

# SEL-2730M

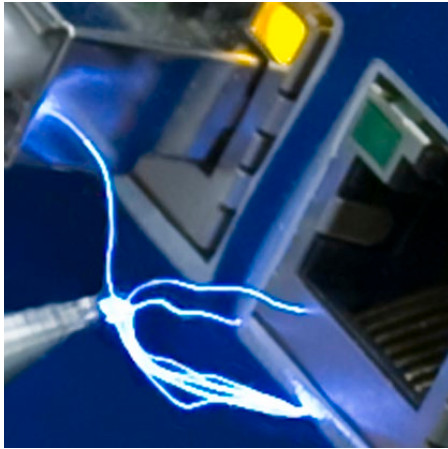
## Managed 24-Port Ethernet Switch



Designed, built, and tested for trouble-free operation in extreme conditions

- Highest mean time between failures (MTBF) in the industry provides years of reliable operation.
- Rapid Spanning Tree Protocol (RSTP) performance as fast as 7 ms shortens any potential downtime.
- Strong network security features provide configurable access control lists and traffic management.
- VLAN management simplifies IEC 61850 network deployments.





## Reliably Control and Monitor Your Substation and Industrial Networks

The SEL-2730M Managed 24-Port Ethernet Switch is specifically designed to handle extreme conditions found in harsh substation environments. It withstands vibration, electrical surges, fast transients, electrostatic discharge, and extreme temperatures and humidity without losing a single packet.

The SEL-2730M has the highest MTBF in the industry. It reliably supports communications under high electromagnetic interference (EMI) and temperature stress with easy-to-provision settings chosen specifically for intelligent electronic device (IED) messaging.



# Features

## **Tough**

Designed, built, and tested for trouble-free operation in extreme conditions, the SEL-2730M meets or exceeds IEEE 1613 (Class 1) and IEC 61850-3 standards for communications devices in electric power substations, with a specified temperature range of  $-40^{\circ}$  to  $+85^{\circ}\text{C}$  ( $-40^{\circ}$  to  $+185^{\circ}\text{F}$ ).

## **Reliable**

SEL is committed to providing superior reliability and quality in all its products. The SEL-2730M is equipped with hot-swappable dual power supplies, allowing simultaneous connection to primary and backup power sources. This ensures no loss of communications due to a single power source failure.

## **Secure**

Strong security features, such as SNMPv3, HTTPS, and MAC security, provide configurable access control lists and traffic management.

## **Dependable**

At SEL, we build all of our switches in U.S.-based manufacturing facilities using the same processes that we use to build our protective relays. And, we offer the same ten-year, worldwide, no-questions-asked warranty for our networking equipment that we do for protection and automation equipment.

## **Easy to Use and Administer**

The SEL-2730M is easy to install and configure. The web management interface has been engineered to emphasize ease of use for common tasks, such as setting up priority communications using VLANs. You can configure settings online through the secure web interface or offline for later uploading to the switch. Centrally manage access to the HTTPS web interface via the Lightweight Directory Access Protocol (LDAP) or one- or two-factor authentication with the Remote Authentication Dial-In User Service (RADIUS) protocol.

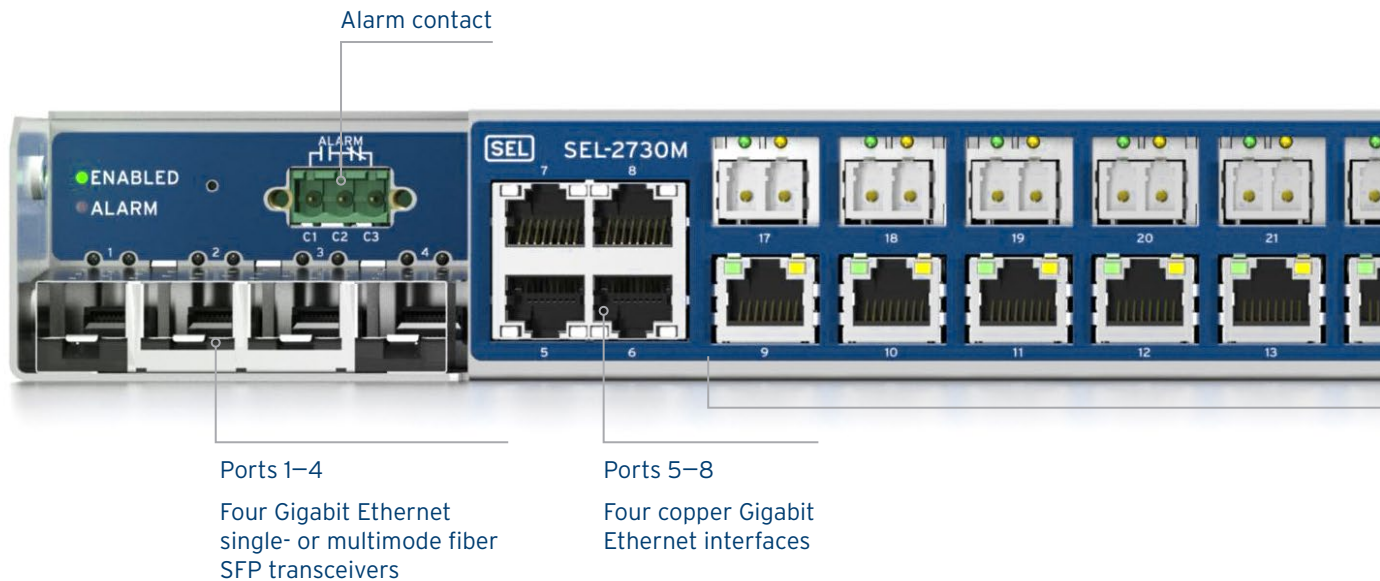
## **Robust**

Bridge Protocol Data Unit (BPDU) Guard prevents spurious BPDU packets from affecting your network. Port rate limiting helps prevent broadcast, multicast, or unicast Ethernet storms from disrupting your network operations.

## **Flexible ordering options**

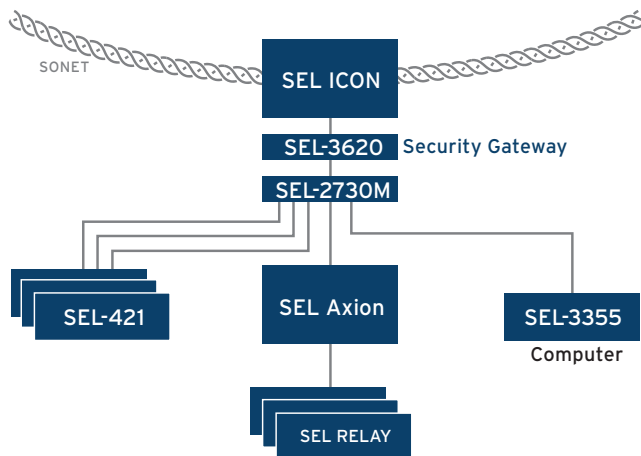
The base-model SEL-2730M has 4 Gigabit Ethernet copper ports and 16 10/100 Mbps copper Ethernet ports, built as 4-port modules. You can order each of these 10/100 Mbps copper port modules as single- or multimode 100 Mbps fiber-optic ports to meet your network's unique requirements. In addition, add up to 4 fiber-optic Gigabit Ethernet ports via small form-factor pluggable (SFP) transceivers, for a total of 24 ports.





## Flexible Design

The SEL-2730M base model comes populated with 4 Gigabit Ethernet interfaces, 4 fiber-optic SFP cages, and 16 additional copper ports. You can upgrade these 16 copper ports to fiber-optic interfaces (single- or multimode) in groups of four.



## Integrated Communications

The SEL-2730M is part of an SEL complete communications system for the substation LAN.

SEL's Ethernet switch complements the SEL ICON® Integrated Communications Optical Network by aggregating Ethernet LAN traffic for station-to-station Ethernet-over-SONET traffic. The ICON and SEL-2730M combination gives SEL an integrated communications solution for aggregation and transport—a huge benefit over point Ethernet switching solutions that rely purely on Ethernet switches for both WAN transmission and LAN connectivity.

In this example of a substation network, the SEL-2730M supports engineering access, SCADA, synchrophasors, and many other required services with easy-to-use configuration.



Ports 9–24

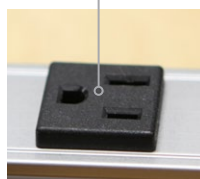
Sixteen 10/100 Mbps copper or 100 Mbps fiber ports in four-port modules

Hot-swappable, redundant power supplies

## Keep the Network Running With Dual Hot-Swappable Power Supplies

Connect a separate power source to each power supply. If one source fails, the other source continues to keep the switch operational. Each power supply is highly reliable. However, should you ever need to replace one, you can remove one power supply module while the switch continues to function, powered by the other module.

Both the SEL-9330-A and SEL-9330-C Power Supplies have an estimated MTBF of 3,000 years. This means in a population of 3,000 power supply modules, you can expect one or fewer failures in a year.



Both ac and station battery voltage sources can be used. If one supply fails, the network will not be affected.

# Key Network Features

VLANs allow you to isolate network traffic between groups of IEDs or by message type, while Ethernet Class of Service (CoS) minimizes latency for mission-critical applications.

SEL designed the SEL-2730M to maximize uptime for IEC 61850 GOOSE communications. The SEL-2730M Switch's RSTP implementation convergence times are quicker than the competition, as fast as 7 ms, ensuring that failure scenarios do not result in missing or delayed GOOSE packets. SEL strongly suggests using network architectures that are optimized for high reliability, such as a simple "ladder" network design that minimizes network downtime due to switch or link disruptions.

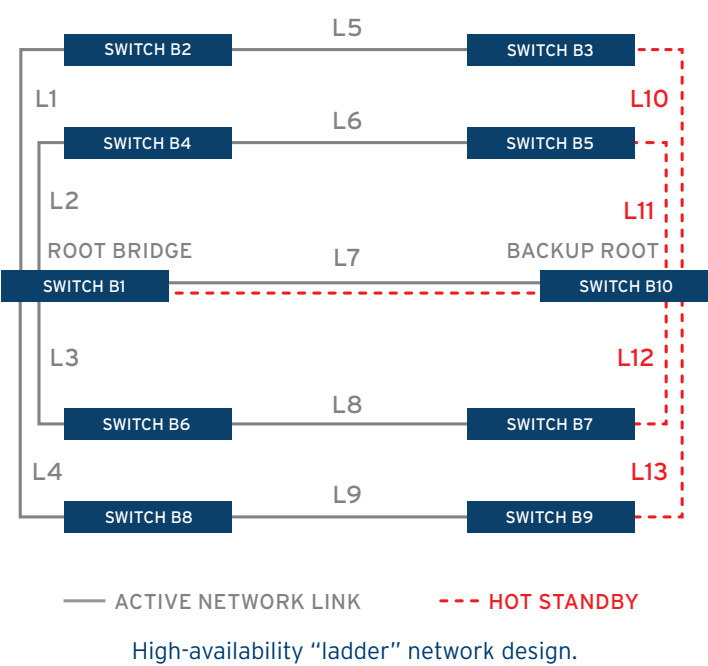
Network security is a critical requirement for any managed switch application. The SEL-2730M is designed to provide the following features:

- User-based account access
- Port disabling
- Secure SNMPv3 network monitoring
- MAC-based port filtering
- LDAP or RADIUS for secure centralized authentication
- Configurable per-port ingress throttling

The SEL-2730M supports SNMPv1/v2c/v3 reads and SNMPv2c/v3 traps and is compatible with existing network management systems.

Manage the SEL-2730M via an HTTPS web management interface with user-based authentication. Update settings either through a secure web interface or offline using acSELERATOR QuickSet® SEL-5030 Software for later uploading to the switch.

Syslog security information can be forwarded to as many as three central servers, making monitoring system activity simple and convenient.



Fault Applied Between Switches	Failure Point	Recovery Time (ms)
B2, B3	L5	7.62
B2, B4	L1 or L2	12.66
B2, B5	L1, L2, or L6	12.68, 11.93, 7.61
B2, B6	L1 or L3	12.66
B2, B7	L1, L3, or L8	12.68, 11.93, 7.61
B2, B8	L1 or L4	12.66
B2, B9	L1, L4, or L9	12.68, 11.93, 7.61

## Accessories

### Shielded, Twisted-Pair (STP) Category 5e Ethernet Cables

SEL-C627 standard Ethernet STP cables

SEL-C627R enhanced Ethernet cables with protection against EMI/RFI for industrial applications

### Fiber-Optic Cables

SEL provides high-quality fiber-optic cable solutions in customer-specified lengths. Various cable sizes, jacket types, and strand counts are available. Field termination kits are also available.

SEL-C808 Multimode 62.5/125  $\mu$ m Core Fiber-Optic Cables

SEL-C809 Single-Mode Fiber-Optic Cables



Visit [www.selcables.com](http://www.selcables.com) for more information on SEL cable solutions.

## SEL-2730M Management Functions

VLANs	Supports tagged and untagged 802.1Q VLANs to separate SCADA and IEC 61850 GOOSE messages from other traffic.
Traffic Prioritization	Features IEEE 802.1p traffic prioritization through configurable CoS and DiffServ mappings to four service levels to support critical substation messaging.
Captive Portal	Easily connect to a laptop computer during initial setup using the front-panel 10/100BASE-T Ethernet port, which by default functions as a Dynamic Host Configuration Protocol (DHCP) server.
Security	Restrict access to select end stations via IEEE 802.1X MAC-based port security. Ports can be disabled through settings. Manage the switch via an HTTPS secure web server. SNMPv3 provides secure network management. The switch can forward syslog security logs to up to three central servers.
User Authentication	Access the SEL-2730M using both local and centralized user accounts with LDAP or RADIUS.
Failover and Redundancy	Enable fast network recovery after a topology change due to a link failure, via IEEE 802.1D-2004 RSTP.
Nonintrusive Port Monitoring and Statistics	Monitor ingress and egress traffic for each port and view network statistics via an encrypted connection. Port mirroring supports mirroring ingress and egress frames to a target port.
Multicast MAC Filtering	Enhances network performance by supporting the filtering of multicast MAC addresses.
Simple Network Management Protocol (SNMP)	Supports SNMPv1/v2c/v3 network management protocols.
Link Layer Discovery Protocol (LLDP)	Allows devices across the local-area network to identify themselves and their capabilities via IEEE 802.1AB.
Graphical User Interface (GUI)-Based Secure Management	Uses a secure GUI-based management interface for all switch settings.
Secure Firmware Upgrades	Supports authentication of firmware through digital signatures.
Network Time Protocol (NTP) Time Synchronization and Distribution	Synchronizes with system time using NTP or can use its own internal clock.
User-Based Accounts	Authenticates and authorizes users via user-based accounts.
Automated Diagnostics and Reporting	Monitors health and function, and reports state changes.
System Logging	Maintains logs locally and forwards event messages via the Ethernet network.
Rate Limiting	Filters Ethernet traffic volume on individual ports and ensures reasonable data throughput on ingress/egress traffic.
BPDU Guard	BPDU Guard adds protection from network degradation caused by spurious BPDU packets with a user-configurable action, such as disabling the Ethernet port for a period of time.
Far-End Fault Indication (FEFI)	In case of a single fiber failure in an RX/TX pair, the remote end can sense the loss of the RX link and notify the SEL-2730M, which can notify operators and optionally shut down the port.

# General Specifications

General															
<b>Ports 1–4</b>	<p>Ports 1 through 4 each accept an SFP transceiver, which adds a single- or multimode Gigabit Ethernet fiber-optic uplink port.</p> <p><b>Distance and Fiber-Optic Mode</b></p> <table><tr><td>SFP options</td><td>0.5 km multimode</td></tr><tr><td></td><td>10 km single-mode</td></tr><tr><td></td><td>20 km single-mode</td></tr><tr><td></td><td>30 km single-mode</td></tr><tr><td></td><td>40 km single-mode</td></tr><tr><td></td><td>50 km single-mode</td></tr><tr><td></td><td>80 km single-mode</td></tr></table>	SFP options	0.5 km multimode		10 km single-mode		20 km single-mode		30 km single-mode		40 km single-mode		50 km single-mode		80 km single-mode
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<b>Ports 5–8</b>	<p><b>Data rate</b> 10/100/1000 Mbps</p> <p><b>Connector</b> RJ45 female</p> <p><b>Autoconfiguration</b> Crossover, speed, and half- or full-duplex mode</p>														
<b>Ports 9–24</b>	<p><b>Standard</b></p> <table><tr><td>Data rate</td><td>10/100 Mbps</td></tr><tr><td>Connector</td><td>RJ45 female</td></tr><tr><td>Autoconfiguration</td><td>Crossover, speed, and half- or full-duplex mode</td></tr></table> <p>Optional (in groups of four: 9–12, 13–16, 17–20, and 21–24)</p> <p><b>Multimode and single-mode optical interface</b></p> <table><tr><td>Data rate</td><td>100 Mbps</td></tr><tr><td>Connector</td><td>LC</td></tr></table>	Data rate	10/100 Mbps	Connector	RJ45 female	Autoconfiguration	Crossover, speed, and half- or full-duplex mode	Data rate	100 Mbps	Connector	LC				
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<b>Power Supply Ratings</b>	<p>Base unit includes one power supply; second supply is optional.</p> <p><b>Voltage Options</b> 100/120/220/230 Vac @ 45–65 Hz, or 100/125/220/250 Vdc 24/48 Vdc</p>														
<b>Operating Temperature Range</b>	–40° to +85°C (–40° to +185°F)														
<b>Relative Humidity</b>	5–95%, noncondensing														