

CALIBRATING THE SCXI™-1100 WITH CALIBRATION EXECUTIVE

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Introduction

This document contains information and step-by-step instructions for loading and running a verification procedure for the SCXI-1100 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. Because the SCXI-1100 is not user-adjustable, calibrating this module consists of verifying the performance only. National Instruments Calibration Executive automates the verification of your National Instruments measurement devices and modules.

Why Should You Verify?

The accuracy of electronic components drifts with time and temperature, which can affect the measurement accuracy of the module. Verification ensures that your module still meets National Instruments standards.

How Often Should You Verify?

The measurement accuracy requirements of your application determine how often you should verify your SCXI-1100 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 verification.

Test Equipment

Verification requires using a high-precision voltage standard with an accuracy of at least 50 ppm and a 16-bit E Series data acquisition (DAQ) device.

The Calibration Executive procedure runs in automated mode if you use National Instruments IVI-supported calibrators. National Instruments recommends you use the following equipment:

- Calibrator—Fluke 5700A
- 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 verification 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

Documentation

This section describes the documentation you need to calibrate your SCXI-1100. The following documents contain information on installing and using Calibration Executive and your SCXI-1100 module:

- *Calibration Executive Software User Manual*
- *Getting Started with SCXI*
- *DAQ Quick Start Guide*
- *SCXI Quick Start Guide*
- *SCXI-1100 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-1100\Limits	Microsoft Access database that stores the calibration limits.
Calibration Executive\Procedures\SCXI-1100\Support Files	Directory structure that contains the calibration procedures.
Calibration Executive\Procedures\SCXI-1100\Support Files	Required support files.

Test Conditions

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

- 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.

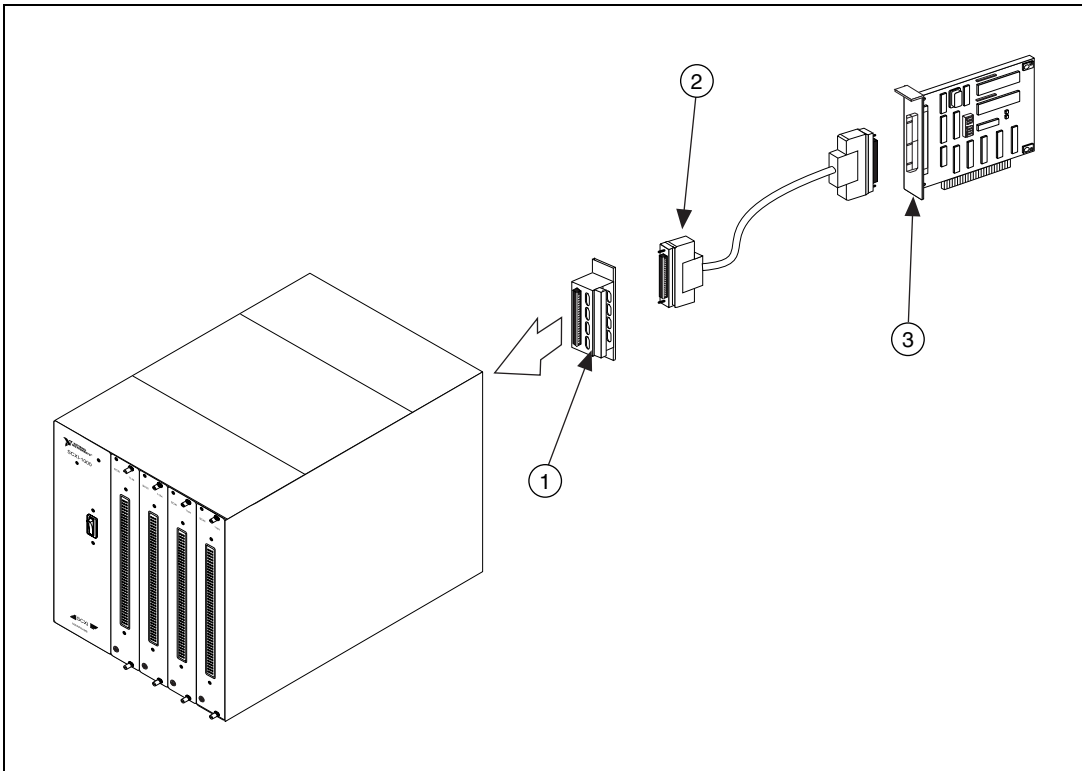
Verification Procedure

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

Setting Up Your Module for Verification

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

1. Remove the side plate of the SCXI chassis.
2. Remove the cover of the SCXI-1100 to access the filter jumper.
3. Install the SCXI-1100 in slot 1 of the SCXI chassis.
4. Install the E Series DAQ device in your host computer.
5. Use the SCXI-1349 cable adapter to connect the SH68-68-EP cable between the SCXI-1100 module and the E Series DAQ device installed in your host computer.
6. 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.



- | | |
|--|---|
| <ul style="list-style-type: none"> 1 SCXI-1349 Cable Adapter 2 SH68-68-EP Shielded Cable Connector | <ul style="list-style-type: none"> 3 E Series DAQ Device |
|--|---|

Figure 1. Connecting an SCXI Module to an E Series DAQ Device and an Adapter

The SCXI-1100 module has jumpers that you use to change the filter settings, as shown in Table 2. During the verification procedure, you need to change the filter settings to verify both the 4 Hz and 10 kHz measurement accuracies. You can change the filter settings without powering down the SCXI chassis.



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

Table 2. Filter Settings

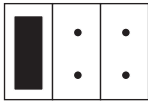
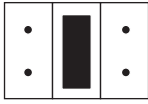
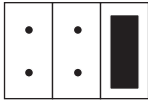
Jumper	Description	Configuration
W2	Factory setting is full bandwidth (FBW) and no filtering	 W2 W3 W4
W3	10 kHz lowpass filter	 W2 W3 W4
W4	4 Hz lowpass filter	 W2 W3 W4

Table 3 shows the jumpers that you must set to the specified (factory-default) settings.

Table 3. Factory-Default Jumper Settings


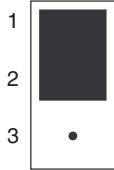
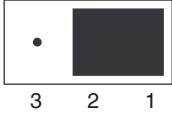


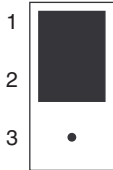
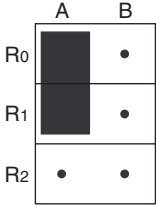

Jumper	Description	Configuration
W1	Factory setting; parking position (used for ground-referenced sources)	 1 2 3
W5	Factory setting; connects MISO to SERDATOUT	 1 2 3

Table 3. Factory-Default Jumper Settings (Continued)

Jumper	Description	Configuration
W6	Factory setting; do not remove this jumper	
W7	Factory setting; parking position. Disconnects the front connector from the module output	
W8	Factory setting; parking position	
W9	Factory setting; connects pullup to SERDATOUT (revision C and higher modules only)	
W10	Factory setting; parking position (used with MIO boards in differential mode)	
W11	Factory setting; (Revision A and Revision B only)	

Connecting Your Calibrator and SCXI Module

The Calibration Executive verification procedure steps you through the connections between your calibrator and the SCXI module. The first connections are as follows:

1. Connect the calibrator positive output to CHO+ of the SCXI-1300 terminal block.
2. Connect the calibrator negative output to CHO– of the SCXI-1300 terminal block.
3. Connect the calibrator guard and ground together, then connect these to the CHO– of the terminal block.
4. Connect the terminal block to the front of the SCXI-1100.



Note 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 2 for the SCXI-1100 pin assignments.

Pin Number	Signal Name	Column			Signal Name	
		A	B	C		
32	CGND	○	○	○	CH0-	
31		○	○	○	CH0+	
30		○	○	○	CH1-	
29		○	○	○	CH1+	
28		○	○	○	CH2-	
27		○	○	○	CH2+	
26		○	○	○	CH3-	
25		○	○	○	CH3+	
24		CGND	○	○	○	CH4-
23			○	○	○	CH4+
22	○		○	○	CH5-	
21	○		○	○	CH5+	
20	○		○	○	CH6-	
19	○		○	○	CH6+	
18	○		○	○	CH7-	
17	○		○	○	CH7+	
16	CGND		○	○	○	CH8-
15			○	○	○	CH8+
14		○	○	○	CH9-	
13		○	○	○	CH9+	
12		○	○	○	CH10-	
11		○	○	○	CH10+	
10		○	○	○	CH11-	
9		○	○	○	CH11+	
8		OUTPUT	○	○	○	CH12-
7		AOREF	○	○	○	CH12+
6	GUARD	○	○	○	CH13-	
5	CGND	○	○	○	CH13+	
4	DTEMP	○	○	○	CH14-	
3	MTEMP	○	○	○	CH14+	
2	CGND	○	○	○	CH15-	
1	+5 V	○	○	○	CH15+	
					CH16-	
					CH16+	
					CH17-	
					CH17+	
					CH18-	
					CH18+	
					CH19-	
					CH19+	
					CH20-	
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					CH27+	
					CH28-	
					CH28+	
					CH29-	
					CH29+	
					CH30-	
					CH30+	
					CH31-	
					CH31+	

Figure 2. SCXI-1100 Front Connector Pin Assignments

Running the Calibration Executive Verification 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-1100 verification 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 Executive 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 DAQ device
 - **MIO Channel**—the analog input channel that your E Series DAQ device uses to communicate with your SCXI module; this value is typically 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-1100 is installed
3. When the procedure is loaded, click **Run Procedure** to begin. Follow any instructions you receive when prompted by Calibration Executive, such as changing the filter settings.

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

1. Click **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 verifying the performance of your SCXI-1100 with Calibration Executive.



Note The SCXI-1100 module is not user-adjustable. If your module fails the verification procedure, contact 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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Canada (Toronto) 905 785 0085, China (Shanghai) 021 6555 7838,
China (ShenZhen) 0755 3904939, Denmark 45 76 26 00, Finland 09 725 725 11,
France 01 48 14 24 24, Germany 089 741 31 30, Greece 30 1 42 96 427,
Hong Kong 2645 3186, India 91805275406, Israel 03 6120092, Italy 02 413091,
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