Reliable Ethernet Communication for Substation and Plant Networks

The SEL-2730U Unmanaged Ethernet Switch is designed for the harsh environments commonly found in the energy and utility industries. The SEL-2730U supports communications infrastructures built for engineering access, supervisory control and data acquisition (SCADA), and offers the same reliability found in SEL protective relays.

➤ **Reliable.** Increase availability with the SEL-2730U, which is designed, built, and tested to function in harsh environments such as substations. Optional hot-swappable, dual power supplies provide for primary and backup power sources.

➤ **Flexible.** Maximize flexibility by using SEL-2730U ordering options to meet different network configurations. Order the SEL-2730U with Ethernet ports in combinations of copper, single-mode fiber, and multimode fiber. Add even more flexibility by using the four small form-factor pluggable (SFP) modules to change port configurations when network designs change.

➤ **Easy to Use.** Simply plug Ethernet devices into the SEL-2730U to start communications. There are no settings or configurations.
Functional Overview

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

- **Four small form-factor pluggable (SFP) ports.** Ports 1–4 support single or multimode fiber SFP transceivers.
- **Four Gigabit Ethernet ports.** Ports 5–8 support 10/100/1000 copper Gigabit Ethernet.
- **16 10/100 Mbps ports.** Ports 9–24 can be ordered in combinations of 4-port groups of either copper or fiber. When fiber is ordered for the 10/100 Mbps ports, far end fault indication (FEFI) is supported on those ports.
- **Redundant, hot-swappable power supplies.** Optional redundant power supplies provide failover protection. Connect a separate power source to each power supply. If one source fails, the other continues to keep the switch operational. The power supply has an estimated MTBF of 3000 years.

- **Reversible mounting.** The SEL-2730U comes with reversible mounting ears to support both front and rear-panel installations.

SEL manufactures the SEL-2730U using the same high standards as those for SEL protective relays and backs it with the same 10-year worldwide warranty.

The SEL-2730U supports far end fault indication (FEFI) on the 10/100 fiber ports. This is enabled by default. If you do not want FEFI, you can turn it off by removing the top panel, locating jumper J16, and asserting position 3 when you are facing the front of the product and counting from left to right.

The SEL-2730U meets or exceeds the IEEE 1613 Class 1, IEC 61850-3, and IEC 60255 industry standards for communications devices in electrical substations for vibration, electrical surges, fast transients, extreme temperatures, and electrostatic discharge.
Front- and Rear-Panel Diagrams

Figure 2 SEL-2730U Front-Panel Diagram
For some port options, a heat sink will be added to the front of the case.

Figure 3 SEL-2730U Rear-Panel Diagrams

Dimensions

RACK-MOUNT CHASSIS

TOP

LEGEND

in (mm)

0.67 (17.0)

1.72 (43.7)

19.00 (482.5)

9.14 (232.1)

9.87 (250.6)

18.31 (465.0)

1.25 (31.8)
Specifications

Compliance
ISO 9001:2008 Certified
47 CFR 15B, Class A
UL Recognized to US and Canadian safety standards (File E231500; NWGQ2; NWGQ8)
UL MX certified to Normas Oficiales Mexicanas (NOM)
CE Mark

General

Operating Environment
Pollution Degree: 2
Overvoltage Category: II

Dimensions
1U Rack Mount
Height: 43.7 mm (1.72 inches)
Depth: 232.1 mm (9.14 inches)
Width: 482.5 mm (19 inches)

Weight
1.96 kg (4.3 lbs)

Switching Properties
Switching Method: Store and Forward
Switching Latency: < 7 μs
Switch Fabric Throughput: 19.2 Gbps
MAC Address Table Size: 8192 Addresses

Warranty
10 Years

Network
IEEE 802.3u: 100BASE-T and 100BASE-FX
IEEE 802.3: 10BASE-T
IEEE 802.x: Flow control

RJ45 Ports
Recommended Cable: Category 5(e) Shielded Twisted Pair Cable (STP) (SEL-C627)
Auto Negotiation: 10 or 100 MBps, full- or half-duplex and MDI/MDI-X crossover

Fiber Optics
Data Rate: 100 Mbps
Connector Type: LC
Wavelength: 1300 nm
Multimode Option: 62.5 μm fiber
Lowest TX Level: –20 dBm
Lowest RX Sensitivity: –31 dBm
Optical Budget: 11 dBm
Max Distance: 2 Km

Communications Ports

Ethernet Ports
Ports: 24 rear
Data Rate: 10, 100, or 1000 Mbps
Rear Connectors: RJ45 Female or LC Fiber (single-mode or multimode)
Standard: IEEE 802.3

Power Supply
125/250 Volt Power Supply
Rated Supply Voltage: 125/250 Vdc; 120/220/240 Vac, 50/60 Hz
Input Voltage Range: 88–300 Vdc or 85–264 Vac
Power Consumption: AC: < 60 VA
DC: < 45 W
Input Voltage Interruptions: 50 ms @ 125 Vac/Vdc
24/48 Volt Power Supply
Rated Supply Voltage: 24/48 Vdc (polarized)
Input Voltage Range: 19.2 Vdc to 57.6 Vdc
Power Consumption: < 45 W
Input Voltage Interruptions: 50 ms @ 48 Vdc

Environmental

Operating Temperature
–40° to +85°C (–40° to +185°F)

Relative Humidity
0 to 95% non-condensing

Altitude
2000 m

Green Product
Compliant with the European Union’s RoHS directive

Type Tests

Communication Product Testing
IEC 61850-3:2002
IEEE 1613, Class 1

Electromagnetic Compatibility Emissions
IEC 60255-25:2000
Generic Emissions: CFR 47 Part 15
Severity Level: Class A
Electromagnetic Compatibility Immunity

Conducted RF Immunity: IEC 60255-22-6:2001
Severity Level: 10 Vrms
IEC 61000-4-6:2008
Severity Level: 10 Vrms

Electrostatic Discharge Immunity:
  Severity Level: 2, 4, 6, 8 kV contact; 2, 4, 8, 15 kV air
  IEC 61000-4-2:2008
  Severity Level: 2, 4, 6, 8 kV contact; 2, 4, 8, 15 kV air
  IEEE C37.90.3:2001
  Severity Level: 2, 4, and 8 kV contact; 4, 8, and 15 kV air

Fast Transient/Burst Immunity:
IEC 60255-22-4:2008
Severity Level: Class A - 4 kV, 5 kHz; 2 kV, 5 kHz on communications ports
IEC 61000-4-4:2011
Severity Level: 4 kV, 5 kHz

Magnetic Field Immunity:
IEC 61000-4-10:2001
Severity Level: 100 A/m
IEC 61000-4-8:2009
Severity Level: 1000 A/m for 3 seconds, 100 A/m for 1 minute
IEC 61000-4-9:2001
Severity Level: 1000 A/m

Power Supply Immunity:
IEC 60255-11:2008
IEC 61000-4-11:2004
IEC 6100-4-29:2000

Radiated Radio Frequency Immunity:
IEC 60255-22-3:2007
Severity Level: 10 V/m
IEC 61000-4-3:2010
Severity Level: 10 V/m
IEE El C37.90.2:2004
Severity Level: 35 V/m

Surge Immunity:
IEC 60255-22-5:2008
Severity Level: 1 kV line-to-line, 2 kV line-to-earth
IEC 61000-4-5:2005
Severity Level: 1 kV line-to-line, 2 kV line-to-earth

Surge Withstand Capability Immunity:
IEC 60255-22-1:2007
Severity Level: 2.5 kV peak common mode, 1.0 kV peak differential mode
IEEE C37.90.1:2002
Severity Level: 2.5 kV oscillatory, 4 kV fast transient waveform

Environmental

Cold:
IEC 60068-2-1:2007
Severity Level: 16 hours at –40°C

Damp Heat, Cyclic:
IEC 60068-2-30:2005
Severity Level: 25°C
Relative Humidity: 93%
Duration: 4 days

Dry Heat:
IEC 60068-2-2:2007
Severity Level: 16 hours at +85°C

Vibration (Front-Panel Mount Only):
IEC 60255-21-1:1988
Severity Level: Class 1 endurance, Class 2 response
IEC 60255-21-2:1988
Severity Level: Class 1 - Shock withstand, bump, and Class 2 - Shock response
IEC 60255-21-3:1993
Severity Level: Class 2 (quake response)

Safety

Dielectric Strength: IEC 60255-5:2000
3100 Vdc on power supply.
Type tested for 1 minute.
IEEE C37.90:2005
3100 Vdc on power supply.
Type tested for 1 minute.

Impulse: IEC 60255-5:2000
Severity Level: 0.5 Joule, 5 kV
IEEE C37.90:2005
Severity Level: 0.5 Joule, 5 kV

Complies with 21 CFR Chapter 1, Subchapter J, Part 1040.10.

Safety: IEC 60950-1:2001 [EN 60950-1:2001]