COMPUTING OVERVIEW

SEL-3355
A server-class computer, the SEL-3355 Computer is built to withstand harsh environments in utility substations and industrial control and automation systems.

SEL-3390
Add ports and connectivity to rugged computers with SEL-3390 PCIe Expansion Cards.

SEL-3360S/3360E
The SEL-3360S/3360E Compact Industrial Computers match the power and ruggedness of the SEL-3355 Computer and are ideal for limited-space applications.

SEL-9331
Use the SEL-9331 Power Supply to power equipment in industrial environments where many power supplies cannot maintain operation.
APPLICATIONS
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

SUPPORTED OPERATING SYSTEMS
Microsoft® Windows® 8/8.1, 10 IoT*; Windows Server® 2012 R2 Standard; Windows Server 2016 Standard*; CentOS Linux® 6 and 7; Red Hat® Enterprise Linux 6 and 7; VMware® ESXi™ 5.x–6.0; SEL Kiosk*; None (User-Loaded Operating System)

PRE-INSTALLED SOFTWARE
SEL Software
McAfee® Whitelist Antivirus
SISCO AX-S4 IEC 61850 GOOSE OPC Server

HARDWARE
Intel® Xeon® E3-1505L Quad-Core 2.0 GHz 64-Bit CPU
Intel Xeon® E3-1515M Quad-Core 2.8 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
Triple Independent Video Displays (2 DVI-D and 1 DisplayPort)
HD Audio Ports, Line In, Line Out, Microphone
Six USB Ports, USB 3.1-Compliant, 2.0 A Max. Current Limit Each (Up to 4 A Combined Front and 4 A Combined Rear)
Two 10/100/1000 Mbps Independent Copper Ethernet Ports
Two EIA-232 Serial Ports, DB-9 Connectors, 300 to 115,000 bps
IRIG-B Input on COM1
IRIG-B When Used With the SEL-3390E Network Card
19" Rack-Mount Chassis
Wall-Mount Chassis
Conductive Panel Mount
PCI/PCIe Expansion Slots
Additional EIA-232/422/485 Serial Ports, RJ45 Connectors, 300 to 921,000 bps, IRIG-B Inputs/Outputs, +5 Vdc Power Via PCIe Cards
Additional 10/100/1000 Mbps Ethernet Ports, Copper RJ45, or Fiber-Optic SFP LC Connectors Via PCIe Cards
Solid-State Drives (2.5" SLC, IMLC, MLC SATA II, 30 GB–2 TB Drives)
Internal 120/230 Vac, 125/250 Vdc, or 48 Vdc Power Supply
Secondary Internal 120/230 Vac, 125/250 Vdc, or 48 Vdc Power Supply
Hot-Swappable Power Supplies
External Power Supply
Alarm Contact, Alarm LED, Watchdog Processor
Three Programmable Auxiliary Bicolor LEDs
Intel Active Management Technology (AMT) v8.1
Trusted Platform Module (TPM) v1.2

LEGACY HARDWARE OPTION
Intel Core™ i7-3555LE Dual-Core 2.5 GHz 64-Bit CPU
Intel Core i7-3612QE Quad-Core 2.1 GHz 64-Bit CPU
4 GB DDR3 ECC PC3-10600 System Memory
Up to 16 GB DDR3 ECC PC3-10600 System Memory
Dual Independent Video Displays (DVI-I [Digital + VGA] and DisplayPort)
Six USB Ports, USB 2.0-Compliant, 800 mA Current Limit Each

• Standard feature  + Model option  *Factory-orderable operating system
COMPUTING APPLICATIONS

INFORMATION PROCESSOR: DATA CONCENTRATOR/PROTOCOL CONVERTER

Seamlessly and flexibly concentrate data and convert protocols with any SEL computer and a wide range of data concentration and protocol conversion software.

ENGINEERING WORKSTATION

Choose an SEL computer as your engineering workstation platform, and get a reliable and robust system suitable for the harshest environments. You can view and change intelligent electronic device (IED) settings, view report and event data, and easily access diagram drawings and documents onsite. Securely and remotely access the engineering workstation using Microsoft® Windows® Remote Desktop, Secure Shell (SSH), or out-of-band management with Intel® Active Management Technology (AMT) Keyboard-Video-Mouse (KVM) over IP.

INDUSTRIAL PROCESS CONTROL PLATFORM

SEL computers are perfect for any industrial control system requiring the power of a rugged, reliable, highly available computer. Implement your control system with your choice of SCADA software. With ample communications ports (serial or Ethernet), the SEL-3355 Computer and SEL-3360E Compact Industrial Computer are also ideal for distributed control systems.
DATA ARCHIVER
Leverage the RAID capabilities of the SEL-3355 or an SEL-3360 to store and access your critical data. Depending on your needs, you can optimize the SEL-3355 SSD subsystem for speed, extra data protection, or both. SEL computers can run your favorite historian software for large data analysis projects, or they can serve as the processing and archiving engine for your disturbance recording and monitoring system.

DEFECT TESTING SYSTEM IN FACTORY AUTOMATION
Use legacy and new PCI standard data acquisition cards to connect and automate diverse devices and sensors in factories where normal computers cannot withstand harsh environmental temperatures or caustic conditions.

SEL KIOSK
The SEL Kiosk is a secure and lightweight embedded operating system that runs on SEL computers to give predefined access to a virtual environment. It allows administrators to define which systems are accessible by generating a controlled whitelist of devices that end users may access, monitor, or configure.
DIGITAL VIDEO RECORDER
Store video security footage and local environmental monitoring data in harsh locations with a conformally coated SEL-3355 or SEL-3360. You can attach card readers, IP cameras, temperature sensors, motion sensors, door contacts, and other IP, serial, and PCI peripherals.

SYNCHROPHASOR PHASOR DATA CONCENTRATOR, ARCHIVER, VIEWER, AND ANALYZER
Concentrate and archive synchronized phasor measurements from a single station or a wide area with SEL-5073 SYNCHROWAVE® Phasor Data Concentrator (PDC) Software. SEL-5078-2 SYNCHROWAVE Central Software lets you view and analyze synchrophasor data. You can load both software packages onto a single SEL computer to provide a powerful solid-state synchrophasor system for a substation or central office.

VIRTUALIZATION SERVER
Create your own virtualization appliance by leveraging Virtualization Technology (VT-x) to allow one hardware platform to function as multiple virtual platforms. Isolating your computing activity onto separate virtual machines helps improve manageability, reduce downtime, and maintain productivity.
HMI VISUALIZATION, MONITORING, AND CONTROL
Create customized screens for control processes, viewing, and monitoring with the SEL RTAC HMI or user-installed HMI software. A rugged SEL computer can serve as a reliable and robust platform for an HMI visualization, monitoring, and control system in harsh environments.

Move your computing-intensive distributed control system applications as close to your equipment as you need. A small footprint and broad operating temperature range make it possible to install an SEL-3360 in locations where many computers would either not fit or not survive. This flexible installation means you can ensure local equipment control is maintained even when communications with the master control center are lost. With the SEL-3360E, you can install additional I/O cards to meet a variety of control needs. For even greater flexibility, the built-in Intel AMT functionality lets you remotely service the units.

CENTRALIZED AUTHENTICATION SERVER
Extend enterprise central authentication to your remote branch office or substation, and use enterprise credentials to allow role-based access control and meet industry standards, such as NERC CIP, NIST SP800 53/82, IEEE 1686, and IEC 62351.
The SEL-3355 is built to withstand harsh environments in utility substations and industrial control and automation systems. By eliminating all moving parts, including rotating hard drives and fans, and using error-correcting code (ECC) memory technology, SEL computers have over ten times the mean time between failures (MTBF) of typical industrial computers.

**PERFORMANCE AND DURABILITY**

**High-Performance Computing Power**—The SEL-3355 has third-generation Intel® Xeon® E3 quad-core processors or Intel Core™ i7 multicore 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 computing resources for your most demanding applications. New multilevel cell (MLC) and industrial-grade MLC (iMLC) drive options extend the storage capacity to 480 GB per slot.

**Protective Relay Standards**—The SEL-3355 is suitable for harsh environments, including those with temperatures ranging from −40°C to +75°C (−40°F 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 computer with respect to RAS—reliability, availability, and serviceability. Industrial computer systems need to always be available and easy to service.

**Reliability**—SEL designs, manufactures, and tests every computer in-house to the same standards as our protective relays. Our computing systems have an MTBF of over 100 years, ten times higher than that of the typical industrial computer. 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 computer 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 back 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 computer events specific to the installed system to aid in faster recovery.
Install up to four hot-swappable SSDs behind the easily accessible front panel. You can tailor the drive technology to your application with SLC, MLC, and iMLC SSD options. A RAID configuration provides even higher data availability.

Configure two built-in EIA-232 ports in the BIOS for +5 V on Pin 1.

Connect three simultaneous displays using two DVI-D ports and one DisplayPort interface.

Network with two high-speed Gigabit Ethernet ports. Ports can be teamed for redundancy or used individually.

Attach up to four USB 3.1 devices, enabling custom, application-specific peripherals.

Line-in, line-out, and microphone jacks for high-definition analog audio applications.

Connect three simultaneous displays using two DVI-D ports and one DisplayPort interface.

View link and activity LEDs for link status and network activity on each Ethernet port.

See hard disk drive activity at a glance with the LED indicator.

Use SEL rugged or third-party PCI expansion cards for additional networking, serial, time, video, or any other application-enabling solutions.

Wire a Form C alarm contact output either normally closed or normally open. The alarm LED on the front provides indication of the alarm contact state.

Observe the “ENABLED” LED for operational status. Green indicates normal operation, and red indicates that the system is halted or booting or that an error condition has occurred.

The “ALARM” LED indicates that a nonoptimal system condition exists. The alarm LED illuminates red when the alarm contact operates.

Test all LEDs with the lamp test button.

Program three bicolor LEDs for your custom application.

Attach one or two USB 3.1 devices, enabling custom, application-specific peripherals.

Choose dual power supplies, and attach power from independent sources for even higher availability. Supplies are hot-swappable for maximum online serviceability.

DisplayPort technology offers higher performance features than any other digital interface.
The SEL-3360 (a compact version of the SEL-3355 Computer) 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 compact industrial computers have over ten times the mean time between failures (MTBF) of typical industrial computers. Designed, manufactured, and tested to the same standards as our protective relays, every SEL-3360 comes with a ten-year, worldwide SEL warranty.

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