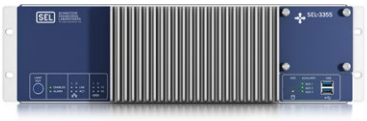
Automation Overview



SEL-3355

The SEL-3355 is a server-class automation controller built to with-stand harsh environments in utility substations and industrial control and automation systems. It can be configured as an RTAC, as a computer, or with the SEL BlueFrame™ application platform.

SEL-3360S/3360E

The SEL-3360S and SEL-3360E match the performance, ruggedness, and configuration flexibility of the SEL-3355 and are ideal for surface- or panel-mount applications.

SEL-3350 NEW

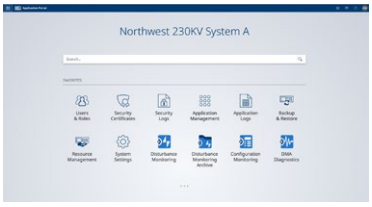
The SEL-3350 is ideal for limited-space, dedicated embedded applications that require midlevel I/O and computation. It can be configured as an RTAC, as a computer, or with the SEL BlueFrame application platform.

SEL-3390

SEL PCIe expansion cards let you add ports and connectivity to various industrial automation platforms.

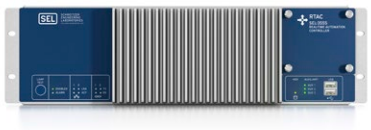
SEL-9331

The SEL-9331 powers equipment in industrial environments where many power supplies cannot maintain operation.



SEL BlueFrame NEW

Scalable and flexible, SEL BlueFrame provides a secure platform for installing applications and for managing and exchanging data between supported applications, like SEL Data Management and Automation applications.



SEL-3555 RTAC

Powerful processing for large-scale automation projects.

SEL-3560E/3560S RTACs

Powerful processing for large-scale automation projects in a compact form factor.

SEL-3530/3530-4 RTACs

Complete and flexible system control with integrated security, seamless configuration, unified logic, and high reliability.

SEL-3505/3505-3 RTACs

Powerful automation, reporting, and control for low-power, limited-space applications.

SEL-2240 Axion®

A fully integrated, modular I/O and control solution for utility and industrial applications.

SEL-2411P

Hardened, SCADA-ready pump automation controller with flexible I/O that is easy to install, set, and customize.

SEL-2411

Flexible I/O for automatic control, SCADA, station integration, remote monitoring, and plant control systems.

SEL-2440

Utility-grade I/O, powerful processing, flexible communications, and microsecond timing.

Applications	SEL-3355	SEL-3360E	SEL-3360S	SEL-3350
Computing in Harsh Environments	■	■	■	■
Running Multiple Applications Simultaneously	■	■	■	■
Installing Third-Party Software	■	■	■	■
Embedding Into Automation and Monitoring Systems	■	■	■	■
HMI	■	■	■	■
Security Gateway to Help Satisfy NERC CIP Requirements	■	■	■	■
Network Monitoring and Intrusion Detection	■	■	■	■
Virtualization Server	■	■	■	■
Engineering Access Point	■	■	■	■
IRIG-B Time Distribution and Network Time Protocol (NTP) Conversion	■	■	■	■
Video Surveillance Control and Archiving/Physical Security Monitoring and Notification	■	■	■	■
SEL Secure Kiosk	■	■	■	■
Parallel Redundancy Protocol (PRP)	■	■	■	■

Supported Operating Systems and Software	SEL-3355	SEL-3360E	SEL-3360S	SEL-3350
SEL Real-Time Automation Controller (RTAC)*	+	+	+	+
SEL BlueFrame™ Operating System (With Kiosk Mode)*	+	+	+	+
SEL Software*	+	+	+	+
Microsoft Windows 10 IoT Enterprise LTSC*	+	+	+	+
Windows Server 2019 Standard*	+	+	+	+
McAfee Whitelist Antivirus*	+	+	+	+

See Page 162 for a complete list of operating system options.

Hardware	SEL-3355	SEL-3360E	SEL-3360S	SEL-3350
Intel Xeon E3-1505L Quad-Core 2.0 GHz 64-Bit CPU	■	■	■	
Intel Xeon E3-1515M Quad-Core 2.8 GHz 64-Bit CPU	+		+	
Intel Atom x5-E3940 Quad-Core 1.6 GHz 64-Bit CPU				■
4 GB DDR4 ECC PC4-17000 (2,133 MHz) System Memory	■	■	■	
Up to 32 GB DDR4 ECC PC4-17000 System Memory	+	+	+	
8 GB DDR3L ECC PC3-1600 (800 MHz) System Memory				■
Triple Independent Video Displays (2 DVI-D and 1 DisplayPort)	■	■	■	
Single DisplayPort With Audio Output (3 Monitors With DisplayPort Hub)				■
HD Audio Ports, Line In, Line Out, Microphone	■	■	■	

Hardware (Continued)	SEL-3355	SEL-3360E	SEL-3360S	SEL-3350
4 Rear and 2 Front USB Ports, USB 3.1-Compliant, 2.0 A Max. Current Limit Each	■	■	■	
4 Rear USB 2.0 Ports and 2 Front USB 3.1 Ports, 1.5 A Combined Current on Front Ports, 1.5 A Combined Current on Rear Ports				■
Front 10/100/1000 Mbps Independent Copper Ethernet Ports				■
Rear 10/100/1000 Mbps Independent Ethernet Ports	2	2	2	
Copper RJ45 and Fiber Small Form-Factor Pluggable (SFP) Ports (4 RJ45, 2 RJ45 and 2 SFP, or 4 SFP)				■
EIA-232 Serial Ports, DB-9 Connectors, 300 to 115,000 bps	2	2	2	
EIA-232/422/485 Serial Ports, RJ-45 Connectors, 300 to 115,200 bps, IRIG-B Output				16
IRIG-B Input (on COM1)	■	■	■	
IRIG-B Input and Output (PCIe Card)	+	+		
IRIG-B Input and Output (BNC and Serial)				■
19" Rack-Mount Chassis	■			■
Panel Mount	+			+
Wall-Mount Chassis		■	■	
Conductive Panel Mount		+	+	
PCI/PCIe Expansion Slots	5	2		
Additional EIA-232/422/485 Serial Ports, RJ45 Connectors, 300 to 921,000 bps, IRIG-B Inputs/Outputs, +5 Vdc Power Via PCIe Cards	24	12		
Additional 10/100/1000 Mbps Ethernet Ports, Copper RJ45, or Fiber-Optic SFP LC Connectors Via PCIe Cards	8	8		
Solid-State Drives (2.5" SLC, iMLC, MLC SATA II, 32 GB–7.6 TB Drives)	4	2	2	2
Internal 120/230 Vac, 125/250 Vdc, or 48 Vdc Power Supply	■	■		■
Internal Low-Voltage 24–48 Vdc Power Supply				■
Secondary 120/230 Vac, 125/250 Vdc, or 48 Vdc Power Supply	+		+	
Hot-Swappable Power Supplies	■		■	
External Power Supply			+	
Alarm Contact, Alarm LED, Watchdog Processor	■	■	■	■
Configurable Universal Control Input				■
Programmable Auxiliary Bicolor LEDs	3	3	3	4
Intel Active Management Technology (AMT) v11.8	■	■	■	
Infineon Trusted Platform Module (TPM) v2.0 (Hardware)	■	■	■	■

■ Standard feature + Model option *Factory-orderable operating system

Applications	SEL-3555 SEL-3560E/3560S	SEL-3530	SEL-3530-4	SEL-2240	SEL-3505/3505-3	SEL-3532/3533	SEL-2411	SEL-2411P	SEL-2440
Collect, Scale Meter Data	■	■	■	■	■	■	■	■	
Collect Targets, Contact Input Status, Fault Location	■	■	■	■	■	■			
Enable Fiber-Optic Links	■	■	■	■	■	■	■	■	■
Control Through IED Outputs	■	■	■	■	■	■			
Accept IRIG-B Time Synchronization	■	■	■	■	+	+	■	■	■
Provide IRIG-B Time Synchronization	■	■	■	■	+	+			
Transparent "Port Switch"	■	■	■	■	■	■	■	■	■
Web Server HMI	+	+	+	+		+			
Concentrate IED Data For:									
Distributed Control System (DCS)	■	■	■	■	■	■			
SCADA Master or Remote Terminal Unit (RTU)	■	■	■	■	■	■			
Local or Remote HMI	■	■	■	■	■	■			

Features	SEL-3555 SEL-3560E/3560S	SEL-3530	SEL-3530-4	SEL-2240	SEL-3505/3505-3	SEL-3532/3533	SEL-2411	SEL-2411P	SEL-2440
Protocol Redundancy (DNP3 and IEC 60870-5 101/104 Server)	■	■	■	■	■	■			
Primary and Standby LAN Support	■	■	■	■	■	■	■	■	■
Optoisolated Inputs/ Programmable Outputs	■[1]	+	■	+	+	■[1]	+	+	+
Rack-Mount or Panel-Mount Hardware	■[2]	+	+	+		■	+	+	+
IEC 61131 Logic Engine	■	■	■	■	■	■			
Cybersecurity Management	■	■	■	■	■	■			
Real-Time Operating System	■	■	■	■	■	■	■	■	■

Serial Port Protocols	SEL-3555 SEL-3560E/3560S	SEL-3530	SEL-3530-4	SEL-2240	SEL-3505/3505-3	SEL-3532/3533	SEL-2411	SEL-2411P	SEL-2440
SEL Mirrored Bits® Communications	■	■	■	■	■	■	■	■	■
Client									
DNP3	■	■	■	■	■	■			
Modbus RTU	■	■	■	■	■	■			
LG 8979	■	■	■	■	■	■			
CP 2179	■	■	■	■	■	■			
SEL Fast Messages, Interleaved With ASCII	■	■	■	■	■	■			
SEL Synchrophasors	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ			
IEC 60870-5 101	■	■	■	■	■	■			
SES-92	■	■	■	■	■	■			
ASCII Flex Parse	■	■	■	■	■	■			

Serial Port Protocols (Continued)	SEL-3555 SEL-3560E/3560S	SEL-3530	SEL-3530-4	SEL-2240	SEL-3505/3505-3	SEL-3532/3533	SEL-2411	SEL-2411P	SEL-2440
Server									
DNP3	■	■	■	■	■	■	+	■	+
Modbus RTU Binary	■	■	■	■	■	■	■	■	■
IEC 60870-5-101	■	■	■	■	■	■			
LG 8979	■	■	■	■	■	■			
SES-92	■	■	■	■	■	■			

Network Protocols	SEL-3555 SEL-3560E/3560S	SEL-3530	SEL-3530-4	SEL-2240	SEL-3505/3505-3	SEL-3532/3533	SEL-2411	SEL-2411P	SEL-2440
Telnet	■	■	■	■	■	■	■	■	■
FTP							■	■	■
DNP3 LAN/WAN Client/Server	■	■	■	■	■	■	+	■	+
Modbus TCP	■	■	■	■	■	■	■	■	■
IEC 61850 MMS Client/Server	+	+	+	+	+	+	+		+
IEC 61850 GOOSE	+	+	+	+	+	+	+		+
IEC 60870-5-104 Client/Server	■	■	■	■	■	■			
IEEE C37.118 Client/Server	■	■	■	■	■	■			
Flex Parse	■	■	■	■	■	■			
FTP/SFTP Client/Server	■	■	■	■	■	■			
SNMP Client/CDC Type 2 Client/ Server	■								
Lightweight Directory Access Protocol (LDAP)	■	■	■	■	■	■			
EtherCAT®	■[3]	■	■	■		■			
EtherNet/IP	■[3]	■	■	■	■	■			
Precision Time Protocol (PTP)/ Network Time Protocol (NTP)	■	■	■	■	■	■			
Simple Network Time Protocol (SNTP)	■	■	■	■	■	■	■	■	■
Parallel Redundancy Protocol (PRP)	■	■	■	■	■	■	■	■	■

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

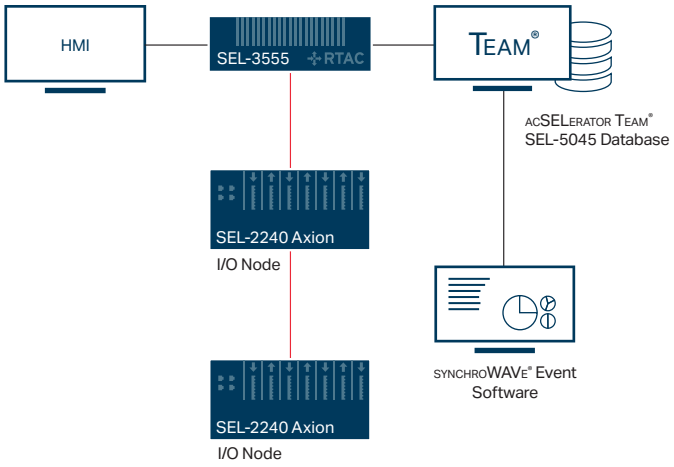
[1]Alarm contact only [2]SEL-3560E/3560S are surface-mount only

[3]Not supported on SEL-3560S

Automation Applications

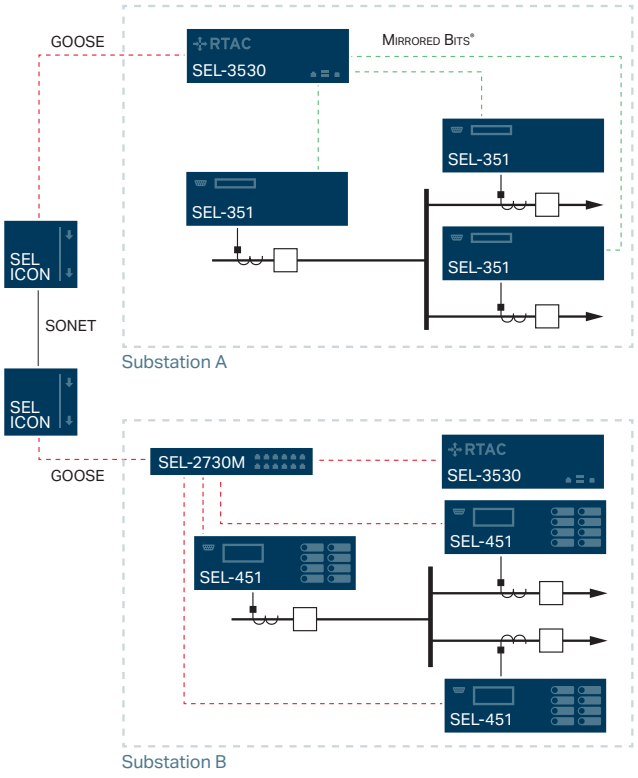
Dynamic disturbance and fault recording systems

Meet and exceed the requirements of NERC PRC-002 using the SEL-3555 Real-Time Automation Controller (RTAC) to collect dynamic disturbance records, fault records, and event reports from relays. You can also combine the SEL-3555 with the SEL-2245-42 AC Protection Module. The module features 24 kHz recording with recording group configuration for combining multiple module event reports, including digital values, into a single COMTRADE file. The SEL-3555 with SSD storage (up to 1 TB) is the perfect controller for recording applications with its ability to maintain more than the minimum ten-day storage requirement of all fault, dynamic disturbance, and Sequence of Events records in the substation. You can configure automatic retrieval of these data by using ACSELERATOR TEAM® SEL-5045 Software, the Secure File Transfer Protocol (SFTP), or MMS file services. The data can then be analyzed using SEL-5601-2 SYNCHROWAVE® Event Software.



Power system automation

Enable high-performance control and monitoring schemes. The SEL Real-Time Automation Controller (RTAC) provides a bridge between MIRRORED BITS® communications and IEC 61850 GOOSE networks. Protection applications include directional element-based bus protection and replacement of tone-channel equipment for communications-assisted blocking, unblocking, permissive, and transfer trip schemes.

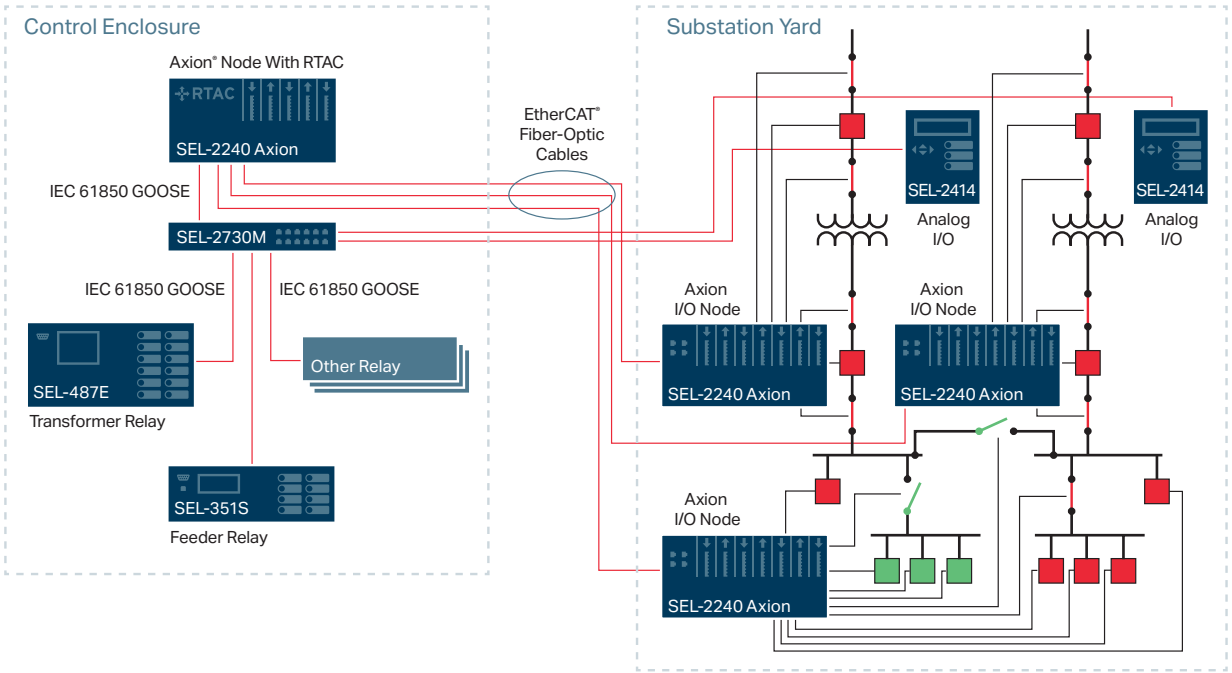


Substation HMI

Provide cost-effective local and remote monitoring and control for substations and other processes by installing the optional web-based HMI, available for the SEL Real-Time Automation Controller (RTAC) and SEL-2240 Axion®. ACSELERATOR Diagram Builder™ SEL-5035 Software easily maps the RTAC tag database to reduce screen development time. You can use the integrated video port of the SEL-3555 RTAC for local display of the HMI without relying on a separate computer.

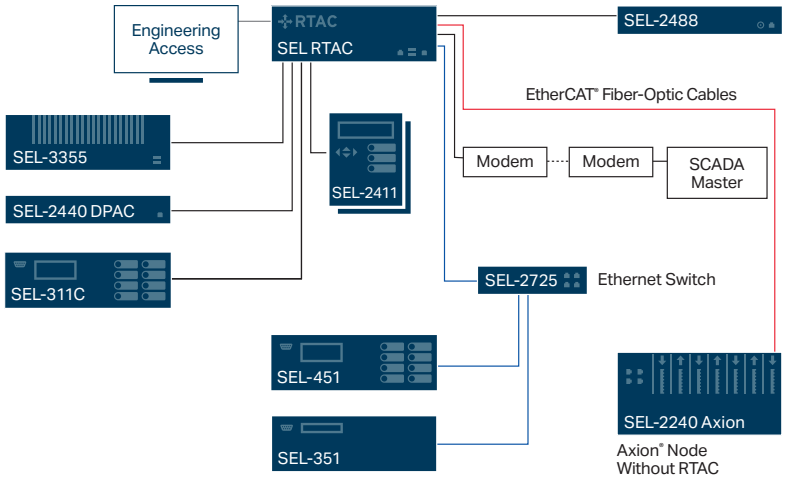
Substation automation

Use the SEL-2240 Axion to integrate substation I/O into a comprehensive substation control scheme that includes IEC 61850 GOOSE messaging. Connecting enclosures and substation yards with EtherCAT® fiber-optic cables offers signal isolation and flexible modular placement.



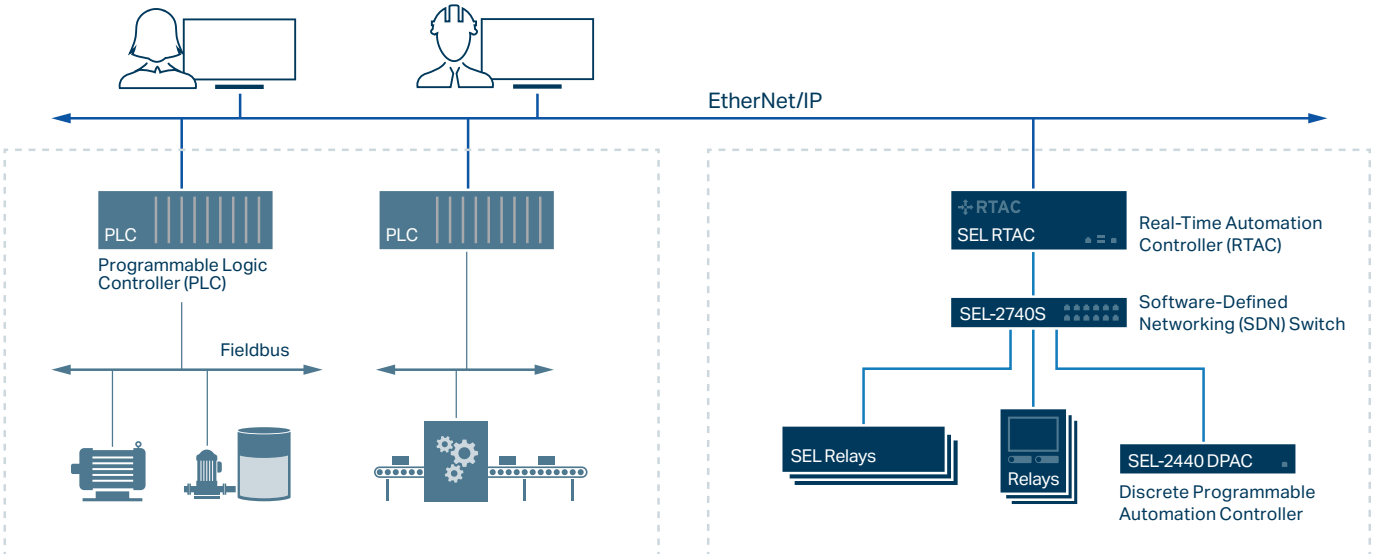
Data concentration and SCADA

Deploy the SEL Real-Time Automation Controller (RTAC) as a data concentrator using protocols such as IEC 61850, Manufacturing Message Specification (MMS), Modbus, DNP3, IEC 61850 GOOSE, LG 8979, IEC 60870-5-101/104, or MIRRORED BITS communications, and integrate both serial and Ethernet IEDs. By enabling logging on any system or IED tag, you can view and archive station-wide event records. Multiple SCADA connections are possible via serial or Ethernet communications.



Integrate power management with industrial control

The SEL Real-Time Automation Controller (RTAC) provides a powerful gateway between the substation and the factory using EtherNet/IP. This popular industrial protocol facilitates reliable communication between electronic devices in industrial automation systems. You can use the RTAC EtherNet/IP adapter to exchange critical data for real-time monitoring, process control, and power system integration.



Industrial Control System

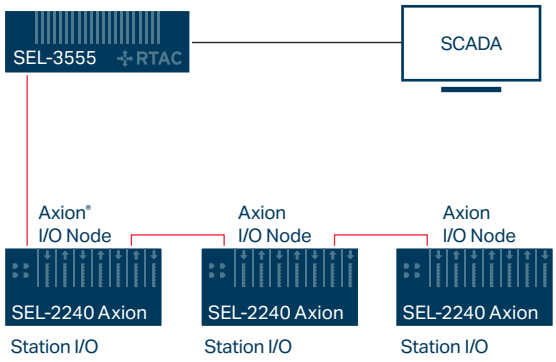
Power Management System/Substation

High-speed fault recording with Axion I/O

Customize fault recording by choosing from 1 to 24 kHz reports ranging from 1 to 560 seconds. You can store up to 1,024 COMTRADE reports.

Use the advanced SEL logic engine in the SEL-2240 Axion to trigger events. You can cross-trigger other digital fault recorder (DFR) systems or relays using IEC 61850 GOOSE messages or MIRRORED BITS communications.

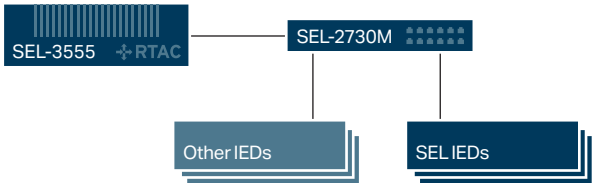
Use SYNCHROWAVE Event Viewer to perform detailed analysis, like Fast Fourier Transform and spectral analysis, to find harmonic content in the power system.



NERC CIP-007-6 network device audit

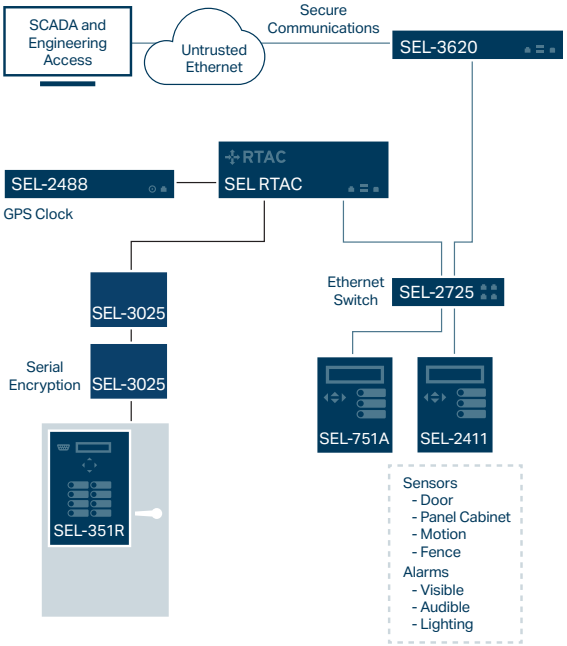
Employ x86 SEL Real-Time Automation Controller (RTAC) platform devices, such as the SEL-3555 RTAC, SEL-3560 RTAC, and SEL-3350 Automation Controller, by integrating them into a network to perform a network audit of devices. You can detect IP and MAC addresses and identify possible duplicate IPs. You can also implement open-port identification and then generate an automatic audit report to review critical assets on your network.

The RTAC offers a self-audit report functionality, which provides the firmware configuration, local user account enumeration, network interface configuration, and open TCP/UPD ports.



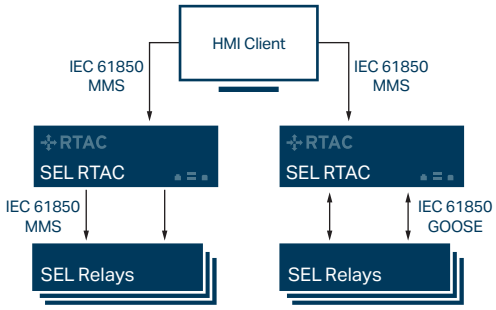
Secure communications, user management, and engineering access

Employ the SEL Real-Time Automation Controller (RTAC), SEL-3620 Ethernet Security Gateway, and SEL accessories to secure your automation network. Per-user security profiles comply with role-based requirements. The system supports intrusion detection, notification, and logging to help maintain perimeter integrity. Secure Shell (SSH) provides encrypted engineering access through the RTAC while the Lightweight Directory Access Protocol (LDAP) provides centralized user authentication and access control.



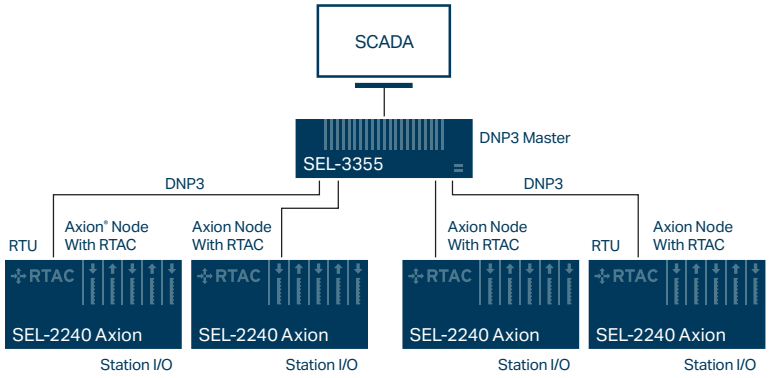
IEC 61850 system

Implement the SEL Real-Time Automation Controller (RTAC) as a central controller in an IEC 61850 system with IEC 61850 GOOSE and Manufacturing Message Specification (MMS) protocols. With IEC 61850 Edition 1 and 2 support, the RTAC easily integrates with new and existing infrastructure. You can collect data from legacy protocols and convert them to MMS using the RTAC's MMS server.



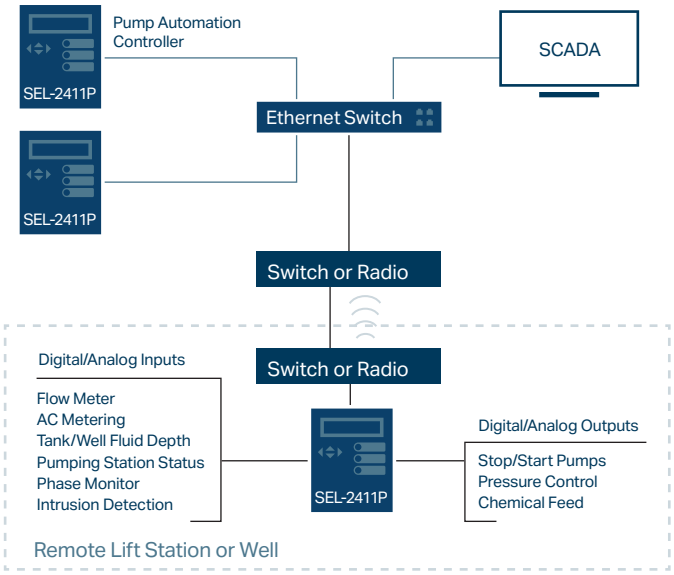
Substation remote terminal unit (RTU)

Gather digital and analog signals from remote sites with the SEL-2240 Axion, and distribute the data over a variety of industry-standard protocols to a central SCADA system or HMI.



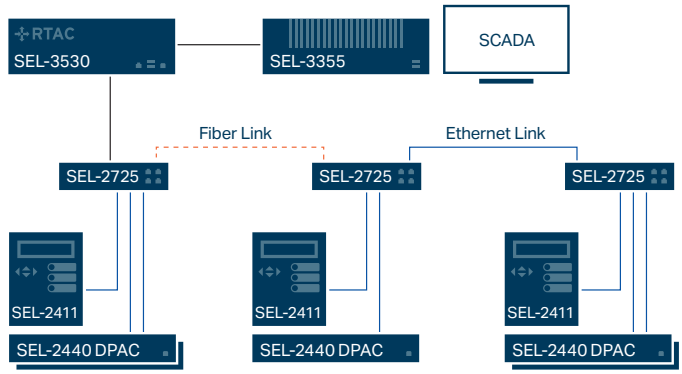
Pump control and monitoring

Manage fluid levels, pump operations, and pump house security with the SEL-2411P Pump Automation Controller. You can coordinate control and monitoring for wells, lift stations, booster stations, or remote terminal units (RTUs) through wired and wireless communications technologies.



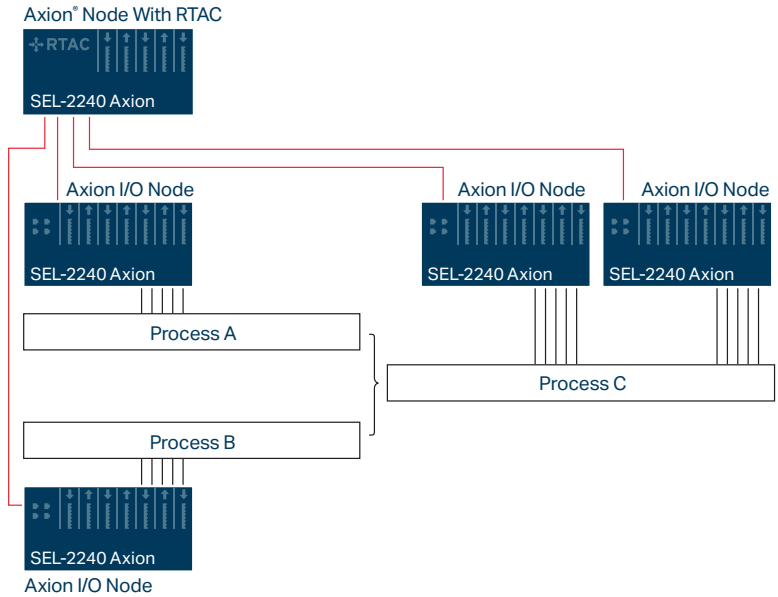
Distributed I/O monitoring

Measure analog currents, voltages, or the status of contact points with SEL automation controllers. You can use the data locally within the device, send the information to another device within the substation, or send the information to one or more databases for operators, engineers, planners, and administrators.



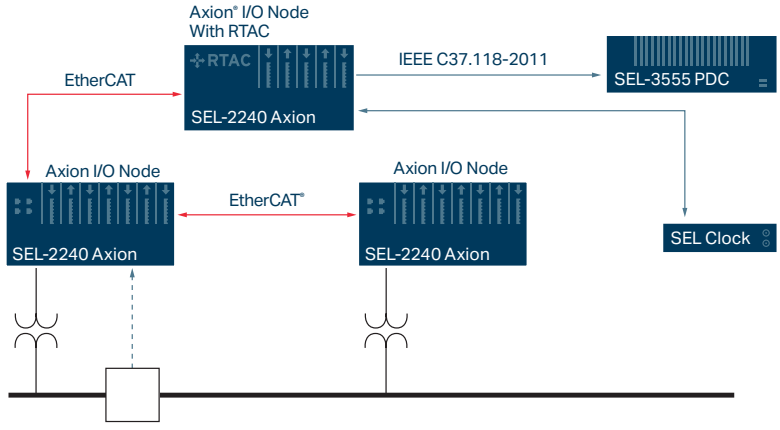
Process and proportional integral derivative (PID) control

Implement sequential control schemes, enable continuous control algorithms, and monitor critical processes throughout an operating facility with the SEL-2240 Axion. You can also apply advanced PID control libraries to dynamic system processes.



Flexible phasor measurement unit (PMU)

Apply the SEL-2240 Axion as a scalable and distributable synchrophasor measurement system. A single SEL Real-Time Automation Controller (RTAC) processor in the primary Axion node serves IEEE C37.118.1a-2014 synchrophasor data from remote Axion nodes. Remote Axion nodes use the SEL-2245-4 AC Metering Module located at the measurement points.

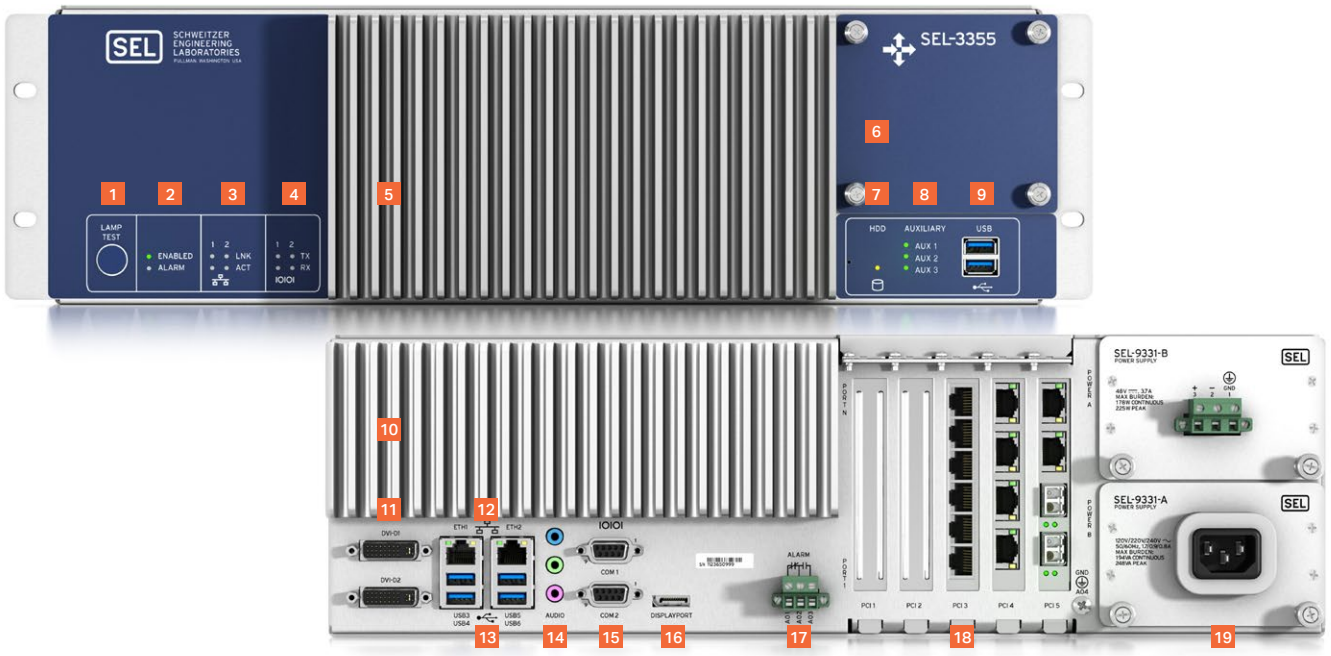


SEL-3355
Automation Controller

Starting price
$3,670 USD

selinc.com/products/3355

The SEL-3355 is built to withstand harsh environments in utility substations and industrial control and automation systems. SEL automation controllers have over ten times the mean time between failures (MTBF) of typical industrial computers because they eliminate all moving parts, including rotating hard drives and fans, and use error-correcting code (ECC) memory technology.



1. LED lamp test button
2. Alarm and operational status LED indicators
3. Ethernet port link status and network activity LEDs
4. Serial port Transmit and Receive LEDs
5. Front heat sink and no fans or moving parts
6. Up to four hot-swappable SSDs
7. Hard disk drive activity LED
8. Three programmable bicolor LEDs
9. Two front-panel USB 3.1 ports
10. Rear heat sink
11. Two DVI-D ports
12. Two high-speed Gigabit Ethernet ports
13. Four USB 3.1 ports
14. Line-in, line-out, and microphone jacks
15. Two built-in BIOS-configurable EIA-232 ports with +5 V on Pin 1
16. DisplayPort monitor connection technology
17. Form C alarm contact output
18. Up to five expansion slots: one legacy PCI, two x1 PCIe, and two x4 PCIe
19. Dual hot-swappable power supplies

Performance and Durability

High-performance processing power

The SEL-3355 has third-generation Intel Xeon E3 quad-core processors, enabling up to 2.8 GHz of processing power. High-speed single-level cell (SLC) SSDs in four slots, with up to 256 GB per slot, and ample system memory (4 to 32 GB of DDR4 ECC memory) provide resources for your most demanding applications. New multilevel cell (MLC) and industrial-grade MLC (iMLC) drive options extend the storage capacity.

Protective relay standards

The SEL-3355 is suitable for harsh environments, including those with temperatures ranging from –40° to +75°C (–40° to +167°F), up to 15 kV of electrostatic discharge, fast transients, radiated emissions, overcurrents, and pulsed magnetic field disturbances. The SEL-3355 conforms to IEC 61850-3, IEEE C37.90, IEEE 1613, and IEC 60255 standards.

Reliable, Available, and Serviceable

The SEL-3355 is a server-class automation controller with respect to RAS—reliability, availability, and serviceability. Industrial automation systems need to always be available and easy to service.

Reliability

SEL designs, manufactures, and tests every automation controller in-house to the same standards as our protective relays. Our automation controllers have an MTBF of over 100 years, ten times higher than that of the typical industrial automation controllers. In addition, the SEL-3355 is backed by a ten-year, no-questions-asked warranty.

Availability

Features like dual power supplies and Intel Active Management Technology (AMT) for out-of-band remote management keep your system operational.

Serviceability

AMT allows you to view diagnostic logs for evaluation and service even when the unit is turned off. You can reboot the controller into another OS for diagnostics or to batch software and then can bring the system back online, all remotely. AMT's remote Keyboard-Video-Mouse (KVM)-over-IP feature lets you get hands-on help and guidance from an expert at the central office to speed up serviceability. The SEL-3355 also features the unique SEL system monitor (SysMon) with a watchdog timer. SysMon logs events specific to the installed system to aid in faster recovery.

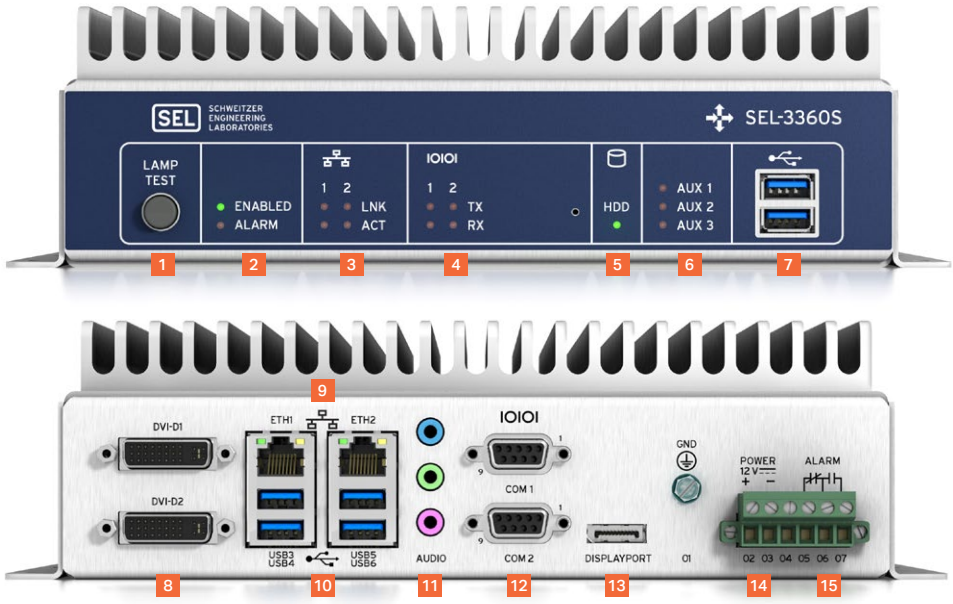
SEL-3360

Compact Automation Controller

Starting price
SEL-3360S: $3,260 USD
SEL-3360E: $3,780 USD

selinc.com/products/3360

The SEL-3360 (a compact version of the SEL-3355 Automation Controller with an Intel Xeon E3 quad-core processor) is built to with-stand harsh environments in utility substations, industrial control systems, and automation systems. By eliminating all moving parts (including rotating hard drives and fans) and using error-correcting code (ECC) memory technology, SEL compact automation controllers have over ten times the mean time between failures (MTBF) of typical automation controllers. Designed, manufactured, and tested to the same standards as our protective relays, every SEL-3360 comes with a ten-year, worldwide SEL warranty.



1. LED lamp test button
2. Alarm and operational status LED indicators
3. Ethernet port link status and network LEDs
4. Serial port Transmit and Receive LEDs
5. Hard disk drive activity LED
6. Three programmable bicolor LEDs
7. Two front-panel USB 3.1 ports
8. Two DVI-D ports
9. Two high-speed Gigabit Ethernet ports
10. Four USB 3.1 ports
11. Line-in, line-out, and microphone jacks
12. Two built-in EIA-232 ports
13. DisplayPort monitor connection technology
14. External power supply connection*
15. Form C alarm contact output

*Add a built-in power supply as well as PCIe expandability with the SEL-3360E (expandable model). The SEL-3360S (standard model) is shown.

SEL-3350

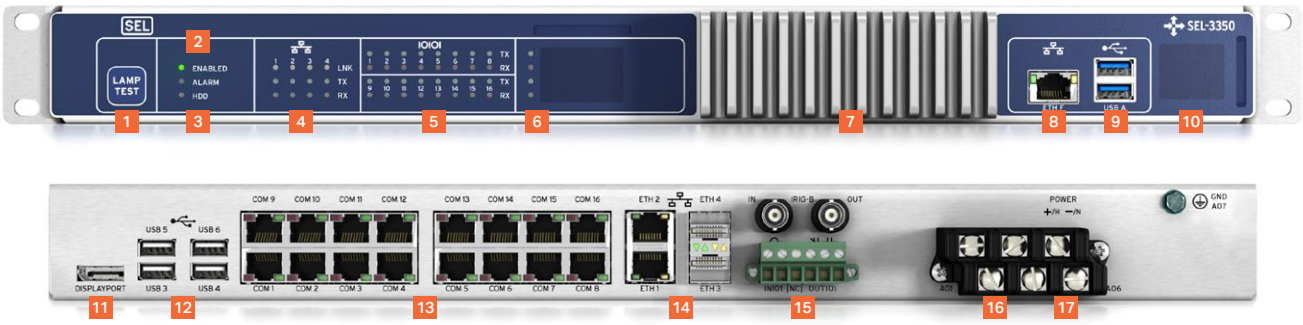
Automation Controller NEW

Starting price
$2,500 USD

selinc.com/products/3350

The SEL-3350 is a versatile automation controller ideal for dedicated embedded applications. The SEL-3350 uses the Intel Atom x5-E3940 quad-core processor with 8 GB of RAM and is built to withstand harsh environments in utility substations, industrial control systems, and automation systems. By eliminating all moving parts (including rotating hard drives and fans) and using error-correcting code (ECC) memory technology, SEL automation controllers have over ten times the mean time between failures of typical industrial controllers. Designed, manufactured, and tested to the same standards as our protective relays, every SEL-3350 comes with a ten-year, worldwide warranty.

For secure automation application needs, you can configure the SEL-3350 as a Real-Time Automation Controller (RTAC) or with the SEL BlueFrame™ application platform. Alternatively, the SEL-3350 can be configured to run as a computer with Microsoft Windows or Linux operating systems.



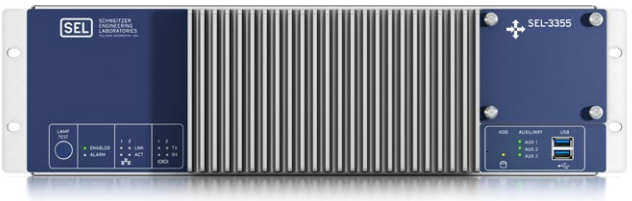
1. LED lamp test button
2. Alarm and operational status LED indicators
3. Hard disk drive activity LED
4. Ethernet port link status and network LEDs
5. Serial port Transmit and Receive LEDs
6. Four programmable bicolor LEDs
7. Front heat sink and no fans or moving parts
8. Front Gigabit Ethernet port
9. Two front-panel USB 3.1 ports
10. Two hot-swappable SSDs
11. DisplayPort monitor connection technology
12. Four USB 2.0 ports
13. 16 built-in RJ45 EIA-232 ports
14. Four high-speed Gigabit Ethernet ports with the following configuration options:
    - 4 RJ45 ports
    - 2 RJ45 and 2 small form-factor pluggable (SFP) ports
    - 4 SFP ports
15. Configurable digital/analog input
16. Form C alarm contact output
17. Built-in power supply connections

SEL Automation Controllers

Operating System Options

SEL-3355, SEL-3360, and SEL-3350 Automation Controllers support various operating system installation options. The controllers can be purchased as hardware without an operating system installed, providing flexibility to install your own custom operating system image.

For secure automation application needs, you can configure an SEL automation controller as a Real-Time Automation Controller (RTAC) or as an application platform with SEL BlueFrame™. SEL automation controllers also support computer configurations with factory-installed Microsoft Windows 10 IoT Enterprise Long-Term Servicing Channel (LTSC) and Windows Server operating systems. SEL network and serial port drivers are available to support the installation of other third-party Linux operating systems.



SEL-3355

SEL-3360E and SEL-3360S

SEL-3350

Operating Systems	SEL-3355	SEL-3360E	SEL-3360S	SEL-3350
SEL RTAC*	+	+	+	+
SEL BlueFrame Operating System*	+	+	+	+
Windows 10 IoT Enterprise LTSC*	+	+	+	+
Windows Server 2019 Standard*	+	+	+	+
Windows 10 IoT LTSB	+	+	+	
Windows Server 2012 R2 Standard	+	+	+	
Windows Server 2016 Standard	+	+	+	
Red Hat Enterprise Linux (RHEL) 7 and 8	+	+	+	+
CentOS Linux 7 and 8	+	+	+	+
Ubuntu 16.04 LTS	+	+	+	+
Ubuntu 18.04 LTS	+	+	+	+
Microsoft Hyper-V	+	+	+	
Linux KVM	+	+	+	
VMware ESXi[1]	+	+	+	
None	+	+	+	+

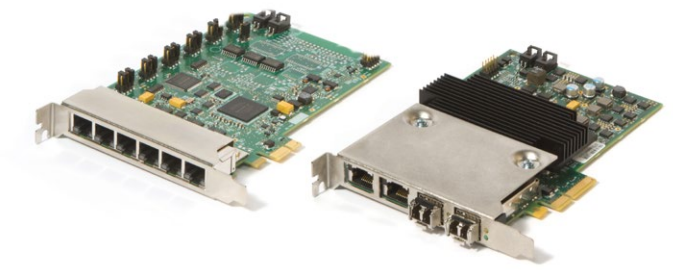
+ Model Option *Factory-orderable operating system

[1]For VMware version compatibility, please contact SEL support.

SEL-3390
PCIe Expansion Card

Starting price
SEL-3390E4: $470 USD
SEL-3390S8: $470 USD

selinc.com/products/3390E4 or selinc.com/products/3390S8



The SEL-3390S8 Serial Adapter Card and SEL-3390E4 Ethernet Network Adapter Card are PCI Express (PCIe) expansion cards. The cards are designed, built, and tested for use in harsh industrial and substation environments, providing a wide operating temperature range and immunity to ESD, shock, and vibration. Both cards offer optional conformal coating for corrosion immunity.

The SEL-3390S8 has six software-configurable EIA-232/422/485 ports with RJ45 connectors. All ports meet EIA-562 and are capable of 300 to 921,600 bps with automatic flow control. You can configure each port to provide +5 V to power modems or transceivers.

The SEL-3390E4 has four independent Gigabit Ethernet ports with improved speed and latency performance. You can choose all copper, all LC fiber, or two copper and two fiber ports.

SEL-9331
Power Supply

Starting price
SEL-9331: $400 USD

selinc.com/products/9331

The SEL-9331 is a high-output +12 Vdc, 200-watt fanless power supply for SEL-3355 and SEL-3360S/E Automation Controllers. It provides ample power in environments where many supplies cannot. The SEL-9331 can produce 11 A of continuous current from –40° to +85°C (–40° to +185°F) and 17 A of maximum current. High-voltage (120/240 Vac or 125/250 Vdc) and low-voltage (48 Vdc) options provide flexibility for a wide range of power sources.

SEL BlueFrame™

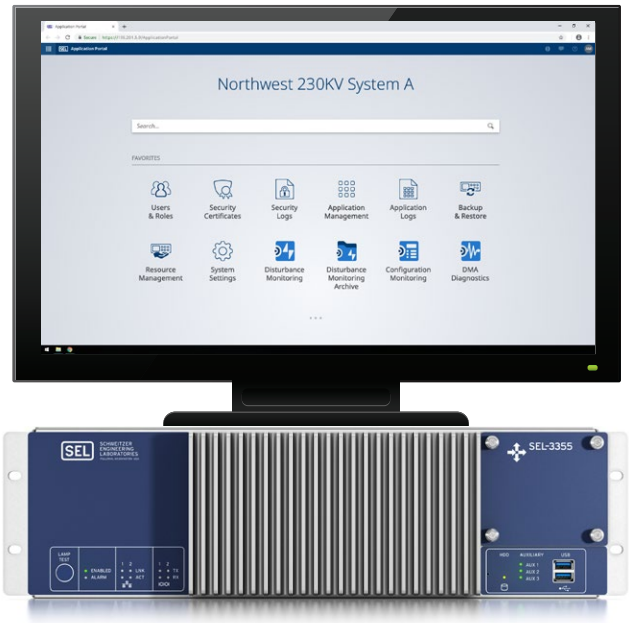
Application Platform NEW

Contact SEL for More Information

selinc.com/products/BlueFrame

The SEL BlueFrame application platform is a secure system that provides a framework for installing applications and for managing and exchanging data between supported applications. Scalable and customizable, the platform provides a solid foundation to accommodate your system schemes today and in the future. BlueFrame enables you to define and manage parameters and settings across the platform through a simple, user-friendly interface. The platform can collect and consolidate data from many devices to run applications on a single platform. Permissions and robust user management ensure data are restricted to only the personnel that have a need to know.

The BlueFrame operating system is designed with security in mind. It is engineered to minimize the attack surface and deploy several security measures, like whitelisting, to prevent unauthorized access and attacks. You can install BlueFrame on any of the powerful and reliable SEL automation controllers (e.g., SEL-3355, SEL-3360, and SEL-3350) to ensure the availability of your system in the most demanding applications and environments.



Versatile

BlueFrame simplifies and centralizes user access permissions, security parameters, and IED data management with a single, user-friendly, consolidated interface to perform different tasks based on the applications deployed. BlueFrame also enables you to customize the system functionality by adding more modular applications.

Scalable

BlueFrame supports installations of any size and is an economical solution for both small and large systems. You can change the applications to accommodate your system's evolving needs. You can also readily scale from one or two targeted applications to multiple application suites.

Flexible

Tailor your system with the applications and hardware you need. Choose from SEL automation controllers to get the hardware that best fits your requirements and budget. If your system already has an SEL automation controller (e.g., SEL-3355 or SEL-3360), you can repurpose it to deploy the SEL BlueFrame platform to run the application you need.

Secure

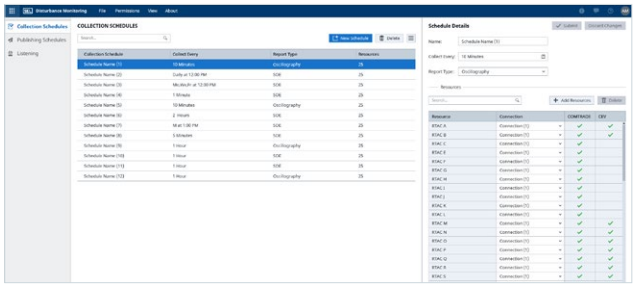
BlueFrame provides secure methods to share information between applications. These applications can only access the data they are permitted to retrieve. Efficient and restricted data exchange allows each application to specialize and provide value-added services to the overall solution. This innovative architecture allows you to customize the automation system and expand it to meet current and future needs.

SEL BlueFrame Data Management and Automation (DMA) Application Suite

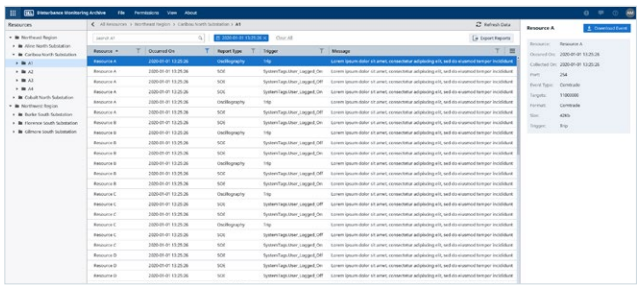
The DMA applications in this first release are designed to automatically collect, store, and manage device-specific information to simplify day-to-day management of your system of devices. DMA applications accelerate the collection of oscillography, Sequence of Events (SOE), and settings information. DMA applications also streamline device audit tasks with automated firmware version and settings checks. By providing system diagnostics and reporting across all the devices in your system, the applications help ensure your system is operating as desired.

Disturbance Monitoring

Define data collection plans for end-point devices with the Disturbance Monitoring application. The application supports the SEL RTAC, which acts as a data aggregator for monitoring multiple SEL and third-party IEDs. Collected data are stored in a short-term repository with APIs, and the data integrates with the Disturbance Monitoring Archive.

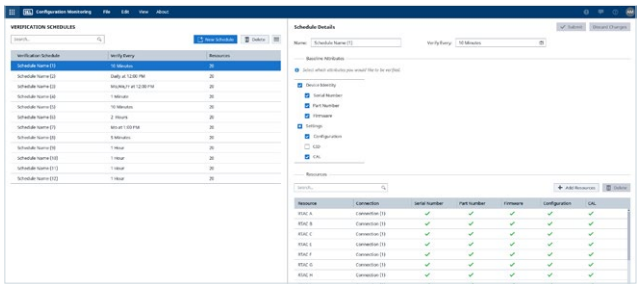


Visualize collected data to view past events with the Disturbance Monitoring Archive application. You can use the built-in filters and predefined views to select information pertinent to your task and download reports for detailed analysis in event analysis tools. The Disturbance Monitoring Archive is included with the purchase of the Disturbance Monitoring application.

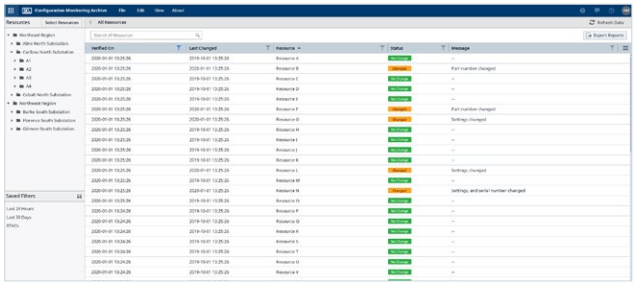


Configuration Monitoring

Automate checks of active device settings, firmware versions, and device IDs with the Configuration Monitoring application. You can securely move collected settings to a settings management repository for comparison.



View Configuration Monitoring application collected settings versions, firmware, and device ID variances with the Configuration Monitoring Archive application. This application lets you identify devices that are out of compliance and require corrective action. The Configuration Monitoring Archive is included with the purchase of the Configuration Monitoring application.



Real-Time Automation Controllers (RTACs)

SEL-3555/3560/3530/3530-4/3505/3505-3

Starting Price

SEL-3555: $7,560 USD selinc.com/products/3555
SEL-3560S: $6,680 USD selinc.com/products/3560
SEL-3560E: $7,610 USD selinc.com/products/3560
SEL-3530: $4,660 USD selinc.com/products/3530
SEL-3530-4: $2,950 USD selinc.com/products/3530
SEL-3505: $830 USD selinc.com/products/3505
SEL-3505-3: $1,140 USD selinc.com/products/3505

Select models typically ship in 2 days

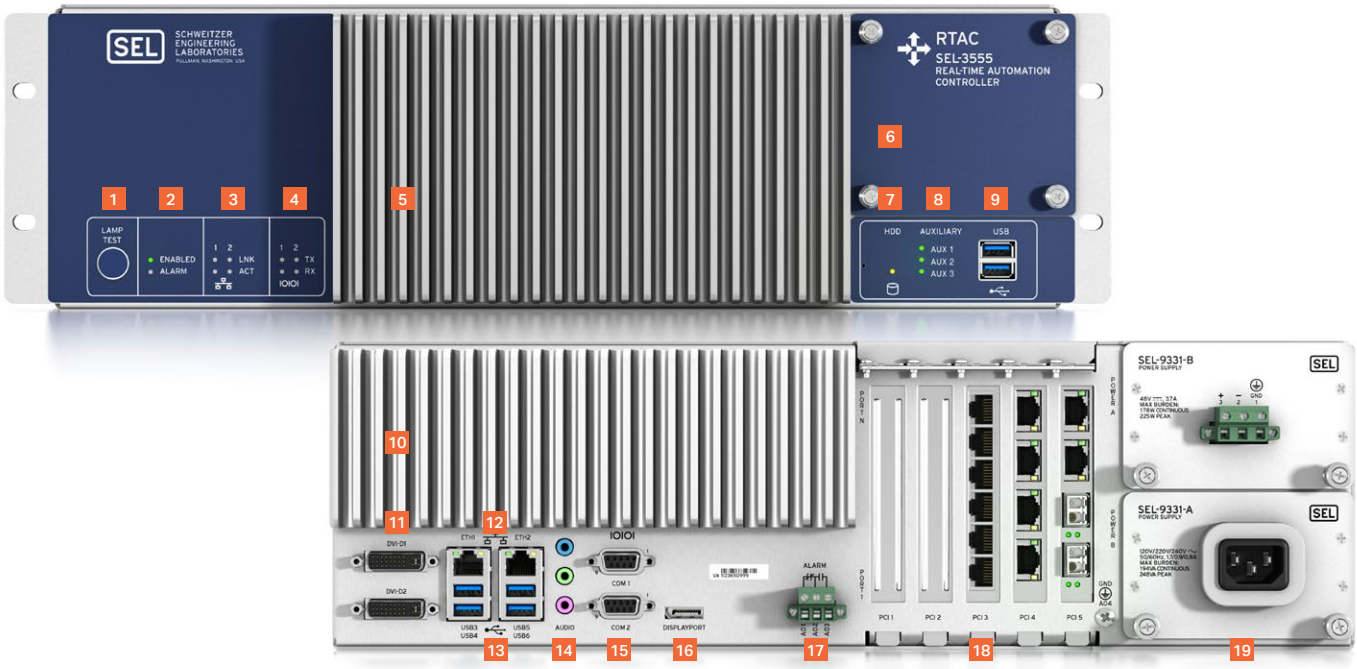
SEL RTACs offer everything from powerful data management solutions to precise, deterministic control for utility and industrial applications. Integrated cybersecurity features facilitate secure, mission-critical monitoring and control while ensuring regulatory compliance. With our ten-year, worldwide warranty and unmatched technical support, the RTAC is the right choice for high-speed, deterministic automation.

RTAC Comparison Table

	Powerful Computing Hardware		Midrange Controllers		Small Form Factor	Modular Control
Features	**SEL-3555**	**SEL-3560**	**SEL-3530**	**SEL-3530-4**	**SEL-3505/ SEL-3505-3**	**SEL-2240 Axion® With SEL-2241 Module**
Processor	2.0 GHz Intel Xeon quad-core	2.0 GHz Intel Xeon quad-core	533 MHz	533 MHz	333 MHz	533 MHz
RAM	Up to 16 GB	Up to 16 GB	1 GB	1 GB	512 MB	1 GB
Storage	30 to 480 GB	30 to 480 GB	2 GB	2 GB	2 GB	2 GB
Operation Temperature	–40° to +75°C (–40° to +167°F)	**SEL-3560S:** –40° to +75°C (–40° to +167°F) **SEL-3560E:** –40° to +60°C (–40° to +140°F)	–40° to +85°C (–40° to +185°F)			–40° to +85°C (–40° to +185°F)
RTAC Web Interface and Video	Viewing and control via web browser; integrated video; 1 DisplayPort; 2 DVI-D ports	Viewing and control via web browser; integrated video; 1 DisplayPort; 2 DVI-D ports	Viewing and control via web browser			Viewing and control via web browser
Power Supply	Redundant 120/240 Vac, 125/250 Vdc; and/or 48 Vdc	**SEL-3560S:** Optional redundant **SEL-3560E:** Single 120/240 Vac, 125/250 Vdc; and/or 48 Vdc	Single 120/240 Vac, 125/250 Vdc; 48/125 Vdc, 120 Vac; or 24/48 Vdc		Single 12/24 Vdc or 24/48 Vdc	Redundant 120/240 Vac, 125/250 Vdc; and/or 24/48 Vdc
Ethernet Ports	2 standard (up to 8 additional with PCIe expansion)	**SEL-3560S:** 2 standard **SEL-3560E:** 2 standard (up to 8 additional with PCIe expansion)	3	2	2	2
Serial Ports	8 standard (up to 18 additional with PCIe expansion)	**SEL-3560S:** 2 standard **SEL-3560E:** 8 standard (up to 18 additional with PCIe expansion)	33 (3U)/ 17 (1U)	4	**SEL-3505:** 4 **SEL-3505-3:** 3	4
USB Ports	6 USB 3.1	6 USB 3.1	USB-B	USB-B	USB-B	USB-B
Size/Mounting	3U rack/ panel mount	Surface or DIN-rail mount	3U or 1U rack/ panel mount	1U half-rack/ panel, surface, or DIN-rail mount	Surface or DIN-rail mount	5U rack/panel or surface mount (10-slot, 4-slot, and dual 4-slot)
Digital and Analog Inputs and Outputs	1 DO	1 DO	8 DO/24 DI (3U); 1 DO/1 DI (1U)	1 DO/1 DI	**SEL-3505:** 1 DO/1 DI **SEL-3505-3:** 3 DO/8 DI	Available Modules DI, DO, Fast high-current DO, dc AI, ac AI, dc AO
Other Features	Conformal coating	Conformal coating	Conformal coating	Conformal coating	**SEL-3505:** V.92 modem **Both:** Conformal coating, ambient light sensor, and accelerometer	Conformal coating
RTAC HMI	Embedded RTAC HMI	Embedded RTAC HMI	Embedded RTAC HMI	Embedded RTAC HMI	N/A	Embedded RTAC HMI

SEL-3555 Overview

The full-size SEL-3555 is a powerful solution for data management, either in the substation or at a central location. You can manage and archive system data, view real-time information, and control substation equipment. The built-in video port allows you to access an HMI locally or remotely for control, annunciation, and alarm management. The SEL-3555 provides the flexibility, reliability, and power to meet your most demanding substation automation projects. It supports EtherCAT® via the optional SEL-3390E4 Network Adapter Card for communicating with SEL-2240 Axion nodes.

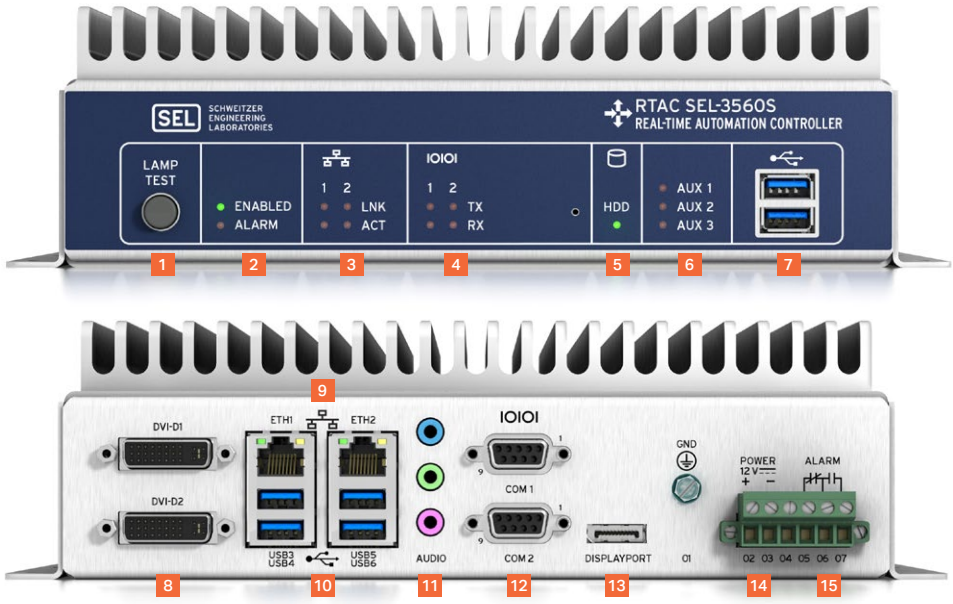


1. LED lamp test button
2. Alarm and operational status LED indicators
3. Ethernet port link status and network activity LEDs
4. Serial port Transmit and Receive LEDs
5. Front heat sink and no fans or moving parts
6. Up to four hot-swappable SSDs
7. Hard disk drive activity LED
8. Three programmable bicolor LEDs
9. Two front-panel USB 3.1 ports
10. Rear heat sink
11. Two DVI-D ports
12. Two high-speed Gigabit Ethernet ports
13. Four USB 3.1 ports
14. Line-in, line-out, and microphone jacks
15. Two built-in BIOS-configurable EIA-232 ports with +5 V on Pin 1
16. DisplayPort monitor connection technology
17. Form C alarm contact output
18. Up to five expansion slots: one legacy PCI, two x1 PCIe, and two x4 PCIe
19. Dual hot-swappable power supplies

SEL-3560 Overview

The compact SEL-3560 RTAC is built to withstand harsh environments in utility substations, industrial control systems, and automation systems. You can manage and archive system data, view real-time information, and control substation equipment. The built-in video port lets you access an HMI locally or remotely for control, annunciation, and alarm management. The SEL-3560 provides the flexibility, reliability, and power to meet your most demanding substation automation projects.

SEL-3560S



1 LED lamp test button

2 Alarm and operational status LED indicators

3 Ethernet port link status and network LEDs

4 Serial port Transmit and Receive LEDs

5 Hard disk drive activity LED

6 Three programmable bicolor LEDs

7 Two front-panel USB 3.1 ports

8 Two DVI-D ports

9 Two high-speed Gigabit Ethernet ports

10 Four USB 3.1 ports

11 Line-in, line-out, and microphone jacks

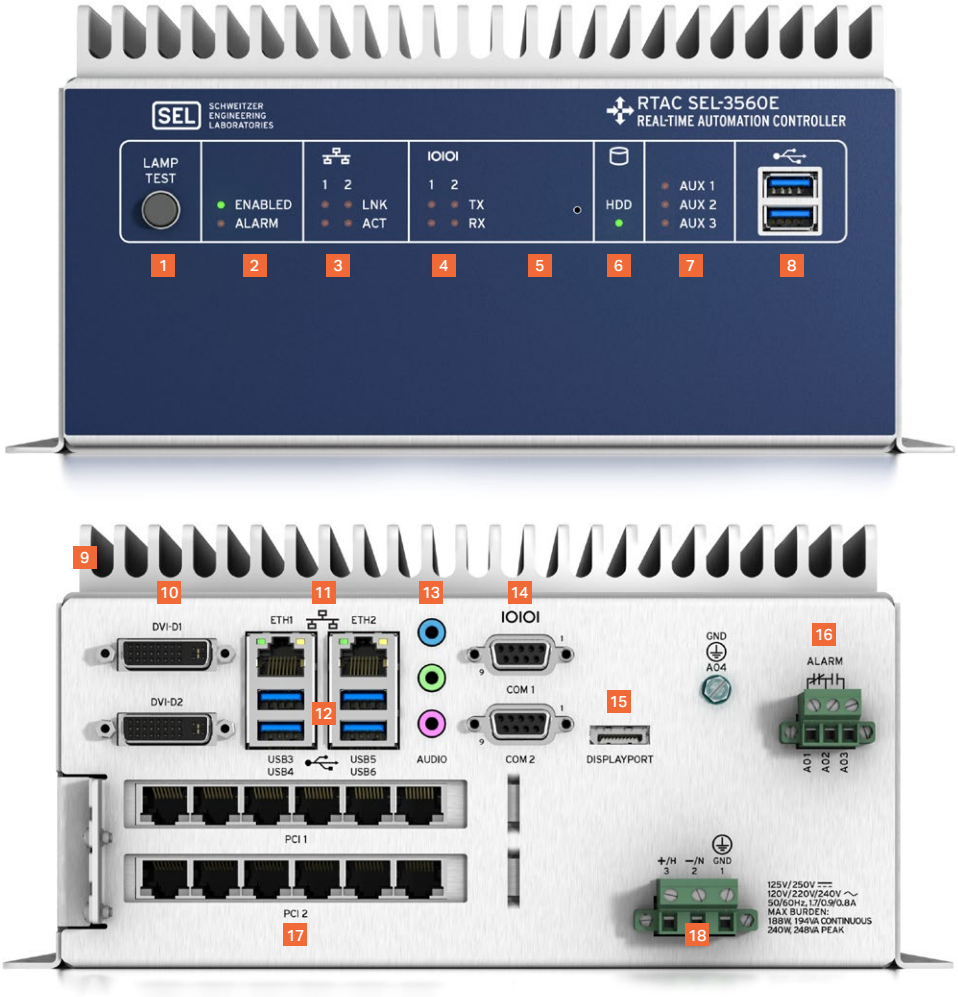
12 Two built-in EIA-232 ports

13 DisplayPort monitor connection technology

14 External power supply connection

15 Form C alarm contact output

SEL-3560E



1 LED lamp test button

2 Alarm and operational status LED indicators

3 Ethernet port link status and network LEDs

4 Serial port Transmit and Receive LEDs

5 Up to two hot-swappable SSDs

6 Hard disk drive activity LED

7 Three programmable bicolor LEDs

8 Two front-panel USB 3.1 ports

9 Heat sink and no fans or moving parts

10 Two DVI-D ports

11 Two high-speed Gigabit Ethernet ports

12 Four USB 3.1 ports

13 Line-in, line-out, and microphone jacks

14 Two built-in EIA-232 ports

15 DisplayPort monitor connection technology

16 Form C alarm contact output

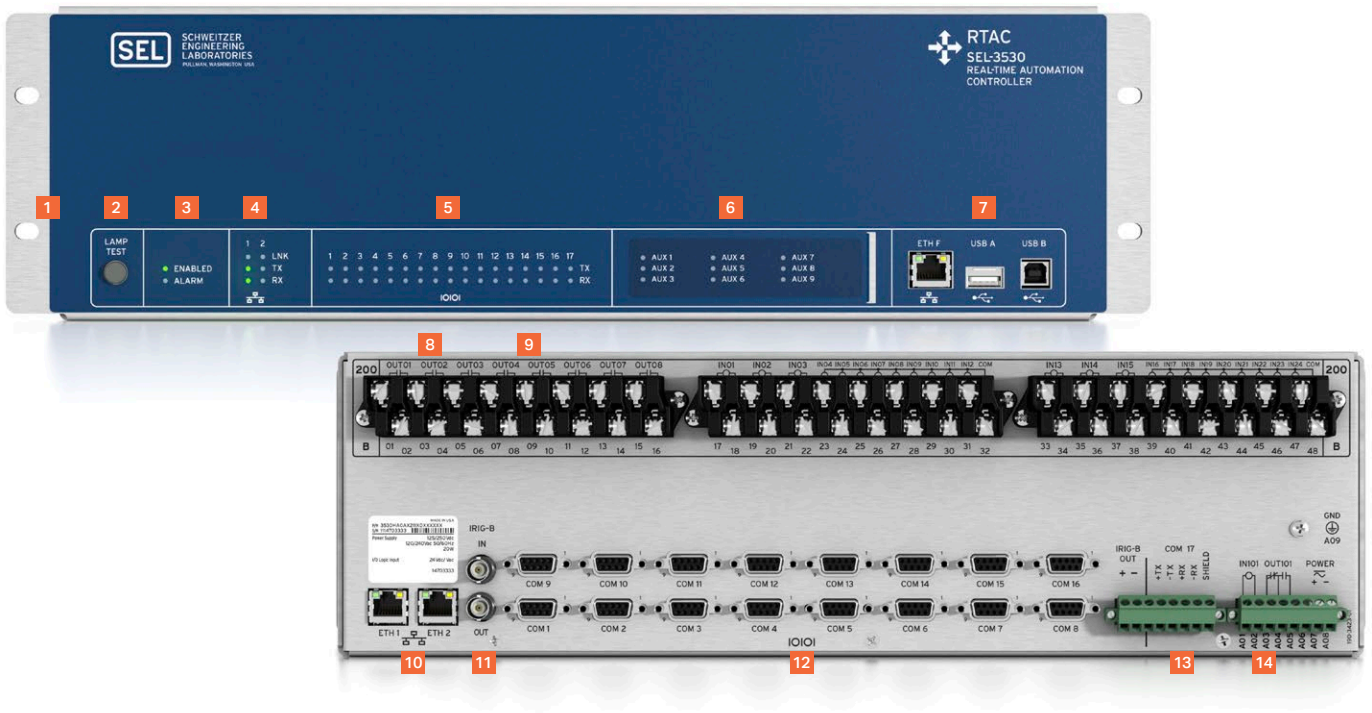
17 Two nonproprietary PCIe expansion slots

18 Built-in ac/dc power supply

SEL-3530/3530-4 Overview

The midrange SEL-3530/3530-4 RTACs are ideal for substation data concentration, for protocol conversion, and to provide remote HMI access for visualization and control. You can use the RTAC to interface with IEDs and communicate back to your SCADA or energy management system or for secure engineering access to protective relays from your desk.

SEL-3530



1. Rugged enclosure withstands electromagnetic interference (EMI), radio frequency interference (RFI), shock, and vibration.
2. LED lamp test button.
3. Alarm and operational status LED indicators.
4. Ethernet port link status and network LEDs.
5. Serial port Transmit and Receive LEDs.
6. Programmable bicolor LEDs with configurable labels.
7. Front Ethernet and USB ports.
8. Programmable I/O for local and remote control integration.
9. All terminals are clearly numbered and lettered for wiring and testing.
10. Independent Ethernet ports can be RJ45 or LC fiber.
11. Demodulated IRIG-B input and output for high-accuracy time synchronization.
12. Software-selectable EIA-232/485 serial ports.
13. Isolated EIA-232/485 port.
14. Programmable input and alarm contact.

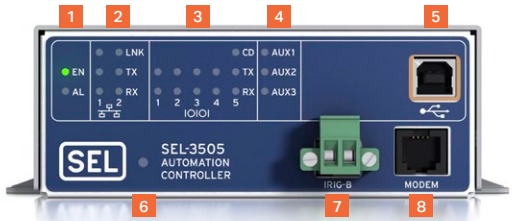
SEL-3530-4

1. Rugged enclosure withstands EMI, RFI, shock, and vibration.
2. LED lamp test button.
3. Alarm and operational status LED indicators.
4. Ethernet port link status and network LEDs.
5. Serial port Transmit and Receive LEDs.
6. Three programmable bicolor LEDs with configurable labels.
7. USB access port.
8. Independent Ethernet ports can be RJ45 or LC fiber.
9. Demodulated IRIG-B input and output for high-accuracy time synchronization.
10. Software-selectable EIA-232/485 serial ports.
11. All terminals are clearly numbered and lettered for wiring and testing.
12. Programmable input and alarm contact.

SEL-3505/3505-3 OVERVIEW

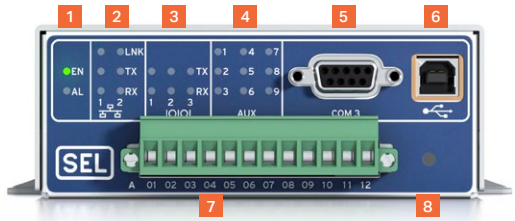
The SEL-3505/3505-3 RTACs are ideally suited for small enclosures, such as recloser controls, capacitor bank controls, or inverter cabinets that are exposed to harsh environmental conditions. You can use these compact, low-cost RTACs for protocol conversion, localized control and industrial applications, secure engineering access, or providing information to distribution automation systems. The SEL-3505 offers four serial ports, and the SEL-3505-3 offers three serial ports.

SEL-3505



1. Alarm and operational status LED indicators
2. Ethernet port link status and network LEDs
3. Serial port Transmit and Receive LEDs
4. User-programmable, bicolored LEDs
5. USB access port
6. Integrated ambient light sensor and accelerometer
7. Demodulated IRIG-B input
8. Optional integrated 56 kbps dial-up modem

SEL-3505-3



1. Alarm and operational status LED indicators
2. Ethernet port link status and network LEDs
3. Serial port Transmit and Receive LEDs
4. User-programmable, bicolored LEDs
5. Software-selectable EIA-232/485 serial port
6. USB access port
7. Three digital output points (not shown) and eight digital input points
8. Integrated ambient light sensor and accelerometer

SEL-2240
Axion®

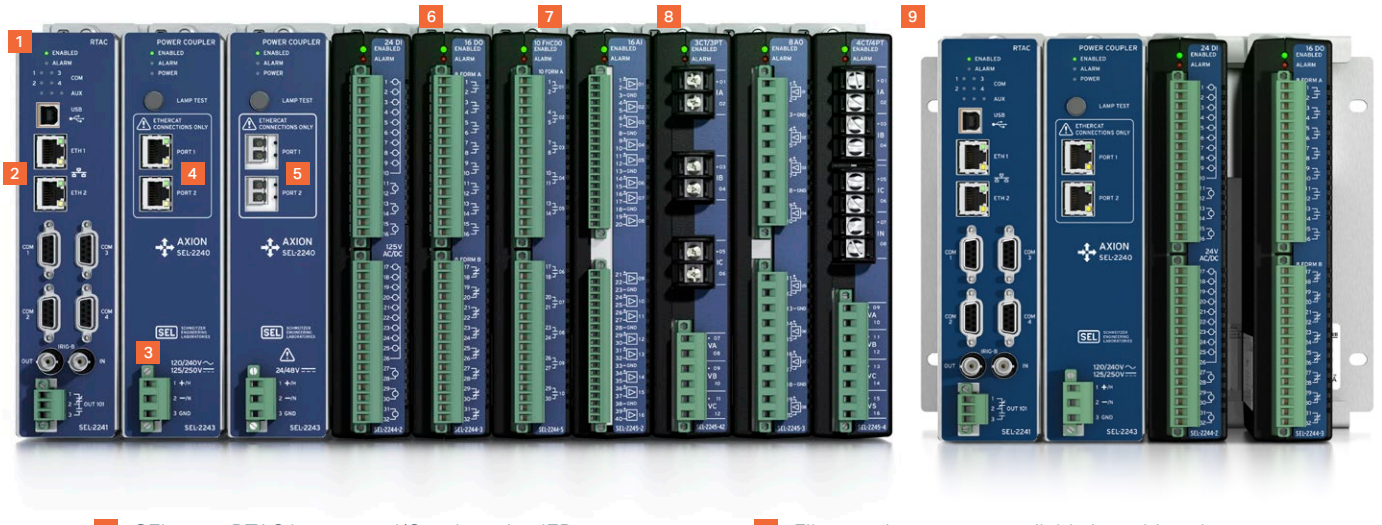
selinc.com/products/2240

Starting Price
SEL-2241 Real-Time Automation Controller (RTAC) Module: $2,490 USD
SEL-2242 Chassis/Backplane (10-Slot): $170 USD
SEL-2243 Power Coupler: $320 USD

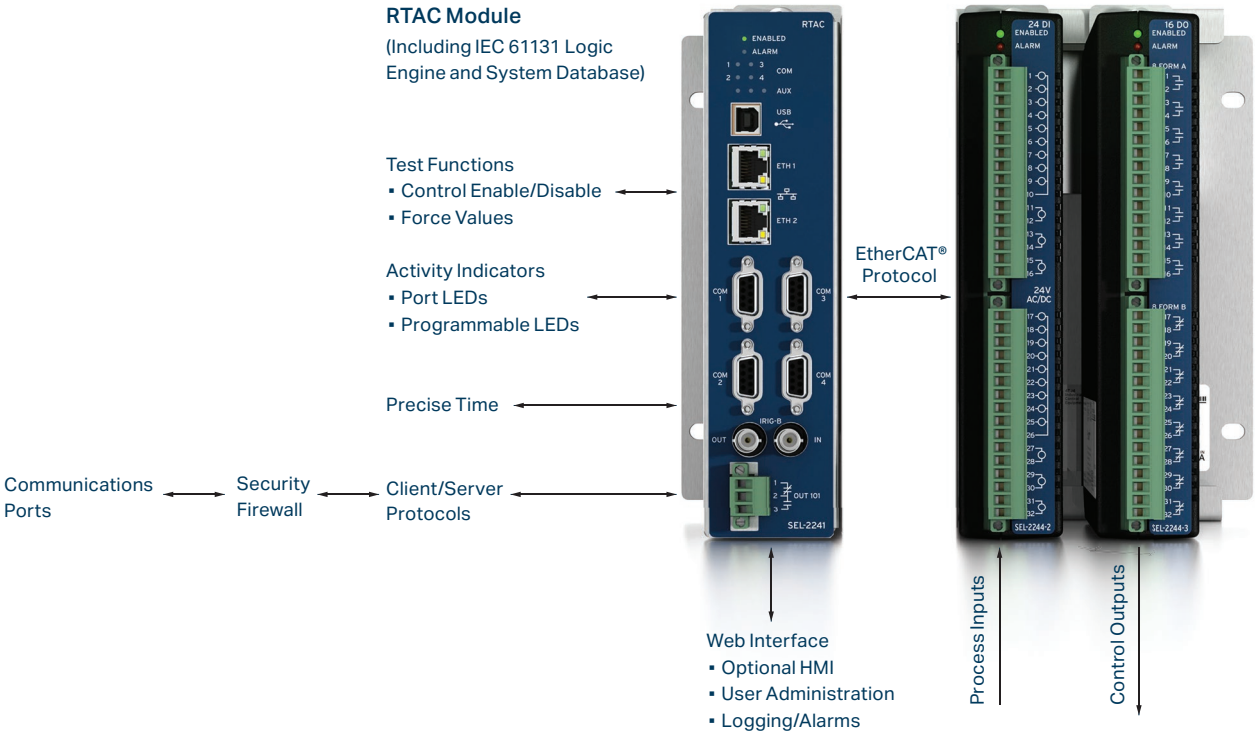
The SEL-2240 Axion is a fully integrated, modular I/O and control solution ideally suited for utility and industrial applications. It combines the communications, built-in security, and IEC 61131 logic engine of SEL Real-Time Automation Controllers (RTACs) with a durable suite of I/O modules that provide high-speed, deterministic control performance over an EtherCAT® network.

Whether your application calls for a remote terminal unit (RTU) or a rugged programmable logic controller (PLC), the Axion is a good match. All the modules are rated from –40° to +85°C (–40° to +185°F) and can include conformal coating. The system is designed to be flexible; you can select a combination of modules and nodes in almost any arrangement. The SEL-2244-3 Digital Output Module has substation-duty contacts (30 A make, 6 A carry) to provide reliable operation and flexible application.

The SEL-3530, SEL-3530-4, and SEL-3555 RTACs and the SEL-2241 RTAC Module can operate as the CPU for an Axion platform. They interface seamlessly with the I/O modules and provide easy integration with other serial and Ethernet devices via preinstalled communications protocols. The RTACs also support multiple SCADA/HMI channels. For high-speed communication, you can use EtherCAT fieldbus connections to I/O modules or optional IEC 61850 GOOSE messaging with station IEDs.



1. SEL-2241 RTAC integrates I/O, substation IEDs, SCADA communications, and security applications.
2. Two independent Ethernet ports are available in either copper or LC fiber and can operate on separate subnets.
3. SEL-2243 Power Coupler is the Axion system power supply.
4. Two EtherCAT ports for additional Axion nodes.
5. Fiber-optic ports are available in multimode or single-mode.
6. Slot identification is visible even when in use.
7. Module alignment guides for easy installation.
8. Surface- or rack-mount chassis.
9. Four-slot, dual four-slot, or ten-slot chassis available.



Axion Module Options

SEL-2241	RTAC Module	$2,490
SEL-2242	Chassis/Backplane (10-Slot)	$170
SEL-2242	Chassis/Backplane (4-Slot)	$150
SEL-2242	Chassis/Backplane (Dual 4-Slot)	$190
SEL-2243	Power Coupler	$320
SEL-2244-2	Digital Input Module	$210
SEL-2244-3	Digital Output Module	$210
SEL-2244-5	Fast High-Current Digital Output Module	$470

SEL-2245-2	DC Analog Input Module	$1,010
SEL-2245-22	DC Analog Input Extended-Range Module	$730
SEL-2245-221	Low-Voltage (LEA) Monitoring Module	$730
SEL-2245-3	DC Analog Output Module	$1,010
SEL-2245-4	AC Metering Module	$940
SEL-2245-411	Standard-Current and Low-Voltage (LEA) Monitoring Module	$940
SEL-2245-42	AC Protection Module	$1,140

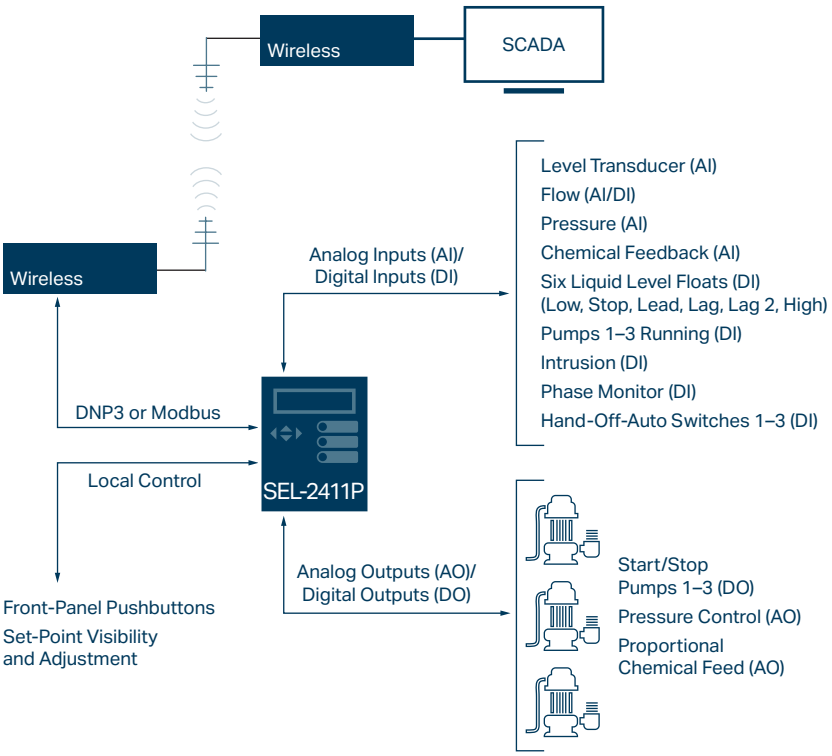
SEL-2411P

Pump Automation Controller

Starting price
$2,130 USD

selinc.com/products/2411P | Select models typically ship in 2 days

The SEL-2411P is a hardened, standalone, preconfigured, SCADA-ready system for the control and monitoring of multiple water and wastewater pumps that perform liquid level control. It is designed for pump-up and pump-down applications, such as lift stations (pump down) and wells or reservoirs (pump up). The SEL-2411P is UL-listed and withstands harsh water and wastewater environments. It comes with conformal coating to protect against corrosive gases, fumes, or liquids. Flexible I/O options, communications protocols, simple configuration, and connectivity to wired and wireless technologies let you easily integrate the SEL-2411P into new or retrofit applications.



Feature	Description
I/O Plug-In Cards	**Pre-installed cards:** one 14 digital input (DI) card and one 4 DI/4 fast high-current hybrid digital output (DO) card **Configurable I/O card options:** 14 DI card, 8 analog input (AI) card, 4 AI/4 analog output (AO) card, or 3 ac voltage input (AVI) phase monitor card
Station Settings	Complete operational configuration from the front panel with four to six settings for most pump applications
Protocols	Modbus RTU and TCP, DNP3, DNP3 LAN/WAN, Mirrored Bits®, SEL ASCII, and binary communications
Communications	Two 10/100 Ethernet ports and two EIA-232 ports (front and back)
Certifications	UL; CSA; Class 1, Div. 2

SEL-2411

Programmable Automation Controller

Starting price
$990 USD

selinc.com/products/2411

The SEL-2411 automates continuous and discrete processes using powerful logic, math, timer, counter, and edge-trigger functions. Designed to withstand harsh physical and electrical environments, the SEL-2411 is built and tested to meet mission-critical IEEE and IEC protective relay standards. With flexible communications and I/O options, the SEL-2411 can easily integrate with SCADA and meets your sequential events reporting, station integration, remote monitoring, ac metering, and plant control system needs. A large touchscreen display option provides an advanced local user interface that is simple to use.

SEL-2440

Discrete Programmable Automation Controller (DPAC)

Starting price
$1,000 USD

selinc.com/products/2440

Select models typically ship in 2 days

The SEL-2440 is a 48-point automation controller ideally suited for utility and industrial applications that require rugged and reliable I/O. The SEL-2440 is a fast and powerful communications device that is easy to maintain and support, and it meets stringent protective relay standards. Mounting options include rack, panel, surface, and DIN-rail mounts. An optional I/O board provides ten fast high-current digital outputs with a pick-up time of less than 85 µs, depending on the voltage level.