SCXI™-1303 TERMINAL BLOCK

Introduction

This document contains information and step-by-step instructions for verifying the temperature sensor performance of the National Instruments SCXI-1303 terminal block:

What Is Calibration?

For SCXI-1303 terminal blocks, calibration is simply determining the measurement accuracy of the components on the terminal block. Because these components are not user-adjustable, calibration consists of a verification procedure only.

Why Calibrate?

Electronic components drift with time, which can affect measurement accuracy as the device ages. Calibration ensures that your SCXI-1303 terminal block is still meeting National Instruments standards. If the results of the procedure indicate that your terminal block is out of specification, return it to National Instruments for repair.

How Often Should You Calibrate?

The measurement accuracy requirements of your application determine the calibration interval of your SCXI-1303 terminal block.
National Instruments recommends you perform a complete calibration at least once every year. You can shorten this interval to six months or 90 days, based on the demands of your application.

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Equipment and Other Test Requirements

This section describes the equipment, software, documentation, and test conditions required for verification.

Test Equipment

Verification requires a high-precision voltage source with at least 50 ppm accuracy, and a multiranging 5 1/2 digit digital multimeter (DMM) with 15 ppm accuracy.

National Instruments recommends you use the following instruments for verification of an SCXI-1303:

- Calibrator—Fluke 5700A
- DMM—NI 4060 or HP 34401A

If the exact instrument is not available, use the accuracy requirements listed above to select a substitute calibration standard.

Software and Documentation

No software is required to verify the operation of the SCXI-1303. All required documentation is found in this calibration procedure. However, if you would like more information on the product, refer to the *SCXI-1303 Terminal Block Installation Guide*.

Test Conditions

Follow these guidelines to optimize the connections and the environment during verification:

- Keep connections to the SCXI terminal block short. Long cables and wires act as antennae, picking up extra noise that can affect measurements.
- Use shielded copper wire for all cable connections to the device. Use twisted-pair wire to eliminate noise and thermal offsets.
- Keep relative humidity below 80%.
- Maintain temperature between 15 °C and 35 °C.

Verification Procedure

The following procedure verifies the performance of the temperature sensor on your SCXI-1303:

1. Connect a +5VDC power source to the terminal block.
   a. Hold the terminal block vertically upright and view it from the rear. The terminals on the 96-pin DIN connector are designated as follows for the purposes of this procedure:
      – Column A is on the right, Column B is in the middle, Column C is on the left.
      – Row 1 is at the bottom and Row 32 is at the top.
      – Individual pins are identified by their column and row. For example, “A3” denotes the terminal located in Column A and Row 3.

      This conforms to the labeling of the pins on the front connector of a matching SCXI module. It does not necessarily correspond to the labeling of the pins on the rear of the terminal block connector itself (which can only be viewed by opening the terminal block enclosure).
   a. Strip 0.5 inches of insulation from one end of a 22AWG solid wire. Insert the stripped end of the wire into terminal **A1** on the 96-pin female DIN connector on the rear of the terminal block. Attach the other end of this wire to the **positive** terminal of the +5 V DC power supply.
   b. Strip 0.5 inches of insulation from one end of a 22AWG solid wire. Insert the stripped end of the wire into terminal **A2** on the 96-pin female DIN connector on the rear of the terminal block. Attach the other end of this wire to the **negative** terminal of the +5 V DC power supply.
2. Connect a calibrated DMM to the temperature-sensor output of the terminal block.
   a. Strip 0.5 inches of insulation from one end of a 22AWG solid wire. Insert the stripped end of the wire into terminal **A3** on the 96-pin female DIN connector on the rear of the terminal block. Attach the other end of this wire to the positive input terminal of the calibrated DMM.
   b. Connect the negative input terminal of the calibrated DMM to the negative terminal of the +5VDC power supply.
3. Place the terminal block in a temperature-controlled environment where the temperature is between 15 °C and 35 °C.

4. When the terminal block temperature equilibrates with its surroundings, measure the temperature sensor output $\mathbf{V_{meas}}$ using a calibrated DMM.
5. Measure the actual temperature $\mathbf{T_{act}}$ in the temperature-controlled environment using a calibrated instrument.
6. Convert $\mathbf{V_{meas}}$ (in volts) to measured temperature $\mathbf{T_{meas}}$ (in degrees Celcius) by multiplying $\mathbf{V_{meas}}$ by 100.
7. Compare $\mathbf{T_{act}}$ to $\mathbf{T_{meas}}$.
   - If $(\mathbf{T_{meas}} - 0.9\ °C) \leq \mathbf{T_{act}} \leq (\mathbf{T_{meas}} + 0.9\ °C)$, then the operation of the terminal block temperature-sensor has been verified.
   - If $\mathbf{T_{act}} < (\mathbf{T_{meas}} - 0.9\ °C)$, the temperature sensor is nonfunctional. Return the terminal block to National Instruments for repair or replacement.
   - If $\mathbf{T_{act}} > (\mathbf{T_{meas}} + 0.9\ °C)$, the temperature sensor is nonfunctional. Return the terminal block to National Instruments for repair or replacement.