

# Calibrating the NI PXI-4070 with Calibration Executive

This document contains step-by-step instructions for loading and running the National Instruments Calibration Executive procedure for the NI PXI-4070 digital multimeter (DMM).

## Contents

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Conventions .....	2
Equipment and Other Test Requirements .....	2
Required Test Equipment .....	2
Test Conditions .....	3
Documentation .....	3
Software .....	4
Calibration Executive Procedures .....	4
Setting Up the NI 4070 for Calibration .....	5
Loading and Running the Calibration Executive Procedure .....	5
Viewing the Calibration Report .....	5
Modifying the Font Size in a Calibration Report .....	6
Troubleshooting Guidelines .....	6
Specifications .....	7
Technical Support Resources .....	7
NI Web Support .....	7
Worldwide Support .....	7

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# Conventions

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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

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This section describes the equipment, test conditions, documentation, and software needed to calibrate NI 4070 DMMs.

### Required Test Equipment

The following equipment is required for calibrating the NI 4070:

- Fluke 5700A multifunction calibrator that has been calibrated within the last 90 days or a Fluke 5720A multifunction calibrator that has been calibrated within the last year
- Pomona 5145 insulated double banana plug shorting bar, or another means of creating a short with low thermal EMF ( $\leq 150$  nV) across the HI and LO input banana connectors on the NI 4070
- Two Pomona B-4 banana-to-banana patch cords (cables) or similar banana-to-banana cables with length not to exceed 4 in.
- Wire ( $\leq 22$  AWG,  $\leq 4$  in.) for connecting the AUX CURRENT and SENSE HI binding posts of the calibrator. Alternatively, you can use one of the Pomona B-4 cables instead of this wire

- National Instruments PXI chassis and controller
- NI 4070 calibration cable assembly (part number 161283A-01)

## Test Conditions

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

- Ensure that the PXI chassis fan speed is set to HI and that the fan filters are clean.
- Power on and warm up both the calibrator and the NI 4070 for at least 30 minutes before beginning this calibration procedure.
- Maintain an ambient temperature of  $23 \pm 1$  °C.
- Maintain an ambient relative humidity of less than 60%.
- Allow the calibrator to settle fully before taking any measurements. Consult the Fluke 5700A/5720A user documentation for instructions.
- Allow the thermal electromotive force (EMF) enough time to stabilize when you change connections to the calibrator or the NI 4070.
- Keep a shorting bar connected between the V GUARD and GROUND binding posts of the calibrator at all times.
- Clean any oxidation from the spade lugs on the calibration cable assembly before connecting them to the binding posts of the calibrator. Oxidation is a discoloration that tarnishes the copper spade lugs so that they appear dull rather than shiny.
- Leave the spade lugs on the calibration cable assembly that are labeled *SHD* connected to the V GUARD binding post of the calibrator at all times.
- Prevent the cables from moving or vibrating by taping or strapping them to a nonvibrating surface. Movement or vibration causes triboelectric effects that can result in measurement errors.

## Documentation

In addition to this calibration procedure, you may find the following documents helpful:

- *Calibration Executive Software User Manual*
- *NI Digital Multimeters Getting Started Guide*
- *NI Digital Multimeters Help*
- *NI-DMM Instrument Driver Quick Reference Guide*
- *Specifications for the NI PXI-4070*

When NI-DMM is installed on your computer, go to **Start»Programs»National Instruments»NI-DMM»Documentation** to view NI digital multimeter documents.

For the most recent of all these related documents, visit [ni.com/manuals](http://ni.com/manuals).

## Software

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

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

**Table 1.** Calibration Executive Directories and Supporting Files

Directory Name	Contents
Program Files\National Instruments\Calibration Executive\Procedures\NI4070	Directory structure that contains the calibration procedure and this document.
Program Files\National Instruments\Calibration Executive\Procedures\NI4070\Limits	Microsoft Access databases that store the calibration limits.
Program Files\National Instruments\Calibration Executive\Procedures\NI4070\Support Files	Support files such as bitmaps and DLLs.

## Calibration Executive Procedures

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

In automated mode, the calibration procedure takes approximately 90 minutes. In manual mode, the calibration procedure can take up to six hours.



**Note** For an explanation of automated versus manual calibration, refer to the *Calibration Executive Software User Manual*.

## Setting Up the NI 4070 for Calibration

To set up the NI 4070 for calibration, complete the following steps:

1. Install the NI 4070 in the PXI chassis according to the instructions in the *NI Digital Multimeters Getting Started Guide*.
2. Configure the hardware using Measurement & Automation Explorer (MAX).

## Loading and Running the Calibration Executive Procedure

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

1. Launch Calibration Executive.
2. Follow the Calibration Configuration Wizard to load the correct calibration procedure. For more information on loading and running the calibration procedure, refer to the *Calibration Executive Software User Manual*.
3. When the procedure is loaded, click **Run Procedure**.
4. When the calibration procedure prompts you for information about the installed hardware, enter the number assigned to the DMM by MAX when you configured the hardware.
5. Follow any further instructions you receive from Calibration Executive.



**Note** For a list of the test limits used in this calibration procedure, refer to the *NI PXI-4070 6½ Digit FlexDMM Calibration Procedure*, available at [ni.com/calibration](http://ni.com/calibration).



**Note** If the NI 4070 fails after calibration, refer to the [Troubleshooting Guidelines](#) section. If the device still fails after you complete the troubleshooting procedures, return it to NI for repair or replacement.

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

## Troubleshooting Guidelines

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This section describes common problems you might encounter when calibrating an NI 4070 and explains how to correct the problems.

If the NI 4070 is not recognized in MAX, make sure that you followed the configuration guidelines. Additional configuration information is available at [ni.com/support/daq](http://ni.com/support/daq). If MAX fails to recognize the NI 4070 after you reconfigure, contact NI technical support.

If the NI 4070 fails after calibration, try the following:

1. Check the connections and run the Calibration Executive procedure again.
2. If the calibration still fails after trying step 1, try verifying the failed test points using the DMM Soft Front Panel (SFP), which is located at **Start»Programs»National Instruments»NI-DMM»NI-DMM Soft Front Panel**. For example, if the analog input (AI) failed at 10.00 VDC, input that value from the calibrator.
  - a. Launch the DMM SFP.
  - b. Using the controls on the DMM SFP, select the appropriate mode and range as follows:
    - **mode:** V DC
    - **range:** 10.00 V
  - c. Check the reading on the display.

If the reading falls outside the range of limits shown in the calibration report after you complete steps 1 and 2, contact NI for repair or replacement. If the reading falls within the limits, you can change the calibration report to indicate the passing value.



**Note** If you have Microsoft Access 2000 or later installed on the computer, you can also modify the database containing the test results. By default, this database is located in Program Files\National Instruments\Calibration Executive\Databases\Calibration Reports.mdb.

# Specifications

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For specification information on the NI 4070, refer to one of the following documents:

- *NI PXI-4070 6½ Digit FlexDMM Calibration Procedure*, which is available for download at [ni.com/calibration/mancal](http://ni.com/calibration/mancal).
- *Specifications for the NI PXI-4070*, which is available for download at [ni.com/manuals](http://ni.com/manuals).
- The product data sheet, which is available for download at [ni.com/products](http://ni.com/products).

## Technical Support Resources

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### 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](http://ni.com).

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electronic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting [ni.com/hardref.nsf](http://ni.com/hardref.nsf). If your product supports calibration, you can obtain the calibration certificate for your product at [ni.com/calibration](http://ni.com/calibration).

### Worldwide Support

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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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Germany 49 0 89 741 31 30, Greece 30 2 10 42 96 427, India 91 80 51190000,  
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