SEL-3530

Real-Time Automation Controller (RTAC)

Powerful, reliable, and secure multifunction controller

- Operates as a SCADA remote terminal unit (RTU), IEC 61850 gateway, data concentrator, event collector, HMI, or substation controller.
- Employs an embedded operating system for system stability, withstands a wide temperature range for rugged outdoor use, and provides maximum reliability with no moving parts.
- Protects against malware and other cybersecurity threats with exe-GUARD® whitelist antivirus technology.
- Includes expandable I/O with Ethernet ports, IRIG-B, and DB-9 EIA-232/-485 software-selectable serial ports.

Product Overview

Suitable for use in utility substations or industrial control and automation systems, the SEL-3530 RTAC provides complete and flexible system control with integrated security, seamless configuration, unified logic, and reliability. It converts data between multiple protocols, communicates with any configured and connected device, and comes with an embedded IEC 61131 logic engine. The RTAC is a robust automation control solution that offers the following benefits and features.

Powerful

- Powerful 32-bit microcontroller for relay-speed I/O, logic, and communications.
- IEC 61131 logic engine with an intuitive configuration environment.

Reliable

- Embedded operating system designed for stability.
- Industry-leading worldwide ten-year warranty.
- Widest operating temperature range of −40° to +85°C (−40° to +185°F); for use indoors and in outdoor cabinets.
- Error-correcting code (ECC) RAM for data integrity.
- No fans: quiet, clean, and reliable.
- Optional conformal coating available.

Secure

- Exe-GUARD whitelist antivirus technology to allow only authorized applications to run.
- Ability to apply unique login accounts and profiles to comply with role-based requirements.
- Support for Lightweight Directory Access Protocol (LDAP) central authentication that works with your existing LDAP authentication server.
- Intrusion detection, notification, and logging to maintain system integrity.
- No backdoor passwords.

Expandable

- 24 contact inputs, 8 contact outputs (via optional I/O board).
- Protection-grade I/O (optional).
- Digital inputs that are each rated for ac and dc and are time-stamped to 1 ms resolution.
- Industry-standard 3U or 1U chassis height and expandable I/O options.

Accurate

- Precision Time Protocol (PTP) and demodulated IRIG-B input that synchronizes the RTAC and connected intelligent electronic devices (IEDs) to absolute time and drives the demodulated IRIG-B output, enabling synchronized control and management.
- Input thresholds that are all near one-half nominal voltage to avoid false assertions during faults and battery grounds.

Flexible

- Two independent rear Ethernet ports available in either LC fiber (single- or multimode) or RJ45 copper and capable of operating on separate subnets.
- Three power supply options.
- Base configuration with many popular and useful client, server, peer-to-peer, and fieldbus communications protocols.

Robust Automation Control

Network Security Device

Make the SEL-3530 or SEL-3530-4 RTAC the secure access point into your substation or plant. The RTAC offers LDAP central authentication and role-based user authentication, access logs, and secure engineering access via Secure Shell (SSH). You can map security tags into SCADA reports for industry-leading integration of security technologies. In addition, whitelist antivirus exe-GUARD technology protects against malware and other cybersecurity threats.

SCADA RTU

Quickly design an integrated substation RTU system that includes protocol conversion, SCADA communications, synchrophasors, time synchronization, data management, and custom logic.

IEC 61850 Integration

Integrate modern IEDs into control and automation schemes with IEC 61850 GOOSE and the manufacturing message specification (MMS) client and server.

Data Concentration

Communicate with any device through built-in client and server protocols. The RTAC exchanges data through DNP3, Modbus, IEC 60870-5-101/104, LG 8979, SES-92, SEL Fast Messaging, Mirrored Bits® communications, and IEEE C37.118 for synchrophasors. You can convert data between protocols, perform math and logic functions, and execute output logic for real-time control.

Event Collection

Detect, filter, and collect event data automatically from connected SEL relays. Fault location, fault current, and other data are populated into tags for easy retrieval through SCADA protocols. You can automatically collect and archive events through the RTAC using acSELerator Team® SEL-5045 Software.

Substation Controller

Use deterministic processing for time-sensitive protection and automation control. You can build custom logic solutions in the embedded IEC 61131 logic engine, which comes standard with every RTAC. Access to all system tags, including diagnostics, contact I/O, protocol data, and communications statistics, provides unparalleled control flexibility.

Rugged, Industrial Design

No moving parts combined with an industrial design that meets and/or exceeds the IEEE 1613 specification for harsh environments means the SEL-3530 RTAC is a high-availability controller. We have designed and built the RTAC to withstand vibration, electrostatic discharge (ESD), and extreme temperatures.

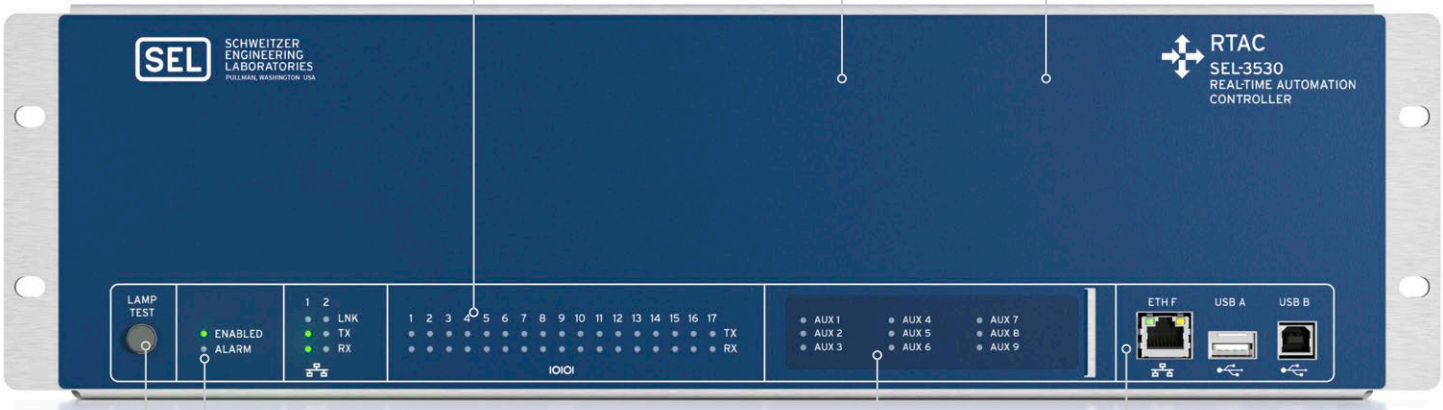
Product Overview

SEL-3530

LEDs simplify diagnostics by indicating transmitted and received activity on each port.

Wide operating temperature range of −40° to +85°C (−40° to +185°F).

Rugged enclosure withstands electromagnetic interference (EMI), radio frequency interference (RFI), shock, and vibration.



Lamp test pushbutton and diagnostic LEDs.

Programmable bicolor LEDs with configurable labels provide custom annunciation.

Front Ethernet and USB ports for quick, convenient system setup and checkout.

Independent Ethernet ports can be RJ45 or LC fiber.

Programmable I/O integrates local and remote control.

All terminals are clearly numbered and lettered for wiring and testing.

Serial ports are EIA-232/485 software-selectable.

Programmable input and alarm contact.

Demodulated IRIG-B input and output for high-accuracy time synchronization.

Isolated EIA-232/485 port.

SEL-3530-4

LEDs simplify diagnostics by indicating transmitted and received activity on each port.

Wide operating temperature range of −40° to +85°C (−40° to +185°F).

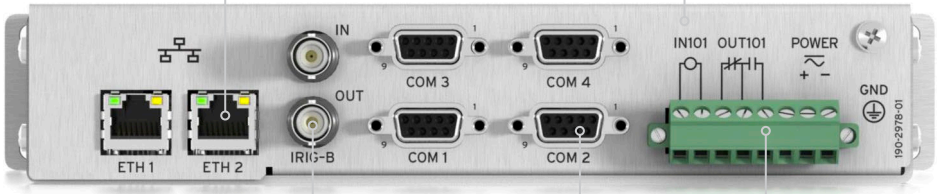
Lamp test pushbutton and diagnostic LEDs.

Programmable bicolor LEDs with configurable labels provide custom annunciation.

Rugged enclosure withstands EMI, RFI, shock, and vibration.

Independent Ethernet ports can be RJ45 or LC fiber.

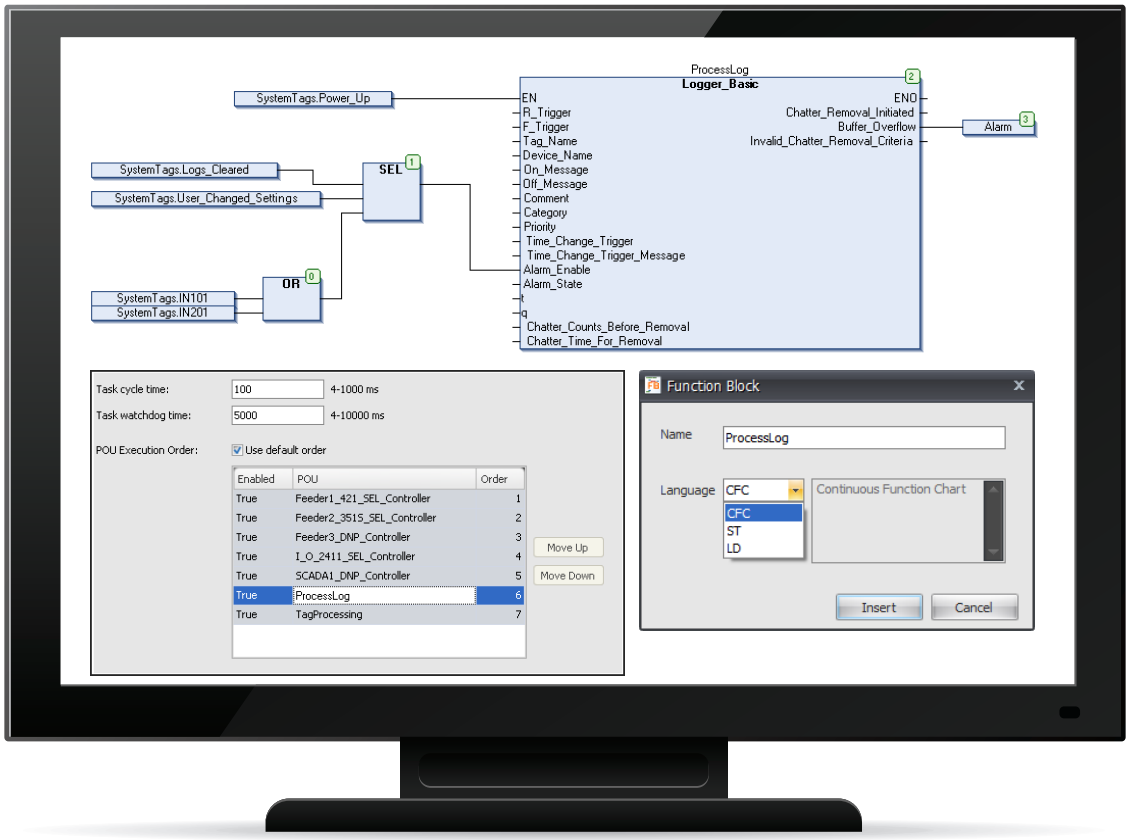
All terminals are clearly numbered and lettered for wiring and testing.



Demodulated IRIG-B input and output for high-accuracy time synchronization.

Serial ports are EIA-232/485 software-selectable.

Programmable input and alarm contact.



Implement Custom Logic Solutions

Design custom automation logic to control your system with ACSELERATOR RTAC® SEL-5033 Software, or monitor system performance using prepopulated device tags. The RTAC lets you scale values and create logic equations in a flexible IEC 61131 configuration environment by applying integrated tools. You can perform complex math and logic calculations on any data using the built-in IEC 61131 logic engine with continuous function chart (CFC), structured text (ST), or ladder diagram (LD) programming.

Security Features

Exe-GUARD Whitelist Antivirus Technology

Account Management

- LDAP central authentication
- User accounts
- User roles
- Strong passwords

Intrusion Detection

- Access/audit logs
- Alarm LED
- Alarm contact

Secure Encrypted Communications

- Transport Layer Security (TLS)
- SSH
- HTTPS
- Secure File Transfer Protocol (SFTP)

Automation Features

Disturbance Record Creation

Event Collection

Sequestered file system/File Transfer Protocol (FTP) server access for record retrieval

Protocol Support

Client, server, peer-to-peer, and fieldbus

Engineering Access

SEL interleaved and direct-transparent modes

Programmable Control

IEC 61131 logic engine

HMI

Flexible web-based HMI

SEL-3530 RTAC Products Comparison

Options	SEL-3530 3U	SEL-3530 1U	SEL-3530-4
Mounting Options			
Horizontal Rack	3U	1U	1U
Horizontal Panel	3U	1U	1U
DIN-Rail Mount			✓
Surface Mount			✓
Power Supply Options			
125/250 Vdc; 120/240 Vac	✓	✓	✓
48/125 Vdc; 120 Vac	✓	✓	✓
24/48 Vdc	✓	✓	✓
Rear Ethernet Connections Options			
Two 10/100BASE-T	✓	✓	✓
One 10/100BASE-T, One 100BASE-FX (multimode)	✓	✓	✓
Two 100BASE-FX (multimode)	✓	✓	✓
One 10/100BASE-T, One 100BASE-LX10 (single-mode)	✓	✓	✓
Two 100BASE-LX10 (single-mode)	✓	✓	✓
I/O			
Standard	1 input, 1 output	1 input, 1 output	1 input, 1 output
Option	24 inputs, 8 outputs		
Client Protocol Options			
SEL, DNP3, Modbus, IEEE C37.118 Synchrophasors, LG 8979, IEC 60870-5-101/104, IEC 61850 MMS and MMS Client File Services, Flex Parse, CP 2179, FTP/S or FTP(S), SES-92, Simple Network Management Protocol (SNMP)	✓	✓	✓
Server Protocols			
SEL, DNP3, Modbus, LG 8979, IEC 60870-5-101/104, SES-92, IEC 61850 MMS and MMS Server File Services, FTP/S or FTP(S), SNMP Agent	✓	✓	✓
Peer-to-Peer Protocol Options			
SEL Mirrored Bits Communications	✓	✓	✓
IEC 61850 GOOSE	✓	✓	✓
Network Global Variable List (NGVL)	✓	✓	✓
Fieldbus Protocol			
EtherCAT®	✓	✓	✓
Serial Port Options			
Standard	17	17	4
Maximum With Expansion	33	17	4
EIA-232/-485 Software-Selectable	33	17	4
Other Options			
Conformal Coating	✓	✓	✓

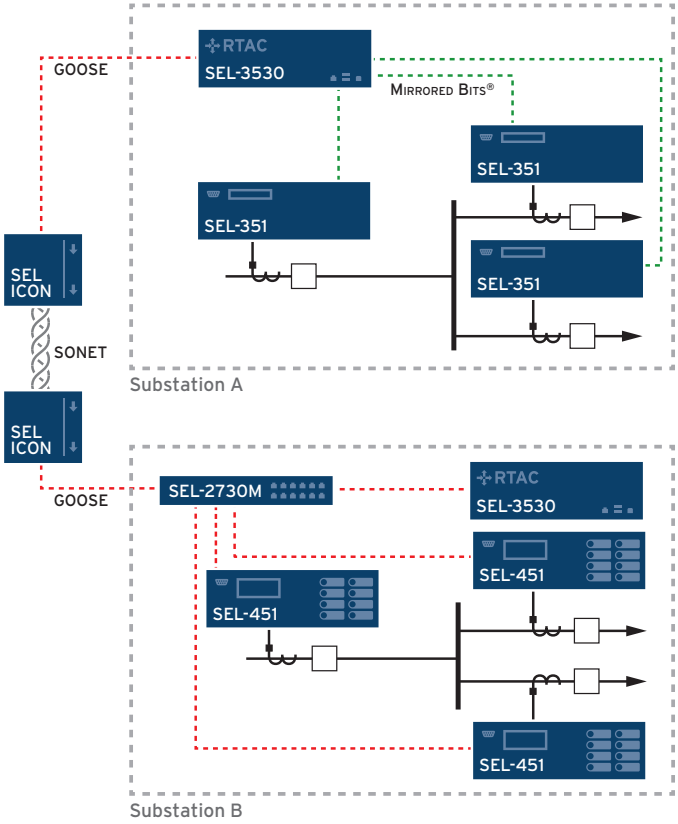
Other RTAC family products include the SEL-3555, SEL-3505/3505-3, and SEL-2240 Axion®.

See **selinc.com/products/3530/RTAC-compare** for more information.

Applications

Power System Automation

Enable high-performance control and monitoring schemes. The 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.

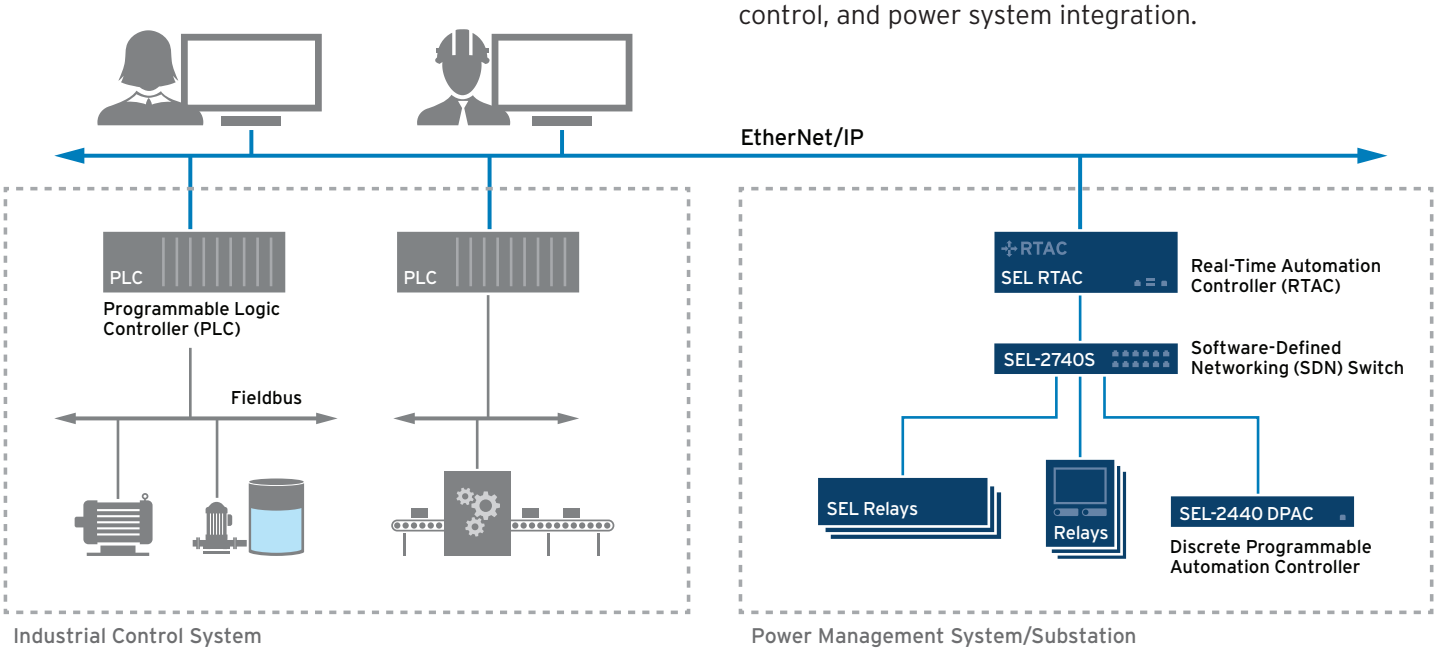


Integrated HMI

Build custom HMI displays quickly and easily without the need for mapping data tags. Because the interface is web-based, no special software is needed to view HMI displays.

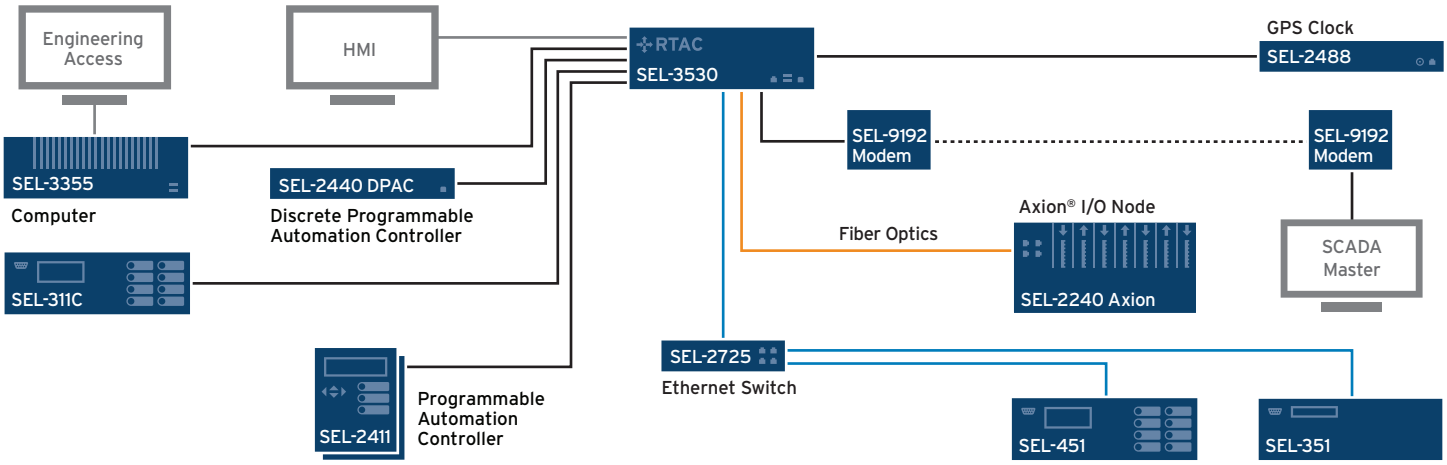
Integrate Power Management With Industrial Control

The 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.



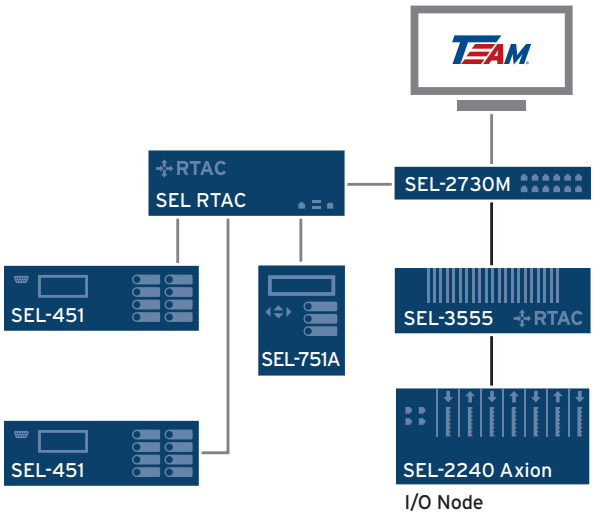
Data Concentration and SCADA

Deploy the RTAC as a data concentrator using protocols such as IEC 61850 MMS client, Modbus, DNP3, IEC 61850 GOOSE, LG 8979, IEC 60870-5-101/104, and MIRRORED BITS communications. By enabling the logging on any system or IED tag, you can view and archive station-wide event records. Support for both serial and Ethernet communications provides flexibility for integrating IEDs and enabling multiple SCADA connections.



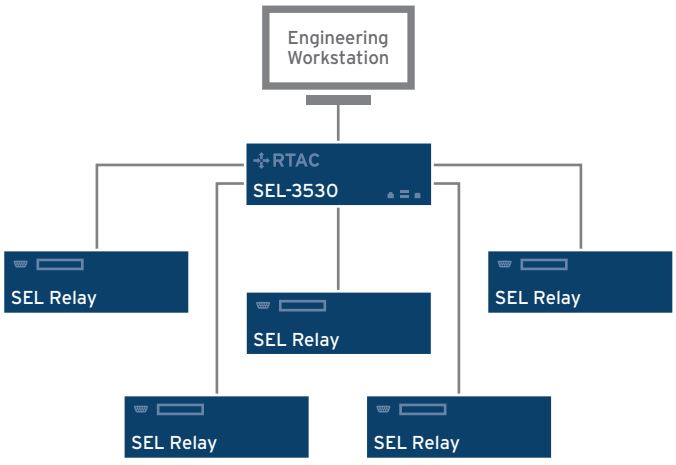
Event Collection

Automatically detect, filter, and collect event data from connected SEL relays. Fault location, fault current, and other data are populated into tags for easy retrieval through SCADA protocols. With TEAM, you can automatically collect events through the RTAC.



Engineering Access

Securely gain remote access to the RTAC and connected devices via Ethernet to configure IEDs, monitor logs, and analyze diagnostics. Engineering access channels in the RTAC enable remote connections to devices using serial or Ethernet communications.



RTAC Line of Automation Controllers

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.

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

SEL-3555 RTAC

The SEL-3555 RTAC is a powerful, full-size RTAC solution with flexible options for your most demanding applications.

SEL-3560 RTAC

The SEL-3560 Compact Industrial RTAC comes in two form factors and offers the power and flexibility of the SEL-3555 in a smaller package.

SEL-3530/3530-4 RTAC

The SEL-3530/3530-4 RTACs are ideal for substation data concentration, for protocol conversion, and to provide a local or remote HMI for visualization and control.

SEL-3505/3505-3 RTAC

Suitable for use in utilities and industrial environments, the SEL-3505/3505-3 RTACs are lower-voltage versions of the SEL-3530. These compact RTACs are ideally suited for small enclosures, such as recloser controls, capacitor bank controls, or inverter cabinets that are exposed to harsh environments.

SEL-2240 Axion With RTAC Module

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 RTACs with a durable suite of I/O modules that provide high-speed, deterministic control performance over an EtherCAT® network.

Specifications

General

Processor	533 MHz
RAM	1,024 MB DDR2 ECC RAM
Storage	2 GB
USB Ports	1 host port, Type A; 1 device port, Type B
Ethernet Ports	1 front: RJ45 female 2 rear: RJ45 female or LC fiber (single-mode or multimode, 100 Mbps only)
Serial Ports	17 rear (standard), 16 additional rear (optional on 3U chassis) EIA-232/-485 (software-selectable) 300 to 115,200 bps DB-9 female (Ports 1–16, 18–33), isolated Pin 8 (Port 17) IRIG-B outputs via Pins 4 and 6 +5 Vdc power on Pin 1 (500 mA maximum)
IRIG-B Ports	**2 Rear** Input: modulated or demodulated IRIG-B (female BNC) Output: demodulated (female BNC)
Onboard I/O	Contact input (programmable) Contact output (programmable) Expansion board: 8 contact outputs, 24 contact inputs (3U chassis only)
Power Supply Options	**Option 1** 125/250 Vdc, 120/240 Vac, 50/60 Hz Range: 85–300 Vdc or 85–264 Vac **Option 2** 48/125 Vdc, 120 Vac, 50/60 Hz Range: 38.4–137.5 Vdc or 88–132 Vac **Option 3** 24/48 Vdc Range: 18–60 Vdc (polarity-dependent)

*Optional feature

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Protocols

Client
CDC Type II
Courier
CP 2179
DNP3 Serial, DNP3 LAN/WAN
EtherNet/IP—Explicit Message Client*
File Transfer Protocol (FTP)/Secure FTP (SFTP)*
Flex Parse
IEC 60870-5-101/104
IEC 60870-5-103
IEC 61850 MMS and MMS Client File Services*
IEEE C37.118 Synchrophasors
LG 8979
Modbus RTU, Modbus TCP
SEL Protocols
SES-92
Simple Network Management Protocol (SNMP)

Server
CDC Type II
DNP3 Modbus
DNP3 Serial, DNP3 LAN/WAN
EtherNet/IP—Implicit Message Adapter*
FTP/SFTP
IEC 60870-5-101/104
IEC 61850 MMS and MMS Server File Services*
IEEE C37.118 Synchrophasors
LG 8979
Modbus RTU, Modbus TCP
SEL Protocols
SES-92
SNMP Agent

Peer-to-Peer
IEC 61850 GOOSE*
Network Global Variable List (NGVL)
SEL Mirrored Bits Communications

Field Bus Protocol
EtherCAT to SEL Axion I/O Modules

SEL SCHWEITZER ENGINEERING LABORATORIES

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