

CALIBRATING THE SCXI™-1125 WITH CALIBRATION EXECUTIVE

Introduction

This document contains information and step-by-step instructions for loading and running a calibration procedure for the SCXI-1125 using Calibration Executive.

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-1125 module at the factory. During the factory-calibration procedure, the calibration constants are stored in the non-volatile memory of the module—the EEPROM. These values are loaded from memory and used as needed by the device.

Why Should You Calibrate?

Offset and gain errors may drift with time and temperature, which could invalidate the factory-set calibration constants. Calibration restores 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-1125 module. National Instruments recommends that you perform a complete calibration at least once every year. You can shorten this interval to 90 days or six months based on the demands of your application.

Equipment and Other Test Requirements

This section describes the equipment, documentation, and test conditions needed for calibration.

Test Equipment

Calibration requires using a high-precision voltage standard with an accuracy of at least 50 ppm, a multiranging 5 1/2 digit digital multimeter (DMM) with an accuracy of 15 ppm, and an E Series device.

The calibration procedure runs in automated mode if you use NI-IVI-supported DMMs and calibrators. National Instruments recommends you use the following equipment:

- Calibrator—Fluke 5700A
- DMM—HP34401A
- 16-bit National Instruments E Series data acquisition (DAQ) device

If you do not have these instruments, use the accuracy requirements listed above to select a substitute calibration standard.



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*.

Connectors

Although you can perform the calibration procedure without any special connectors, connecting and disconnecting your calibration hardware is 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-1320, SCXI-1327, or SCXI-1328
- SCXI-1349 shielded cable assembly, which includes an SH68-68-01 shielded cable and a cable adapter with a 50-pin male breakout connector
- 50-pin ribbon cable

Documentation

This section describes the documentation you will need to calibrate your SCXI-1125. The following documents contain information on installing and using Calibration Executive and your SCXI-1125 device:

- *Calibration Executive Software User Manual*
- *SCXI Quick Start Guide*
- *DAQ Quick Start Guide*

The following documents contain information on using the NI-DAQ driver:

- *NI-DAQ Function Reference Online Help*
- *NI-DAQ User Manual for PC Compatibles*

The function reference online help file includes detailed information on the driver functions. You can access the online help by clicking **Start»Programs»National Instrument»NI-DAQ»NI-DAQ Help**. The user manual provides instructions on installing and configuring National Instruments DAQ devices.

Test Conditions

Follow these guidelines to optimize the connections and the environment 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. Use twisted-pair wire to eliminate noise and thermal offsets.
- Maintain a temperature between 18 and 28 °C.
- Keep relative humidity below 80%.
- Allow a warm-up time of at least 30 minutes for the SCXI module and the E Series device to ensure that the measurement circuitry is at a stable operating temperature.

Calibration

This section explains how to set up and run the calibration procedure. In automated mode, the calibration procedure should take approximately 1 hour. In manual mode, the calibration procedure can take as long as 2 hours.

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-1125 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 DAQ device installed in your host computer via the SCXI adapter device.
4. Connect the terminal block to the 50-pin breakout on the adapter device.
5. Configure the hardware with Measurement & Automation Explorer (MAX).

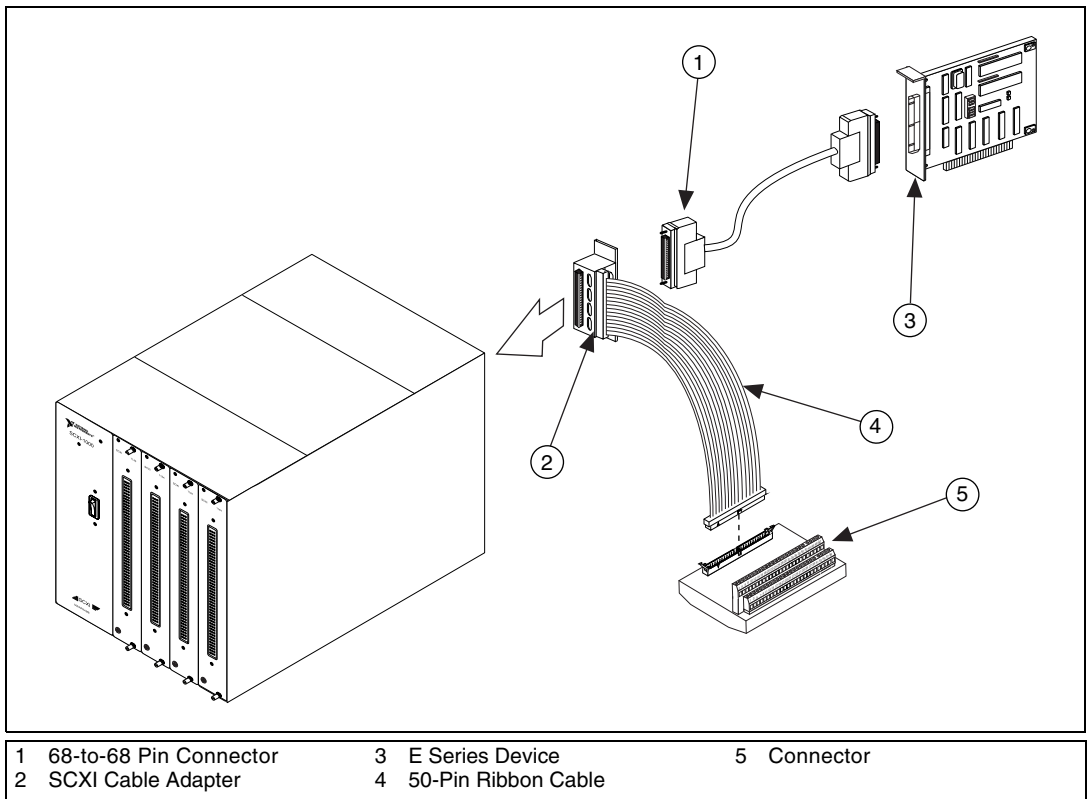


Figure 1. Connecting an SCXI Module to an E Series Device and a Terminal Block



Note Refer to the *SCXI Quick Start Guide* and *DAQ Quick Start Guide* for additional configuration information.

Connecting Your Calibrator, DMM, and SCXI Module

The calibration procedure will step you through the connections between your calibrator, DMM, and the SCXI module. However, the first connections are as follows:

1. Connect all negative inputs of each SCXI-1125 channel together on the SCXI-1320, SCXI-1327, or SCXI-1328 terminal block.
2. Connect all positive inputs of each channel together on the same terminal block.
3. Connect the calibrator positive output to CH0+ of the same terminal block.
4. Connect the calibrator negative output to CH0– of the same terminal block.
5. Connect the terminal block to the front of the SCXI-1125.
6. Connect the DMM HI voltage input to pin 3 of the 50-pin connector block as shown in Figure 1.
7. Connect the DMM LO voltage input to pin 4 of the 50-pin connector block as shown in Figure 1.

Loading Calibration Procedures

Start Calibration Executive, and follow the steps listed in the Calibration Configuration Wizard to load the SCXI-1125 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.

The calibration procedure prompts you to enter the following information about the installed hardware:

- **MIO Device Number**—The device number assigned by MAX 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 MAX assigns for your SCXI chassis.
- **SCXI Module Slot**—The SCXI slot where the SCXI-1125 has been installed.
- **MIO Resolution**—The resolution of your E Series DAQ device; the device user manual tells you the resolution of your device.
- **SCXI Module**—A list of all 1125 modules supported by the calibration procedure. Select the module type that you are going to calibrate.

- **Terminal Block**—The SCXI terminal block that you are using.
- **Channels to Verify and Adjust**—The SCXI-1125 channels you want to verify and adjust. Refer to the *Calibration Executive Software User Manual* to learn how to perform verification only.

When the procedure is loaded, click **Run Procedure** to begin the procedure. Follow any instructions you receive from Calibration Executive. After the procedure finishes, complete the following steps:

1. Click on **View»Reports**.
2. Select **View** to launch your browser and view your report. Your calibration report appears as a printable HTML file.

You have completed calibrating your SCXI-1125 with Calibration Executive.