

CALIBRATING THE SCXI™-1102/B/C WITH CALIBRATION EXECUTIVE

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Introduction

This document contains information and step-by-step instructions for loading and running a calibration procedure for SCXI-1102/B/C modules using Calibration Executive.

What Is Calibration?

Calibration consists of verifying the measurement accuracy of a module and adjusting for any measurement error. *Verification* is measuring performance of a module and comparing the results to the factory specifications. National Instruments Calibration Executive automates the verification and adjustment of your National Instruments measurement devices and modules.

Why Should You Calibrate?

The accuracy of electronic components drifts with time and temperature, which can affect measurement accuracy of the module. Calibration restores your module to its specified accuracy and ensures that it still meets National Instruments standards.

How Often Should You Calibrate?

The measurement accuracy requirements of your application determine how often you should calibrate your SCXI-1102/B/C 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 6 1/2 digit digital multimeter (DMM) with an accuracy of 15 ppm, and an E Series data acquisition (DAQ) 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 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:

- Terminal block such as the National Instruments SCXI-1300.
- SCXI-1349 shielded cable assembly, which includes an SH68-68-EP shielded cable and a cable adapter.
- 50-pin ribbon cable
- 50-pin connector block such as the CB-50

Documentation

This section describes the documentation you need to calibrate your SCXI-1102/B/C. The following documents contain information on installing and using Calibration Executive and your SCXI-1102/B/C module:

- *Calibration Executive Software User Manual*
- *DAQ Quick Start Guide*
- *SCXI Quick Start Guide*
- *Getting Started with SCXI*
- *SCXI-1102/B/C User Manual*

You can download these documents from the National Instruments Web site at ni.com/manuals

Software

Complete the following steps to install Calibration Executive:

1. Make sure that your computer and monitor are powered on and that you have installed Windows 2000/NT/Me/9x.
2. Close all open applications.
3. Insert the installation CD into the CD-ROM drive.
4. Choose the **Run** option from the **Start** menu on the desktop task bar.
5. In the command line box, type `x:\setup.exe` (where *x* is the letter of the CD-ROM drive you are using), and click **OK**.
6. Follow the instructions that appear in the dialog boxes.

The setup program installs Calibration Executive as well as the associated files listed in Table 1.

Table 1. Calibration Executive Directories and Supporting Files

Directory Name	Contents
Calibration Executive\Procedures\SCXI-1102\Limits	Microsoft Access database that stores the calibration limits.
Calibration Executive\Procedures\SCXI-1102\Support Files	Directory structure that contains the calibration procedures.
Calibration Executive\Procedures\SCXI-1102\Support Files	Required support files.

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 act as antennae, which conduct extra noise that can affect measurements.
- Use shielded copper wire for all cable connections to the module. 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 DAQ device to ensure that the measurement circuitry is at a stable operating temperature.

Calibration Procedures

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

Setting Up Your Module for Calibration

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

1. Install the SCXI-1102/B/C in slot 1 of the SCXI chassis.
2. Install the E Series DAQ 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 using the SCXI cable adapter.
4. Connect the 50-pin connector block to the 50-pin breakout on the SCXI-1349 cable adapter using the 50-pin ribbon cable.

5. Configure the hardware with Measurement & Automation Explorer (MAX).
 - a. In the MAX Help file, select **Help»Help Topics»NI-DAQ**.
 - b. Double-click **SCXI Devices**.
 - c. Double-click the correct file for the hardware you want to configure and follow the displayed instructions.

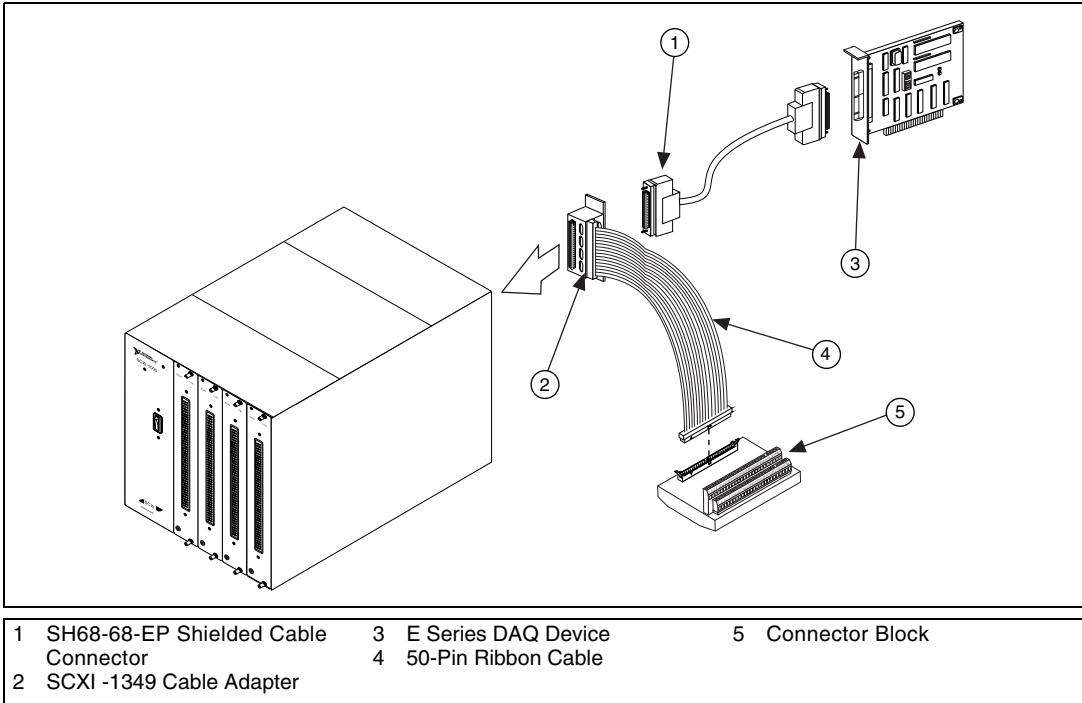


Figure 1. Connecting an SCXI Module to an E Series Device and a Terminal Block



Note Refer to *Getting Started with SCXI, DAQ Quick Start Guide*, and *SCXI Quick Start Guide* if you need additional configuration information.

Connecting Your Calibrator, DMM, and SCXI Module

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

1. Connect all negative inputs of channels 0 through 31 on the SCXI-1102/B/C together on the SCXI-1300 terminal block. If a terminal block is not available, you can connect to the pins on the front panel using a 96-pin Euro-style connector. Refer to Figure for pin designations.
2. Connect all positive inputs of each channel together on the terminal block.
3. Connect the calibrator positive output to CH0+ of the terminal block.
4. Connect the calibrator negative output to CH0- of the terminal block.
5. Connect the calibrator guard and ground together, then connect these to the CH0- of the terminal block.
6. Connect the terminal block to the front of the SCXI-1102/B/C.
7. Connect the DMM HI voltage input to pin 3 of the 50-pin connector block.

8. Connect the DMM LO voltage input to pin 4 of the 50-pin connector block.

	A		B		C			
	CGND	32		CH0-	64		CH0+	96
	NC	31		CH1-	63		CH1+	95
	NC	30		CH2-	62		CH2+	94
	NC	29		CH3-	61		CH3+	93
	NC	28		CH4-	60		CH4+	92
	NC	27		CH5-	59		CH5+	91
	NC	26		CH6-	58		CH6+	90
	NC	25		CH7-	57		CH7+	89
	CGND	24		CH8-	56		CH8+	88
	NC	23		CH9-	55		CH9+	87
	NC	22		CH10-	54		CH10+	86
	NC	21		CH11-	53		CH11+	85
	NC	20		CH12-	52		CH12+	84
	NC	19		CH13-	51		CH13+	83
	NC	18		CH14-	50		CH14+	82
	NC	17		CH15-	49		CH15+	81
	CGND	16		CH16-	48		CH16+	80
	NC	15		CH17-	47		CH17+	79
	NC	14		CH18-	46		CH18+	78
	NC	13		CH19-	45		CH19+	77
	NC	12		CH20-	44		CH20+	76
	NC	11		CH21-	43		CH21+	75
	NC	10		CH22-	42		CH22+	74
	NC	9		CH23-	41		CH23+	73
	NC	8		CH24-	40		CH24+	72
	NC	7		CH25-	39		CH25+	71
	NC	6		CH26-	38		CH26+	70
	CGND	5		CH27-	37		CH27+	69
	CJSENSOR	4		CH28-	36		CH28+	68
	CJSENSOR	3		CH29-	35		CH29+	67
	CGND	2		CH30-	34		CH30+	66
	+5 V	1		CH31-	33		CH31+	65

Figure 2. SCXI 1102 Front Connector Pin Assignments

Running the Calibration Executive Procedure

To run the Calibration Executive verification procedure, complete the following steps:

1. Launch Calibration Executive and follow the instructions in the Calibration Configuration Wizard to load the SCXI-1102/B/C calibration procedure. Refer to Chapter 1, *Introduction to Calibration Executive*, in the *Calibration Executive Software User Manual* if you need more information on configuring and loading a calibration procedure.
2. Enter the following information about the installed hardware when prompted by Calibration Executive:
 - **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 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-1102/B/C is installed
 - **MIO Resolution**—the resolution of your E Series DAQ device; the user manual tells you the resolution of your device
 - **Channels to Verify and Adjust**—the SCXI-1102/B/C channels you want to verify and adjust; refer to the *Calibration Executive Software User Manual* to learn how to perform verification only
3. When the procedure is loaded, click **Run Procedure** to begin. Follow any instructions you receive when prompted by Calibration Executive.

After the procedure finishes, complete the following steps to view the calibration report:

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-1102/B/C with Calibration Executive.



Note If your SCXI-1102/B/C module fails after calibration, return it to National Instruments for repair or replacement.

Technical Support Resources

NI Web Support

National Instruments Web support is your first stop for help in solving installation, configuration, and application problems and questions. Online problem-solving and diagnostic resources include frequently asked questions, knowledge bases, product-specific troubleshooting wizards, manuals, drivers, software updates, and more. Web support is available through the Technical Support section of ni.com

Worldwide Support

National Instruments has offices located around the world to help address your support needs. You can access our branch office Web sites from the Worldwide Offices section of ni.com. Branch office Web sites provide up-to-date contact information, support phone numbers, e-mail addresses, and current events.

If you have searched the technical support resources on our Web site and still cannot find the answers you need, contact your local office or National Instruments corporate. For telephone support in the United States, dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

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