

Calibrating the NI 5122 with Calibration Executive

This document contains step-by-step instructions for loading and running the National Instruments Calibration Executive procedure for NI 5122 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.

| | |
|---|---|
| ◆ | The ◆ symbol indicates that the following text applies only to a specific product, a specific operating system, or a specific software version. |
|  | This icon denotes a note, which alerts you to important information. |
|  | This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. |
| 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. |
| <i>italic</i> | 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. |

Equipment and Other Test Requirements

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

Test Equipment

Table 1 lists the specifications for equipment you can use to calibrate the NI 5122 with Calibration Executive.



Note If you do not have the recommended instruments, use the accuracy requirements listed in Table 1 to select a substitute calibration standard.

Table 1. Required Equipment Specifications for NI 5122 External Calibration

| Required Equipment | Recommended Equipment | Parameter Measured | Specification |
|--------------------|--|--------------------|---|
| Signal Generator | Fluke 9500B oscilloscope calibrator (Wavetek 9500 with high-stability reference option) 9510 or 9530 Test Head | Vertical Gain | DC $\pm(0.025\% + 25 \mu\text{V})$ into 1 M Ω or 50 Ω |
| | | Bandwidth | $\pm 1.5\%$ output amplitude flatness for leveled sine wave up to 100 MHz relative to 50 kHz into 1 M Ω or 50 Ω |
| | | Timing | 2 ppm frequency accuracy |
| BNC cable | — | — | 50 Ω |

Documentation

This section describes the documentation you need to calibrate the NI 5122. In addition to this calibration procedure, you may need to refer to the following documents:

- *NI High-Speed Digitizers Getting Started Guide*
- *NI High-Speed Digitizers Help*
- *NI PXI/PCI-5122 Specifications*

You can find these documents by navigating to **Start»Programs»National Instruments»NI-SCOPE»Documentation**.

- *Calibration Executive Software User Manual*

You can find this document by navigating to **Start»Programs»National Instruments»Calibration Executive»Documentation**.

You can also download the latest version of all documents from the National Instruments 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 2.

Table 2. Calibration Executive Directories and Supporting Files

| Directory Name | Contents |
|--|--|
| CalExec\Procedures\NI 5122\Limits | Microsoft Access database that stores the calibration limits |
| CalExec\Procedures\NI 5122 | Directory structure that contains the calibration procedures |
| CalExec\Procedures\NI 5122\Support Files | Required support files |

Test Conditions

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

- Always connect the calibrator test head directly to the input BNC of the digitizer, or use a short 50 Ω BNC coaxial cable if necessary. Long cables and wires act as antennae, picking up extra noise that can affect measurements.
 - Keep relative humidity between 10 and 90% non-condensing, or consult the digitizer hardware documentation for the optimum relative humidity.
 - Maintain an ambient temperature of 23 ± 5 °C.
 - Allow a warm-up time of at least 15 minutes after the NI-SCOPE driver is loaded. Unless manually disabled, the NI-SCOPE driver automatically loads with the operating system and enables the device. The warm-up time ensures that the measurement circuitry of the NI 5122 is at a stable operating temperature.
- ◆ For PXI digitizers:
 - Ensure that the PXI chassis fan speed is set to HI, that the fan filters are clean, and that the empty slots contain filler panels.
 - Plug the PXI chassis and the calibrator into the same power strip to avoid ground loops.
 - ◆ For PCI digitizers:
 - Plug the PC and the calibrator into the same power strip to avoid ground loops.

Calibration Procedures

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

Using the Fluke 9500B/Wavetek 9500 in automated mode, the calibration procedure takes approximately 50 minutes. In manual mode, the procedure takes at least two hours.

Running the Calibration Executive Procedure

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

1. Launch Calibration Executive and follow the instructions in the Calibration Configuration Wizard to load the NI 5122 calibration procedure. Refer to 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 9500B/Wavetek 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.

3. When the procedure is loaded, click **Run Procedure** to begin. The procedure prompts you to enter the NI-DAQmx device name, which is found in Measurement & Automation Explorer (MAX).
4. Follow any instructions you receive from Calibration Executive.

Using an Alternative Calibrator



Caution The instructions provided by Calibration Executive for connecting the calibrator during external adjustment are specific to Fluke9500B/Wavetek 9500 oscilloscope calibrators.

If you are using a calibrator other than a Fluke9500B/Wavetek 9500, the procedure for connecting the calibrator is different.

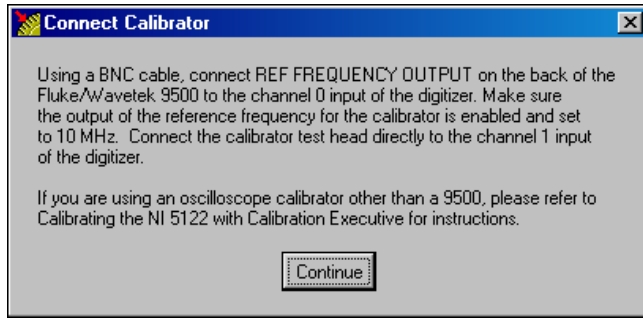


Figure 1. Connect Calibrator Dialog Box

When the Connect Calibrator dialog box appears, as shown in Figure 1, complete the following steps instead:

1. Connect a 10 MHz, 1 V_{pp} sine or square wave source to channel 0.
2. Connect the oscilloscope calibrator DC source to channel 1.
3. Click **Continue** and follow the remaining instructions provided by 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**.



Note If the NI 5122 fails verification after the adjustment, return it to NI for repair or replacement.

Reading the Calibration Report

For the NI 5122, the report database modifies the Bandwidth and Flatness tables to show input frequencies in a nonstandard format. The input frequencies used to test the device *As Found* are different from the input frequencies used to test the device *As Left*. These two separate frequencies are listed in the same cell of the table in the following format:

(Input Frequency As Found)/(Input Frequency As Left)

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**.

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.

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Worldwide Support

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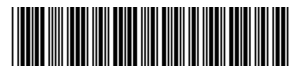
from the Worldwide Offices section of ni.com. Branch office Web sites provide up-to-date contact information, support phone numbers, email addresses, and current events.

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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Canada (Toronto) 905 785 0085, Canada (Vancouver) 514 685 7530,
China 86 21 6555 7838, Czech Republic 420 224 235 774,
Denmark 45 45 76 26 00, Finland 385 0 9 725 725 11, France 33 0 1 48 14 24 24,
Germany 49 0 89 741 31 30, Greece 30 2 10 42 96 427, India 91 80 51190000,
Israel 972 0 3 6393737, Italy 39 02 413091, Japan 81 3 5472 2970,
Korea 82 02 3451 3400, Malaysia 603 9131 0918, Mexico 001 800 010 0793,
Netherlands 31 0 348 433 466, New Zealand 0800 553 322,
Norway 47 0 66 90 76 60, Poland 48 22 3390150, Portugal 351 210 311 210,
Russia 7 095 783 68 51, Singapore 65 6226 5886, Slovenia 386 3 425 4200,
South Africa 27 0 11 805 8197, Spain 34 91 640 0085, Sweden 46 0 8 587 895 00,
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