CALIBRATING THE SCXI™-1124 WITH CALIBRATION EXECUTIVE

Thank you for purchasing the SCXI-1124 calibration module for Calibration Executive. This document offers an overview of calibration, tells you the equipment and environmental conditions needed for calibration, and offers device-specific instructions for loading and running a calibration procedure.

Calibration Overview

This section defines calibration, describes why it is necessary, and explains how often you should perform it.

What Is Calibration?

Calibration is a procedure of reading offset and gain errors from a device and correcting for these errors during measurement. National Instruments calibrates every SCXI-1124 module at the factory. During the factory-calibration procedure, the calibration constants are stored in the nonvolatile memory of the module—the EEPROM. From memory, these values are loaded and used as needed.

Why Calibrate?

Offset and gain errors may drift with time and temperature. As a result, the factory-set calibration constants may become invalid, requiring calibration to achieve the specified accuracy of the device.

How Often Should You Calibrate?

The measurement accuracy requirements of your application determine how often you should calibrate your SCXI-1124 module. National Instruments recommends that you perform a complete calibration at least once every year. You can shorten this interval to 90 days or 6 months if desired.

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Equipment and Other Test Requirements

This section describes the equipment and environmental conditions needed for calibration.

Test Equipment

To calibrate an SCXI-1124, you need a digital multimeter (DMM). The calibration procedure runs in automated mode if you use NI-IVI-supported instruments. National Instruments recommends you use the following standards:

- DMM—HP34401A
- 16-bit National Instruments E Series data acquisition device

Note For an explanation of automated versus manual calibration, refer to the *Automated Versus Manual Calibration* section in Chapter 2, *Calibration Executive System Overview,* of your *Calibration Executive Software User Manual.*

If you do not have this DMM, you need to use a multiranging 5 1/2 digit DMM with an accuracy of 15 ppm as a substitute calibration standard.

Connectors

Although you can perform the calibration procedure without any special connectors, connecting and disconnecting your standards can be easier with the correct equipment. If you do not have custom connection hardware, you may need the following connectors:

- Connector block such as the National Instruments SCXI-1325
- Shielded 68-pin connector cable
- SCXI adapter board

Connection and Environmental Considerations

You need to be aware of several connection and environmental concerns during calibration:

- Keep connections to the SCXI module as short as possible. Long cables and wires can act as antennae, which could pick up extra noise that would affect measurements.
- Use shielded copper wire for all cable connections to the device. It is often advisable to use twisted-pair wire to eliminate noise and thermal offsets.
- Maintain a temperature of 18–28 °C.
- Keep relative humidity below 80%.
- Allow a warm-up time of at least 30 minutes for the SCXI module and E Series device to ensure that the measurement circuitry is at a stable operating temperature.

Calibration Temperature Considerations

Temperature change affects an instrument's measurement characteristics. To take these changes into account, the tested specifications include the effects of temperature drift. For the SCXI-1124, valid temperature drift is ±5 °C.

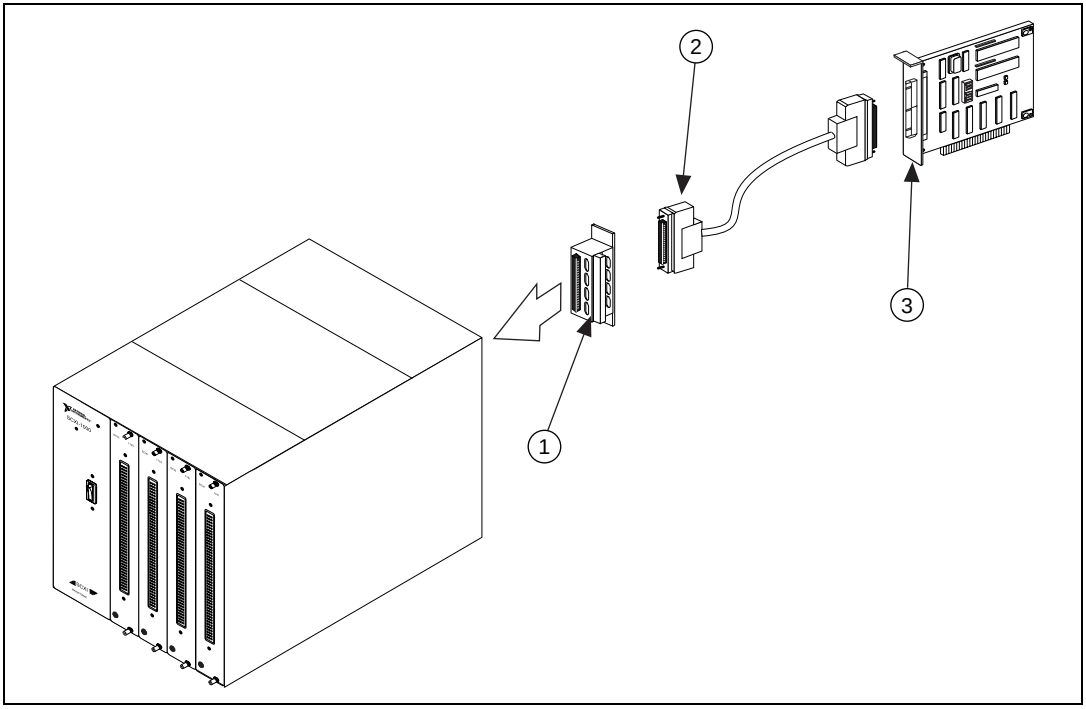
Running the SCXI-1124 Calibration Procedure

This section will help you set up and run your calibration procedure. In automated mode, the calibration procedure should take approximately 30 minutes. In manual mode, the calibration procedure can take as long as an hour.

Setting Up Your Device

To make sure your module is ready for calibration, refer to Figure 1 as you perform the following steps:

1. Install the SCXI-1124 in slot 1 of the SCXI chassis.
2. Install the E Series device in your host computer.
3. Connect a 68-to-68-pin cable between the SCXI module and the E Series data acquisition device installed in your host computer via the SCXI adapter board.
4. Configure the hardware with Measurement & Automation Explorer.



1 SCXI Adapter Board	2 68-to-68 Pin Connector	3 E Series Device

Figure 1. Connecting an SCXI Module to an E Series Device

Note Refer to the *SCXI Quick Start Guide* and *DAQ Quick Start Guide* that you received with this procedure for specific configuration information.

Connecting Your DMM to Your SCXI Module

Calibration Executive steps you through connections between your DMM and SCXI module. However, the first steps are the following:

1. Connect all GND inputs on each channel together.
2. Connect the LO voltage input of your DMM to any GND channel.
3. Connect the HI voltage input of your DMM to V_{OUT} on channel 0.

Loading Calibration Procedures

Start Calibration Executive, and follow the steps listed in the Calibration Configuration Wizard to load the SCXI-1124 calibration procedure. Refer to Chapter 1, *Introduction to Calibration Executive*, in the *Calibration Executive Software User Manual* for more information on configuring and loading a calibration procedure.

To calibrate your module, the calibration procedure prompts you to enter the following information about the installed hardware:

- *MIO Device Number*—The device number assigned by Measurement & Automation Explorer for your E Series device
- *MIO Channel*—The analog input channel that your E Series device uses to communicate with your SCXI module; this value can typically be left at 0.
- *SCXI Chassis ID*—The ID number that Measurement & Automation Explorer assigns for your SCXI chassis
- *SCXI Module Slot*—The SCXI slot where the SCXI-1124 has been installed
- *MIO Resolution*—The resolution of your E Series data acquisition device; the device user manual tells you the resolution of your device.
- *SCXI Module*—This is a list of all 1124 modules supported by the calibration procedure; select the module type that you are going to calibrate.

When the procedure is loaded, click **Run Procedure** to start the procedure. For more information on running a calibration procedure, refer to Chapter 2, *Calibration Executive System Overview,* in your *Calibration Executive Software User Manual*.

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