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SCXI-1322 Terminal Block Installation Guide

Part Number 320711-01

This guide describes how to use and install the SCXI-1322 terminal block with the SCXI-1122 module. In addition to the SCXI-1322 kit contents, you will need an SCXI chassis, an SCXI-1122 module, Phillips-head number 1 and number 2 screwdrivers, a $^1/_8$ in. flathead screwdriver, long-nose pliers, a wire cutter, and a wire insulation stripper.

Introduction

The SCXI-1322 terminal block consists of a shielded board with 48 screw terminals for easy connection to the SCXI-1122 input connector. Sixteen pairs of screw terminals connect to the SCXI-1122 module inputs. The remaining seven pairs of screw terminals are for the module excitation channels.

What Your Kit Should Contain

The SCXI-1322 terminal block kit (part number 776573-22) contains the following components:

Kit Component	Part Number
SCXI-1322 terminal block	182378-01
SCXI-1322 Terminal Block Installation Guide	320711-01

If your kit is missing any of the components, contact National Instruments.

Signal Connection

The following warnings contain important safety information concerning hazardous voltages and terminal blocks.

Warnings: ⚠ ***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, disconnect the AC power line or any high voltage sources (≥42 Vrms or 60 VDC) that may be connected to the terminal block.***

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When using the terminal block with high common-mode voltages, you MUST insulate your signal wires appropriately to the HIGHEST voltage connected to the SCXI-1322. National Instruments is NOT liable for any damages or injuries resulting from inadequate signal wire insulation.

When you connect or disconnect signal lines to the SCXI-1322 terminal block screw terminals, the lines must be powered off. Potential differences between the lines and the ground create a shock hazard while you connect the lines.

Connections, including power signals to ground and vice versa, that exceed any of the maximum signal ratings on the SCXI-1322 can damage any or all of the boards connected to the SCXI chassis, the host computer, and the SCXI-1322 terminal block. National Instruments is NOT LIABLE FOR ANY DAMAGES OR INJURIES resulting from incorrect signal connections.

If high voltages (≥42 Vrms) are present, YOU MUST CONNECT THE SAFETY EARTH GROUND TO THE STRAIN-RELIEF TAB. This complies with UL 1244 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.

To connect the signal to the terminal block, perform the following steps:

1. Turn off the power to the SCXI chassis and the terminal block.
2. Remove the grounding screw of the top cover of the terminal block with the Phillips-head number 1 screwdriver.
3. Snap out the top cover of the shield by placing the flathead screwdriver in the groove at the bottom of the terminal block.
4. After loosening the strain-relief screws with the Phillips-head number 2 screwdriver, slide the signal wires one at a time through the front panel strain-relief opening. Add insulation or padding if necessary.
5. Connect the wires to the screw terminals by inserting the wires into the terminals and tightening the screws without letting the wires slip out of the strain-relief bar.
6. Tighten the larger strain-relief screws.
7. Snap the top cover back into place.
8. Reinsert the grounding screw to ensure proper shielding.
9. Connect the terminal block to the module front connector as explained in the *Installation* section later in this guide.

Using the VEX/SENSE+ and the VEX/SENSE- Terminals for Strain-Gauge Excitation

Your terminal block has two terminals labeled VEX/SENSE+ and VEX/SENSE-. When resistors R3 and R4 are loaded (factory default), you can use the VEX/SENSE+ and VEX/SENSE- terminals as VEX+ and VEX- terminals, respectively. When you have a heavy load–for example, all 16 channels are connected to 16 120 Ω strain-gauge half-bridges–you should remove resistors R3 and R4 to transform the VEX/SENSE+ and VEX/SENSE- terminals to sense terminals. These terminals must connect to the VEX+ and VEX- leads at the load for remote sensing and therefore compensate for the voltage drop in the excitation leads.

It is important to notice that because the SCXI-1122 provides a single voltage excitation channel, you can remotely sense your excitation voltage at a single load location. Therefore, when using multiple loads, you either have to sense in the terminal block (leave R3 and R4 in place) or make sure your loads are located close to each other and remotely sense at the end of the excitation leads. Use a single pair of excitation leads for all the loads, as shown in Figure 1.

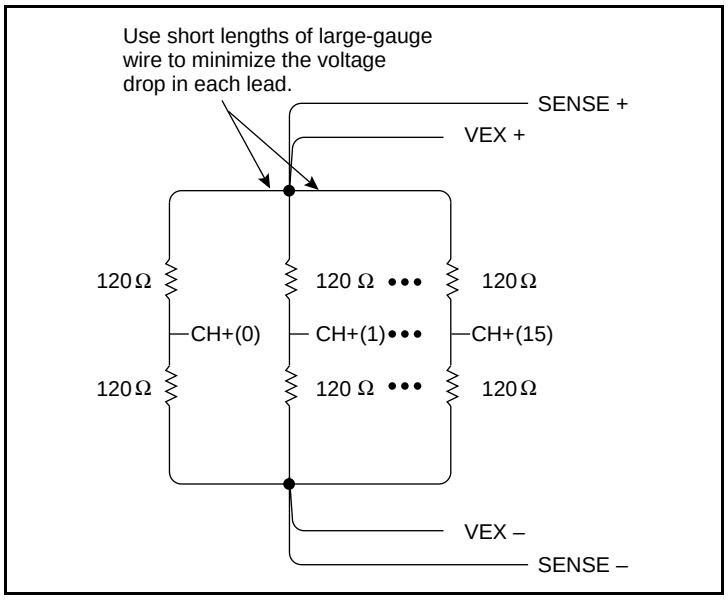

Figure 1. Remote Sensing with Multiple Loads

Figure 2 shows a setup where remote sensing is not used. In this case, use a different pair of excitation leads for each load. To minimize the voltage drop in each pair of excitation leads, use large gauge wires to reduce the I * R_{LEAD} drop.

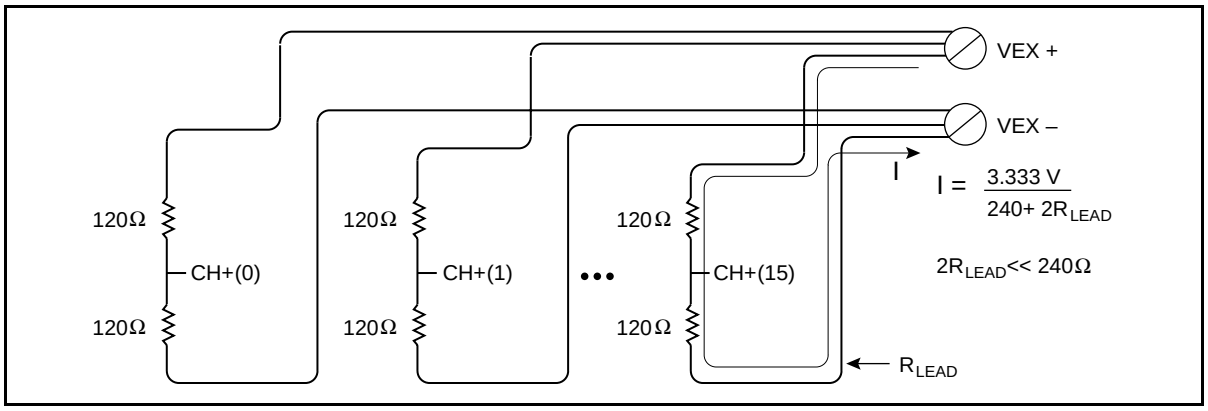

Figure 2. No Remote Sensing

Figure 3 shows multiple loads with bad remote sensing. Only the load at which the sense leads are connected is correctly regulated; the other loads suffer from the voltage drop in their excitation leads because of current flow.

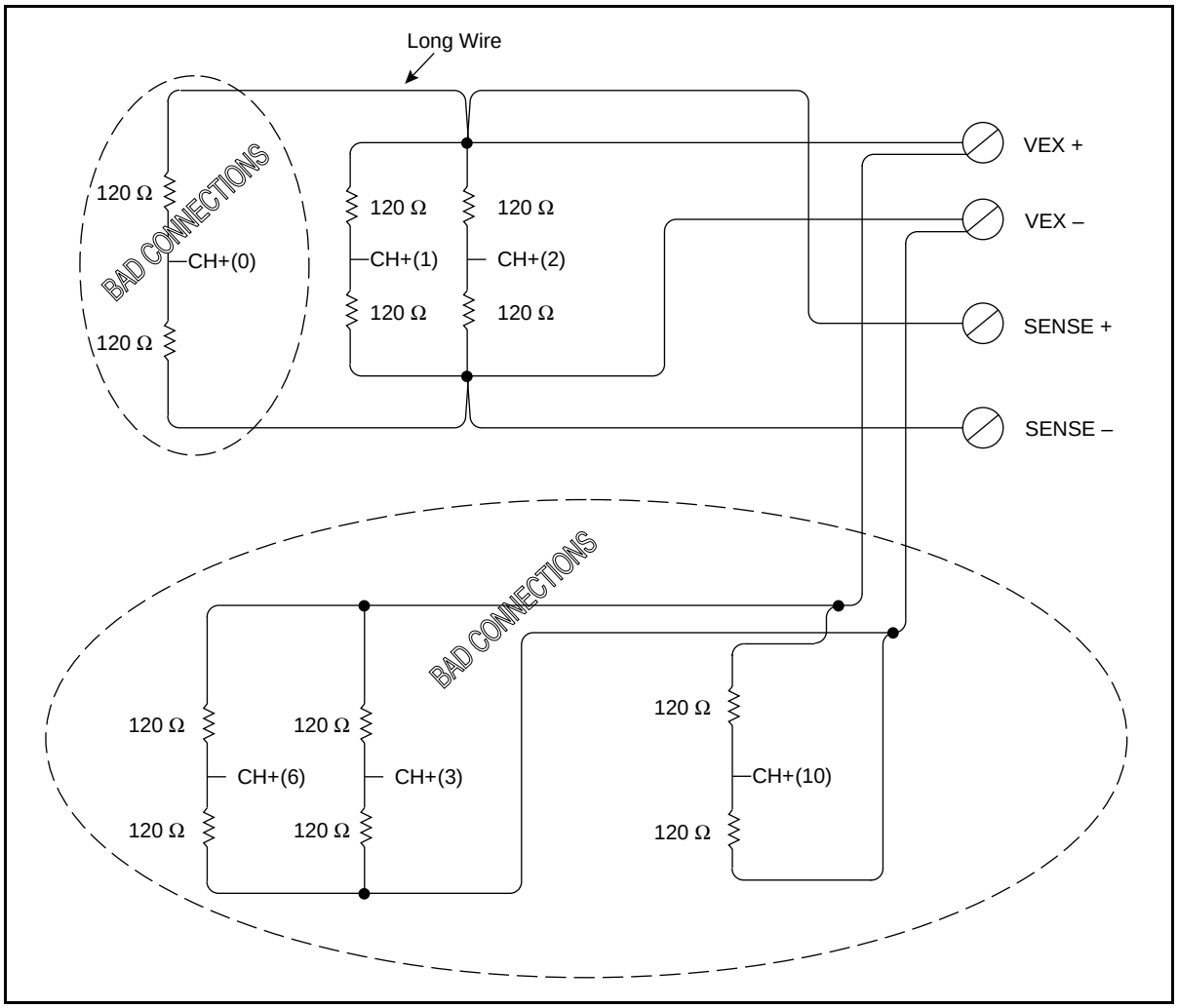

Figure 3. Multiple Loads with Bad Remote Sensing

Figure 4 shows the SCXI-1322 terminal block parts locator diagram.

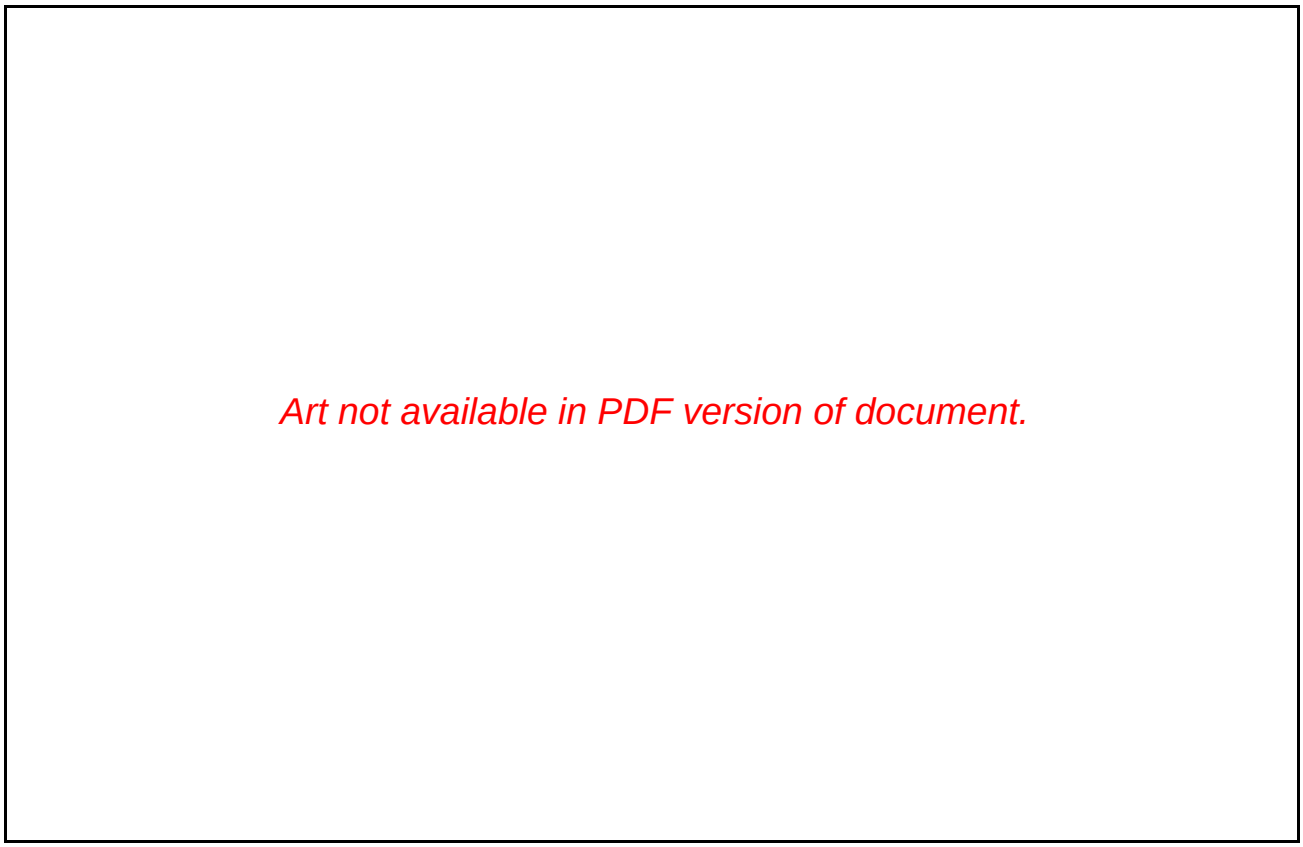

Figure 4. SCXI-1322 Parts Locator Diagram

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. Make sure that the module top and bottom thumbscrews do not obstruct the rear panel of the terminal block.
3. Tighten the top and bottom screws on the back of the terminal block to hold it securely in place.

Temperature Sensor Output and Accuracy

The SCXI-1322 temperature sensor outputs 1.91 to 0.58 V from 0° to 55° C and has an accuracy of ±0.65° C over the 15° to 35° C range and ±0.85° C over the 0° to 15° and 35° to 55° C ranges[1].

Note: ***If you are using National Instruments software such as LabVIEW or LabWindows, you do not need to read this section.***

To determine the temperature, use the following formulas:

$T(°C) = T_K - 273.15$

where T_K is the temperature in kelvin and is determined by the Steinhart-Hart equation:

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

$a = 1.295361 \times 10^{-3}$
$b = 2.343159 \times 10^{-4}$
$c = 1.018703 \times 10^{-7}$
R_T = resistance of the thermistor in Ω

$$R_T = 5{,}000\left(\frac{V_{TEMPOUT}}{2.5 - V_{TEMPOUT}}\right)$$

$V_{TEMPOUT}$ = output voltage of the temperature sensor

$$T(°F) = \frac{[T(°C)]\ 9}{5} + 32$$

where T(°F) and T(°C) are the temperature readings in degrees Fahrenheit and degrees Celsius, respectively.

Note: ***Use an average of a large number of samples to obtain the most accurate reading. Noisy environments require more samples for greater accuracy.***

[1]The temperature sensor accuracy includes tolerances in all component values, effects caused by temperature, loading, self-heating, and temperature gradients.

Specifications

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

Cold-junction sensor	
Accuracy[2]	0.65° from 15° to 35° C
	0.85° from 0° to 15° and 35° to 55° C
Repeatability	0.4° from 15° to 35° C
Output	1.91 to 0.58 V from 0° to 55° C
Maximum voltage	
Terminal to earth	450 Vrms
Terminal to terminal	250 Vrms

Temperature Sensor Circuit Diagram

The circuit diagram in Figure 5 is optional information that you can use if you want more details about the SCXI-1322 temperature sensor.

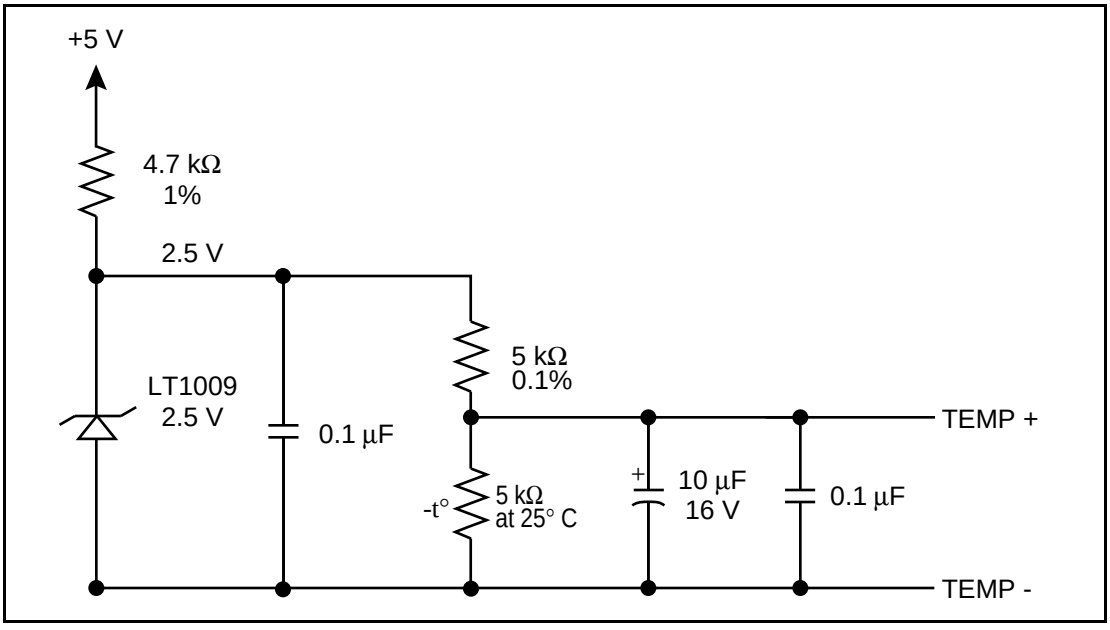

Figure 5. Temperature Sensor Circuit Diagram

[2]The temperature sensor accuracy includes tolerances in all component values, effects caused by temperature, loading, self-heating, and temperature gradients.