

# SCXI™-1331 HIGH-VOLTAGE GENERAL-PURPOSE TERMINAL BLOCK

This guide describes how to use and install the SCXI-1331 terminal block with your SCXI-1127 module.

## Introduction

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The SCXI-1331 terminal block consists of a shielded board with 84 screw terminals for easy connection to the SCXI-1127 input connector. The SCXI-1331 allows you to connect 1-, 2-, and 4-wire signals to the SCXI-1127. It also has terminals for connecting external trigger signals to the SCXI-1127. Detailed explanations of the various input and triggering terminals of the SCXI-1331 are in the *SCXI-1127 User Manual*.

## Conventions Used in This Guide

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The following conventions are used in this guide:

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



This icon to the left of bold italicized text denotes a note, which alerts you to important information.



This icon to the left of bold italicized text denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.

**bold**

Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, windows, or Windows 95 tabs.

*bold italic*

Bold italic text denotes a note or caution.

*italic* Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept.

monospace Text in this font denotes text or characters that you should literally enter from the keyboard and syntax examples. This font is also used for the proper names of functions, operations, variables, and filenames and extensions.

## What You Need to Get Started

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To set up and use your SCXI-1331 terminal block, you will need the following items:

- SCXI-1331 terminal block
- SCXI-1331 High-Voltage General-Purpose Terminal Block Installation Guide*
- SCXI chassis
- SCXI-1127 module
- SCXI-1127 User Manual*
- No. 1 and No. 2 Phillips-head screwdrivers
- 1/8 in. flathead screwdriver
- Long-nose pliers
- Wire cutter
- Wire insulation stripper

## Safety Information

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The following cautions contain important safety information concerning hazardous voltages.



**Cautions** *You MUST insulate all of your signal connections appropriately to the HIGHEST available voltage with which the terminal block may come in contact. ANY voltage connected to the terminal block may appear on any other pin of this terminal block.*

*Equipment described in this document must be used in an Installation Category II environment per IEC 60664. This category requires local level mains-connected installation.*

***DO NOT OPERATE THE MODULE IN AN EXPLOSIVE ATMOSPHERE OR WHERE THERE MAY BE FLAMMABLE GASES OR FUMES.***

**SHOCK HAZARD**—*This unit should only be opened by qualified personnel aware of the dangers involved. Disconnect all power before removing the cover. Always install the grounding screw. If signal wires are connected to the module or terminal block, dangerous voltages may exist even when the equipment is turned off. Before you remove any installed terminal block or module, disconnect the AC power line or any high-voltage sources, ( $\geq 30 V_{rms}$  and  $42.4 V_{peak}$  or 60 VDC), that may be connected to any terminal block or module.*

**DO NOT OPERATE DAMAGED EQUIPMENT.** *The safety-protection features built into this module can be impaired if the module becomes damaged in any way. If it is damaged, turn the module off and do not use it until service-trained personnel can check its safety. If necessary, return the module to National Instruments for service and repair to ensure that its safety is not compromised.*

*The terminal block must be used in a UL listed SCXI chassis with a UL listed SCXI module.*

*Use only 26-14 AWG wire with a voltage rating of 300 V and 60 °C for all signals that may come in contact with 250 V.*

**DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT.** *Because of the danger of introducing additional hazards, do not install unauthorized parts or modify the terminal block. Return the module to National Instruments for service and repair to ensure that its safety features are not compromised.*

*When using the terminal block with high common-mode voltages, you MUST insulate your signal wires appropriately. National Instruments is NOT liable for any damages or injuries resulting from inadequate signal wire insulation.*

*Connections, including power signals to ground and vice versa, that exceed any of the maximum signal ratings on the SCXI-1331 can damage any or all of the modules connected to the SCXI chassis, the host computer, and the SCXI-1331. National Instruments is NOT LIABLE FOR ANY DAMAGES OR INJURIES resulting from incorrect signal connections.*

*If high voltages ( $\geq 30 V_{rms}$  and  $42.4 V_{peak}$  or 60 VDC) are present, YOU MUST CONNECT SAFETY EARTH GROUND TO THE STRAIN-RELIEF TAB OF THE TERMINAL BLOCK. This maintains compliance with UL 3111-1 and IEC-61010, and protects against electric shock when the terminal block is not connected to the chassis. To connect the safety earth ground to the strain-relief tab, run an earth ground wire in the cable from the signal source to the terminal block. National Instruments is NOT liable for any damages or injuries resulting from inadequate safety earth ground connections.*

*Do not loosen or re-orient the safety ground solder lug hardware when connecting the safety ground wire; to do so reduces the safety isolation between the high voltage and safety ground.*

# Temperature Sensor Output and Accuracy

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The SCXI-1331 temperature sensor outputs 0.2 to 0.024 V from 0 to 50 °C and has an accuracy of  $\pm 0.5$  °C over the 15 to 35 °C range and  $\pm 0.9$  °C over the 0 to 15 °C and 35 to 50 °C ranges.<sup>1</sup>

National Instruments software can convert a thermistor voltage to the thermistor temperature for the circuit diagram shown in Figure 3 later in this guide. In LabVIEW, you can use the Convert Thermistor Reading virtual instrument (VI) in the **Data Acquisition»Signal Conditioning** palette. If you are using LabWindows/CVI or NI-DAQ, use the `Thermistor_Convert` function. The VI takes the output voltage of the temperature sensor, the reference voltage (2.5 V), and the precision resistance (189 k $\Omega$ ) and returns the thermistor temperature.

Alternatively, you can use the following formulas:

$$T(^{\circ}\text{C}) = T_K - 273.15$$

where  $T_K$  is the temperature in Kelvin,

$$T_K = \frac{1}{[a + b(\ln R_T) + c(\ln R_T)^3]}$$

where  $a = 1.295361 \times 10^{-3}$

$b = 2.343159 \times 10^{-4}$

$c = 1.018703 \times 10^{-7}$

$R_T$  = resistance of the thermistor in ohms,

$$R_T = 189,000 \left( \frac{V_{TEMPOUT}}{2.5 - V_{TEMPOUT}} \right)$$

where  $V_{TEMPOUT}$  is the output voltage of the temperature sensor,

$$T(^{\circ}\text{F}) = \frac{[T(^{\circ}\text{C})]19}{5} + 32$$

where  $T(^{\circ}\text{F})$  and  $T(^{\circ}\text{C})$  are the temperature readings in degrees Fahrenheit and degrees Celsius, respectively.

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<sup>1</sup> Includes the combined effects of the temperature sensor accuracy and the temperature difference between the temperature sensor and any screw terminal. The temperature sensor accuracy includes tolerances in all component values, the effects caused by temperature and loading, and self-heating.

# Signal Connection

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## Note

*Refer to the [Safety Information](#) section before removing equipment covers or connecting or disconnecting any signal wires.*

To connect the signal to the terminal block, perform the following steps, referring to Figures 1 and 2 as necessary:

1. Unscrew the top cover screws and remove the cover.
2. Loosen the strain-relief screws and remove the strain-relief bar.
3. Run the signal wires through the strain-relief opening. You can add insulation or padding if necessary.
4. Prepare your signal wire by stripping the insulation no more than 7 mm.
5. Connect the wires to the screw terminals by inserting the stripped end of the wire fully into the terminal. No bare wire should extend past the screw terminal. Exposed wire increases the risk of shorting and causing a failure.

When connecting your signals to the SCXI-1331, follow the labeling on the SCXI-1331 for the appropriate module, as indicated in Figure 2.

6. Tighten the screws to a torque of 5–7 in.-lb.
7. Connect safety earth ground to the safety ground solder lug. Refer to the [Safety Information](#) section for connection information.
8. Reinstall the strain-relief bar and tighten the strain-relief screws.
9. Reinstall the top cover and tighten the top cover screws.
10. Connect the terminal block to the module front connector as explained in the [Installation](#) section later in this guide.

Figure 1 shows the SCXI-1331 terminal block parts locator diagram.

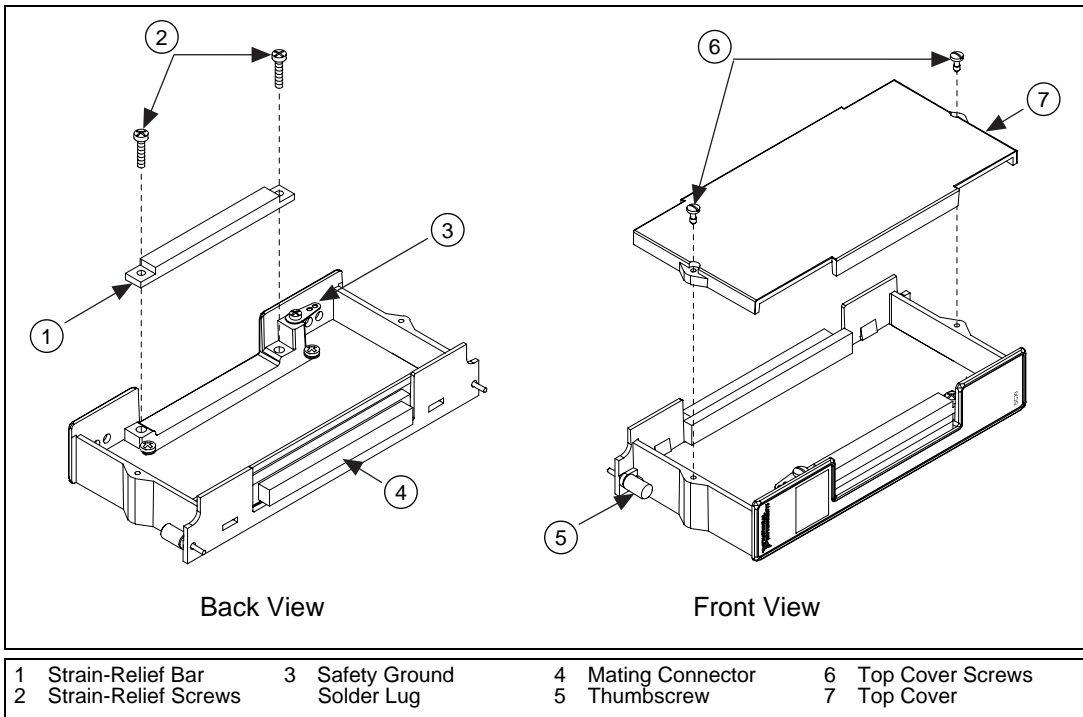


Figure 1. SCXI-1331 Parts Locator Diagram

Figure 2 shows the SCXI-1331 signal connections.

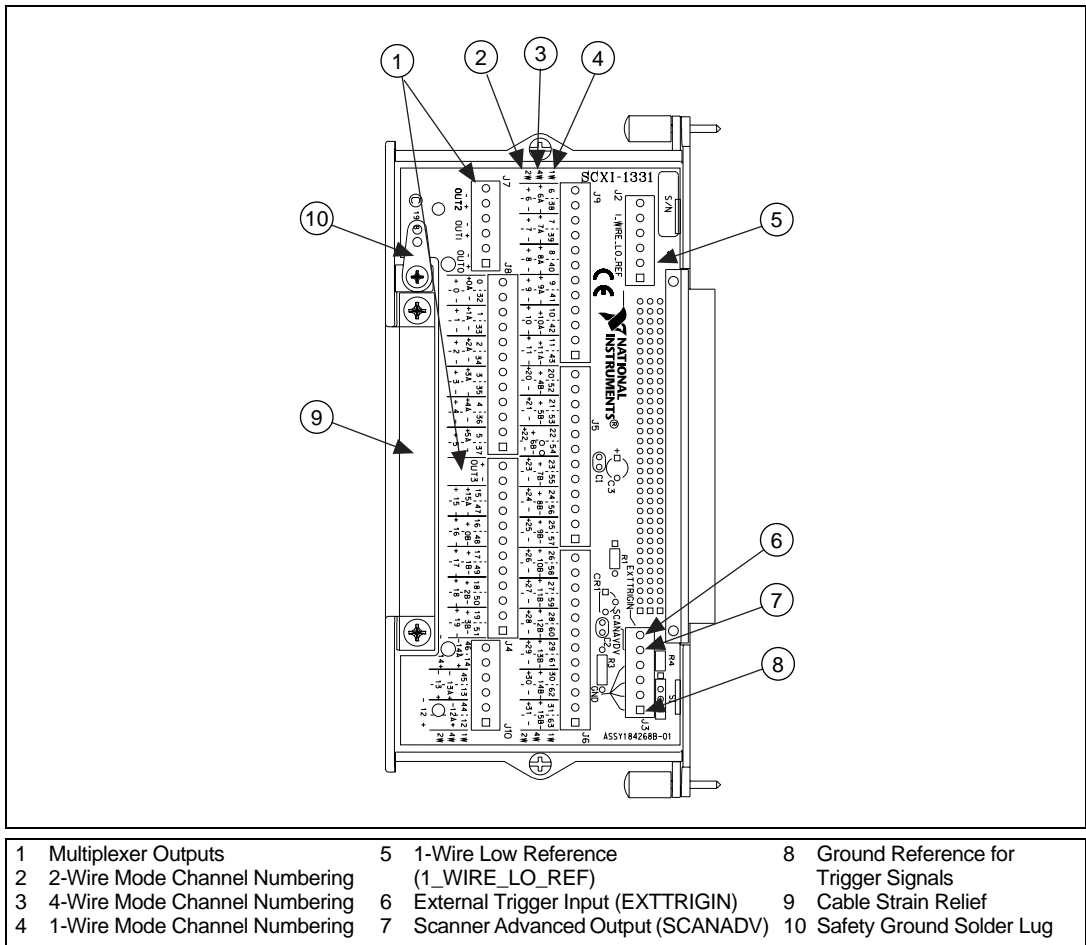


Figure 2. SCXI-1331 Signal Connections

## Installation

To connect the terminal block to the SCXI module front connector, perform the following steps:

1. Connect the module front connector to its mating connector on the terminal block.
2. Tighten the top and bottom thumbscrews on the back of the terminal block to hold it securely in place.



### Note

*For accurate cold-junction compensation, place the SCXI chassis away from an extreme temperature differential.*

# Cleaning the Terminal Block

Clean the terminal block by brushing off light dust with a soft, nonmetallic brush. Remove other contaminants with deionized water and a stiff nonmetallic brush. The unit must be completely dry and free from contaminants before returning to service.

# Temperature Sensor Circuit Diagram

The circuit diagram in Figure 3 is optional information that you can use if you want more details about the SCXI-1331 temperature sensor.

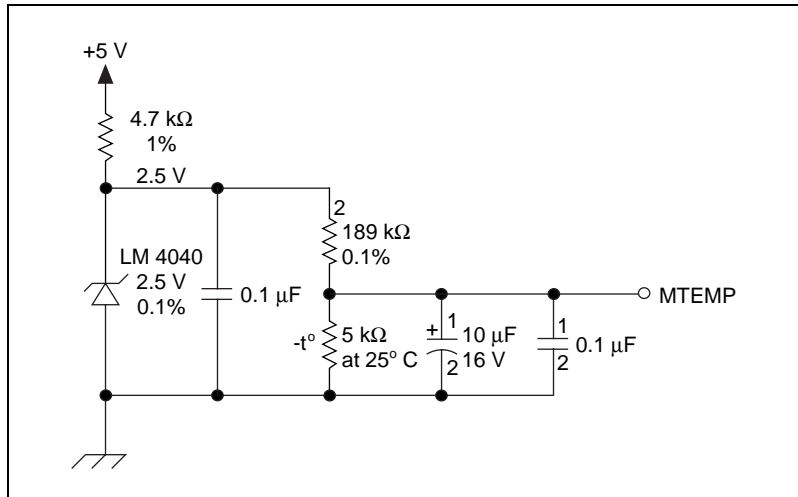


Figure 3. Temperature Sensor Circuit Diagram



# Specifications

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

## Cold-Junction Sensor

Accuracy<sup>1</sup> ..... 0.5 °C from 15 to 35 °C  
0.9 °C from 0 to 15 °C and  
35 to 50 °C

Output..... 0.2 to 0.024 V from 0 to 50 °C

## Maximum Voltage

Terminal to earth..... 250 V<sub>rms</sub> or VDC

Terminal to terminal..... 250 V<sub>rms</sub> or VDC

## Environment

Operating temperature..... 0 to 50 °C

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

Relative humidity ..... 10 to 90%

## Safety

Designed in accordance with IEC61010-1, UL 3111-1, and  
CAN/CSA C22.2 No. 1010.1 for electrical measuring and test equipment

Approved at altitudes up to 2000 m

Indoor use only

Installation Category II

Pollution Degree 2

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<sup>1</sup> The temperature sensor accuracy includes tolerances in all component values, effects caused by temperature, loading, self-heating, and temperature gradients.

# Support Information

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## Internet Support

E-mail: [support@natinst.com](mailto:support@natinst.com)

FTP Site: <ftp.natinst.com>

Web Address: <http://www.natinst.com>

## Bulletin Board Support

BBS United States: 512 794 5422

BBS United Kingdom: 01635 551422

BBS France: 01 48 65 15 59

## Fax-on-Demand Support

512 418 1111

## Telephone Support (USA)

Tel: 512 795 8248

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## International Offices

Australia 03 9879 5166, Austria 0662 45 79 90 0, Belgium 02 757 00 20, Brazil 011 288 3336,

Canada (Ontario) 905 785 0085, Canada (Québec) 514 694 8521, Denmark 45 76 26 00, Finland 09 725 725 11,

France 01 48 14 24 24, Germany 089 741 31 30, Hong Kong 2645 3186, Israel 03 6120092, Italy 02 413091,

Japan 03 5472 2970, Korea 02 596 7456, Mexico 5 520 2635, Netherlands 0348 433466, Norway 32 84 84 00,

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