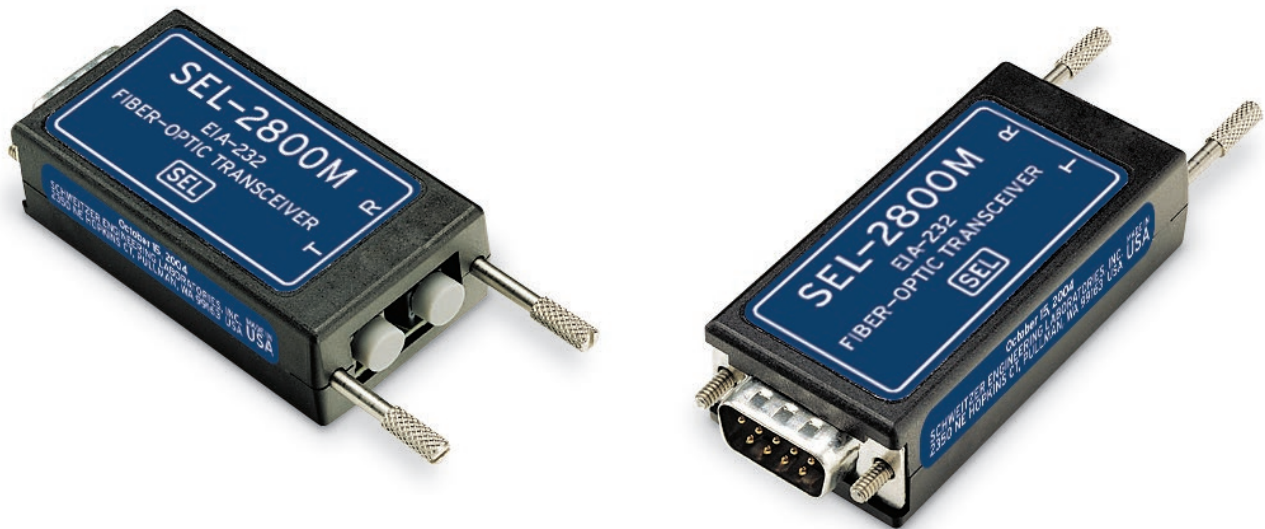# SEL-2800

Fiber-Optic Transceiver

Communicate 500 meters with EIA-232 port-powered fiber-optic transceivers

- Zero settings and no external power connections provide for easy application.
- Low-cost fiber-optic communications enable affordable deployment.
- Fiber-optic cables isolate data communication from ground potential rise and electrical interference.

SEL

Features and Benefits

Low-Cost Fiber-Optic Communication

Send serial data over distances up to 500 meters using multimode optical fiber with standard V-pin connectors. Transfer data at rates up to 40 kbps with less than a 5 μs delay.
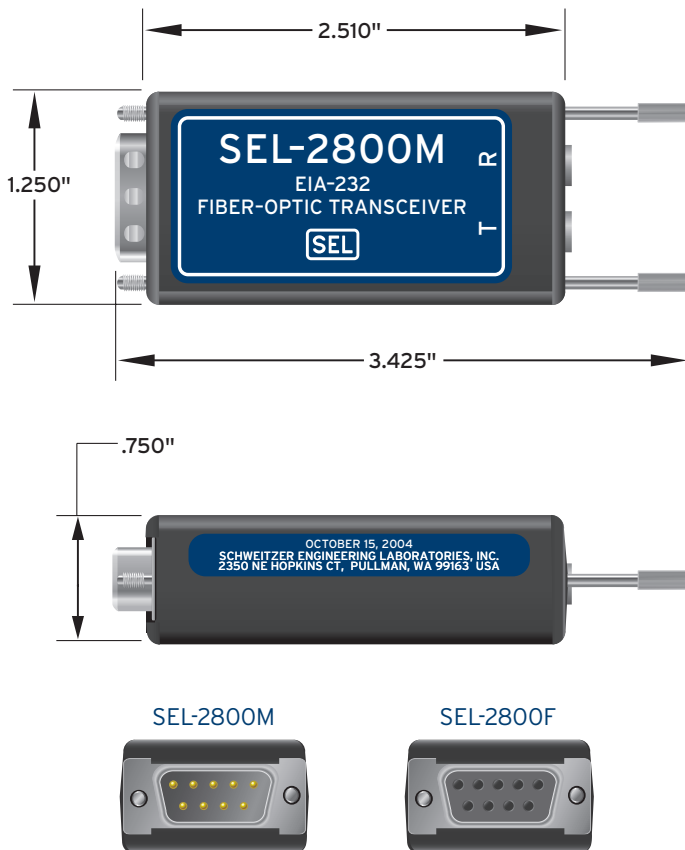
Easy Application

Plug the SEL-2800 Fiber-Optic Transceiver directly onto a standard 9-pin serial connector (DB-9). No special mounting is required. The SEL-2800 receives power from the host device via the connector; no separate power supply or wiring is needed. The transceiver transmits visible light (650 nm) for easy inspection, and it requires no jumpers or settings.

Safe, Secure, and Reliable Data Transfer

Apply the SEL-2800 in harsh electrical and physical environments. The transceiver is far less susceptible to electromagnetic interference (EMI)/radio frequency interference (RFI) than copper links and provides improved isolation from ground potential rise and other electrical hazards.

Product Overview

PIN	DCE NAME	IN / OUT
1	DCD[3]	→
2	RXD[1]	→
3	TXD[1]	←
4	DTR[2]	←
5	GND[1]	
6	DSR[3]	→
7	RTS[2]	←
8	CTS	→
9	N/C	

CONNECTED INTERNALLY

[1]REQUIRED CONNECTIONS

[2]DTR OR RTS MUST BE CONNECTED AND ACTIVE HIGH

[3]CURRENT LIMITED TO 4mA AT DTR=12Vdc

R   T

Back Label With EIA-232 Pin Usage

Imprinted on the bottom of the device.

SEL-2800M

EIA-232 FIBER-OPTIC TRANSCEIVER

SEL

2.510"

1.250"

3.425"

.750"

OCTOBER 15, 2004
SCHWEITZER ENGINEERING LABORATORIES, INC.
2350 NE HOPKINS CT, PULLMAN, WA 99163 USA

SEL-2800M   SEL-2800F

Application Information

Connecting and Disconnecting Fiber Cable

Use the supplied connector caps to cover V-pin fiber-optic connectors that are not connected to a fiber cable to prevent reflected light from appearing as a received message.

Connecting to Serial Ports

Plug the SEL-2800 directly onto a standard 9-pin serial connector (DB-9). No special mounting is required. The transceiver receives power from the host device via the connector; no separate power supply or wiring is needed. One pair of fibers handles a duplex serial data link. The transceiver requires no jumpers or settings.

Determining Maximum Cable Length

The table below shows maximum cable lengths based on typical fiber loss. The optical power budget includes the transmit and receive connector coupling loss; therefore, the maximum cable length is determined by dividing the total optical power budget by the typical fiber loss/km specification.

To calculate the maximum cable length for your application, first ask your fiber cable supplier for fiber loss/km and connector/splice loss specifications (over the expected temperature range) based on a 650 nm wavelength optical source. Calculate the available optical power budget by subtracting the total connector/splice attenuation from the power budget specification shown in the table below. Divide the available optical power budget by the fiber loss/km specification to determine the maximum cable length.

Example

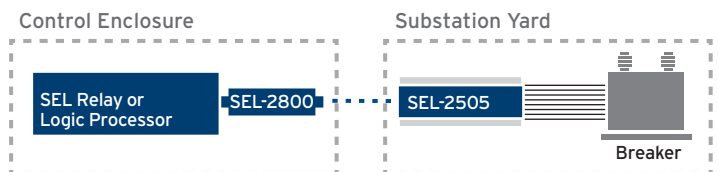|	
Fiber Type	200 µm
Splice Margin.	3 dB
Fiber Loss @ 650 nm	12 dB/km
SEL-2800 Optical Budget	9 dB
Less Splice Margin (3 dB)	3 dB
Available Power	6 dB
Maximum Cable Length	6 dB ÷ 12 dB/km = 0.5 km

Application Examples

Local Relay-to-Relay Protection Data Links

Connect SEL-2800 Transceivers to the serial port of a relay and an SEL-2100 Protection Logic Processor. Use SEL MIRRORED BITS® communications for high-speed exchange of protection information. Coordinate protection between generating plants and associated switchyards or between multiple control enclosures in the same station. Transfer to backup protection based on loss of potential or failures detected by diagnostics. Keep the dc circuits segregated between cabinets. Provide directional, element-based bus protection.

Control Enclosure — SEL Relay or Logic Processor — SEL-2800
Switchyard — SEL-2800 — Relay
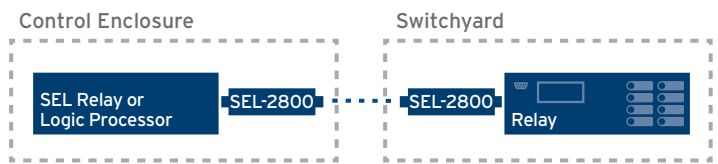
Communicate With SEL-2505 Remote I/O Modules

Connect the SEL-2800 to an EIA-232 port of an SEL relay or an SEL-2100. Install two fibers to the V-pin connectors on an SEL-2505 Remote I/O Module. The SEL-2505 provides eight contact outputs and eight contact inputs and communicates using SEL MIRRORED BITS communications. Provide isolated remote I/O, or use data from electromechanical relays or other non-SEL devices in MIRRORED BITS communications-based logic in SEL relays or the SEL-2100.

Control Enclosure — SEL Relay or Logic Processor — SEL-2800
Substation Yard — SEL-2505 — Breaker

Receive Data From SEL-2600 RTD Module

Install an SEL-2800 on a serial port of an SEL information processor. Connect a single fiber between the SEL-2800 Receive (R) fiber input and the SEL-2600 to obtain temperature data from up to 12 resistance temperature detectors (RTDs).

Control Enclosure — SEL Relay or Logic Processor — SEL-2800 — Simplex Fiber — SEL-2600 — RTD Inputs
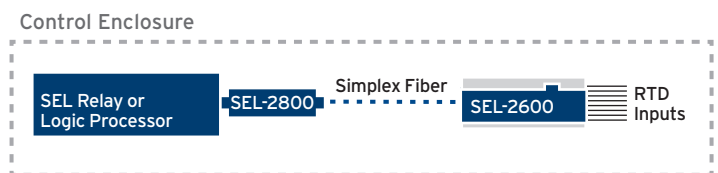
Transceiver Mounting Options

Use an SEL Transceiver Mounting Kit and adapter cable when connecting the SEL-2800 to IEDs with an RJ-45 male serial connector or when the mounting depth is an issue (e.g., in switchgear applications). These kits provide a simple and secure way to remote-mount the transceiver away from the host connector:

- 915900573—Mounting Kit for SEL Transceiver; includes mount only
- 915900574—Mounting Kit for SEL Transceiver; includes mount and SEL-C478A cable (6 ft, DB-9 female to RJ-45 male)
- 915900575—Mounting Kit for SEL Transceiver; includes mount and SEL-C641 cable (6 ft, DB-9 female to DB-9 male)
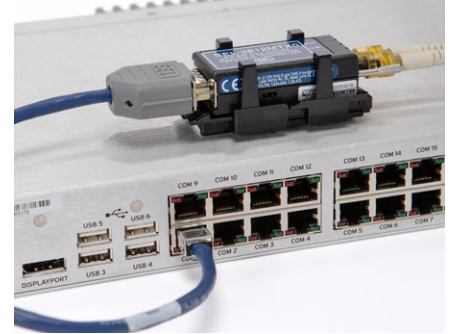
SEL Multimode Fiber-Optic Cable

Use SEL-C805 200 µm Core Fiber-Optic Cables for distances up to 500 meters.

- Standard-duty duplex zipcord for indoor riser applications (2 fibers). Do not use where exposed to direct sunlight.
- Heavy-duty water-blocked round cable for indoor and outdoor applications (2 or 4 fibers).

Each link between SEL-2800 Transceivers uses two fibers. Specify the length when ordering optical cables, terminated at the SEL factory with V-pin connectors. Or, order bulk unterminated cable, a termination kit, and connectors to easily terminate your own cables.

General Specifications	
Data Rate	Up to 40 kbps full-duplex, no jumpers or settings
Link Data Delay	5 µs plus 5 µs/km of fiber
Optical Source	650 nm (visible red) LED
Typical Transmit Level	−24 dBm
Maximum Output Level	−10 dBm
Operating Temperature	−40° to +85°C (−40° to +185°F)
Projection From DB-9 Connector	127 mm (5 in) typical, including fiber-optic connector and minimum cable bend radius
Power Requirements	Receives adequate power from a single EIA-232 TXD data line connected to Pin 3 of the DB-9 connector. Additionally, the SEL-2800 accepts power applied to Pins 4, 7, and 8.
Fiber-Optic Cable and Connectors	V-pin connectors
	Multimode fiber (200 µm)
	SEL provides compatible SEL-C805 Cables.

SEL **SCHWEITZER ENGINEERING LABORATORIES**

Making Electric Power Safer, More Reliable, and More Economical
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