INSTALLATION GUIDE

SCXI™-1314T TEDS Bridge Sensor Terminal Block

This guide describes how to install and use the SCXI-1314T terminal block with the SCXI-1520 module and hardware Transducer Electronic Data Sheet (TEDS)-enabled bridge sensors (IEEE-P1451.4 Class 2).

The SCXI-1314T terminal block works with the SCXI-1520 universal strain/bridge sensor module to conveniently connect hardware TEDS smart sensors using RJ-50 10 position/10 conductor (10p10c) modular plugs. There are 10 pins arranged in eight modular jacks. Each jack corresponds to one of the eight channels available on the SCXI-1520. For a complete description of the use and operation of the SCXI-1520 module, refer to the *SCXI-1520 User Manual*.

Conventions

The following conventions are used in this manual:

» The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.

This icon denotes a note, which alerts you to important information.

When this icon is marked on the product, refer to the *Read Me First: Safety and Radio-Frequency Interference* document, shipped with the product, for precautions to take.

When symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.

When symbol is marked on a product, it denotes a component that may be hot. Touching this component may result in bodily injury.

NATIONAL INSTRUMENTS™

bold	Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.
italic	Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text that is a placeholder for a word or value that you must supply.
`monospace`	Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.

What You Need to Get Started

To install and use the SCXI-1314T terminal block, you need the following items:

- ❑ Hardware
  - SCXI-1314T terminal block
  - SCXI-1520 module
  - SCXI or PXI/SCXI combination chassis
  - Cabling, cable adapter, and Wheatstone-bridge sensors as required for your application
- ❑ Documentation
  - *Read Me First: Safety and Radio-Frequency Interference*
  - *SCXI Quick Start Guide*
  - *SCXI-1314T TEDS Bridge Sensor Terminal Block Installation Guide*
  - *SCXI-1520 User Manual*
  - SCXI or PXI/SCXI combination chassis user manual

- Tools
  - Number 2 Phillips screwdriver
  - Long-nose pliers
  - Wire cutter
  - RJ-50 terminal crimper
- Cables and plugs
  - Shielded twisted pair (up to 5 pair, 10 conductor) cable
  - Up to eight RJ-50 (10p10c) modular plugs

Note If your application does not require shunt calibration, you also can use RJ-45 10 position/8 conductor (10p8c) modular plugs in which only pins 2 through 9 are populated. However, NI recommends using the RJ-50 (10p10c) for most applications.

Changing the Shunt Resistors

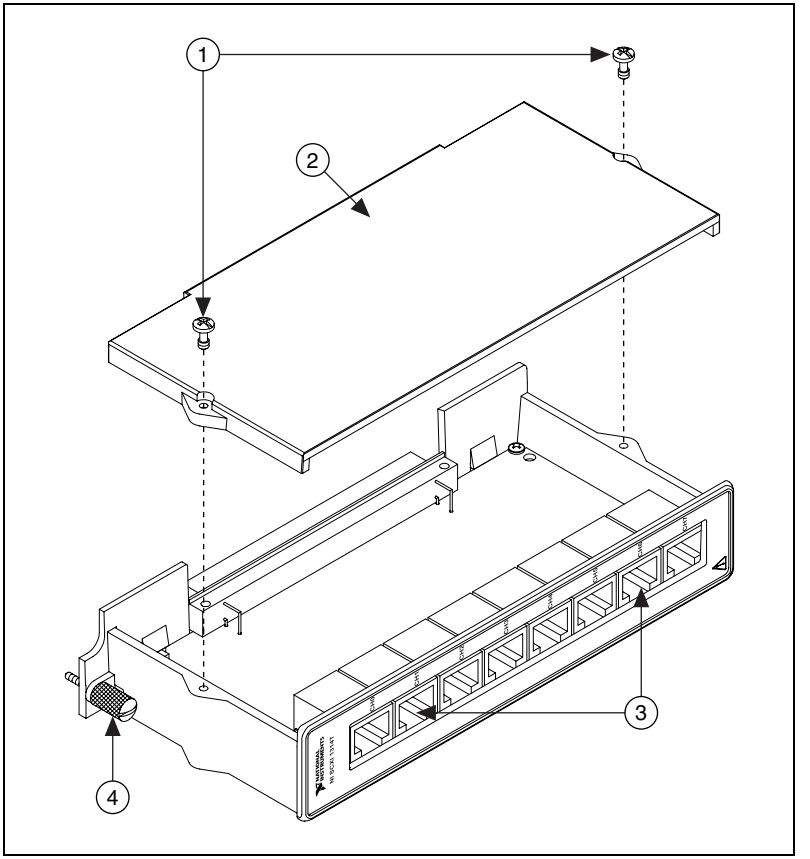
Note Refer to the *Read Me First: Safety and Radio-Frequency Interference* document before removing equipment covers or connecting or disconnecting any signal wires.

Each channel input contains pins that connect to the inputs and outputs of the SCXI-1520, and to a precision 100 kΩ shunt calibration resistor. The SCXI-1520 contains relays that switch the resistors in and out of the input circuit to provide shunt calibration. These resistors are placed in sockets on the SCXI-1314T terminal block so you can easily replace them with resistors suitable to the specific Wheatstone-bridge sensor in your application. If your application requires different shunt resistor values, exchange the resistors with the appropriate value 1/4 W resistors.

Note Only the shunt resistors are socketed.

To change shunt resistors, complete the following steps, referring to Figures 1 and 2 as necessary:

1. Unscrew the top cover screws and remove the top cover.



1	Top Cover Screws	3	RJ-50 Connector
2	Top Cover	4	Thumbscrew

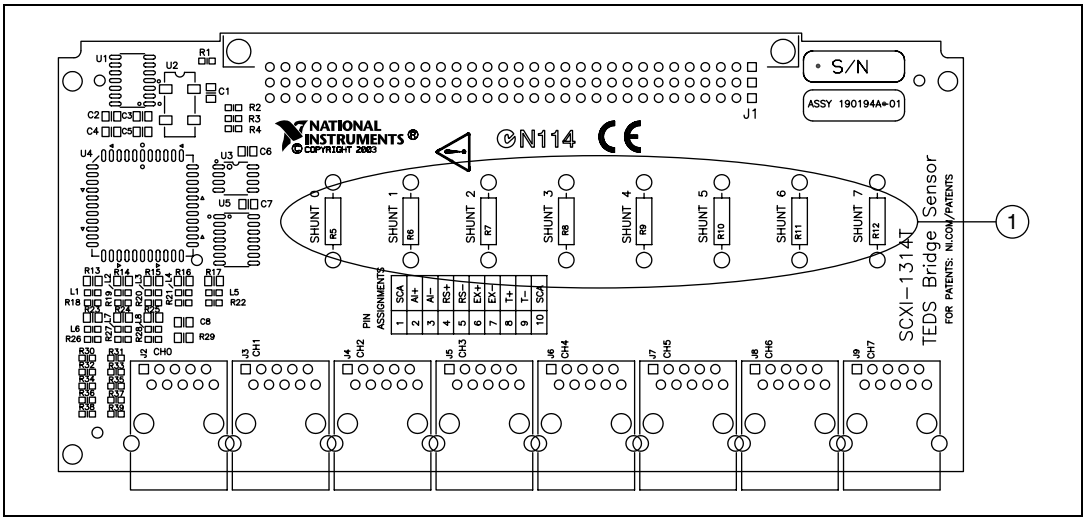
Figure 1. SCXI-1314T Parts Locator Diagram

2. Use long-nose pliers to carefully remove the socketed 100 kΩ precision resistors.

Note To avoid damaging the precision resistors, pull the leads directly, alternating the force back and forth rather than pulling the resistor itself.

3. Use wire cutters to shorten the new resistor leads to 6.4 mm (0.25 in.).

4. Use long-nose pliers to insert the new resistors into the sockets, indicated in Figure 2.



1 Shunt Resistor Sockets

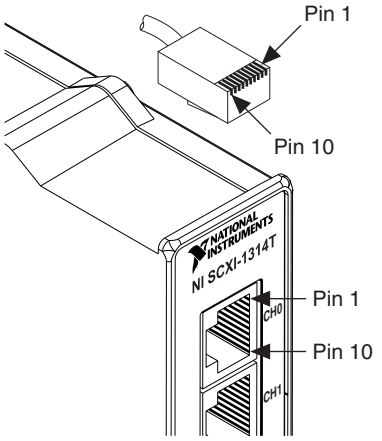
Figure 2. SCXI-1314T Shunt Resistor Sockets

5. Reinstall the top cover and tighten the top cover screws.
6. Refer to the *SCXI Quick Start Guide* to finish installing the SCXI-1314T and configure it in Measurement & Automation Explorer (MAX), and to find instructions for taking measurements.

Channel Signals

Table 1 lists the signal names of the terminals for each channel, and lists the correlation between the pin numbers of the RJ-50 (10p10c) modular plug and the SCXI-1314T receptacle.

Table 1. Channel Signal Names

RJ-50 (10p10c) Modular Plug and SCXI-1314T Receptacle Pin Numbers	Pin	Signal Name	Signal Description
	1	SCA	Shunt calibration
	2	AI +	Positive input signal
	3	AI –	Negative input signal
	4	RS +	Positive remote sense signal
	5	RS –	Negative remote sense signal
	6	EX +	Positive excitation signal
	7	EX –	Negative excitation signal
	8	T +	TEDS data
	9	T –	TEDS ground
	10	SCA	Shunt calibration

TEDS Sensor Bridge Configurations

This section describes the quarter-, half-, and full-bridge TEDS sensor bridge configurations available for use with the SCXI-1314T.

Quarter-Bridge

This section shows the quarter-bridge signal connections. Figure 3 shows the quarter-bridge circuit wiring diagram.

Note AI – is left unwired. Set the SCXI-1520 module to internal half-bridge completion. Refer to the *SCXI-1520 User Manual* for more information.

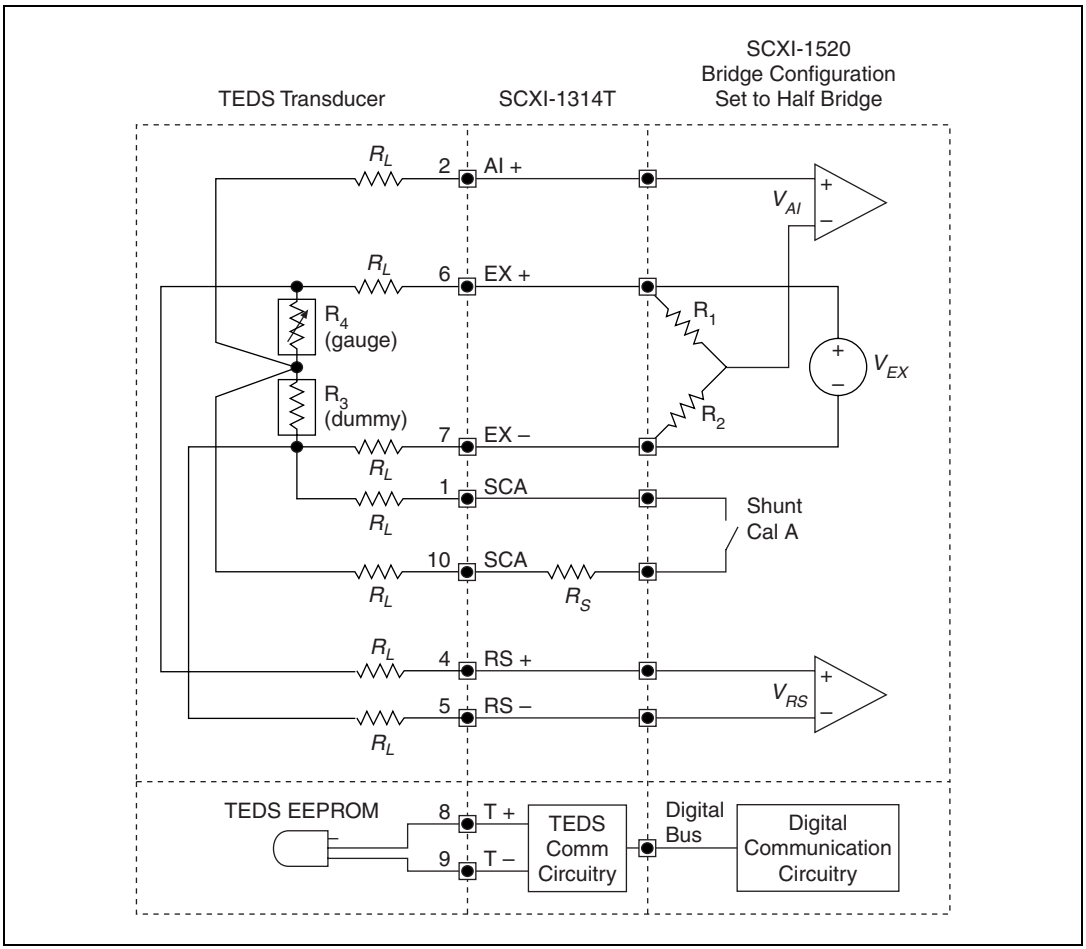


Figure 3. Quarter-Bridge Circuit Diagram

The following symbols apply to the circuit diagram and equations:

- R_1 and R_2 are half-bridge completion resistors.
- R_3 is the quarter-bridge completion resistor (dummy resistor) you provide externally to the SCXI-1314T.
- R_4 is the active measuring element.

- V_{EX} is the excitation voltage.
- R_L is the lead resistance.
- V_{AI} is the measured voltage.
- V_{RS} is the remote sense measured excitation voltage.
- $T+$ is the TEDS data transmission line.
- $T-$ is the TEDS ground reference.

Note For greatest calibration accuracy, use separate wires between the bridge and the SCA terminals as shown in Figure 3.

Half-Bridge

This section shows the half-bridge signal connections. Figure 4 shows the half-bridge circuit wiring diagram.

Note AI – is left unwired. Set the SCXI-1520 module to internal half-bridge completion. Refer to the *SCXI-1520 User Manual* for more information.

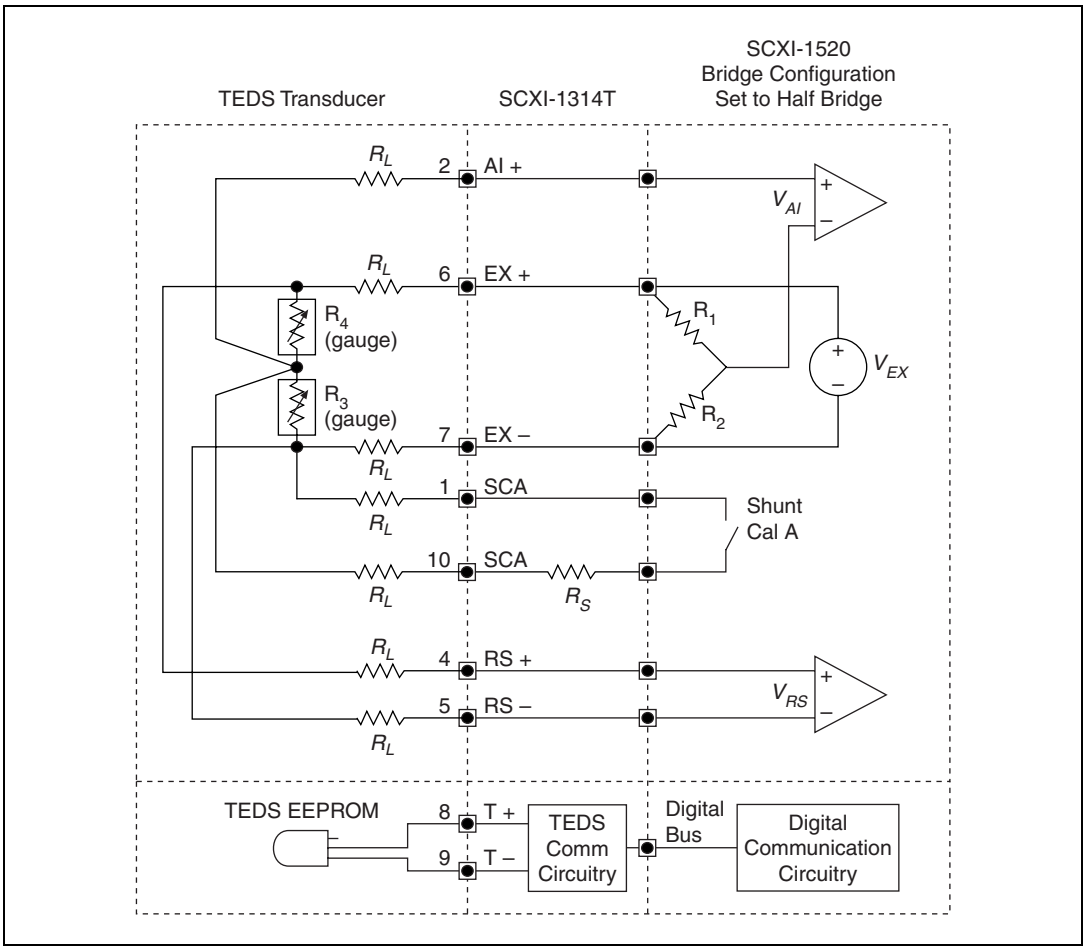


Figure 4. Half-Bridge Circuit Diagram

The following symbols apply to the circuit diagram and equations:

- R_1 and R_2 are half-bridge completion resistors.
- R_3 and R_4 are the active measuring elements.
- V_{EX} is the excitation voltage.

- R_L is the lead resistance.
- V_{AI} is the measured voltage.
- V_{RS} is the remote sense measured excitation voltage.
- $T+$ is the TEDS data transmission line.
- $T-$ is the TEDS ground reference.

Note For greatest calibration accuracy, use separate wires between the bridge and the SCA terminals as shown in Figure 4.

Full-Bridge

This section shows the full-bridge signal connections. Figure 5 shows the full-bridge circuit wiring diagram.

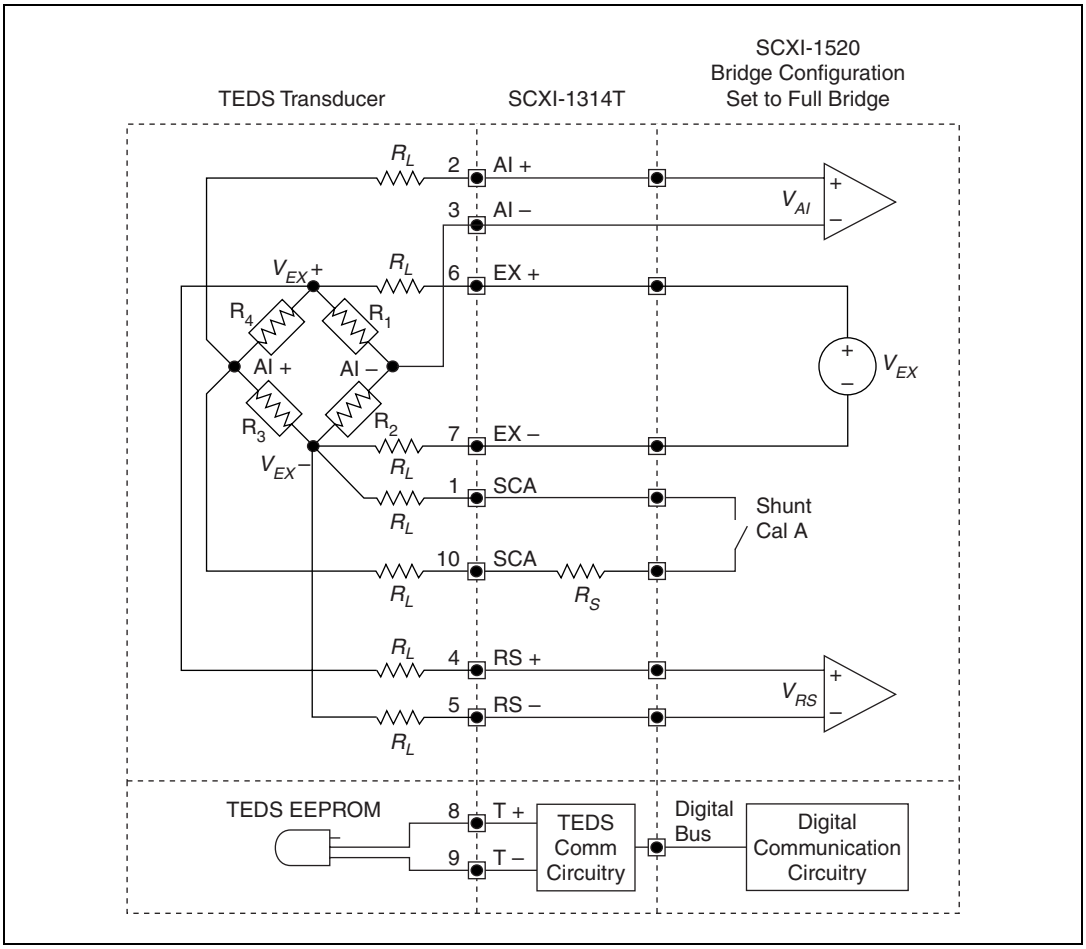


Figure 5. Full-Bridge Circuit Diagram

The following symbols apply to the circuit diagram and equations:

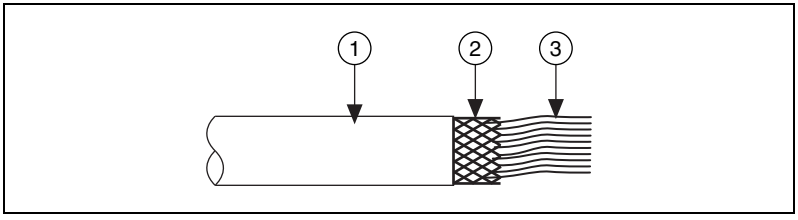
- R_1, R_2, R_3, and R_4 are active measuring elements.
- V_{EX} is the excitation voltage.
- R_L is the lead resistance.
- V_{AI} is the measured voltage.
- V_{RS} is the remote sense measured excitation voltage.
- $T+$ is the TEDS data transmission line.
- $T-$ is the TEDS ground reference.

Note For greatest calibration accuracy, use separate wires between the bridge and the SCA terminals as shown in Figure 5.

Connecting the Signals

Complete the following steps to connect the signals wires to the RJ-50 (10p10c) modular plug:

1. Determine the number of signals used in your application. You can use a maximum of 10 signal wires per RJ-50 (10p10c) modular plug.
2. Choose the shielded twisted pair (up to 5 pair, 10 conductor) cable for your application. The recommended twisted pairs are as follows:
   - (AI +/AI –)
   - (RS +/RS –)
   - (EX +/EX –)
   - (T +/T –)
   - (SCA/SCA)
3. Expose 12.7 to 15.9 mm (0.500 to 0.625 in.) of signal wires without stripping the insulation as shown in Figure 6. Do not strip the insulation from the exposed signal wires.

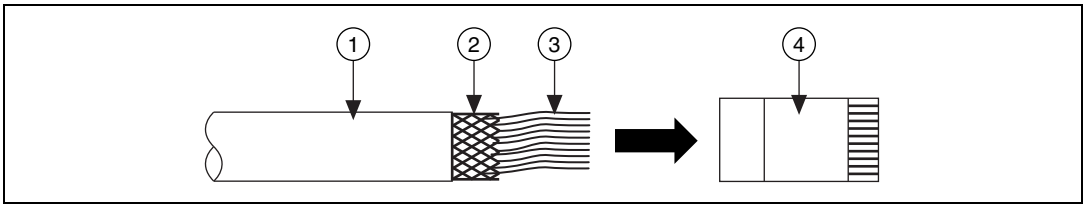


1 Insulation 2 Shielding 3 Unstripped Signal Wires

Figure 6. Unstripped Exposed Wire for RJ-50 (10p10c) Modular Plug Connection

4. Determine the color coding of the signal wires for your application.
5. Untwist and flatten the wires into the correct color order for your application. Maintain the twist in the wire as close as possible to the RJ-50 modular plug while allowing enough room to insert the wires into the plug.

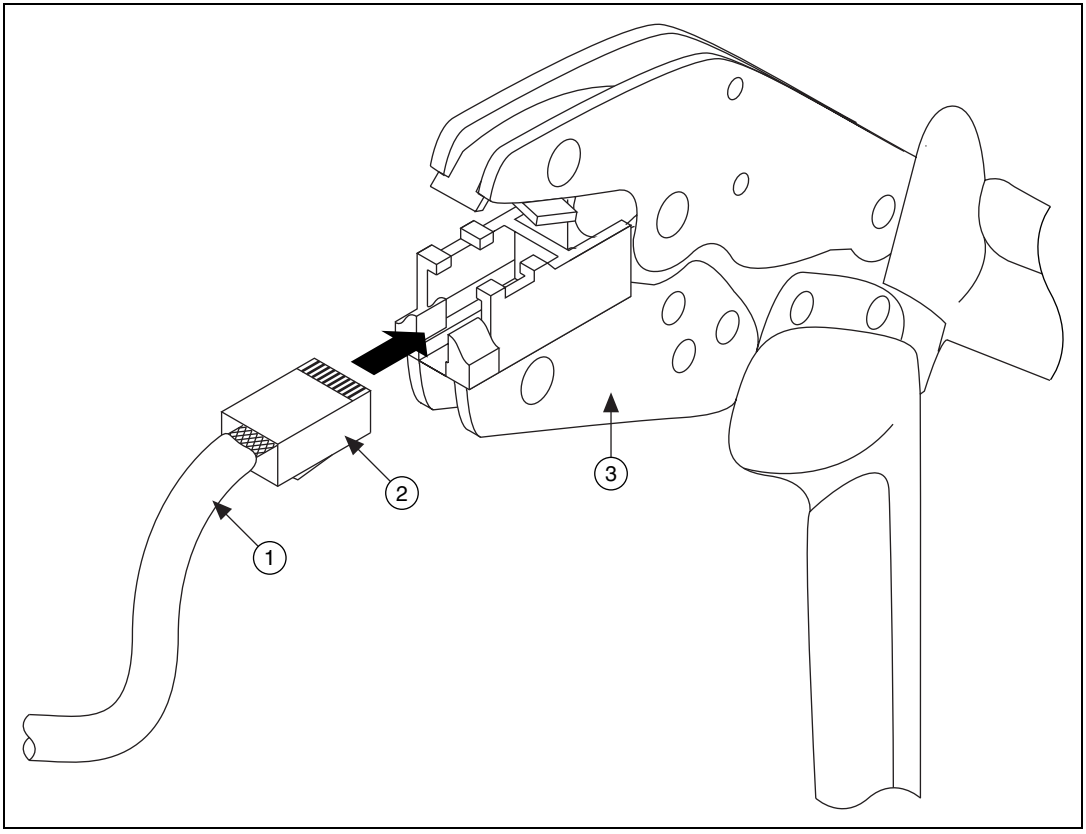
6. Insert the wires into the RJ-50 (10p10c) modular plug as shown in Figure 7.



1 Insulation	3 Unstripped Signal Wires
2 Shielding	4 RJ-50 (10p10c) Modular Plug

Figure 7. Inserting Signal Wires into RJ-50 (10p10c) Modular Plug

7. Crimp the terminal using an RJ-50 terminal crimper as shown in Figure 8.

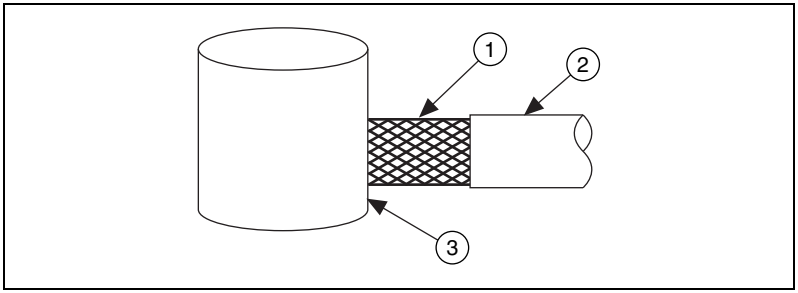


1 Shielded Twisted Wire Cable	3 RJ-50 Terminal Crimper
2 RJ-50 (10p10c) Modular Plug	

Figure 8. Crimping the RJ-50 (10p10c) Modular Plug

Note Refer to `ni.com/info` and enter info code `rdrj50` for more information on RJ-50 modular plug crimpers, modular plugs, and cables.

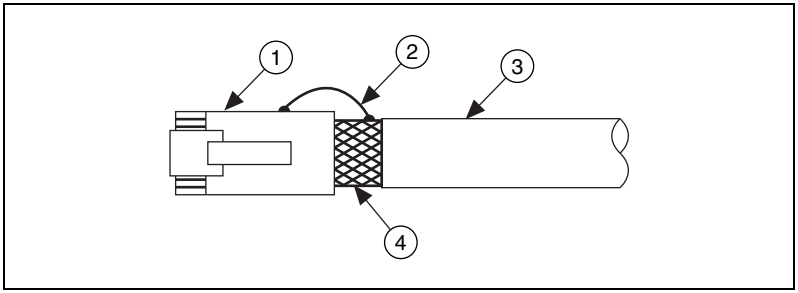
8. Use only one of the following methods to ground the signals wires in your TEDS application:
   - Attach the cable shielding to the TEDS sensor as shown in Figure 9.



1	Cable Shielding	2	Cable Insulation	3	TEDS Sensor

Figure 9. Attach the Shielding to the TEDS Sensor

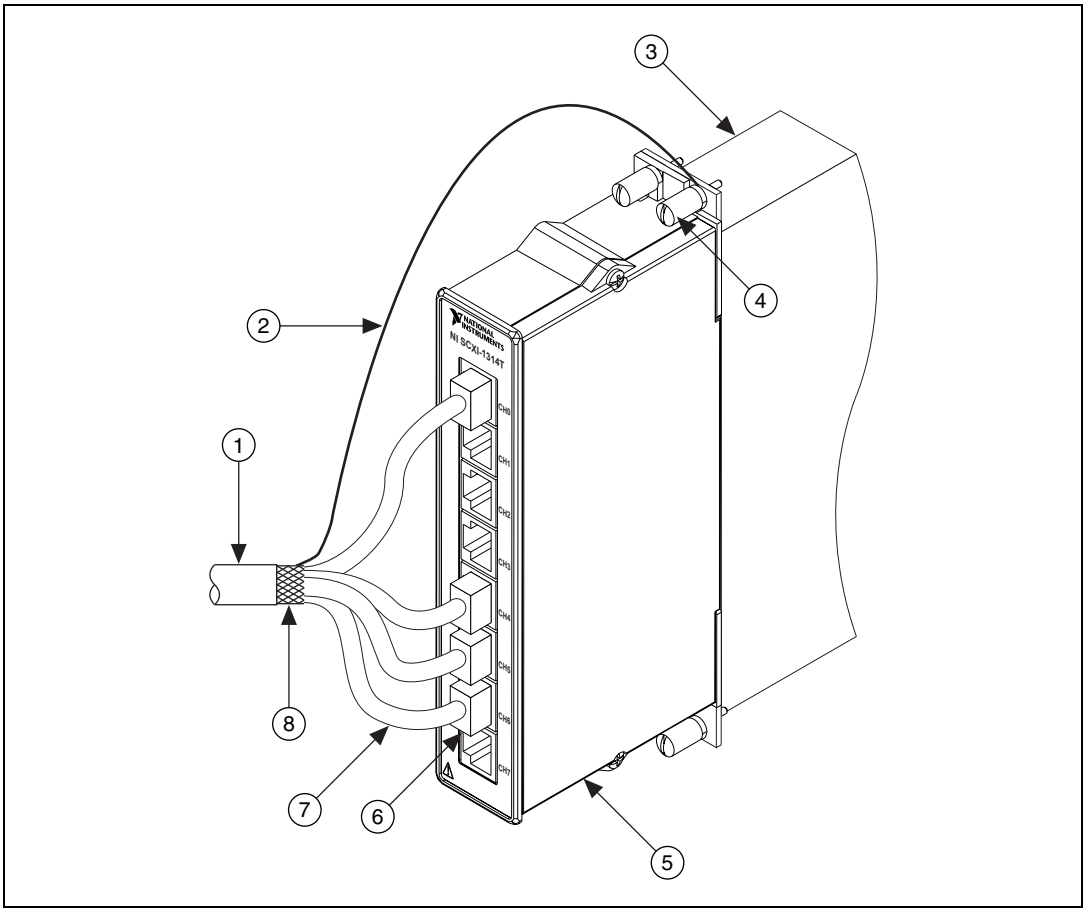
   - Connect the cable shielding to the metal grounding portion of the RJ-50 (10p10c) modular plug with a grounding wire as shown in Figure 10.



1	Ground Shield	3	Cable Insulation
2	Grounding Wire	4	Cable Shielding

Figure 10. Connect the Shielding to the RJ-50 (10p10c) Modular Plug

- Connect the conduit cable shielding to the metal thumbscrew of the SCXI module with a grounding wire as shown in Figure 11.



1	Conduit Cable Insulation	5	SCXI-1314T
2	Grounding Strap Wire	6	RJ-50 (10p10c) Modular Plug
3	SCXI Module	7	Twisted Pair Cable
4	Thumbscrew	8	Cable Shielding

Figure 11. Connect the Shielding to the SCXI Module Using the Thumbscrew

9. After you have grounded your application, insert the RJ-50 (10p10c) modular plugs into the SCXI-1314T.

Note Improperly grounding the shielding causes signal noise.

10. Refer to the *SCXI Quick Start Guide* to power on the SCXI chassis and configure the system in software.

TEDS-Related Information

You can find more TEDS-related information in the following locations:

- *Measurement & Automation Explorer Help for NI-DAQmx* and the *NI-DAQmx Help*
- `ni.com/info`, entering any of the following info codes:
  - `rdsenr`
  - `rdpnpy`
  - `rdpnsn`
  - `rdted6`
  - `rdrscl`

Specifications

All specifications are typical at 25 °C unless otherwise specified.

Electrical

Shunt calibration resistors .....RN-55 style 1/4 W

Accuracy of resistors

100 kΩ shunt calibration resistor ....±0.1%

Temperature coefficient of resistors

100 kΩ shunt calibration resistor ....±10 ppm/°C

Mechanical

Resistor sockets

Lead size.....0.6 to 0.7 mm (0.023 to 0.026 in.)

Lead length.....2.8 to 4.4 mm (0.110 to 0.175 in.)

Lead spacing.....12.7 mm (0.500 in.)

RJ-50 receptacle

mean number of insertions before failure 500

Maximum Working Voltage

Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Analog signals

Channel-to-earth ..... Either the AI *X* + or AI *X* – input should remain within ±10 V of ground. Both inputs should be within ±10 V of one another, Installation Category I.

Channel-to-channel ..... Either the AI *X* + or AI *X* – input should remain within ±10 V of ground. Both inputs should be within ±10 V of one another, Installation Category I.

Digital signals

Channel-to-earth ..... 0 to 5 V of one another

Environmental

Operating temperature..... 0 to 50 °C

Storage temperature ..... –20 to 70 °C

Humidity ..... 10 to 90% RH, noncondensing

Maximum altitude ..... 2,000 m

Pollution Degree (indoor use only) 2

Safety

The SCXI-1314T terminal block meets the requirements of the following standards for safety and electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1
- CAN/CSA C22.2 No. 61010-1

Note For UL and other safety certifications, refer to the product label, or visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

Emissions.....EN 55011 Class A at 10 m
FCC Part 15A above 1 GHz

Immunity .....EN 61326:1997 + A2:2001, Table 1

EMC/EMI .....CE, C-Tick, and FCC Part 15 (Class A) Compliant

Note For EMC compliance, operate this device with shielded cabling.

CE Compliance

The SCXI-1317 terminal block meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety).....73/23/EEC

Electromagnetic Compatibility Directive (EMC).....89/336/EEC

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

373746C-01 Aug04