SEL-2810

Fiber-Optic Transceiver With IRIG-B

Communicate EIA-232 and IRIG-B data over 500 meters using fiber-optic transceivers

- Zero settings and no external power connections make application easy.
- Data and time synchronization with millisecond accuracy reduces cabling and saves costs.
- Fiber-optic cables isolate data signals from electrical interference.

Features and Benefits

Low-Cost Fiber-Optic Communication

Transmit and receive data at rates from 0—20,000 bits per second (bps) for a full-duplex serial link with up to 500 meters (1,640 ft) of multimode optical fiber. The same transceivers and fibers simultaneously transfer simplex IRIG-B time code.

Easy Application

Plug an SEL-2810 Fiber-Optic Transceiver With IRIG-B directly into a standard 9-pin serial connector (DB-9). No special mounting is required. The SEL-2810 receives power from the host device via the connector; no separate power supply or power wiring is needed. It also requires no jumpers or settings. The transceiver transmits visible light (650 nm) for easy inspection, and one pair of fibers handles a duplex serial data link and a simplex IRIG-B time-code link.

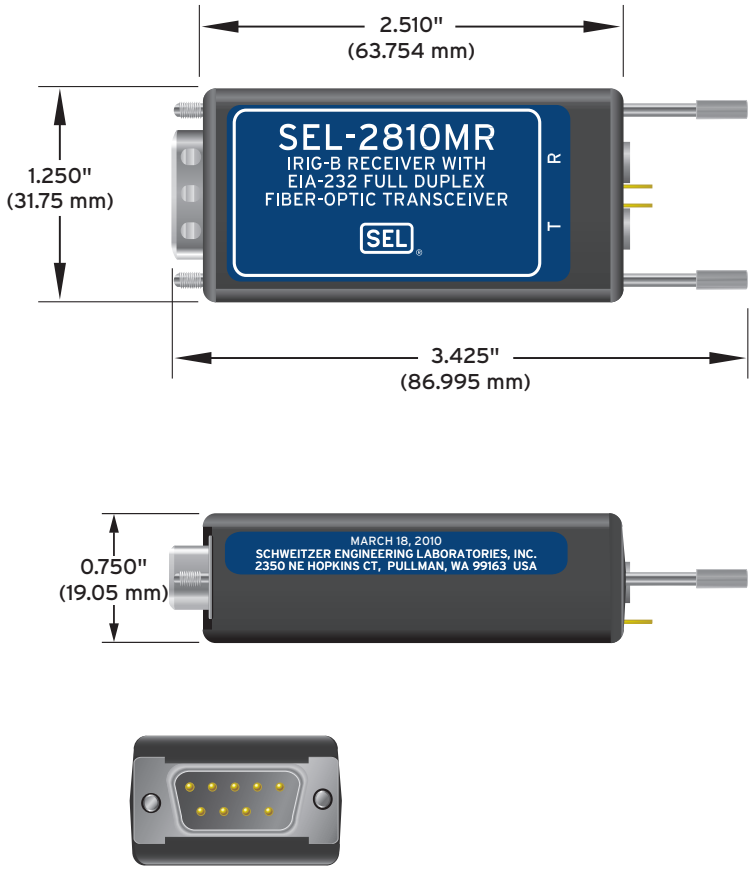
Safe, Secure, and Reliable Data Transfer

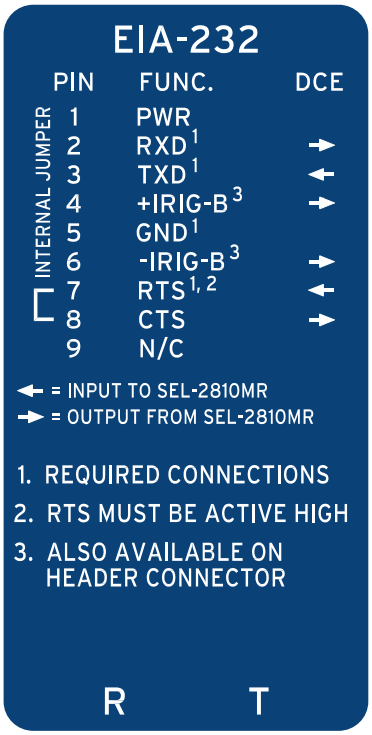
Apply the SEL-2810 in harsh electrical and physical environments. The transceiver is far less susceptible to electromagnetic interference (EMI) and radio frequency interference (RFI) than copper links and provides improved isolation from ground potential rise and other electrical hazards.

Improved Safety

Provide improved isolation from ground potential rise and other electrical hazards compared to copper connections.

Product Overview





Label With EIA-232 Pin Usage

Imprinted on the bottom of the device.

Application Information

Using Fiber-Optic V-Pin Connectors

You can cover the V-pin connectors with the supplied connector caps when they are not connected to a fiber. If both of the fiber connections on a transceiver are uncovered, it can receive transmitted light reflected from external objects through the receive (R) connector. The reflected signals appear as messages sent from a remote SEL-2810.

Connecting to Serial Ports

You can plug the SEL-2810 directly into a standard 9-pin serial connector (DB-9). No special mounting, jumpers, or settings are required. The transceiver receives power from the host device via the connector; no separate power supply or power wiring is needed. One pair of fibers handles a duplex serial data link.

Determining Maximum Cable Length

The example below shows maximum cable lengths based on typical fiber loss. The optical power budget includes transmit and receive connector coupling loss; therefore, you can determine the maximum cable length 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 example below. Divide the available optical power budget by the fiber loss/km specification to determine the maximum cable length.

Example Power Budget	
Fiber Type	200 µm
Splice Margin.	3 dB
Fiber Loss at 650 nm	12 dB/km
SEL-2810 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

Power, Transmit, and Receive LED indicators

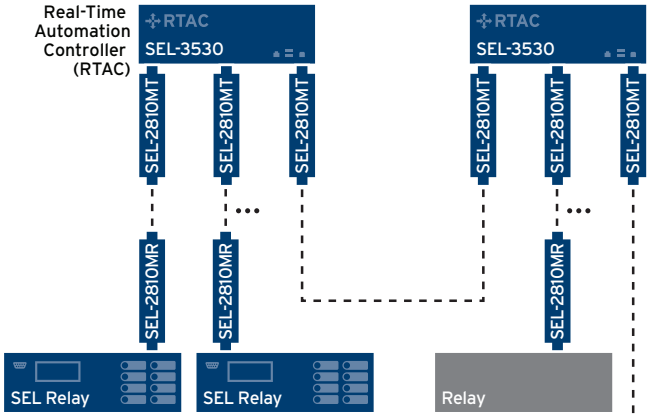
The EN (Power) LED will illuminate red as soon as it has the minimum power applied to Pin 1, 3, 7, or 8 of the DB-9 serial port.

The Transmit and Receive LEDs illuminate green when the transmit or receive signals of the SEL-2810 are active. These LEDs help verify the function of the transceiver.

Application Examples

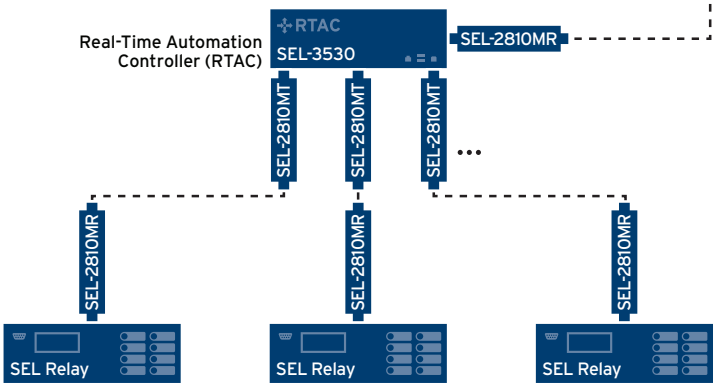
SEL Information Processors and Relays

Use an SEL-2810MT for each IED port on an SEL information processor. A duplex fiber-optic cable can connect each SEL-2810MT to an SEL-2810MR, mounted on each relay, lower-tier communications processor, or logic processor. Appropriate adapter cables then connect the IRIG-B output on the SEL-2810MR to the IRIG-B input on the remote device. The SEL information processors communicate with interleaved ASCII and binary messages over the full-duplex serial link with the same fibers that are also synchronizing the device clocks with simplex IRIG-B signals.



SEL Logic Processors and Relays

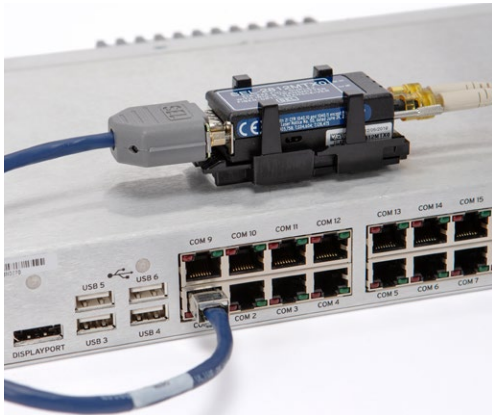
Connect SEL-2810MT Fiber-Optic Transceivers to the serial ports of a relay and an SEL-3530 Real-Time Automation Controller (RTAC). You can use SEL MIRRORED BITS® communications for the high-speed exchange of protection information between generating plants and associated switchyards or between multiple control houses/enclosures in the same substation. You can transfer to backup protection based on loss of potential or failures detected by diagnostics. The SEL-2810 Transceivers allow you to keep the dc circuits segregated between cabinets and provide directional element-based bus protection.



Transceiver Mounting Options

Use an SEL Transceiver Mounting Kit and adapter cable when connecting the SEL-2810 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)



Specifications

General	
Data Rate	0—20,000 bps, full duplex, no jumpers or settings
Data Delay	**Serial Data** 50 µs plus 5 µs/km of fiber **IRIG-B Time Code** 80 µs plus 5 µs/km of fiber
Optical Source	650 nm (visible red) LED Typical transmit level: —24 dBm Maximum output level: —10 dBm
Typical Transmit Level	—24 dBm
Maximum Output Level	—10 dBm
Operating Temperature	—40° to +85°C (—40° to +185°F)
IRIG-B Input Impedance	25 kΩ
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-2810 accepts power applied to Pins 1, 7, and 8.
Fiber-Optic Cable and Connectors	V-pin connectors Multimode fiber (200 µm) SEL provides compatible SEL-C805 200 µm Multimode Fiber-Optic Cables.

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