

CALIBRATING NI 5112 DIGITIZERS WITH CALIBRATION EXECUTIVE

This document contains step-by-step instructions for loading and running the National Instruments Calibration Executive procedure for NI 5112 digitizers.

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Conventions

The following conventions are used in this document:

»

The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.



This icon denotes a note, which alerts you to important information.

bold

Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.

italic

Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text that is a placeholder for a word or value that you must supply.

monospace

Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames and extensions, and code excerpts.

Equipment and Other Test Requirements

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

Test Equipment

Tables 1 and 2 list specifications for equipment you can use to calibrate the NI 5112 with Calibration Executive.

Recommended Equipment

Table 1 lists the equipment that NI recommends for this procedure.

Table 1. Recommended Instrument Specifications for NI 5112 Calibration

Instrument	Recommended Instrument	Parameter Measured	Necessary Specifications
Scope Calibrator	Fluke 9500 Scope Calibrator	Vertical Offset	0 VDC \pm 0.1 mV
		Vertical Gain	DC \pm 25 mV to \pm 22.5 V, \pm 0.25% into 1 M Ω
		AC Coupling	sine wave 9–13 Hz \pm 100 ppm, 1.8 Vpp \pm 2% into 1 M Ω
		Bandwidth	\pm 2% amplitude flatness for leveled sine wave 100 kHz to 100 MHz \pm 50 ppm, 1.5 Vpp \pm 2% into 50 Ω
		Input Impedance	2-wire resistance accuracy of 0.25% for 50 Ω and 1 M Ω measurements
		Timing/RIS	sine wave 10 kHz to 10 MHz \pm 15 ppm, 1.8 Vpp \pm 2% into 1 M Ω
		Trigger Sensitivity	sine wave 100 kHz to 10 MHz \pm 100 ppm, 300 mVpp \pm 2% into 1 M Ω
Active Head	Fluke 9510 Active Head or better	—	—
Digital Multimeter (DMM)	NI 4070	Internal Reference	DC voltage accuracy of \pm 0.25% (\pm 12.5 mV) when measuring \pm 5 V

If you do not have the recommended instruments, use the accuracy requirements listed above to select a substitute calibration standard. Refer to Table 2 for a list of alternative instruments you can use for the calibration procedure. Although these instruments are acceptable, NI recommends that you use the instruments from Table 1.

Alternative Equipment

Table 2 contains a list of alternative equipment you can use to calibrate the NI 5112 with Calibration Executive.

Table 2. Alternative Instrument Specifications for NI 5112 Calibration

Instrument	Recommended Instrument	Parameter Measured	Necessary Specifications
Calibrator	Fluke 5700 Calibrator	Vertical Offset	0 VDC \pm 0.1 mV
		Vertical Gain	DC \pm 25 mV to \pm 22.5 V, \pm 0.25% into 1 M Ω
		AC Coupling	sine wave 9 Hz to 13 Hz \pm 100 ppm, 1.8 Vpp \pm 2% into 1 M Ω
Sine Wave Generator	Tegam SG 5030	Bandwidth	\pm 2% amplitude flatness for leveled sine wave 100 kHz to 100 MHz \pm 50 ppm, 1.5 Vpp \pm 2% into 50 Ω
		Timing/RIS	sine wave 10 kHz to 10 MHz \pm 15 ppm, 1.8 Vpp \pm 2% into 1 M Ω
		Trigger Sensitivity	sine wave 100 kHz to 10 MHz \pm 100 ppm, 300 mVpp \pm 2% into 1 M Ω
DMM	NI 4070	Input Impedance	2-wire resistance accuracy of 0.25% for 50 Ω and 1 M Ω measurements
		Internal Reference	DC voltage accuracy of \pm 0.25% (\pm 12.5 mV) when measuring \pm 5 V
BNC Cable	—	—	50 Ω
BNC terminator	—	—	50 Ω
BNC T-connector	—	—	—

Documentation

This section describes the documentation you need to calibrate the NI 5112 digitizer. In addition to this calibration procedure, you may need to refer to the following documents:

- *Where to Start with Your NI Digitizer*
- *NI 5112 User Manual*
- *Calibration Executive Software User Manual*

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

Software

For information on installing and uninstalling Calibration Executive procedures, refer to the *Calibration Executive Software User Manual*.

The setup program installs Calibration Executive as well as the associated files listed in Table 3.

Table 3. Calibration Executive Directories and Supporting Files

Directory Name	Contents
Calibration Executive\Procedures\ NI 5112\Limits	Microsoft Access database that stores the calibration limits
Calibration Executive\Procedures\ NI 5112	Directory structure that contains the calibration procedures

Test Conditions

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

- Keep connections to the NI 5112 short. Long cables and wires act as antennae, picking up extra noise that can affect measurements.
- Use a 50 Ω BNC coaxial cable for all connections to the digitizer if you are not using a Fluke 9500 calibrator.
- Keep relative humidity between 10% and 90%, noncondensing, or consult the digitizer hardware manual for the optimum relative humidity.
- Maintain the temperature between 25 °C and 35 °C.
- Allow a warm-up time of at least 15 minutes to ensure that the measurement circuitry of the NI 5112 is at a stable operating temperature.

Calibration Procedures

This section explains how to set up and run the Calibration Executive procedure.

Using the Fluke 9500 in automated mode, the calibration procedure takes approximately 10 minutes. In manual mode, the procedure takes approximately 30 minutes.

Using the alternative instruments in automated mode, the calibration procedure takes approximately 20 minutes. In manual mode, the procedure takes approximately 40 minutes.

Connecting the Calibrator, DMM, and NI 5112

The calibration procedure guides you through the connections between the calibrator, sine wave generator, DMM, and NI 5112.

Running the Calibration Executive Procedure

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

1. Launch Calibration Executive and follow the Calibration Configuration Wizard to load the NI 5112 calibration procedure. Refer to Chapter 1, *Introduction to Calibration Executive*, of the *Calibration Executive Software User Manual* if you need more information on configuring and loading a calibration procedure.
2. When prompted by Calibration Executive, enter information about the instruments you are using.



Note The Fluke 9500 is the only oscilloscope calibrator currently supported through GPIB control. You can run the calibration procedure in manual mode if you have another type of oscilloscope calibrator. If you do not have an oscilloscope calibrator, use the alternative instruments listed in Table 2 and run the calibration procedure in manual mode. You can add information about the alternative instruments in the Notes section of the Calibration Configuration Wizard. NI recommends that when prompted for the Scope Calibrator information, you include a list of all three alternative instruments, along with their associated tracking numbers and calibration due dates, in the Notes section. When the calibration report is generated, this information appears in the section labeled Scope Calibrator. You may want to preface your instrument list with the following text: *Instead of using a scope calibrator.*

3. When the procedure is loaded, click **Run Procedure** to begin.
The procedure prompts you to enter the device number, which is the number assigned by Measurement & Automation Explorer (MAX).
4. Follow any instructions you receive from Calibration Executive.

Viewing the Calibration Report

When the calibration procedure is finished, complete the following steps to view the calibration report:

1. Select **View»Reports**.
2. Click **View**.

Modifying the Font Size in a Calibration Report

If you have selected the HTML format and the text size in the calibration report is too large, you can decrease the size as follows:

- In Internet Explorer, modify the text size by selecting **View»Text Size** and then selecting the appropriate size from the menu.
- In Netscape, modify the text size by selecting **View»Decrease Font**.



Note If your NI 5112 digitizer fails after calibration, return it to NI for repair or replacement.

Specifications

For specification information on the device you are calibrating, refer to one of the following documents:

- The manual calibration procedure for the device, which is available for download at ni.com/calibration
- The product data sheet, which is available for download at ni.com/products
- The hardware documentation for the device, which is available for download at ni.com/manuals

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, email 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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