SEL-2740S Software-Defined Network (SDN) Switch

Traffic-Engineered Ethernet Communication for Critical Infrastructure

Key Features and Benefits

The SEL-2740S SDN Switch is a 20-port switch designed for the harsh environments common to critical infrastructure industries. The SEL-2740S is a deny-by-default network switch that enables full control of Ethernet traffic engineering. Traffic engineering provides you the ability to configure each communications flow path, configure flow match filters for approved forwarding, and pre-engineer failover conditions to design fault-tolerant networks. The result is greater performance, improved reliability, and more deterministic packet delivery.

- **Reliability.** Provides a robust design built and tested to function in harsh environments, meeting IEEE 1613 and IEC 61850-3 standards. Hot-swappable, dual power supplies provide connectivity to primary and backup power sources.
- **Fast Failover.** Allows healing in microseconds with proactive traffic engineering for fault conditions.
- **Modularity.** Provides six hot-swappable modular interface slots and two power supply module slots. The SEL-2740S requires one alarm contact and flow coprocessor module, and it provides the installation option of as many as five Ethernet interface modules and two power supply modules.
- **Redundancy.** Provides strong, central management of all traffic flow circuits and backup circuits. Also provides operational statistics from the flow controller.
- **Ease of Use.** Supports quick commissioning and all network configuration programming through the SEL-5056 SDN Flow Controller.
- **SDN Management.** Supports OpenFlow 1.3.
- **Syslog Logging.** Generate and send log event messages directly to a central server through use of UDP or with encrypted and authenticated Transport Layer Security (TLS).
- **Low-Latency Forwarding.** Provides store-forward, low-latency forwarding.
- **Large Flow Table Size.** Supports small and large networks with a 4,096 flow entry capacity.
- **Cybersecurity.** Supports deny-by-default network access control and secure management of communication with OpenFlow 1.3 through the use of TLS and the detailed central monitoring capability of the SEL-5056.
- **Flexible Group and Action Bucket Support.** Supports 256 groups and 30 action buckets per group, enabling flexible network design and traffic engineering.
- **Packet Buffer Memory.** Supports 87 packets at maximum transmission unit (MTU).
- **Switching Capacity.** Supports a 5.6 Gbps packet data rate and full-duplex, nonblocking design.
- **Forwarding Match Filters.** Provides the user with control of all network forwarding through each hop by allowing configuration of match attributes for each flow on Layer 1, 2, 3, or 4 fields.
- **Quality of Service (QoS).** Provides traffic priority management through four 8:4:2:1 weighted round-robin (WRR) priority queues.
- **Network Time Protocol (NTP) Time Synchronization.** Allows time synchronization through NTP and operation as an NTP client to time-align events and user activity across the system.

- **X.509 Certificates.** Supports secure communication between the switch and the flow controller, and manages keys through certificates.
- **IEEE C37.238-2017 PTP Power Profile Transparent Clock.** Supports networks that demand precise time synchronization.

Functional Overview

The SEL-2740S is a standards-based, OpenFlow 1.3-compatible, 20-port switch that provides a rugged and versatile modular platform and supports build-to-suit switching solutions for applications in extreme environmental conditions. The SEL-2740S provides six communications module slots and two power supply slots. The main SEL-2740S chassis requires one alarm contact and flow coprocessor module in the first slot (Slot A) and then provides five optional slots for copper or fiber modules (Slots B–F), allowing users to construct the desired combination of communications interfaces. Each port supports PTP TC when PTP is enabled on the SEL-2740S. Users can create a load-sharing, hot-swappable, and redundant design with the two available power supply slots by selecting from a combination of power supply options.

Available Modules

The following modules are available for creating a custom interface:

Module[a]	Number of Ports	Max Cable Distance
Alarm contact and coprocessor[b]	NA	NA
10/100/1000BASE-T RJ45[c]	4	100 m[d]
100BASE-FX Multimode	4	2 km
100BASE-LX10 Single-mode	4	10 km
1000BASE-SX Multimode	4	500 m
1000BASE-LX Single-mode	4	10 km
1000BASE-EX Single-mode	4	40 km
10BASE-FL	4	2 km

[a] Conformal coating option available.

[b] One is required in Slot A of each SEL-2740S.

[c] Supports auto-MDIX, autonegotiation, and full- and half-duplex. In Slots B, C, E, and F, ports can operate at 10 or 100 Mbps. In Slot D, ports can operate at 10, 100, or 1000 Mbps.

[d] Cat 5 cable.

Power Supplies

Redundant power supplies provide uninterrupted failover protection. Each power supply may be connected to a separate power source. If one source fails, the other source continues to keep the switch operating. Two power supplies are available: high-voltage (110–240 Vac and 88–300 Vdc) and low-voltage (24–48 Vdc).

Architecture

The modular architecture of the SEL-2740S allows rapid reconfiguration or repair by supporting field-replaceable communications and power supply modules. One high-speed slot supports a Gbps-capable communications module, one slot supports the alarm contact and flow coprocessor module, and four slots support available 10/100 Mbps-capable communications modules.

Security

The SEL-2740S is managed through the use of encrypted and authenticated communication by using the SEL-5056. Touchless topology management and switch discovery facilitate commissioning and deployment. The SEL-5056 provides secure, mutually authenticated central management of an entire network as a single asset, controls which traffic flows the network allows, and establishes the path each flow takes. Using deny-by-default flow management, the SEL-2740S provides strong network access control and enables greater discipline in network engineering. Use of predetermined failover conditions can improve network performance by establishing consistent, fault-tolerant performance and by eliminating the need for dynamic convergence protocols such as Rapid Spanning Tree Protocol (RSTP).

Users configure the SEL-2740S by using the SEL-5056, enabling system-wide change management capability and the ability to plan and execute changes without interruption of service. Cybersecurity is designed in from the start with whitelisting architecture, deny-by-default network management at each hop, near real-time operational diagnostics collected from all network assets (providing improved situational awareness), and detailed audit logging of user activity with role-based access control and centralized logging. Centrally collect event logs from the SEL-2740S through the use of syslog. The SEL-2740S supports configuration options to deliver syslog events over one-way UDP packets or through the use of TLS-protected TCP transport. Configure as many as three syslog server destinations for each SEL-2740S to publish to, and uniquely set the severity level for each server delivery.

Manufacture and Warranty

The manufacture of the SEL-2740S adheres to the same high standards as those used for SEL protective relays, and the product is backed with the same worldwide, ten-year warranty.

The SEL-2740S meets or exceeds the high-reliability standards defined in IEEE 1613, IEC 61850-3, and IEC 60255, the industry standards for communications devices in electrical substations. The SEL-2740S has completed and received the KEMA certification of conformance to the IEC 61850-3 environmental and IEC 61850-90-4 performance requirements, ensuring interoperability with IEC 61850 Ethernet communication.

Application Examples

The SEL-2740S is ideally suited for use as an Ethernet switch for substation LANs, providing highly reliable, centrally managed, continuous, and easy-to-use status monitoring. The SEL-2740S is an SDN switch platform based on OpenFlow 1.3. It is specifically designed for systems that require exceptional reliability in rugged environments, relying on the revolutionary network advances of SDN technology. These advances include reduced complexity, improved performance, and centralized control and monitoring of entire networks. Combined with the SEL-5056, the system allows management of networks as a single asset and makes possible the monitoring of operational counters that provide health and diagnostics information about the network.

Traffic Engineering

The SEL-2740S eases configuration management challenges and improves Ethernet communications performance and reliability. An SDN provides the central configuration and operational monitoring to which critical infrastructure industries are accustomed (i.e., SCADA) and provides proactive, fault-tolerant, professional engineering methods.

An SDN allows the asset owner to control every forwarded packet and to determine which path the forwarded packet takes by managing the entire network as a single asset and by whitelisting traffic on each link.

An SDN also allows the purposeful engineering of networks and the designing of failure contingency plans. The SEL-2740S allows proactive configuration to handle fault conditions, enabling next-packet healing, and eliminating the long convergence healing times of spanning-tree algorithms. The SEL-2740S reduces complexity in field devices by abstracting and centralizing Ethernet forwarding control intelligence, resulting in smaller firmware requirements in these devices and reduced patch management and field configuration.

Network Topology

The SEL-2740S and SEL-5056 provide touchless device discovery and topology management. This enables users to discover network topology, track the locations of hosts, and configure end-to-end communications flows while providing system-wide visualization of each flow path.

The SEL-5056 provides a global view of the entire network, showing communications health and diagnostics information for each flow. This view helps system operators understand in greater detail what is happening on the communications infrastructure. The SEL-5056 also provides device views of the network to allow controlling and monitoring of each individual network appliance configuration and the configuration of all allowed device traffic.

Traffic engineering is made simple through the use of aliases for any host, port, link, flow, meter, or group. This allows the engineer to reference friendly names rather than numeric identifiers. Counters are also referenced by these aliases, simplifying troubleshooting. Logical connection-focused configuration allows circuit provisioning to be simplified by automating all OpenFlow configurations once the desired starting and ending point is selected for each flow. Redundancy is automated and proactively configured, ensuring network healing times are in microseconds.

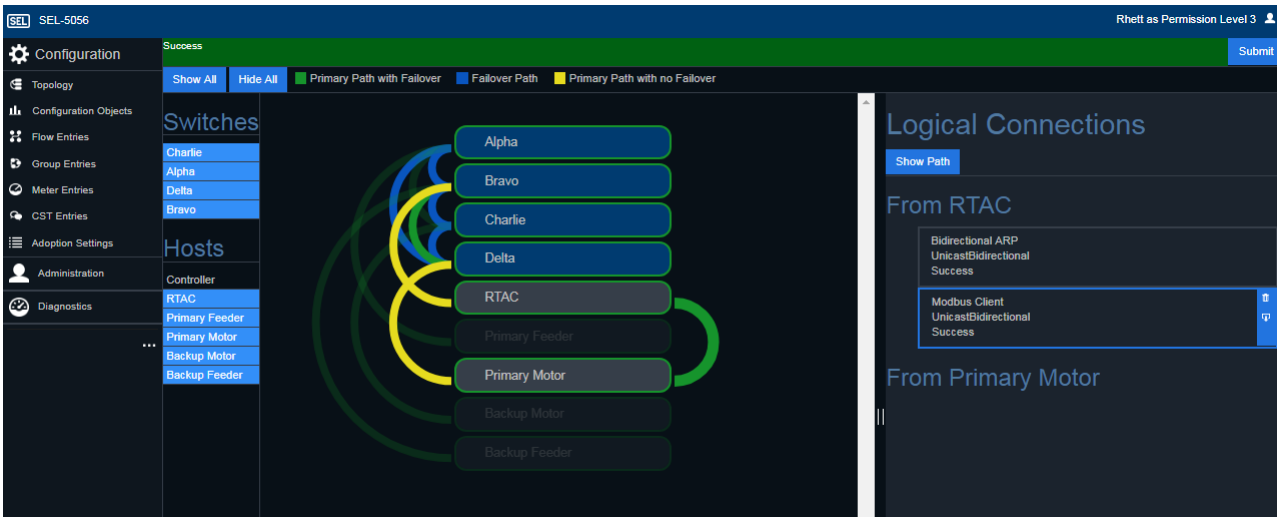


Figure 1 SEL-5056 Network Topology

Improve QoS and Maximize Operations

Users can maximize asset use without port-blocking requirements such as those in RSTP. System owners can proactively engineer and test Ethernet circuits, predetermining exact primary and failover communications flow circuits. This results in more deterministic latency and less disruption during faults because the switch has already been programmed for how to respond to a case of a link or network appliance failure (instead of having to learn or converge the network every time). Users can engineer communications flows similarly to power flows by using fault-tree analysis and N–1 redundancy; users can also validate communications performance before deployment with simple, repeatable acceptance testing of all fault conditions.

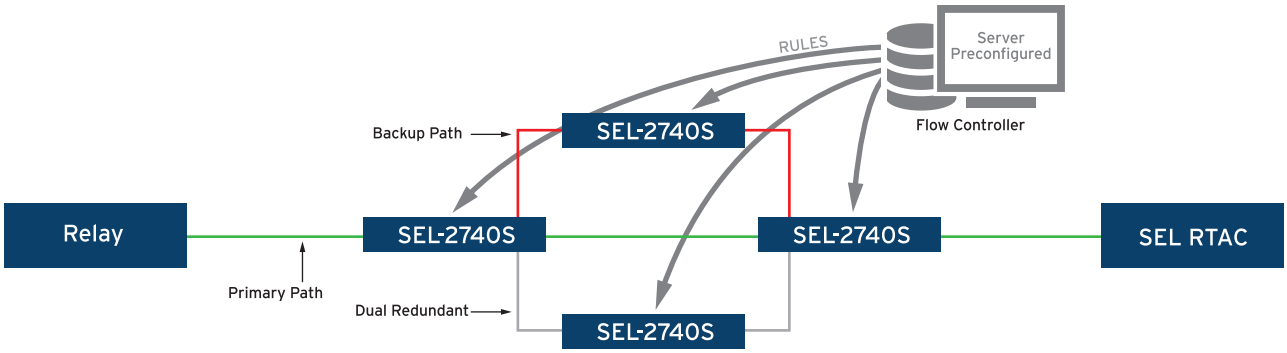


Figure 2 Proactive Traffic Engineering of Path- and Packet-Level Flows and Redundancy

Strong Cybersecurity and Audit Support

An SDN provides strong network access control and a deny-by-default security model; packets are not forwarded until the communications flow is configured to be forwarded. An SDN matches ingress packets and determines if packets match an allowed forwarding condition. Match conditions are not restricted to the attributes of any particular layer (for example, Layer 2) but can be constructed by using layer-independent attributes supporting fields from Layers 1 through 4 of the Open Systems Interconnection (OSI) model. Forwarding rules are also flexible, allowing the network to forward a single packet to one or many destinations, or to route it through an intrusion detection system (IDS) to support deep packet inspection on a per-flow basis, either locally or centrally.

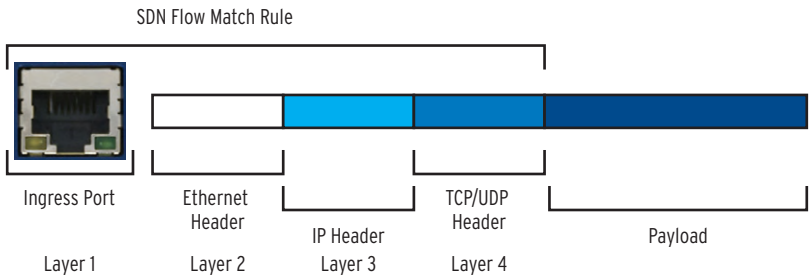


Figure 3 Multilayer packet inspection at each hop establishes a strong network access control model that eliminates packet injection or unauthorized pivoting on the network, blocking network reconnaissance.

Centrally Manage and Monitor

Field networks can be managed and monitored as a single asset. The SEL-2740S works with the SEL-5056 to provide communications flow configuration and monitoring capabilities. This allows operators to monitor all flows and their attributes from a central location. No engineering access interface is necessary on the SEL-2740S; the SEL-5056 conveniently and centrally manages everything, greatly simplifying field deployment. In addition, the SEL-5056 provides backup and restore features for maintaining high reliability. Operators can take a snapshot of the system and use any backup as a restore point from the same version for recovery.

Figure 4 SEL-5056 Software Banner

Diagrams and Dimensions

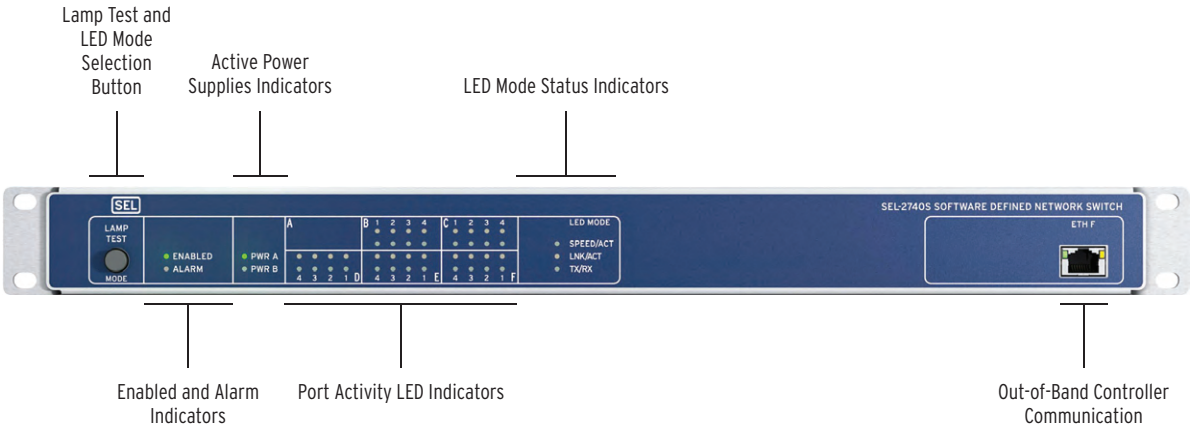


Figure 5 SEL-2740S Front-Panel Diagram

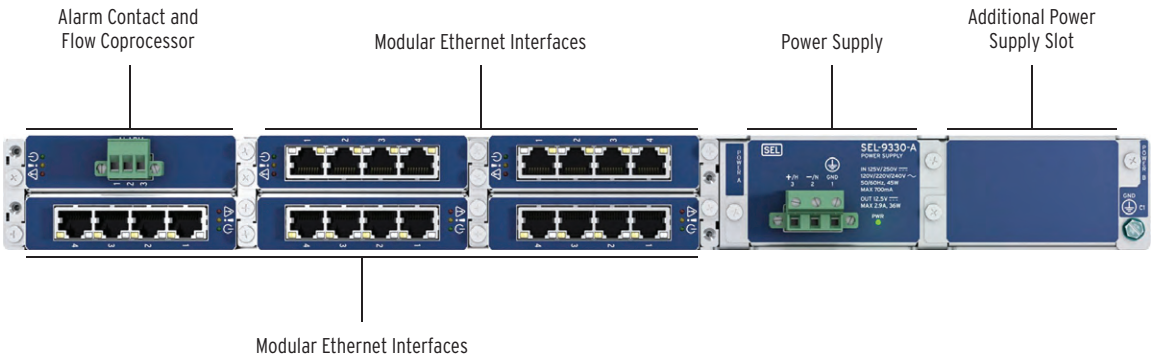


Figure 6 SEL-2740S Rear-Panel Diagram

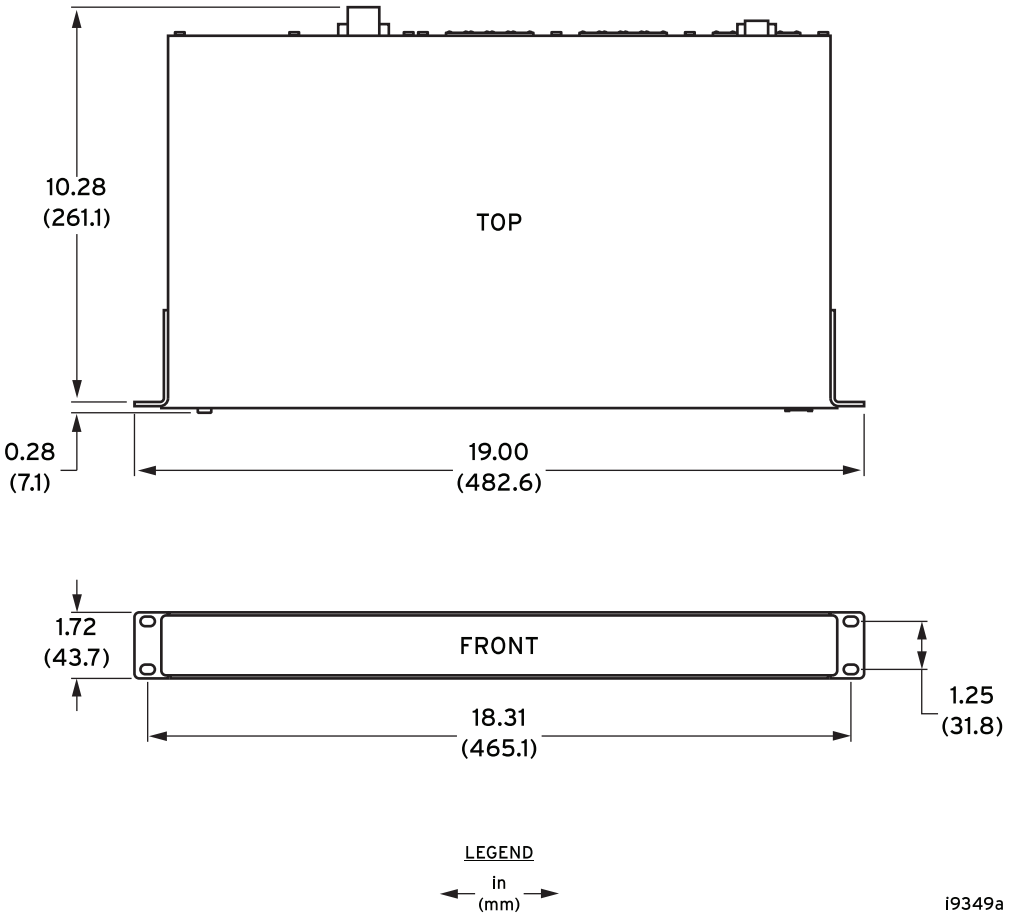
Figure 7 SEL Alarm Contact and Flow Coprocessor

Figure 8 SEL Modular Copper Ethernet Interface

Figure 9 SEL Fiber Ethernet Interface Module

Figure 10 SEL Modular Power Supply

RACK-MOUNT CHASSIS



Note: The SEL-2740S supports front, 19-inch rack-mount and wall-mount installations.

Note: When using 915900533 wall-mount brackets, use appropriate fasteners for the wall location to which the unit is being mounted and install the device in a restricted area with wires down to meet UL compliance.

Note: When mounted higher than 2 m with the optional wall-mount brackets, the unit meets UL MS3 hazardous condition classification and should only be accessed by qualified personnel.

Note: When using the wall-mount brackets, insert one mounting screw in each bracket cutout, for a total of four mounting screws per switch.

Note: For torque recommendations, refer to *Specifications*.

Note: When mounting multiple SEL-2740S Switches in the same rack, leave a one-unit space between each device to ensure proper heat dissipation.

Figure 11 SEL-2740S Dimensions

Specifications

Compliance

Designed and manufactured under an ISO 9001 certified quality management system

UL recognized to U.S. and Canadian safety standards (File E231500, Vol X3)

47 CFR 15B, Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

CE Mark

General

Switching Properties

Switching Method:	Store and forward
Switch Fabric Throughput:	5.6 Gbps
Priority Queues:	4
Priority Queue Method:	8:4:2:1 weighted round-robin (WRR)
Flow Entries:	4096
Flow Tables:	4
Maximum Transmission Unit (MTU):	1632

Warranty

10 years

Network Management

SNMP v2c

OpenFlow 1.3

Group Entries:	256
Action Buckets Per Group Entry:	30
Group Types:	All, Select, Indirect, Fast Failover
Instructions:	Write-Actions, Meter, Clear-Actions, Goto-Table
Actions:	Output, Group, Push Vlan, Pop Vlan, Set Queue, Set VID, Set PCP

Secure Communication

TLS with the OpenFlow controller

X.509 certificate to establish TLS connection to the OpenFlow controller

Logging and Diagnostics

Syslog

UDP and TLS

OpenFlow 1.3

SNMP v2c

Precision Time Protocol

Profile

IEEE C37.238-2017 (Power Profile)
Transparent Clock (100BASE-TX, 1000BASE-T, 100BASE-FX, 1000BASE-SX, 100BASE-LX, or 1000BASE-LX)

Communications Ports

Ethernet Ports

Ports:	20 rear, 1 front
Data Rate	
Slots B, C, E, F:	10 or 100 Mbps
Slot D:	10, 100, or 1000 Mbps
Front Connector:	RJ45 female
Rear Connectors:	RJ45 female or LC fiber (single-mode or multimode)
Standard:	IEEE 802.3

Fiber-Optic Ports

10BASE-FL Multimode Option (to 2 km)

Maximum TX Power:	–12 dBm
Minimum TX Power:	–19 dBm
Maximum RX Power:	–12 dBm
RX Sensitivity:	–32 dBm
System Gain:	13 dB
Source:	VCSEL
Wavelength:	850 nm
Connector Type:	LC (IEC 61754-20)

100BASE-FX Multimode Option (to 2 km)

Maximum TX Power:	–14 dBm
Minimum TX Power:	–19 dBm
Maximum RX Power:	–14 dBm
RX Sensitivity:	–31 dBm
System Gain:	12 dB
Source:	FP laser
Wavelength:	1310 nm
Connector Type:	LC (IEC 61754-20)

100BASE-LX Single-Mode Option (to 10 km)

Maximum TX Power:	–8 dBm
Minimum TX Power:	–15 dBm
Maximum RX Power:	–8 dBm
RX Sensitivity:	–25 dBm
System Gain:	10 dBm
Source:	FP laser
Wavelength:	1310 nm
Connector Type:	LC (IEC 61754-20)

1000BASE-LX Single-Mode Option (to 10 km)

Maximum TX Power:	–3 dBm
Minimum TX Power:	–11.5 dBm
Maximum RX Power:	–3 dBm
RX Sensitivity:	–19 dBm
System Gain:	7.5 dB
Source:	FP laser
Wavelength:	1310 nm
Connector Type:	LC (IEC 61754-20)

1000BASE-SX Multimode Option (to 500 m)

Maximum TX Power:	0 dBm
Minimum TX Power:	–9.5 dBm
Maximum RX Power:	0 dBm
RX Sensitivity:	–17 dBm

System Gain:	7.5 dB
Source:	VCSEL
Wavelength:	850 nm
Connector Type:	LC (IEC 61754-20)

1000BASE-EX Single-Mode Option (to 40 km)

Maximum TX Power:	0 dBm
Minimum TX Power:	–4.5 dBm
Maximum RX Power:	–3 dBm
RX Sensitivity:	–22.5 dBm
System Gain:	18 dB
Source:	FP laser
Wavelength:	1310 nm
Connector Type:	LC (IEC 61754-20)

Note: If connecting with a short fiber-optic cable, a minimum of 3 dB attenuation is required for proper operation.

Ethernet

IEEE 802.3
IEEE 802.3ac

Power Supply

125/250 Volt Power Supply (SEL-9330-A)

Rated Voltage Range:	125/250 Vdc 120/220/240 Vac, 50/60 Hz
Min/Max Voltage:	88–300 Vdc 85–264 Vac
Maximum Burden	
AC:	<70 VA
DC:	<45 W
Input Voltage Interruptions:	50 ms @ 125 Vac/Vdc 100 ms @ 250 Vac/Vdc

24/48 Volt Power Supply (SEL-9330-C)

Rated Voltage Range:	24/48 Vdc
Min/Max Voltage:	19.2–60.0 Vdc
Maximum Burden:	<42 W
Input Voltage Interruptions:	50 ms @ 48 Vdc 10 ms @ 24 Vdc

Power Supply Fuse Ratings

SEL-9330-A:	2.5 A, 250 Vdc/300 Vac time-lag T, 250 Vac/1500 A break rating
SEL-9330-C:	4.0 A, 150 Vdc time-lag T, 250 Vac/1500 A break rating

Note: Fuses are not user-serviceable.

Recommended External Overcurrent Protection

Breaker Type:	Standard
Breaker Rating:	15 A at 250 Vdc

Alarm Contact Output

Output Type:	Relay, Form C, break-before-make
Alarm Contact Output Power Supply Burden:	<1 W maximum
Mechanical Life:	2,000,000 operations
Operational Voltage:	250 Vac/Vdc
Make:	30 A at 250 Vdc
Carry:	6 A continuous at 70°C
1 s Rating:	50 A
MOV Protection:	270 Vac, 23 J
Insulation Voltage:	300 Vdc
Pickup Time:	<8 ms
Dropout Time:	<8 ms

Breaking Capacity (10,000 Operations):

24 V	0.75 A	L/R = 40 ms
48 V	0.50 A	L/R = 40 ms
125 V	0.30 A	L/R = 40 ms
250 V	0.20 A	L/R = 40 ms

Cyclic Capacity (2.5 Cycles/Second):

24 V	0.75 A	L/R = 40 ms
48 V	0.50 A	L/R = 40 ms
125 V	0.30 A	L/R = 40 ms
250 V	0.20 A	L/R = 40 ms

Terminal Connections

Compression Screw Terminals

Power Wiring

Insulation:	300 V minimum
Size:	12–18 AWG
Tightening Torque Min/Max:	0.6–0.8 Nm (5–7 in-lb)

Note: Crimp ferrule is recommended.

Alarm Wiring

Insulation:	300 V minimum
Size:	16–24 AWG
Tightening Torque Min/Max:	0.5–0.6 Nm (4–5 in-lb)

Note: Crimp ferrule is recommended.

Mounting Ear Tightening Torque Min/Max:	2–4 Nm (18–35 in-lb)

Grounding Screw

Ground Wiring

Insulation:	300 V minimum
Size:	12 AWG
Length:	<3 m
Tightening Torque Min/Max:	0.9–1.4 Nm (8–12 in-lb)

Note: Ring terminal is recommended.

Dimensions

1U Rack Mount

Height:	43.7 mm (1.72 inches)
Depth:	232.1 mm (9.74 inches)
Width:	482.5 mm (19 inches)

Weight

1.96 kg (4.3 lb)

Environmental

Operating Temperature

–40° to +85°C (–40° to +185°F)

Relative Humidity

0% to 95% noncondensing

Altitude

2000 m

Atmospheric Pressure

80–210 kPa

Operating Environment

Pollution Degree:	2
Overvoltage Category:	II
Insulation Class:	I

Enclosure Protection

IEC 60529:2001 + A2:2014
Severity Level: IP20

Type Tests

Communications Product Testing

IEC 61850-3:2013, Performance Class 1
IEEE 1613, Class 1

IEEE 1613-2009, Class 1*	KEMA certified
IEC 61850-3:2013	KEMA certified
IEC 61850-90-4	KEMA certified

* With SEL-C627-R or equivalent cables.

Electromagnetic Compatibility Emissions

Generic Emissions:	FCC 47 CFR:2008 Part 15.107 & 109 EN 60255-26:2013 IEC 60255-26:2013 EN 61850-3:2014 IEC 61850-3:2013 EN 55011:2009 + A1:2010 EN 55022:2010 + AC:2011 EN 55032:2012 + AC:2013 EN 55016 (Series) CISPR 11:2009 + A1:2010 CISPR 22:2008 ICES-003, Issue 6 ANSI C63.4:2014
Severity Level:	Class A

Electromagnetic Compatibility Immunity

Conducted RF Immunity:	IEC 60255-26:2013 Severity Level: 10 Vrms IEC 61000-4-6:2008 Severity Level: 10 Vrms
Radiated RF Immunity:	IEEE C37.90.2-2004 Severity Level: 20 V/m unmodulated 80 MHz–1 GHz IEEE 1613-2003 Class 1 IEC 60255-26:2013 Severity Level: 10 V/m unmodulated 80 MHz–1 GHz, 1.4–2.7 GHz
Conducted Common-Mode Disturbance (CCMD):	IEC 61000-4-16:2009 Severity Level: 4 Profile Level: 4
Electrostatic Discharge Immunity:	IEC 60255-26:2013 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 1613-2003 Class 1 IEEE C37.90.3-2001 Severity Level: 2, 4, 8 kV contact; 4, 8, 15 kV air
Fast Transient/Burst Immunity:	IEC 60255-26:2013 IEC 61000-4-4:2012 Severity Level: Zone A IEEE 1613-2003 Class 1
Magnetic Field Immunity:	IEC 61000-4-8:2009 IEC 61000-4-10:2000 Severity Level: 100 A/m (100 kHz and 1 MHz) IEC 60255-26:2013 Severity Level: 100 A/m for 60 seconds; 1000 A/m for 3 seconds IEC 61000-4-9:2001 Severity Level: 1000 A/m
Power Frequency Immunity:	IEC 60255-26:2013 IEC 61000-4-16:2009 IEC 61000-4-16:2011 Severity Level: Zone A 150 Vrms
Power Supply Immunity:	IEC 60255-26:2013 IEC 61000-4-11:2004 IEC 61000-4-29:2000
Power Supply Ripple:	IEC 60255-26:2013 IEC 61000-4-17:2008 IEEE 1613-2003 Class 1
Power Supply Gradual Shutdown and Startup:	IEC 60255-26:2013 Severity: shutdown ramp 60 seconds, power off 5 minutes, startup 60 seconds
Power Supply Discharge Capacitors:	IEC 60255-27:2013
Power Supply Reverse Polarity and Slow Ramp:	IEC 60255-27:2013
Surge Immunity:	IEC 60255-26:2013 Clause 7.2.7 IEC 61000-4-5:2005 Severity Level: Zone A
Surge Withstand Capability:	IEC 60255-26:2013 IEC 61000-4-18:2010 IEC Surge Withstand Capability Severity Level: 1 MHz common mode, 2.5 kV on power and I/O, 1 kV on communications ports Severity Level: 1 MHz differential mode, 1 kV on power and I/O IEEE C37.90.1-2012 Severity Level Oscillatory: ±2.5 kV, 1 MHz common and differential mode Severity Level Fast Transient: ±4 kV, 2.5 kHz common and differential mode IEEE 1613-2003 Class 1

Environmental

Cold:	IEC 60068-2-1:2007 Severity Level: 16 hours at –40°C IEC 60255-27:2013 IEEE 1613-2003 Class 1
Damp Heat, Cyclic:	IEC 60068-2-30:2005 Severity Level: 25°C Relative Humidity: 93% Duration: 6 cycles IEC 60255-27:2013
Dry Heat:	IEC 60068-2-2:2007 Severity Level: 16 hours at +85°C IEC 60255-27:2013 IEEE 1613-2003 Class 1
Damp Heat, Steady State:	IEC 60068-2-78:2012 Severity Level: 40°C at 90% for 10 days IEC 60255-27:2013 IEEE 1613-2003 Class 1
Vibration:	IEC 60255-21-1:1988 Severity Level: Class 1 endurance, Class 2 response IEC 60255-21-2:1998 Severity Level: Class 1 shock withstand, bump, and Class 2 shock response IEC 60255-21-3:1993 Severity Level: Class 2 (quake response) IEC 60255-27:2013 IEEE 1613-2003 Class 1

Safety

Dielectric Strength:	IEC 60255-27:2013 IEEE 1613-2003 Class 1 IEEE C37.90-2005 3100 Vdc on power supply and alarm contact 2100 Vdc on Ethernet ports Type tested for 1 minute

Impulse:	IEC 60255-27:2013 IEEE 1613-2003 Class 1 IEEE C37.90-2005 Severity Level: Common Mode 5 kV power supply, alarm contact 2 kV Ethernet ports Common Mode, Port to Port 5 kV power supply, alarm contact zero-rated, Ethernet ports
Protective Bonding Resistance:	IEC 60255-27:2013 IEEE C37.90-2005

Technical Support

We appreciate your interest in SEL products and services. If you have questions or comments, please contact us at:

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PDS2740S-01