



# SEL-2886 EIA-232 to EIA-485 Interface Converter Instruction Manual



## Features, Benefits, and Applications

The SEL-2886 is a full-featured, isolated 9-Pin EIA-232 to EIA-485 interface converter that provides the following features:

- **Easy installation.** The SEL-2886 plugs directly on a DB-9 serial connector. No special mounting is required.
- **Two power options.** The SEL-2886 receives +5 Vdc power from Pin 1 of the DB-9 connector when connected to an SEL device or from an external 5 Vdc source through a power jack on the side of the converter.
- **Robust performance.** Operates over  $-40$  to  $+85^{\circ}\text{C}$  ( $-40$  to  $+185^{\circ}\text{F}$ ) temperature range. Provides 1500 Vrms isolation. Meets many utility and industrial type-test standards.
- **Flexible.** Control (DIP) switch programmable for multiple applications and operating modes.

# Product Overview

The SEL-2886 is an interface converter designed to control the communications interface between a data terminal device serial port and an EIA-485 network. EIA-232 connections are shown in *Table 1*.

**Table 1 Connections**

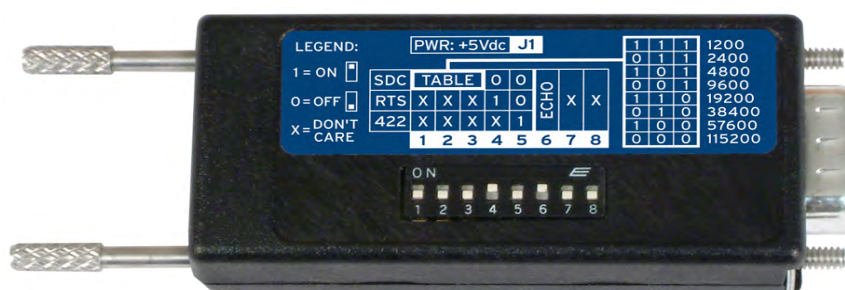
PIN	Description	Input/Output
1	+5 Vdc	Input
2	RX	Output
3	TX	Input
4	N/C	N/A
5	Ground	N/A
6	N/C	N/A
7	RTS	Input
8	CTS	Output
9	Ground	N/A

## Power Requirements

The SEL-2886 has two power options: +5 Vdc can be supplied through a 0.7-mm power jack located on the side of the device or +5 Vdc can be supplied on Pin 1 of the EIA-232 port.

## Operation

The SEL-2886 Interface Converter has several operating modes. These modes are enabled through the use of control (DIP) switches. These switches are accessible from the bottom of the device as shown in *Figure 1*.



**Figure 1 SEL-2886 Bottom View**

**Table 2 Switch Functions**

Switch (SW) Position	Function
1	Set data rate for Send Data Control (SDC), see <i>Table 3</i>
2	Set data rate for SDC, see <i>Table 3</i>
3	Set data rate for SDC, see <i>Table 3</i>
4	Transmitter controlled by RTS or SDC
5	Transmitter is always enabled (EIA-422 mode)
6	Receiver echo on or off
7 and 8	Unused

## Transmit Data Control (Switches 1-5)

There are several options to control the transmitter output.

- **EIA-422 mode**—In the EIA-422 mode the transmitter is always enabled. Only use this mode in a point-to-point, 4-wire application because the transmitter is always terminating the circuit.
- **RTS mode**—In the RTS mode the transmitter is enabled whenever the connected serial device asserts the serial port RTS line. When the RTS line is negative or not connected the transmitter will not enable in the RTS mode.
- **SDC mode**—In the Send Data Control (SDC) mode the transmitter is enabled when data are present on the serial port TX line. Apply a one-character time delay to ensure the transmitter stays enabled through low data transitions. This time delay is set using SW1–SW3. Note these switches are only used by the SEL-2886 when SDC mode is enabled (SW4 and SW5 = 0).

Table 3 displays the interdependencies of control switches 1 through 5.

**Table 3 Switch Settings**

SW1	SW2	SW3	SW4	SW5	Application
X <sup>a</sup>	X	X	X	1 <sup>b</sup>	EIA-422 mode (TX always enabled)
X	X	X	1	0 <sup>c</sup>	TX enabled with the RTS line
* <sup>d</sup>	*	*	0	0	TX enabled by the data (SDC)

<sup>a</sup> X = Don't care.

<sup>b</sup> 1 = On.

<sup>c</sup> 0 = Off.

<sup>d</sup> \* = Set per Table 4.

**Table 4 Switch Settings for SDC Timing and Associated Data Rates**

SW1	SW2	SW3	TX enable hold time ms/rate
1	1	1	11.66 ms/1200 bps
0	1	1	5.83 ms/2400 bps
1	0	1	2.91 ms/4800 bps
0	0	1	1.45 ms/9600 bps
1	1	0	0.72 ms/19200 bps
0	1	0	0.36 ms/38400 bps
1	0	0	0.24 ms/57600 bps
0	0	0	0.12 ms/115200 bps

## ECHO Control (Switch 6)

When ECHO is set to On, the receiver is always enabled.

When ECHO is set to Off, the receiver is disabled while the transmitter is active. When operating in 2-wire mode, it is preferable to turn ECHO off to prevent the transmitted data from echoing back into the receiver.

## EIA-485/422 Connections

The EIA-485/422 connections are made on the green five-position compression terminal block located on one end of the SEL-2886. Connection wiring will vary based on the application. The following schematics provide wiring diagrams for each of the operating modes.

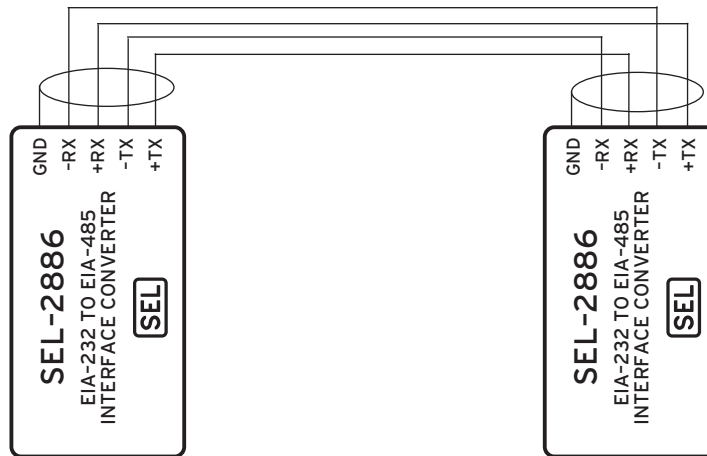


Figure 2 EIA-422 Connections

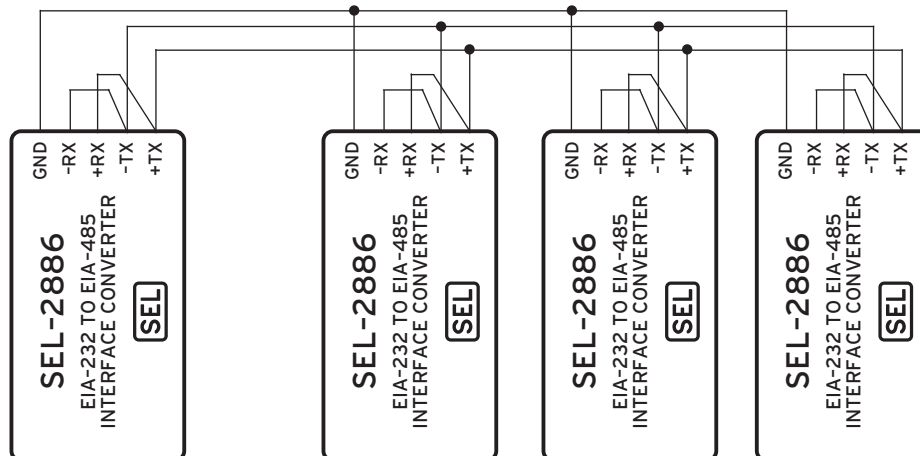
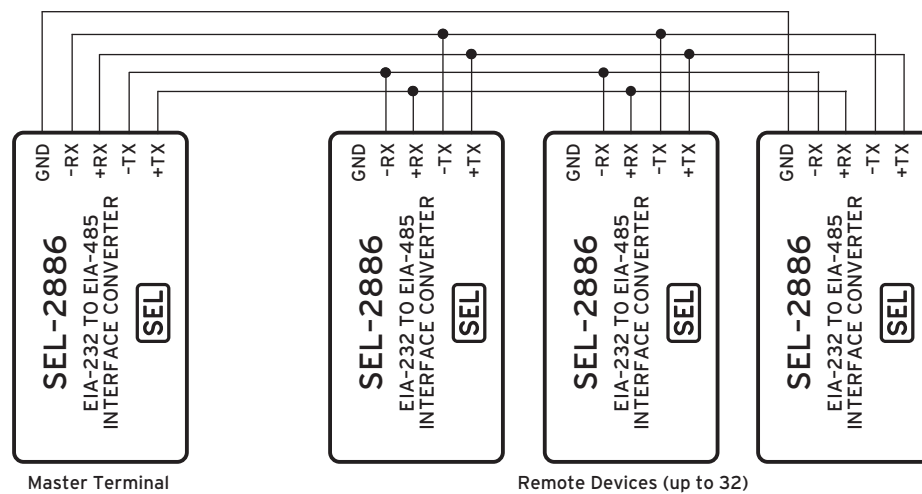


Figure 3 EIA-485 Two-Wire Multidrop



**Figure 4 EIA-485 Four-Wire Multidrop**

## EIA-485 Terminations

EIA-485 systems operating at high speeds and long distances require termination resistors to prevent reflected signals from interfering with proper operation. Generally, the only applications of the SEL-2886 that require termination resistors are those operating at 115200 bps with wire lengths of 450 meters (1500 feet) or more.

The need for termination resistors is based on data rate and cable length. A good rule of thumb is that no termination is required when the propagation delay of the signal through the data line at the required data rate is much less than one bit time. For example, in a system operating at a data rate of 115200 bps, one bit time is approximately 8.7  $\mu\text{s}$ . To determine the total round-trip signal time for an example cable length of 1500 feet, assume the signal speed in the cable to be 0.7 times the speed of light. This results in a total round trip delay for the signal of approximately 4.35  $\mu\text{s}$ . Because this is equal to or greater than half of the bit time, we recommend termination resistors.

When termination resistors are required, apply one termination resistor across the EIA-485 wire-pair on each of the extreme ends of the circuit (two total). The value of the resistors should match the characteristic impedance of the twisted-pair line. If this is not known, use 120-ohm resistors as a reasonable approximation.

# Specifications

## Compliance

Designed and manufactured under an ISO 9001 certified quality management system

## Data Rate and Format

1200 to 115200 bps

8 data bits

1 stop bit

No parity

## Power

+5 Vdc ( $\pm 5\%$ ) @ 100 mA on Pin 1 of 9-Pin connector or through a 0.7 mm power jack located on the side of the device.

## EIA-232 Interface

DB-9 male connector

## EIA-485 Interface

32-unit load maximum

5-position terminal block

## Operating Temperature Range

$-40^{\circ}$  to  $+85^{\circ}\text{C}$  ( $-40^{\circ}$  to  $+185^{\circ}\text{F}$ )

## Type Tests

### Electromagnetic Compatibility Emissions

Product Specific: IEC 60255-25:2000  
[EN 60255-25:2000]  
Canada ICES-001(A) / NMB-001(A)

### Electromagnetic Compatibility Immunity

Conducted RF Immunity: IEC 60255-22-6:2001  
[EN 60255-22-6:2001]  
IEC 61000-4-6:2004  
[EN 61000-4-6:1996  
+ CDRG:2001]

Digital Radio Telephone RF Immunity: ENV 50204:1995

Radiated Radio Frequency Immunity: IEC 60255-22-3:2000  
[EN 60255-22-3:2001]  
IEC 61000-4-3:2002  
[EN 61000-4-3:2002]  
IEEE C37.90.2-2004

Surge Withstand Compatibility Immunity: IEEE C37.90.1-2002

## Environmental

Cold: IEC 60068-2-1:1990  
+ A1:1993 + A2:1994  
[EN 60068-2-1:1993 + A2:1995]

Dry Heat: IEC 60068-2-2:1974  
+ A1:1993 + A2:1994  
[EN 60068-2-2:1993 + A1:1995]

Damp Heat Cyclic: IEC 60068-2-30:1980 + A1:1985  
[EN 60068-2-30:1999]

Electrostatic Discharge Immunity: IEC 60255-22-2:1996  
[EN 60255-22-2:1997]  
IEC 61000-4-2:2001  
[EN 61000-4-2:1995  
+ A1:1999 + A2:2001]  
IEEE C37.90.3-2001

Vibration: IEC 60255-21-1:1988 Class 1  
[EN 60255-21-1:1996 + A1:1996]  
IEC 60255-21-2:1988 Class 1  
[EN 60255-21-2:1996 + A1:1996]  
IEC 60255-21-3:1993 Class 2  
[EN 60255-21-3:1995 + A1:1995]

Dielectric Strength: IEC 60255-5:2000 (1500 Vac for 1 min.)  
IEEE C37.90-1989 (1500 Vac for 1 min.)

Fast Transient Burst: IEC 60255-22-4:2002  
[EN 60255-22-4:2002]  
IEC 61000-4-4:1995  
+ A1:2000 + A2:2001  
[EN 61000-4-4:1995  
+ A1:2001 + A2:2002]

# Manual Versions

## Determining the Manual Version

The date code at the bottom of each page of this manual reflects the creation or revision date.

*Table 1* lists the product manual release dates and a description of modifications. The most recent product manual revisions are listed at the top.

**Table 1** Manual Revision History

Revision Date	Summary of Revisions
20210715	► Updated <i>Specifications</i> .
20150216	► Renamed <i>Certifications</i> to <i>Compliance</i> and moved to top of <i>Specifications</i> .
20061102	► Initial release.

# Technical Support

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

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## WARNING

Operator safety may be impaired if the device is used in a manner not specified by SEL.

## AVERTISSEMENT

La sécurité de l'opérateur peut être compromise si l'appareil est utilisé d'une façon non indiquée par SEL.

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