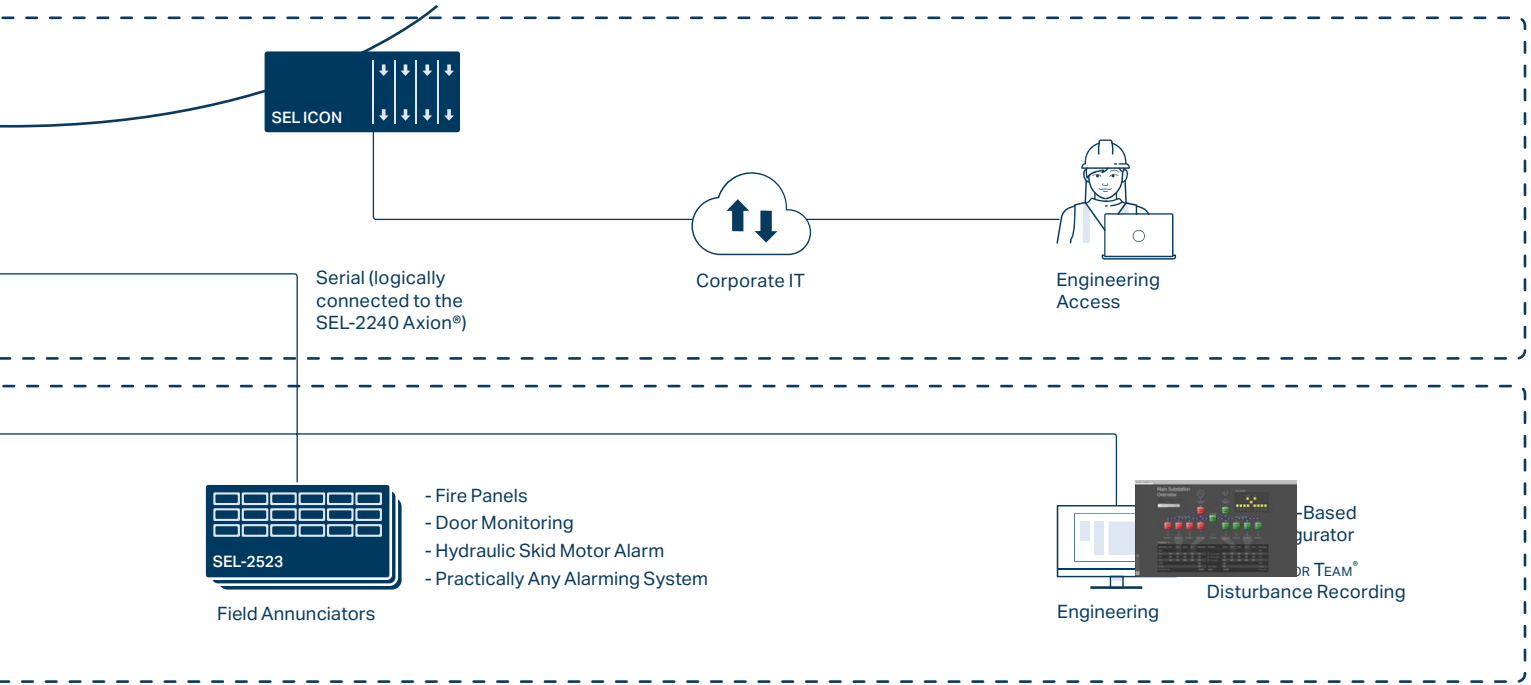
IEC 61850 MMS  
 Active Arc-Flash Protection

Mirrored Btrs Via Fiber Transfer Trip  
 \*Local Integration Not Shown

# SEL SOLUTIONS AUTOMATION DIAGRAM EXAMPLE







# ORDERING AND CUSTOMER SUPPORT

[selinc.com/support](https://selinc.com/support) | +1.509.338.3838

## Online Configuration and Ordering

Configure products to meet your exact application needs and order them online with an SEL account. Once logged in, select “Configure and Order” on a product webpage to choose from available model options, including items like power supply voltages, inputs and outputs, communications ports and protocols, and conformal coating. Save individual products to your cart, create projects to house specific product orders, and request a quote—all online. For products that do not require configuration or have been identified as common product configurations, select “Popular Models” on a product webpage to quickly and easily find the model you want.

## Ordering Support

Our sales representatives and customer service teams are always happy to answer questions and help configure the right SEL solution for your application. Visit [selinc.com/support](https://selinc.com/support) for regional sales contact information.

## Popular Models

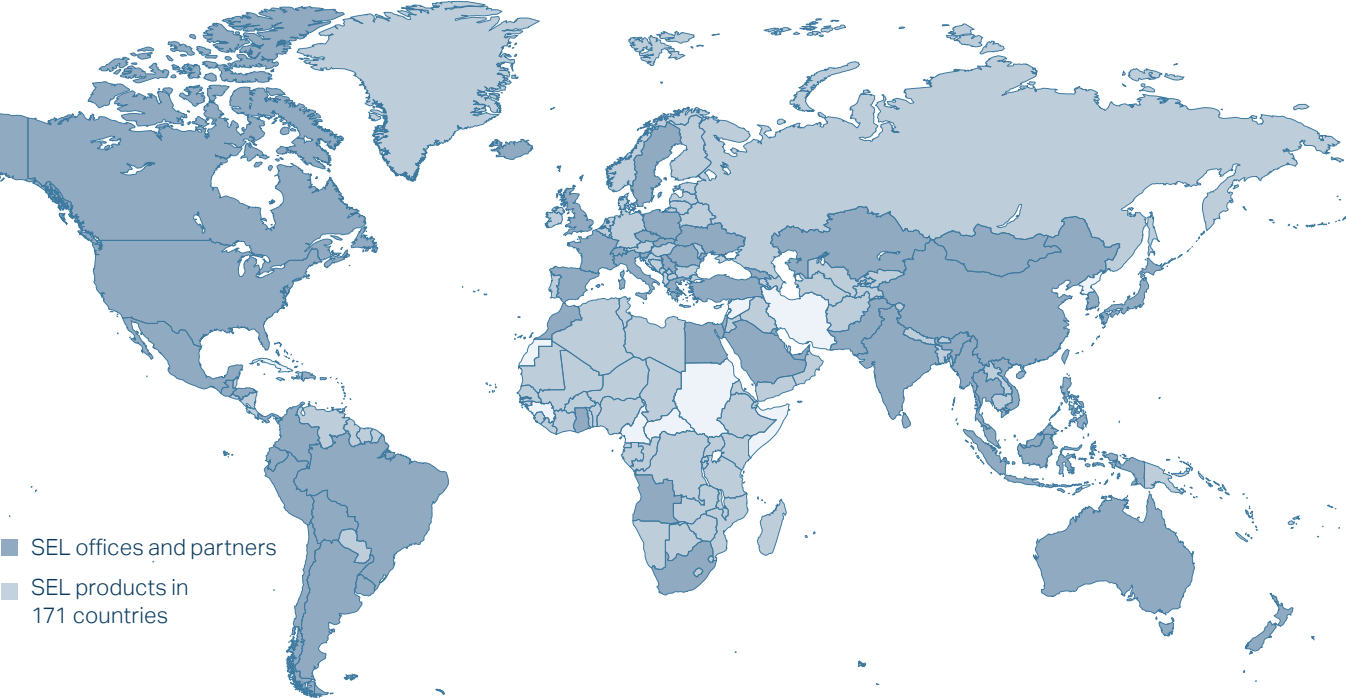
The Popular Models program makes selecting and ordering SEL products simple, fast, and convenient. SEL popular models are products preconfigured for popular applications and available for many SEL devices. Specific popular models may ship from stock. When available, the popular model configurations are displayed on the related SEL product webpage, where you can also view their technical details and popular applications. You can order these models directly from SEL or through your SEL sales representative.

**Local Support. Global Expertise.**

Whether it's grid modernization in the Philippines or an ambitious offshore wind integration project in Belgium, our global engineering experts have helped projects in regions like yours succeed. And with local support from technical staff in your region, you can count on us to help your successes continue.

Scan to find a customer support representative in your area.

[selinc.com/water-solutions](http://selinc.com/water-solutions)







Making electric power safer, more reliable, and more economical

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