

POWER SOLUTIONS FOR EDUCATION CAMPUSES



Power Protection, Monitoring, and Control

Generator Protection

Fault Indication

Advanced Metering

Secure Communications





Making Electric Power Safer, More Reliable, and More Economical®

Schweitzer Engineering Laboratories has delivered solutions for over 30 years that make electrical power systems safer, more reliable, and more economical. Education facilities worldwide deploy advanced power management solutions from SEL and are supported by SEL engineers who know their industry and business.

Headquartered in Pullman, Washington, USA, and with four world-class manufacturing centers, SEL has sales and technical offices in 22 countries. We have provided solutions for critical operations in over 144 countries and for some of the most recognizable institutions in the world, including:

- Stanford University
- Cornell University
- Algonquin College
- Guangzhou University Town
- Bangkok University
- Universidad de Sevilla

Innovative Research and Development

Through meticulous research and development, SEL consistently delivers innovative, practical products with unmatched features and performance to protect and secure electric power systems. SEL products provide secure power system protection, monitoring, automation, communications, metering, and control.

Reliability

SEL designs and manufactures products for the world's most challenging environments, exceeding all industry standards for temperature, shock, and electric stress. SEL products operate in a temperature range of -40° to $+85^{\circ}\text{C}$ (-40° to $+185^{\circ}\text{F}$). They can withstand electrostatic shock up to 15 kV and are vibration/shock resistant up to 15 g.

Ten-Year, Worldwide Warranty

The SEL ten-year, worldwide product warranty is proof of our confidence in the quality products we manufacture, following the strictest industry standards.

SEL Product Hospital quickly restores devices to proper operating condition and collects valuable product information.



Learn more by visiting us online at www.selinc.com/education.

SEL Solution Benefits

Safety: Well-lit walkways, facilities, and physical security infrastructure are important campus safeguards that rely on constant electric power. SEL protects students and faculty by minimizing the frequency and duration of power outages.

Security: SEL power management, control, and communications equipment is designed with encryption and security features that ensure your campus data networks and power infrastructure are protected from intruders or unauthorized modifications.

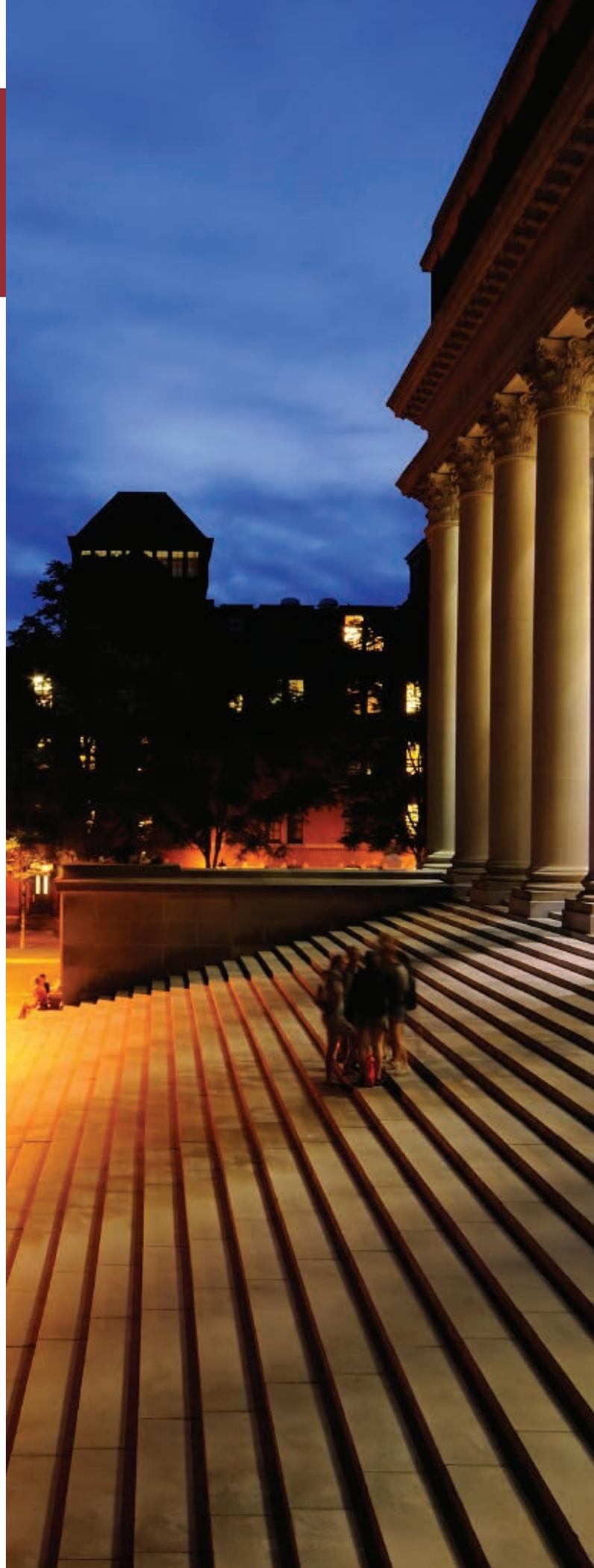
Reliability: SEL solutions are designed and manufactured for utility-grade reliability. Our devices provide valuable power system performance information and track equipment wear to mitigate future power system problems.

Efficiency: SEL distribution automation solutions transform campus electrical systems into self-correcting, self-healing power networks that maximize facility uptimes and reduce maintenance expenses.

Environmental Responsibility: SEL integrates cogeneration, emergency power, and renewable energy sources within efficient power networks that reduce energy expenses and increase reliability within an environmentally friendly architecture.

Productivity: SEL systems ensure laboratories, data centers, healthcare facilities, security hubs, and other critical campus assets are online and operating efficiently.

Responsiveness: SEL technology maintains reliable electric power and, if necessary, addresses problems quickly and effectively.



Campus-Wide Applications

Electric Utility



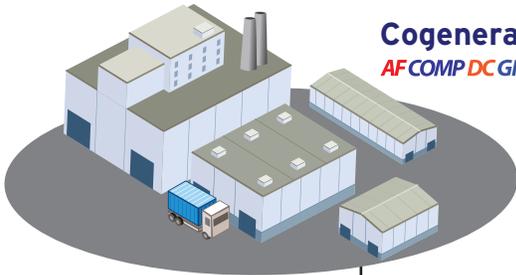
SEL Phasor Measurement Solutions

SEL synchrophasors monitor critical parameters and initiate control commands when system instabilities threaten power availability.



Substation

AF COMP DC INT MP PT RM SW



Cogeneration Plant

AF COMP DC GP INT MP PQ PT RM SW

SEL Distribution Automation
Automate feeder restoration and reduce outage times with the SEL Distribution Automation Control System. The system analyzes and detects fault conditions, isolates affected feeder sections, and quickly restores power to unaffected sections campus-wide.



Classrooms and Dormitories

DC PT



Athletic Facilities

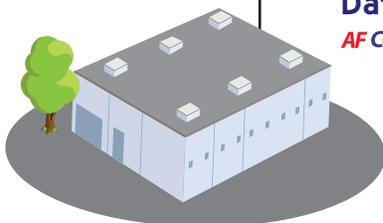
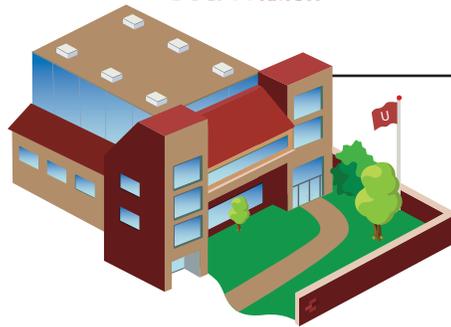
DC RM

FCI

FCI

Campus Administration

DC GP PT RM SW



Data Center

AF COMP DC GP MC PT RM SW



Laboratories

AF COMP DC GP PT

FCI

FCI

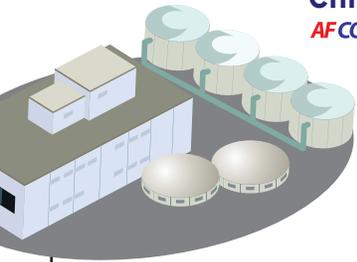
SEL Substation Automation

SEL relays protect and monitor valuable breakers, transformers, capacitors, and other power system assets. SEL's automation solutions ensure that protection schemes are well-coordinated.

SEL Substation Control Enclosures

SEL's control enclosures are engineered, constructed, and delivered to your site with state-of-the-art SEL protection, automation, and control technology.

Chilled Water Plant
AF COMP DC MP PQ PTRM SW



Renewable Energy Sources
AF COMP DC GP INT PTRM SW



Campus Security
DC GP MC PT



Remote Facilities
COMP DC GP MC MP



Medical Center
AF DC GP MC PTRM

	SEL Wireless Transceiver	<u>Fiber-Optic Cable</u>
	SEL Wireless Communications	<u>Overhead Power Line</u>
	Automated Pad-Mounted Switchgear	<u>Underground Power Line</u>

	Pad-Mounted Switchgear	
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AF SEL Arc-Flash Protection (Feeder Protection)
 Protect personnel and equipment with SEL's combined arc-flash detection and high-speed overcurrent protection.

COMP SEL Industrial Computers
 Increase the toughness and reliability of your computing systems with ruggedized computers that contain no moving parts and have a mean time between failures (MTBF) of over 100 years.

DC SEL Data Communications Solutions
 SEL's fiber-optic, Ethernet, and wireless communications solutions provide secure, low-latency communications for critical infrastructure.

FCI SEL Faulted Circuit Indicators
 Reduce the time spent locating electrical faults, so power can be restored quickly.

GP SEL Generator Protection
 Integrate synchronization and protection capabilities for synchronous generators.

INT SEL Intertie Protection
 Safely connect on-site generation with the utility power grid.

MC SEL Monitoring and Control Solutions
 SEL automation controllers and annunciators monitor remote processes, electrical power configurations, and physical security.

MP SEL Motor Protection
 Speed restarts and reduce false trips on high-horsepower motors to increase productivity and minimize equipment wear.

PQ SEL Power Quality Metering
 Record voltage, flicker, harmonics, and other parameters that affect energy efficiencies and expenses.

PT SEL Precise Time Solutions
 SEL's satellite-synchronized clocks provide +100 ns accuracy for critical process management, precise event recording, and campus-wide synchronization.

RM SEL Revenue Metering
 Ensure accurate power billing, and submeter multiple buildings on campus.

SW SEL Software Solutions
 SEL's SCADA and HMI software combine easy-to-use graphics with powerful control and data reporting features.



SEL-700G Generator Protection Relay

Generator Protection

SEL's generator protection solutions protect expensive equipment from damage, failures, and costly repairs while maintaining power system performance. The SEL-700G Generator Protection Relay simplifies design and improves power system availability across campus. Its fully integrated autosynchronizer quickly and reliably synchronizes generators while its secure protection features defend the generator against electrical and mechanical damage. To ensure the power stays on, alarms report abnormal conditions, such as oil, coolant, or overspeed shutdown, to ensure fast, reliable start-ups.



SEL-751A Feeder Protection Relay

Arc-Flash Protection (Feeder Protection)

SEL feeder protection solutions provide overcurrent, overvoltage, undervoltage, and over- and underfrequency protection elements with flexible I/O options, easy mounting, and fast settings. The SEL-751A Feeder Protection Relay easily retrofits into existing panels to upgrade both power reliability and employee safety. The SEL-751A Relay's fully automatic arc-flash detection (AFD) features interrupt power when an arc-flash event is detected. Innovative fiber-optic, light-sensing, and overcurrent protection detects arc-flash hazards and sends a trip signal to the breaker in as fast as 2 ms to protect operators, minimize equipment damage, and prevent lengthy system outages.



SEL-735 Power Quality and Revenue Meter

Revenue and Power Quality Metering

The SEL-735 Power Quality and Revenue Meter provides high-accuracy, four-quadrant metering and advanced load profile recording. In addition to revenue metering, the SEL-735 provides advanced power quality information to identify and mitigate harmonics, line imbalances, voltage sags and swells, flickering, and power factor problems. The SEL-735 is an indispensable asset for ensuring accurate utility billing and submetering. Indoor mounting options and prewired outdoor enclosures enable high-accuracy metering at virtually any location.



SEL-710-5 Motor Protection Relay

Motor Protection

SEL motor protection solutions provide complete protection for the high-horsepower motors that power your campus infrastructure. The SEL-710-5 Motor Protection Relay features the industry's most accurate motor protection with settings, mounting, and communications options designed for easy application. With this solution, you are able to minimize wait periods between starts and extend start times for slow-starting motors to substantially reduce equipment wear and lower maintenance expenses. The SEL-710-5 also provides programmable logic controller (PLC) functions, including multiple communications options, I/O choices, and programmable control equations, making it a complete protection and control solution for large induction motors.



SEL-3530 Real-Time Automation Controller (RTAC)

Monitoring and Control

SEL information processors integrate power system protection, automation, communications, control, and monitoring with a variety of microprocessor-based devices. The SEL-3530 Real-Time Automation Controller (RTAC) includes SEL's simple, intuitive acSELERATOR RTAC® SEL-5033 Software to simplify power system design and integration. The embedded RTAC web interface speeds setup and monitoring of critical data, such as network access, user accounts, and system performance.



SEL-3355 Computer

Computing

Improve system reliability with a rugged computing solution from SEL. By eliminating all moving parts and using error-correcting code memory and single-level cell (SLC) solid-state drive (SSD) technology, SEL computers have over ten times the MTBF of typical industrial computers. Install an SEL computer, and create integrated solutions with hot-swappable load-sharing power supplies, hot-swappable SSDs, and onboard Ethernet, USB, serial, and video ports. With Windows® 7 Ultimate 64-bit and Windows Server® R2 operating system choices, you have the tools you need for any application.

Satellite-Synchronized Timing

SEL provides a reliable, accurate, low-price time source for synchrophasors, relay event correlation, and keeping precise time across campus. The SEL-9929 Satellite-Synchronized Clock Display Kit provides a demodulated IRIG-B output with +100 ns average accuracy. The SEL-9929 synchronizes up to 20 display clocks from a single master unit.



SEL-9929 Satellite-Synchronized Clock Display Kit

Data Communications

Build a high-reliability communications network with equipment designed and tested to operate in the harshest environments. SEL communications equipment withstands temperature extremes, electrical transients, electrostatic discharges, vibration, and more.

The SEL ICON™ Integrated Communications Optical Network creates multiple fully independent communications networks over one fiber-optic cable with time-division multiplexing (TDM). Integrated network management, data encryption, and routing creates secure and dedicated communications paths for multiple Ethernet, voice, telephone, I/O, and video devices.



SEL ICON™ Integrated Communications Optical Network

The SEL-2730M Managed 24-Port Ethernet Switch connects 4 gigabit, 4 fiber-optic SFP, and 16 copper ports to create a highly reliable network. Comprehensive security features ensure that only authorized users and traffic have access to the network.



SEL-2730M Managed 24-Port Ethernet Switch

The SEL-3620 Ethernet Security Gateway is a router, virtual private network (VPN) endpoint, and firewall device that can perform security proxy services for serial and Ethernet-based intelligent electronic devices (IEDs). Its data management features help create a user audit trail through strong, centralized, user-based authentication and authorization to modern and legacy IEDs. In addition, it secures your control system communications with stateful deny-by-default, strong cryptographic protocols, and logs for system awareness.



SEL-3620 Ethernet Security Gateway

Fault Indication

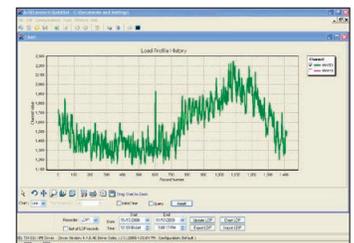
Fault indicators greatly reduce the time it takes to locate and isolate a cable fault, which leads to reduced outage duration. Fault indicators lead the repair crew directly to the problem area and have been shown to cut the fault patrol time by 50 percent. SEL fault indicators are available for underground, enclosed, or overhead conductors. They attach easily to power lines and begin sensing current and voltage right away. When the device senses fault conditions on the line, the display target changes from white to red and, when equipped with LEDs, the lights flash when a fault is detected.



SEL Paper-Insulated Lead Cable Fault Indicator and AR360 AutoRANGER® Fault Indicator

Software

Most SEL products include application software, which dramatically reduces acquisition, operating, and maintenance expenses. You can manage SEL equipment settings across your entire system, receive updates to your computer on a schedule that you choose, and easily update settings as your power system evolves over time. With SEL's acSELERATOR QuickSet® SEL-5030 Software, you can reduce equipment setup times, create templates to streamline SEL device deployment, and view energy consumption data to manage energy expenses more effectively.



acSELERATOR QuickSet® Software Load Profile History

Services and Support

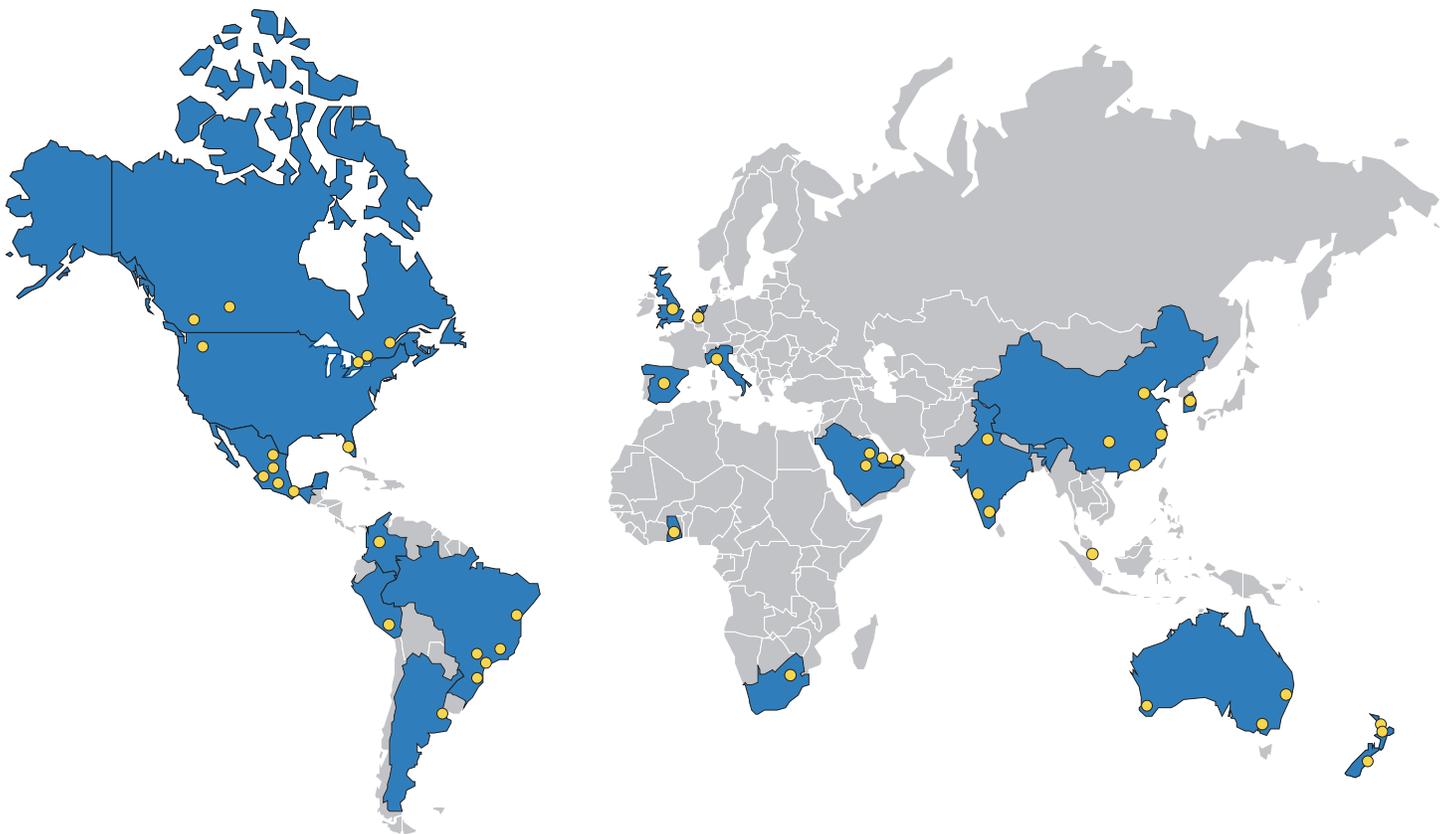
Engineering Services and Consulting

SEL's team of engineers is ready to assist you in the following areas:

- Arc-flash hazard studies
- Power system studies
- Cybersecurity studies
- Power management systems
- Custom panel and enclosure solutions
- Protection and automation scheme design, settings, and testing
- HMI design and programming
- Model power system testing
- Distribution automation control systems
- Synchrophasor systems
- Autosynchronization systems

Regional Technical Support

SEL provides personalized, regional support to our customers in more than 144 countries and from 101 offices worldwide.



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