

SEL-2820

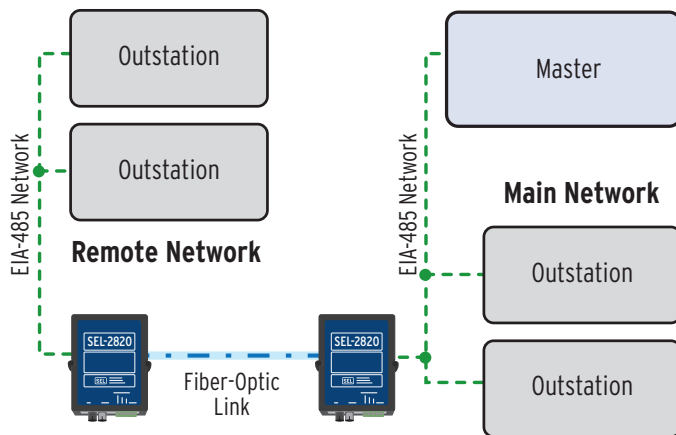


EIA-485 Fiber-Optic V-Pin Transceiver

Safely extend EIA-485 networks via fiber-optic links.



Extend networks up to 500 meters.



Add isolated segments to EIA-485 networks.

Features and Benefits

Increases Safety

Isolate devices from ground potential rise and fault current in the communications connections by using optical fiber instead of wire.

Improves Signal Integrity

Prevent electromagnetic interference and signal ground loops by using optical connections instead of copper wires.

Withstands Harsh Conditions

Operates over -40° to $+85^{\circ}\text{C}$ temperature range, and meets or surpasses electric utility and industrial type-test standards for instrumentation, control, and communications equipment.

Easily Applied

Implement fiber-optic links between two- and four-wire EIA-485 network segments. Set operating modes via control (DIP) switches. Simplify network commissioning and repair with LED traffic indicators for each port. Connect power through terminal block or jack.

Making Electric Power Safer, More Reliable, and More Economical[®]

Application Information

Determining Maximum Cable Length

We recommend SEL-C805 Multimode 200µm Core Fiber-Optic Cables with V-pin terminations for use with the SEL-2820, with a typical loss at the 650 nm wavelength of 12 dB/km at 25°C. The optical power budget includes 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.

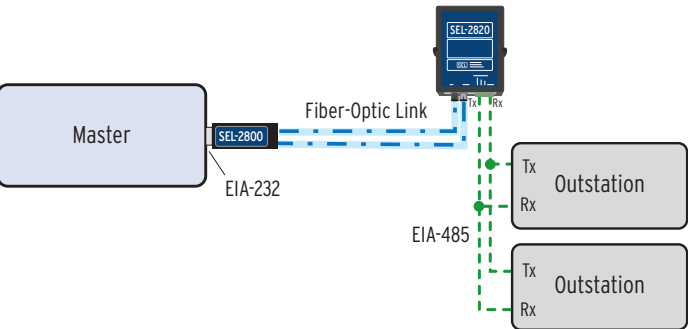
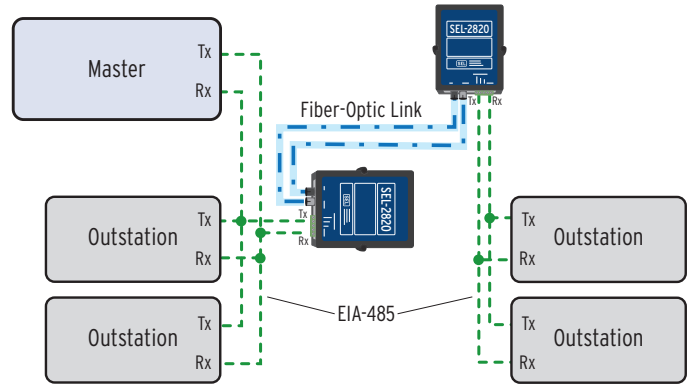
To calculate the maximum cable length for your application, first ask your fiber cable supplier for fiber loss/km and connector/splice loss specifications (over expected temperature range) based on a 650 nm wavelength optical source. Calculate the available optical power budget by subtracting the total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

Example With SEL-C805 Fiber-Optic Cable

<i>Fiber Type</i>	200 µm
<i>Splice Margin</i>	3 dB
<i>Fiber Loss @ 650 nm</i>	12 dB/km
<i>SEL-2820 Optical Budget</i>	9 dB
<i>Less Splice Margin (3 dB)</i>	3 dB
<i>Available Power</i>	6 dB
<i>Maximum Cable Length</i>	$6 \text{ dB} \div 12 \text{ dB/km} = 0.5 \text{ km}$

Add a Segment to an Existing EIA-485 Network

Mount one SEL-2820 near the existing network, and connect the EIA-485 wires to the EIA-485 compression block terminal strips, exactly as you would connect another slave/outstation device. Install a two-fiber SEL-C805 Fiber-Optic Cable with V-pin connectors between this SEL-2820 and the location of the new segment, up to 500 meters away. Connect the transmit (T) fiber-optic connector of each SEL-2820 to the receive (R) fiber-optic connector of the other SEL-2820. Wire the compression block terminals of the new segment SEL-2820 to serve as the master of the new segment.



Connect an EIA-232 Port to an EIA-485 Network

Use an SEL-2800 Fiber-Optic Transceiver, SEL-C805 Fiber-Optic Cable, and an SEL-2820 for a safe, isolated connection to an EIA-485 network. Mount the SEL-2800 on an EIA-232 port on a relay, information processor, or other device. Install a two-fiber SEL-C805 Fiber-Optic Cable with V-pin connectors between this SEL-2800 and an SEL-2820 on the EIA-485 network, up to 500 meters away. Connect the transmit (T) fiber-optic connector of each transceiver to the receive (R) fiber-optic connector of the other. If the EIA-232 device is the master for the network, wire the compression block terminals of the SEL-2820 to serve as the master of the new segment. If the EIA-232 device is a slave/outstation device, wire the SEL-2820 as an outstation.

Technical Specifications

Data Rate

0–40,000 bits per second, full-duplex

Data Delay

5 μs plus 5 μs/km of fiber

Operating Temperature

–40° to +85°C (–40° to +185°F)

Power Requirements

5 to 30 Vdc 5% tolerance, <1.5 W

Fiber-Optic Port

Connectors Two V-pin female
 Wavelength 650 nm (visible red)
 Typical Tx Power –30 dBm
 Min Rx Sensitivity –39 dBm
 Optical Budget 9 dB
 Compatible Optical Fiber 200 μm core diameter

Electrical Port

Connector 5-position compression terminal block
 Connections 4-wire full-duplex or 2-wire half-duplex
 Operation EIA-485 multidrop or EIA-422 point-to-point

LED Indicators

Enable Powered and operating
 Fiber Tx Data sent to T fiber
 Fiber Rx Data received from R fiber
 EIA-485 Tx Data sent to EIA-485 network
 EIA-485 Rx Data received from EIA-485 network

Dimensions

Height (without DIN mount) 25.4 mm (1.0 in)
 Width 93.35 mm (3.675 in)
 Depth 121.9 mm (4.8 in)



SEL-2820 EIA-485 to Fiber-Optic V-Pin Transceiver

Type Tests and Standards

Cold

IEC 60068-2-1:2007 [BS EN 60068-2-1:2007]

Test Ad: 16 hours at -40°C

IEEE 1613:2003

Dry Heat

IEC 60068-2-2:2007 [BS EN 60068-2-2:2007]

Test Bd: 16 hours at +85°C

IEEE 1613:2003

Damp Heat, Cyclic

IEC 60068-2-2:2007 [BS EN 60068-2:2007]

Test Db: 95% r.h., 25° to 55°C, 6 cycles (12 + 12 hour cycle)

Vibration and Shock Resistance

IEC 60068-2-6:2007 [BS EN 60068-2-6:2008]

Test Fc: Vibration (Sinusoidal), 3G, 10-160 kHz

IEC 60255-21-1:1988 [BS EN 60255-21-1:1996]

Class 1 Vibration Endurance

Class 2 Vibration Response

IEC 60255-21-2:1988 [BS EN 60255-21-2:1996 + A1:1996]

Class 1 Shock Withstand

Class 2 Shock Response

Class 1 Bump Withstand

IEC 60255-21-3:1993 [BS EN 60255-23-3:1995]

Class 2 Quake Response

Electrostatic Discharge Immunity

IEC 60255-22-2:2008 [BS EN 60255-22-2:2007]

IEC 61000-4-2:2008 [BS EN 61000-4-2:1:2009]

IEEE C37.90.3-2001

Severity Level: 2, 4, 6, 8 kV contact discharge;

2, 4, 8, 15 kV air discharge

Conducted Radio Frequency Interference Immunity

IEC 61000-4-6:2008 [BS EN 61000-4-6:2009]

IEC 60255-22-3:2001 [BS EN 60255-22-6:2001] Severity Level: 10 V/m

Digital Radio Telephone RF Immunity ENV 50204:1995

Radiated Radio Frequency Immunity

IEC 61000-4-3:2006 [BS EN 61000-4-3:2006+A1:2008]

IEC 60255-22-3:2007 [BS EN 60255-22-3:2008] Severity Level: 10 V/m

IEEE C37.90.2-2004 Severity Level: 35 V/m

IEEE 1613:2003

Emissions

IEC 60255-25:2000 [BS EN 60255-25:2000]

FCC CFR 47 Part 15 Class B

This Class B device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Accessories

AC Power Adapter

Use the 230-0604 AC Power Adapter to provide power from 90 to 264 Vac.

SEL-9321 Low-Voltage DC Power Supply

Use the SEL-9321 to power SEL-2820 Transceivers from higher voltage power sources, including 48, 125, and 250 Vdc station batteries and 125 and 250 Vac sources. Mount the SEL-9321 on a wall, cabinet, or DIN rail.

SEL-C577 EIA-232 Port Power Cable

Provide power to an SEL-2820 from an SEL relay or controller that has a 5 Vdc pin-one power jumper. Connect the tinned leads of an SEL-C577 Cable to an SEL-2820 before plugging the 9-pin connector into an unused EIA-232 serial port.

SEL-C805 200 μ m Multimode Fiber-Optic Cable

Choose the cable type that matches your application:

- Standard-duty duplex zipcord for indoor riser applications (Do not use where exposed to direct sunlight.)
- Heavy-duty waterblocked round cable for outdoor applications

Each link between SEL-2820 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 terminate your own cables.



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