Integrated Security

As with its bigger brother, the SEL-3530, you can make the SEL-3530-4 four-port RTAC the secure access point into your substation or plant using Lightweight Directory Access Protocol (LDAP) central authentication and role-based user authentication, access logs, and secure engineering access. Map security tags into SCADA reports for industry-leading integration of security technologies.

Simple, Seamless Configuration

Quickly design an integrated substation system that includes protocol conversion, SCADA communications, synchrophasors, time synchronization, data management, flexible web-based HMI displays, and custom logic.

Complete System Control


Unified Substation Logic

Create your logic solutions in the embedded IEC 61131 logic engine, standard with every RTAC. Build custom user logic, and access all system tags, including diagnostics, contact I/O, protocol data, and communications statistics, for unparalleled control flexibility.

Renowned SEL Reliability

The RTAC is designed and tested to meet or exceed IEEE 1613 and protective relay specifications for harsh environments to withstand vibration, electrical surges, fast transients, and extreme temperatures.
SCADA Applications

Data Concentrator and Poletop Device Controller

Synchrophasor Calculations and SCADA Communications

SEL-300 Series Relay
With Ethernet and IEEE C37.118 Protocol

SEL-400 Series Relay

SEL-2730M Managed 24-Port Ethernet Switch

SEL Industrial Relays

IEEE C37.118 PMU

IEEE C37.118 Synchrophasors

Move synchrophasor data to SCADA operations centers

DNP3, Modbus®, SEL

Perform complex math/logic calculations on synchrophasor data

Synchrophasors included at no additional charge
Control System Applications

High-Speed Control With SEL Mirrored Bits® and IEC 61850 GOOSE Communications

The RTAC processes Mirrored Bits communications faster and better than the SEL-2100 Logic Processor.

Custom IEC 61131-3 Logic Solutions for SCADA, Synchrophasors, and Mirrored Bits Communications

Example software screen.
Integrated HMI Applications

Flexible Web-Based HMI Display and Control

Step 1. Use ACSELEATOR Diagram Builder™ Software to build custom HMI display and control screens.

Step 2. Easily link objects to RTAC tags by extracting tags directly from ACSELEATOR RTAC® SEL-5033 Software projects or from the RTAC’s database.

Step 3. Upload HMI screens to the RTAC.

Step 4. View HMI screens in the RTAC’s web interface.
Security Applications

LDAP Central Authentication

Log in as Alice.
Connection established.
Is Alice an authorized user? Yes.

Log in as Rob.
Connection refused.
Is Rob an authorized user? No.

Event Collection Applications

IED Event Collection With Optional acSELerator TEAM® SEL-5045 Software

Local event collection included at no additional charge
Industry-leading, worldwide, ten-year warranty.

Widest operating temperature range (~—40°C to +85°C); use indoors and in outdoor cabinets.

Client (Master) Protocols:
- IEC 61850 MMS
- DNP3 Serial
- DNP3 LAN/WAN
- Modbus RTU
- Modbus TCP
- IEEE C37.118 Synchronphasors
- SEL ASCII
- SEL Fast Messaging
- LG 8979

Server (Outstation) Protocols:
- IEC 61850 MMS
- DNP3 Serial
- DNP3 LAN/WAN
- Modbus RTU
- Modbus TCP
- SEL Fast Messaging
- LG 8979
- IEC 60870-5-101/104
- SES-92

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

Fieldbus Protocol:
- EtherCAT®

Powerful 32-bit microcontroller delivers relay-speed I/O, logic, and communications.

Two independent Ethernet ports available in 10/100BASE-T copper, 100BASE-FX multimode, or 100BASE-LX single-mode fiber, capable of operating on separate subnets.

Demodulated IRIG-B input synchronizes the RTAC and connected IEDs to absolute time, drives the demodulated IRIG-B output, and enables synchronized control and management.
No backdoor passwords.

ECC RAM for data integrity.

Industry standard 1U height.

Four DB-9 EIA-232/EIA-485 software-selectable serial ports operate up to 115 kbps.

Isolated contact input with user-settable voltage ranges for programmable control functions.

Three power supply options: 125/250 Vdc, 120/240 Vac; 48/125 Vdc, 120 Vac; 24/48 Vdc. Low power (<20 W typical).

Programmable alarm contact for internal diagnostic status indication, communications access, and settings changes.

Synchrophasor-accurate timing.

No fans: quiet, clean, and reliable.

User-programmable, bicolored LEDs.

Front ports for secure monitoring and configuration.

Serial activity indicators.
## Real-Time Automation Products Reference Table

<table>
<thead>
<tr>
<th>Mounting Options</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal rack, 3U</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal panel, 3U</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal rack, 1U</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Horizontal panel, 1U</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>DIN rail-mount</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Surface-mount</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Power Supply Options</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>125/250 Vdc; 120/240 Vac</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>48/125 Vdc; 120 Vac</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>24/48 Vdc</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>12/24 Vdc</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rear Ethernet Connections Options</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two 10/100BASE-T</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>One 10/100BASE-T, one 100BASE-FX (multimode)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Two 100BASE-FX (multimode)</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>One 10/100BASE-T, one 100BASE-LX10 (single-mode)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Two 100BASE-LX10 (single-mode)</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V.92 Analog Modem Option</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>I/O</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard (1 input, 1 output)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Option 24/8</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Ambient Light Sensor</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Three-Axis Accelerometer</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Client Protocol Options</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEL, DNP3, Modbus, IEEE C37.118 synchrophasors, LG 8979</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IEC 61850 MMS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Server Protocols</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEL, DNP3, Modbus, LG 8979, IEC 60870-5-101/104, SES-92, IEC 61850 MMS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peer-to-Peer Protocol Options</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEL Mirrored Bits communications</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IEC 61850 GOOSE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Network Global Variable List (NGVL)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fieldbus Protocol</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>EtherCAT</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serial Port Options</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>17</td>
<td>17</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Maximum with expansion</td>
<td>33</td>
<td>17</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>EIA-232/EIA-485 software-selectable</td>
<td>33</td>
<td>17</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conformal Coating Option</th>
<th>SEL-3530 3U</th>
<th>SEL-3530 1U</th>
<th>SEL-3530-4</th>
<th>SEL-3505</th>
</tr>
</thead>
</table>
What features do I get for the base price?
By leveraging previous SEL designs and world class manufacturing, we can provide a complete automation system for a great price. Just as we do in our SEL-2030/SEL-2032 Communications Processors, we include a powerful logic engine in every RTAC. It is an IEC 61131 engine with an intuitive configuration environment: the acSELEnator RTAC SEL-5033 Software and RTAC web interface.

Your device will include four serial ports, two Ethernet ports, one USB port, an IRIG-B input and output, plus alarm contacts. All of the serial ports can be used in EIA-232 or EIA-485 mode via a software setting.

Finally, the RTAC ships with many popular and useful communications protocols. Client (master) protocols include: DNP3 serial, DNP3 LAN/WAN, Modbus RTU/TCP, SEL Compressed ASCII, SEL Fast Messaging, LG 8979, and SEL synchrophasors. The included server (outstation) protocols are DNP3 serial, DNP3 LAN/WAN, IEC 60870-5-101/104, SES-92, Modbus RTU/TCP, LG 8979, and SEL Fast Messaging. Also, we’ve built SEL Mirrored Bits communications into the system for peer-to-peer communications.

What options can I get?
You can order the RTAC with 10/100BASE-T Ethernet or 100BASE-FX multimode fiber, or even a combination. With the 24 Vdc model, you can order your RTAC with 100BASE-LX single-mode fiber. With the optional acSELEnator Diagram Builder, you can build one-line diagrams, annunciators, and other HMI screens that you can view on the RTAC’s web interface. Build high-speed control systems using IEC 61850 GOOSE messaging. Poll data sets and reports with IEC 61850 MMS.

I need to implement security measures. Can the RTAC help me?
Yes. You can apply unique login accounts and profiles to comply with role-based requirements. We included a “temporary” role so that consultant access can be automatically removed after a configurable date. Enable intrusion detection, notification, and logging to maintain system integrity. Use additional auditing, port control, web authentication, and password restrictions to comply with additional security requirements. All data in the RTAC are available for logic and communications, so you can easily report security information to the control center along with process SCADA information. As well, every RTAC supports LDAP central authentication that works with your existing LDAP authentication server.

Where is the RTAC designed and made?
It is designed and manufactured in our factory in Pullman, Washington. The RTAC firmware and software are developed in Pullman too.

Do I need to purchase a different license in order to get the logic engine or higher point counts?
No. Every RTAC includes the complete IEC 61131 logic engine and SEL acSELEnator RTAC configuration software. You can configure all needed points with every RTAC without additional license fees.

How long will it take to configure simple SCADA connections in a 4-feeder substation?
You will be amazed at how easy it is to set up simple systems with the RTAC. Twenty minutes is all you need to configure a complete 4-feeder system.

Is this running Windows®?
Just like SEL communications processors and relays, the RTAC runs on an embedded operating system that is designed for stability and security. No Windows here.

Does it meet all of the same standards as SEL relays?
Yes. The RTAC is tested in the same laboratory and to all of the same standards as our relays. The design engineers at SEL understand these standards, and they know their designs must not only comply, but also have margin beyond the standard. For instance, standards require a dielectric strength test (HiPot) of 2000 Vac. SEL adds margin onto the standard and requires the product pass at 2500 Vac—for a 25 percent margin above the standard. This requires careful attention to clearances, spacing, and many other parameters. Unfortunately, there are many companies that say their products, which cost much more and have (understandably) weaker warranties, are “designed to” the standards.

Can I make relay templates?
Yes. Once you configure a relay connection for the substation, use a simple copy-paste function to apply that template for other connected relays.
## RTAC Product Comparison

<table>
<thead>
<tr>
<th>DESIGN</th>
<th>RTAC</th>
<th>OTHERS</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiPot routine test</td>
<td>✓</td>
<td>?</td>
<td>Every SEL device is HiPot tested in manufacturing before it goes out the door. Others may not be and may fail during HiPot testing of your panels.</td>
</tr>
<tr>
<td>Utility-rated power supply</td>
<td>✓</td>
<td>no</td>
<td>SEL makes its own power supplies, which have a 600-year MTBF. Others may use commercial supplies, like those found in computers.</td>
</tr>
<tr>
<td>−40º to +85ºC</td>
<td>✓</td>
<td>few</td>
<td>The SEL RTAC will work in outdoor cabinets and when air conditioning fails. Others probably won’t.</td>
</tr>
<tr>
<td>Vibration</td>
<td>✓</td>
<td>?</td>
<td>Designed and tested to work in vibration-prone environments.</td>
</tr>
<tr>
<td>Tested to IEEE C37.90</td>
<td>✓</td>
<td>?</td>
<td>SEL type tests all products. Others may say only “designed to.” Type tests prove secure, reliable performance.</td>
</tr>
</tbody>
</table>

### PROTOCOLS

<table>
<thead>
<tr>
<th>PROTOCOLS</th>
<th>RTAC</th>
<th>OTHERS</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE C37.118 synchrophasors</td>
<td>✓</td>
<td>no</td>
<td>Enables time-synchronized, wide-area reporting and control of the power system.</td>
</tr>
<tr>
<td>SEL Mirrored Bits communications</td>
<td>✓</td>
<td>no</td>
<td>Provides high-speed, secure, point-to-point communication.</td>
</tr>
<tr>
<td>IEC 61850 GOOSE</td>
<td>✓</td>
<td>?</td>
<td>Optional GOOSE protocol enables high-speed, secure messaging for deterministic control schemes.</td>
</tr>
<tr>
<td>IEC 61850 MMS client</td>
<td>✓</td>
<td>?</td>
<td>Optional MMS client provides polling of MMS-capable IEDs for buffered and unbuffered reports and data sets.</td>
</tr>
</tbody>
</table>

### PROCESSING CAPABILITIES

<table>
<thead>
<tr>
<th>PROCESSING CAPABILITIES</th>
<th>RTAC</th>
<th>OTHERS</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated IEC 61131 logic engine</td>
<td>✓</td>
<td>no</td>
<td>Provides local control and processing in a single software program; no additional charge.</td>
</tr>
<tr>
<td>System-wide SER and synchrophasor alarm logging</td>
<td>✓</td>
<td>no</td>
<td>Provides a complete substation SER that includes configurable triggers, network security information, and time-aligned synchrophasor events.</td>
</tr>
</tbody>
</table>

### COMMUNICATIONS

<table>
<thead>
<tr>
<th>COMMUNICATIONS</th>
<th>RTAC</th>
<th>OTHERS</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two integrated Ethernet ports with independent MAC addresses</td>
<td>✓</td>
<td>no</td>
<td>Enables switched or isolated Ethernet operation, including failover operation.</td>
</tr>
<tr>
<td>Integrated web-based HMI</td>
<td>✓</td>
<td>no</td>
<td>SEL’s optional integrated HMI extracts tags directly from the RTAC so you don’t have to configure tags in multiple places or worry about complicated point mapping.</td>
</tr>
</tbody>
</table>

### WARRANTY AND SUPPORT

<table>
<thead>
<tr>
<th>WARRANTY AND SUPPORT</th>
<th>RTAC</th>
<th>OTHERS</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-questions-asked, ten-year, worldwide warranty</td>
<td>✓</td>
<td>no</td>
<td>Best in the industry.</td>
</tr>
<tr>
<td>Free, worldwide technical support</td>
<td>✓</td>
<td>no</td>
<td>SEL maintains more than 90 offices in over 20 countries.</td>
</tr>
</tbody>
</table>

### PRICE

<table>
<thead>
<tr>
<th>PRICE</th>
<th>RTAC</th>
<th>OTHERS</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base price includes software, logic engine, synchrophasors, and Mirrored Bits communications</td>
<td>✓</td>
<td>no</td>
<td>No device in the industry offers the combination of price and performance you get with the RTAC.</td>
</tr>
</tbody>
</table>
The embedded RTAC web interface means speedy setup and monitoring of critical security data, such as network access, user accounts, and system performance. Easily view and download station-wide logging and alarms without special software. Optionally, build flexible web-based HMI screens, and then view them on the RTAC’s web interface.

Step 1
View system status on the dashboard. Enable or disable Ethernet ports for network applications and to comply with security policies.

Step 2
Create user accounts for system access and security logging. With the built-in, role-based accounts and secure communication, you control who can access sensitive information. Alternately, configure LDAP settings for central authentication.

Step 3
Monitor operations and security events using the sequential events and alarm reports. Download reports via open database connectivity (ODBC) to create a permanent record.

acSELErator RTAC SEL-5033 Software for System Design

acSELErator RTAC Software simplifies the design of integration and automation.

Step 1
Select a device template for each client or server connection, and set communications parameters.

Step 2
Map source and destination tags using the Tag Processor, or copy SCADA maps directly from a spreadsheet.

Step 3
Send the configuration to the RTAC.
SEL-3530-4 Real-Time Automation Controller (RTAC)

Hardware Specifications

**Processing and Memory**
- Processor speed: 533 MHz
- Memory: 512 MB DDR2 ECC RAM
- Storage: 4 GB (2 GB reserved)

**Ethernet Ports**
- Ports: 2 rear
- Data rate: 10 or 100 Mbps
- Rear connectors: RJ45 female or LC fiber (100 Mbps only)

**Serial Ports**
- Ports: 4 rear
- Type: EIA-232/EIA-485 (software selectable)
- Data rate: 300 to 115200 bps
- Connector: DB-9 female
- Time synchronization: IRIG-B outputs via Pins 4 and 6
- Power: +5 Vdc power on Pin 1 (500 mA maximum)

**USB Ports**
- Ports: 1 front
- 1 device port: Type B

**IRIG-B Ports**
- Ports: 2 rear
- IRIG-B input: Modulated or demodulated IRIG-B (female BNC)
- IRIG-B output: Demodulated (female BNC)

**Onboard I/O**
- Contact input: 1
- Contact output: 1

**Power Supply Options**
- Option 1: 125/250 Vdc, 120/240 Vac
- Range: 100–275 Vdc or 88–264 Vac
- Option 2: 48/125 Vdc, 120 Vac
- Range: 38.4–137.5 Vdc or 88–132 Vac
- Option 3: 24/48 Vdc
- Range: 18–60 Vdc polarity dependent

**Operating Temperature**
- IEC performance rating: -40° to +85°C (-40° to +185°F)

Security Features

**Account Management**
- LDAP central authentication
- User accounts
- User roles
- Strong passwords

**Intrusion Detection**
- Access/audit logs
- Alarm LED
- Alarm contact

**Secure Encrypted Communications**
- TLS/SSH
- HTTPS

Automation Features

**Protocols**
- **Client**
  - DNP3 serial, DNP3 LAN/WAN, Modbus RTU, Modbus TCP, SEL ASCII,
  - SEL Fast Messaging, IEEE C37.118, IEC 61850 MMS, LG 8979
- **Server**
- **Peer-to-Peer**
  - SEL mirrored BITS communications, IEC 61850 GOOSE, Network Global Variable List (NGVL)
  - EtherCAT

**Engineering Access**
- SEL interleaved and direct transparent modes

**Programmable Control**
- IEC 61131 logic engine

**Human-Machine Interface (HMI)**
- Flexible web-based HMI