
Calibration Executive

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Calibration Executive

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This help file describes how to use NI Calibration Executive to calibrate NI hardware devices. For detailed information on calibration, visit ni.com/calibration.

For more information about this help file, refer to the following topics:

[Related Documentation](#)

[Glossary](#)

[NI Services](#)

To comment on NI documentation, refer to the NI website.

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Activating Your Software

How Do I Activate My Software?

Before using your product, you must activate it in accordance with its license agreement. To activate a product, you must first purchase a license. For information on purchasing licenses, contact your local NI sales representative or visit ni.com/niglobal.

Complete the following steps to activate your NI products:

1. Select **Start»National Instruments»NI License Manager** to open NI License Manager.
2. Select one of the following methods to launch the Activate Software window:
 - Click **Activate Software** on the ribbon.
 - When in the **Local Licenses** view, right-click the product in the License tree and select **Activate**.



Note The first time you open NI software, the license activation window launches automatically.

3. If requested, log in to your NI User Account. If you do not have a User Account, you must create one.
4. Select one of the following methods to activate your products.
 - **Check my account for licenses**

Licenses associated with your account are verified successfully, activation completes. If your account lacks the appropriate licenses for a particular product, proceed to activate the product using either a activation code or a serial number.
 - **Enter a serial number**

You can find your serial numbers in the following locations:

 - On the Certificate of Ownership included in your software kit
 - On the product packing slip or shipping label
 - Visit ni.com/info and enter the Info Code SerialNumbers_en.
 - If you have installed a previous version of your application software using your serial number, you can find the serial number by selecting **Help»About** within the application.
 - Contact your local NI branch.
 - **Enter activation codes**

Click on **Generate an activation code** or visit ni.com/activate to obtain an activation code.
 - **Connect to a volume license server**

Enter the name of the volume license server on which your NI products should check for licenses.
5. Follow the prompts in the **Activate Software** window to complete activation.

If you activated through your NI software, you can use the product immediately after successful activation.



Notes

- If you were using NI software before you began the activation process, you may need to restart the software for the change to take effect.
- If your NI software is licensed through a volume license agreement, you do not need to activate your product. Instead, you need to point NI License Manager to a volume license server. For more information, refer to the **Using a Volume License Server** topic of the **NI License Manager Help**.

What Is Activation?

Activation is the process of obtaining an activation code to enable your software to run on your computer. An **activation code** is an alphanumeric string that verifies the software, version, and computer ID to enable features on your computer. Activation codes are unique and are valid on only one computer.

What Information Do I Need to Activate My NI Software?

You need your NI User account log-in, the product version and serial number, and a computer ID that uniquely identifies your computer. Certain activation methods may require additional information for delivery. This information is used only to activate your product. Complete disclosure of the NI software licensing information privacy policy is available at ni.com/activate/privacy. If you optionally choose to register your software, your information is protected under the NI privacy policy, available at ni.com/privacy.

How Do I Find My Product Serial Number?

Your serial number uniquely identifies your purchase of NI software. You can find your serial number on the Certificate of Ownership included in your software kit, or you can visit ni.com/info and enter the Info Code SerialNumbers_en.

If you have installed a previous version using your serial number, you can find the serial number by selecting **Help»About** within the application. You can also contact your local NI branch at ni.com/contact.

What Is a Computer ID?

The computer ID is a 16-character value that uniquely identifies your computer. NI requires this information to enable your software. You can find your computer ID through the NI Licensing Wizard or by using NI License Manager, as follows:

1. Launch the NI License Manager.
2. Click **Computer Information** in the ribbon.

For more information about product activation and licensing, refer to ni.com/activate.

How Can I Evaluate NI Software?

You can evaluate most NI products, in accordance with the license agreement. Evaluation terms vary, depending on which product you want to evaluate. Refer to your product documentation for specific information on the product's evaluation mode.

Moving Software after Activation

To transfer your software to another computer, uninstall the software on the first computer, then install and activate it on the second computer. You can transfer your software from one computer to another; you do not need to contact or inform NI of the transfer. Because activation codes are unique to each computer, you will need a new activation code. Refer to the [How do I Activate my Software?](#) section of this topic to learn how to acquire a new activation code and reactivate your software.

Deactivating a Product

To deactivate a product and return it to its preactivation state, navigate to the **Local Licenses** view, select the product to be deactivated, and click **Deactivate** from the ribbon. Alternatively, navigate to the **Local Licenses** view, right-click the product in the License tree, and click **Deactivate**. If the product was in evaluation mode before you activated it, the properties of the evaluation mode may not be restored.

Using Windows Guest Accounts

NI License Manager does not support Microsoft Windows Guest accounts. You must log in to a non-Guest account to run licensed NI application software.

Related Documentation

Most Calibration Executive manuals also are available as PDFs. You must have Adobe Reader installed to view the PDFs. Refer to the Adobe Systems Incorporated website at www.adobe.com to download the latest version of Adobe Reader. Refer to the NI Product Manuals Library at ni.com/manuals for updated documentation resources.

The following documents contain information that you may find helpful as you use this help file:

Calibration Executive

- **Calibration Executive Release Notes**
- **Calibration Executive Readme**

C Series Devices

- Refer to the getting started guide for your C Series device.

Data Acquisition (DAQ) Devices

- **DAQ Getting Started Guide for Bus-Powered USB**
- **DAQ Getting Started Guide for PCI/PCI Express**
- **DAQ Getting Started Guide for PXI/PXI Express**
- **DAQ Getting Started Guide for Externally Powered USB**
- **E/S Series and MIO 62xx Models Calibration Hardware Adapter Installation Guide**
- **Measurement & Automation Explorer Help for NI-DAQmx**
- **NI R Series Intelligent DAQ User Manual**
- **Getting Started with R Series Intelligent DAQ**
- B/E/S Series and MIO 62xx/63xx Models hardware documentation

- NI CompactDAQ hardware documentation

NI-DAQ and NI-DAQmx

- **NI-DAQmx C Reference Help**
- **NI-DAQmx Help**

Dynamic Signal Acquisition (DSA) Devices

- **National Instruments Dynamic Signal Acquisition Help**
- **NI Dynamic Signal Acquisition User Manual**

Modular Instruments Devices

- **Read Me First: Safety and Radio-Frequency Interference**
- **Maintain Forced-Air Cooling Note to Users**

Digital Multimeters

- **NI Digital Multimeters Getting Started Guide**
- **NI Digital Multimeters Help**

Digital Waveform Generator/Analyzers

- **NI Digital Waveform Generator/Analyzer Getting Started Guide**
- **NI Digital Waveform Generator/Analyzer Help**

High-Speed Digitizers

- **NI High-Speed Digitizers Getting Started Guide**
- **NI High-Speed Digitizers Help**

RF Devices

- **NI RF Signal Analyzers Getting Started Guide**
- **NI RF Signal Generators Getting Started Guide**
- **NI RF Signal Analyzers Help**
- **NI RF Signal Generators Help**

Power Supplies

- **NI DC Power Supplies and SMUs Getting Started Guide**
- **NI DC Power Supplies and SMUs Help**

Signal Generators

- **NI Signal Generators Getting Started Guide**
- **NI Signal Generators Help**

Specifications

To find the specifications of the device you are calibrating, select one of the following methods:

- Visit ni.com/calibration to find the manual calibration procedure for the device.
- Refer to the hardware documentation for the device. You can download the latest product documentation from ni.com/manuals.
- Visit ni.com/products to find the product data sheet for the device.



Note Data sheets for some products contain detailed specs.

Calibration Executive Device and Module Compatibility

The following table provides compatibility information about NI devices and modules that are not supported in this version of Calibration Executive but may be supported in a previous version. If a model is no longer supported, information in this table indicates which version of Calibration Executive is the last to support the device or module.



Note Using hardware with unsupported versions of Calibration Executive may result in errors, the inability for your operating system to recognize or detect and then find a driver for your device, or missing devices in Calibration Executive.

Device or Module	Last Supported in Calibration Executive
AT-5102	3.5.2
AT-AI-16XE-10	3.5.2
AT-MIO-16DE-10	3.5.2
AT-MIO-16E-1	3.5.2
AT-MIO-16E-10	3.5.2
AT-MIO-16E-2	3.5.2
AT-MIO-16XE-10	3.5.2
AT-MIO-16XE-50	3.5.2
AT-MIO-64E-3	3.5.2
DAQCard-4050	3.5.2
DAQCard-4350	3.5.2
DAQCard-5102	3.5.2
DAQCard-AI-16E-4	3.5.2
DAQCard-AI-16XE-50	3.5.2
DAQPad-4350	3.5.2
DAQPad-6020E	3.5.2
DAQPad-6020E (BNC)	3.5.2
DAQPad-6052E	3.5.2
DAQPad-6070E	3.5.2
DAQPad-6070E (BNC)	3.5.2
PC-4350	3.5.2
PCI-4060	3.5.2
PCI-4351	3.5.2
PCI-4451	3.5.2
PCI-4452	3.5.2
PCI-4551	3.5.2
PCI-4552	3.5.2
PCI-5102	3.5.2
PCI-5112	3.5.2
PCI-5911	3.5.2

PCI-6601	3.5.2
PCI-6602	3.5.2
PCMCIA-4050	3.5.2
PCMCIA-4350	3.5.2
PCMCIA-5102	3.5.2
PXI-4060	3.5.2
PXI-4351	3.5.2
PXI-5102	3.5.2
PXI-5112	3.5.2
PXI-5600	3.5.2
PXI-5620	3.5.2
PXI-6602	3.5.2
PXI-6608	3.5.2
SCXI-1100	3.5.2
SCXI-1120	3.5.2
SCXI-1120D	3.5.2
SCXI-1121	3.5.2
SCXI-1124	3.5.2
USB-5102	3.5.2
WSN-3202	3.6.6
WSN-3212	3.6.6
WSN-3226	3.6.6
NI cDAQ-9172 (USB Chassis)	4.5
DAQCard-6024E	5.2
DAQCard-6036E	5.2
DAQCard-6062E	5.2
DAQCard-6715	5.2
DAQPad-6015 (BNC)	5.2
DAQPad-6015 (Mass Termination)	5.2
DAQPad-6015 (Screw Termination)	5.2
DAQPad-6016	5.2
FP-AI-100	5.2

FP-AI-102	5.2
FP-AI-110	5.2
FP-AI-111	5.2
FP-AI-112	5.2
FP-AIO-600	5.2
FP-AIO-610	5.2
FP-AO-200	5.2
FP-AO-210	5.2
FP-RTD-122	5.2
FP-RTD-124	5.2
FP-TC-120	5.2
PCI-6010	5.2
PCI-6011E	5.2
PCI-6013	5.2
PCI-6014	5.2
PCI-6023E	5.2
PCI-6024E	5.2
PCI-6025E	5.2
PCI-6030E	5.2
PCI-6031E	5.2
PCI-6032E	5.2
PCI-6033E	5.2
PCI-6034E	5.2
PCI-6035E	5.2
PCI-6036E	5.2
PCI-6040E	5.2
PCI-6052E	5.2
PCI-6070E	5.2
PCI-6071E	5.2
PCI-6551	5.2
PCI-6552	5.2
PCI-7830R	5.2

PCI-7831R	5.2
PCI-7833R	5.2
PCI-AI-16XE-10	5.2
PCI-AI-64XE-10	5.2
PCI-MIO-16E-1	5.2
PCI-MIO-16E-4	5.2
PCI-MIO-16XE-10	5.2
PCI-MIO-16XE-50	5.2
PCI-MIO-64E-1	5.2
PCI-MIO-64XE-10	5.2
PCMCIA-6715	5.2
PXI-4220	5.2
PXI-5610	5.2
PXI-5900	5.2
PXI-6025E	5.2
PXI-6030E	5.2
PXI-6031E	5.2
PXI-6040E	5.2
PXI-6052E	5.2
PXI-6070E	5.2
PXI-6071E	5.2
PXI-6551	5.2
PXI-6552	5.2
PXI-7830R	5.2
PXI-7831R	5.2
PXI-7833R	5.2
PXIe-6555_6556 Switch Fixture	5.2
SCXI-1102	5.2
SCXI-1102B	5.2
SCXI-1102C	5.2
SCXI-1104	5.2
SCXI-1104C	5.2

SCXI-1125	5.2
SCXI-1503	5.2
SCXI-1520	5.2
SCXI-1600	5.2
FP-AI-100	5.2
FP-AI-102	5.2
FP-AI-110	5.2
FP-AI-111	5.2
FP-AI-112	5.2
FP-AI-118	5.2
FP-AIO-600	5.2
FP-AIO-610	5.2
FP-AO-200	5.2
FP-AO-210	5.2
FP-RTD-122	5.2
FP-RTD-124	5.2
FP-TC-120	5.2
PXI-5691	6.9.0
PXIe-5632	6.9.0
VB-8012	6.9.0
VB-8034	6.9.0
VB-8054	6.9.0

The **Calibration Executive Readme** contains the most up-to-date information for device and module compatibility for each version of the software. The readme and other documentation is available at ni.com/manuals.

Calibration Executive Overview

Calibration Executive, intended primarily for metrology labs, provides an integrated software environment in which to verify and adjust NI measurement devices.

Features

Calibration Executive has the following capabilities:

- Externally calibrates many NI measurement devices
- Operates in automated or manual mode
- Configures and controls calibration instruments automatically
- Stores calibration reports in a central database
- Expands as new hardware calibration procedures are added

The Calibration Executive engine provides the core calibration, control, and reporting functionality. Each [device calibration procedure](#) provides the calibration routines and automation for a specific measurement device family.

Major Components of Calibration Executive

Calibration Executive is designed using NI LabVIEW, IVI, TestStand, and NI-VISA. A core component of Calibration Executive is the calibration engine. This engine, which includes the user interface, communicates with the following drivers and databases to control the calibration process:

- Interchangeable virtual Instruments (IVI)—A software standard for creating a common interface (API) to common test and measurement instruments. The IVI driver communicates with your standards during calibration, typically using GPIB.
- Report Database—A Microsoft Access database that stores the calibration results about assets you have calibrated, such as verification readings taken before and after calibration.
- TestStand—A test executive framework that manages the calibration procedures used to calibrate the asset.

Download the Calibration Executive installer from ni.com/downloads. Refer to **Installing, Updating, Repairing, and Removing NI Software** using Package Manager on ni.com/docs.

New Features and Changes

Learn about updates—including new features and behavior changes—introduced in each version of Calibration Executive.

Calibration Executive 2023 Q3

- Added support for the following products
 - PXIe-4147
 - PXIe-5655
- Removed support for the following procedures
 - NI VB-8012
 - NI VB-8034
 - NI VB-8054
 - PXIe-5632
 - PXI-5691

Calibration Executive 6.9

- Added driver support for Rohde & Schwarz NRP33S Power Sensor
- Added product support for NI 9262

Calibration Executive 6.8

- Added support for the following products
 - PXIe-5163
 - PXIe-5698
- Updated the following procedures
 - PXIe-5160 (2CH)
 - PXIe-5160 (4CH)
 - PXIe-5162 (2CH)
 - PXIe-5162 (4CH)
 - PXIe-5164
 - PXIe-5650
 - PXIe-5651
 - PXIe-5652
 - PXIe-5663E

- PXIe-5673E 3.3GHz
- PXIe-5673E 6.6GHz
- Removed NI USB-5681 calibration procedure support
- Removed NI USB-5684 power meter standard support

Calibration Executive 6.7

- Added support for the following products
 - FD-11613
 - FD-11614
 - NI 9210
 - NI TB-9212 with mini-TC
 - PXIe-4135 (40W)
 - PXIe-4137 (40W)
- Updated the following procedures
 - NI 9219
 - PXIe-4081 (90 day)
 - PXIe-4081 (2 yr)
 - PXIe-4137
 - RM-26999

Calibration Executive 6.6

- Added driver support for Rohde & Schwarz SMA100B signal generator for procedures that previously supported the Rohde & Schwarz SMA100A
- Updated the following procedures
 - PXIe-5160
 - PXIe-5162
 - PXIe-5644R
 - PXIe-5645R
 - PXIe-5646R

Calibration Executive 6.5

- Added product support for the PXIe-4139 (40W)
- Updated the following procedures
 - PXIe-4081 (90 day)
 - PXIe-4081 (2 yr)
 - PXIe-4135
 - PXIe-4139
 - PXIe-5840
 - PXIe-5841
 - NI 9212

Calibration Executive 6.4

- Revised the reporting of guard band values with dB and dBv units on the calibration report
- Import uncertainties from an Open XML spreadsheet using formulas that result in text values
- Added support for the following products
 - PXIe-5841
 - PXIe-5841 (2 yr)
 - RM-26999
- Updated the guard band calculation for uncertainties with dB and dBv units
- Updated the following procedures
 - PCI-4461
 - PXI-4461
 - PXIe-5654 (10 GHz)
 - PXIe-5654 (20 GHz)
 - PXIe-5654 with PXIe-5696 (10 GHz) Adjust Only
 - PXIe-5654 with PXIe-5696 (20 GHz)
 - PXIe-5668 (14 GHz), all bandwidth options

- PXIe-5840
- PXIe-5840 (2 yr)
- NI 9220
- NI 9263

Calibration Executive 6.3

- Revised formulas for determining measurement uncertainty related to TURs and nominal values
- Updated the TUR calculation for uncertainties with dB and dBv units
- Updated the following procedures
 - PXIe-4135
 - PXI-5422

Calibration Executive 6.2

- Added support for the following products
 - PXIe-5624
 - PXIe-5606 Adjust Only
 - PXIe-5668 Adjust Only
 - USB-6346 (Screw Terminal)
 - STS-DIO-01
- Updated the following procedures
 - PXI-4110
 - PCI-5412
 - PXI-5412
 - PCI-5421
 - PXI-5421
 - PXI-5441
 - PXIe-5442
 - PXIe-5653

- PXIe-5665 (3.6 GHz)
- PXIe-5665 (3.6 GHz), no pre-amp
- PXIe-5665 (14 GHz)
- PXIe-5668 (14 GHz), all bandwidth options
- PXIe-5668 (26.5 GHz), all bandwidth options

Calibration Executive 6.1

- Added support for the following products
 - NI 9224
 - NI 9228

Calibration Executive 6.01

- A critical bug in the Verify ALC Limits Table test was fixed, enabling the following devices to be verified and adjusted
 - PXI-5650
 - PXIe-5650
 - PXI-5651
 - PXIe-5651
 - PXI-5652
 - PXIe-5652
 - PXIe-5663
 - PXIe-5663E
 - PXIe-5673
 - PXIe-5673E

Calibration Executive 6.0

- Uncertainty and guard band options in custom report configurations
- Added support for the following products
 - PXIe-6349
 - USB-6349

- NI 9202
- NI 9252
- Added adjustment support for NI 9203
- Modified audio notifications can only be enabled or disabled; there are no additional options to be configured
- Removed support for 32-bit OS calibration procedures

System Requirements

For proper operation of the Calibration Executive software, your computer must meet the following minimum requirements:

- Pentium 4/M processor or equivalent
- 4 GB of RAM
- 1024 x 768 pixels screen resolution
- The user must have administrator privileges
- Windows 10 (64-bit version only)



Notes

Calibration Executive is not compatible with operating systems that use wide characters (for example, Japanese or Chinese).

Calibration Executive only supports using periods (.) for decimal places. If your computer is configured to use commas as decimal places, you must change this setting.

Additional Software Requirements

To view calibration reports in all available formats, you must have the following components installed on your system:

- Java Runtime Environment, Java SE 8 Update 51 or greater

- Adobe Acrobat Reader
- Microsoft Word
- Microsoft Excel (64-bit is recommended)

The following instruments require specific drivers that are not installed by Calibration Executive. To install these drivers, you must download them directly from the manufacturer's website; you can find links to third party instrument drivers at ni.com/idnet.

Driver versions listed are those tested during development; later versions might be available and should be compatible.

Instrument	Required Drivers
Rohde & Schwarz NRP-Z power meter	<ul style="list-style-type: none"> ▪ NRP-Toolkit 4.16 ▪ NRP-NI-VISA Passport 2.7.1 ▪ NRP-Z VXI Plug & Play x64 Driver 3.6.0.0
Rohde & Schwarz SMA100A signal generator	VXIplug&play x64 driver rssma version 2.21.0



Note This release does not include an NI-VNA driver. To run the PXI-5691 and PXIe-5632 procedures, download NI-VNA 18.0 and install the driver manually after you install Calibration Executive.

Automated Mode Versus Manual Mode

For most devices, Calibration Executive calibrates in either automated or manual mode.

Automated Mode

If the IVI driver supports the calibration standard(s) you are using or if Calibration Executive provides a custom driver and you have a GPIB card, Calibration Executive automates verification and adjustment by communicating directly with the calibration standards.

Manual Mode

If you do not have supported standards, you must run the procedure in manual mode. In manual mode, Calibration Executive prompts you to manually control the standards. Calibration Executive then makes the necessary verification and/or adjustment to the device. To enter manual mode, select **Enter Unsupported Instrument** on the [Required Standards](#) page when launching a calibration procedure.



Note Not all devices are supported in manual mode. Refer to the specific [device calibration procedure](#) to check if your device supports manual mode.

Upgrade Considerations

Refer to **Installing, Updating, Repairing, and Removing NI Software** using Package Manager on ni.com/docs.

Calibration Executive versions 6.0 and later have a new installation path, and the program no longer launches as an administrator application. These changes can render some application database paths invalid after the upgrade. After an upgrade, you might need to manually move some files.

Upgrading Calibration Executive 5.x to 6.0 and later

If your Report and Uncertainty databases are in their default locations, the setup program will automatically move the databases to the new default location and no action is required.

If databases were moved from their default locations in Calibration Executive 5.x, then Calibration Executive 6.x attempts to reference the current location. If Calibration Executive cannot write to the files in this location, a warning message will be displayed when you first launch Calibration Executive. In this case, you will need to move the files manually to a writable location. After you move the database files, follow the instructions in [Selecting Database Locations](#) to configure the paths for Calibration Executive 6.0 and later.

Upgrading Calibration Executive 4.x to 6.0 and later

The setup program for Calibration Executive 6.x does not automatically move your Report and Uncertainty databases, even if they are in their default locations. Instead, you will need to move the databases manually to a writable location. After you move the database files, follow the instructions in [Selecting Database Locations](#) to configure the paths for Calibration Executive 6.0 and later.

Selecting Database Locations

To select the location of your Report database:

1. In the menu bar, select **Configure » Database options**.
2. Click the folder icon in the Calibration Executive Configure Report Database dialog, and browse to find the database file.
3. Select the file and click **OK**.
4. Click **OK** to close the dialog box.

To select the location of your Uncertainty database:

1. In the menu bar, select **Configure » Calibration Reports**.
2. In the Calibration Reports window, click **Manage Uncertainty**. The Uncertainty Export/Import window opens.
3. Select **Database Options » Select Database Location**.
4. Use controls in the Select Uncertainty Database File explorer window to locate your uncertainty database file.
5. Select the file, and click **OK**.
6. In the Uncertainty Export/Import window, click **Done**.
7. Click **Close** to close the Calibration Reports window.

Uninstalling Calibration Executive

Each NI software product has its own uninstall information. To remove any of these products from your system, use the Add/Remove Programs utility in your system

control panel. Many of these programs update your Windows registry and place files in your system directory.

For Windows systems, perform the following procedure to uninstall Calibration Executive:

1. Open the Control Panel from **Start»Settings»Control Panel** and choose **Add or Remove Programs**.
2. Select **National Instruments Software**.
3. Click **Remove**.
4. Select **NI Calibration Executive** from the list of installed NI software.
5. Click **Uninstall**.



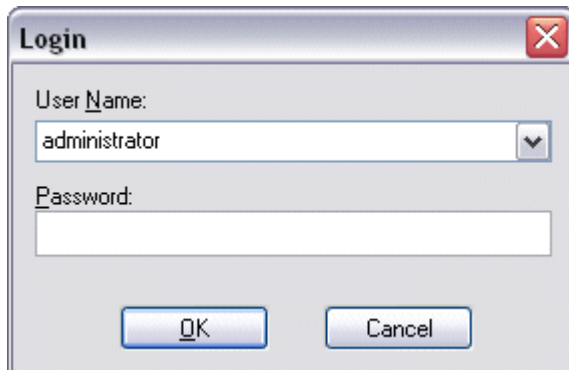
Notice Do **not** attempt to uninstall by deleting files, as some files may be shared with other programs.

Refer to [Calibration Reports Database](#) for information on saving a report database file (calibration reports.mdb) that is compatible with version 3.2 or prior.

Launching Calibration Executive and Logging In

To log in to Calibration Executive, complete the following steps:

1. Launch Calibration Executive by selecting **Start»Programs»National Instruments»Calibration Executive**.
2. In the Login dialog box, select either **administrator** or another user name from the User Name control.



- If you select a user name other than administrator, enter a valid password. If you select administrator, no password is necessary.

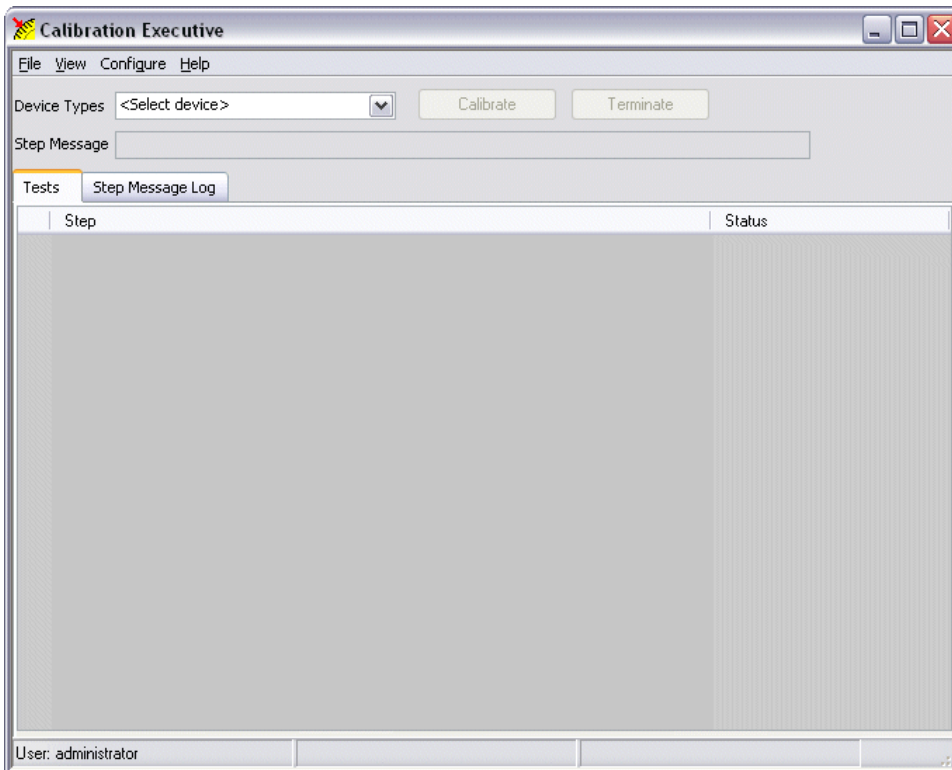


Note You should change the default administrator password after the initial login. Refer to [Editing a User Profile](#) for instructions on how to change the default password.

- Click **OK** to launch the user interface.

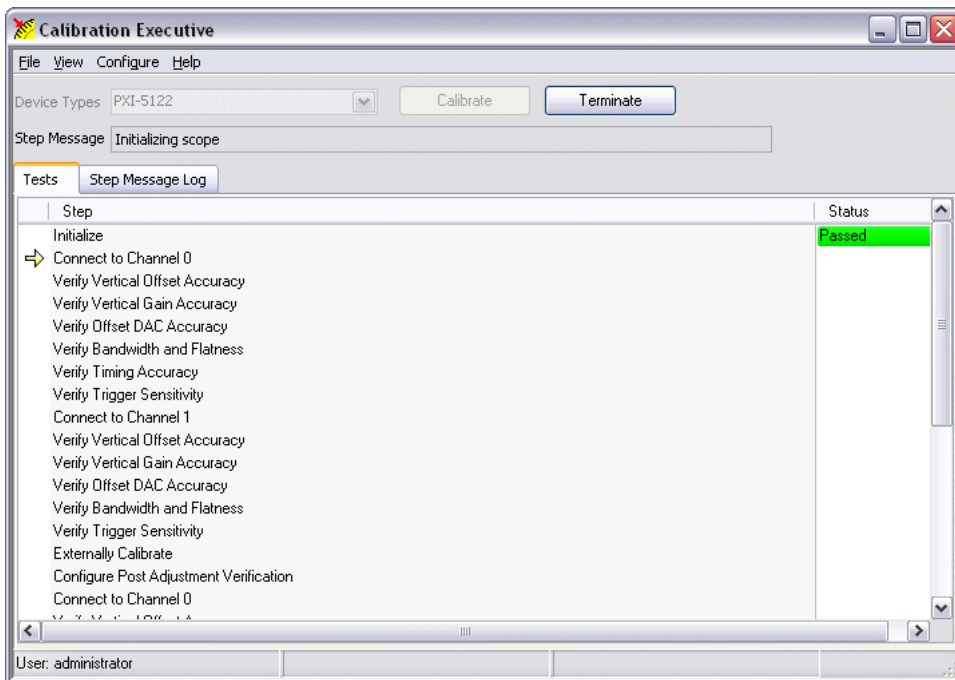
Calibration Executive User Interface

The following figure shows the main components of the Calibration Executive user interface. This interface provides access to run calibration procedures; configure users, databases, and calibration reports; and to view the documentation.

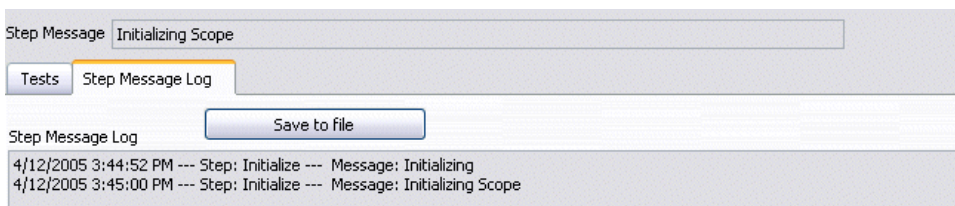


- **Menu bar**—Menu items control the main processes of Calibration Executive.
- **Device Types selector**—Select the device name for the calibration procedure to run.

- **Calibrate button**—Starts the calibration procedure.
 - **Terminate button**—Ends the calibration procedure before it completes.
 - **Step Message**—Displays status messages from the step that is currently executing.
 - **Tests tab**—Displays the step name that is currently running and the status of each step.
 - **Step**—Displays which values are currently being verified or adjusted.
 - **Status**—Indicates whether a step in the procedure passed or failed.
- The following figure shows the Step and Status window during a calibration procedure. The yellow arrow to the left of the step indicates which step is currently executing.



- **Step Message Log tab**—Displays a log of the history of verify test points and their results.



- **Save to file button**—Saves the Step Message Log results in a text file.

Menu Bar



The Calibration Executive menu bar contains the following four menus:

File

The File menu contains the following options:

- **Logout**—Logs out the current user and enables the Login selection under the File menu.
- **Exit**—Closes Calibration Executive.



Note If a calibration procedure is currently running, closing Calibration Executive may cause errors. Make sure you click the **Terminate** button before you exit Calibration Executive.

- **Login**—Allows a new user to log in to the application.

View

The view menu contains the following option:

- **Calibration Reports**—Opens the Calibration Reports window. Use this window to [view or delete](#) a stored calibration report.

Configure

The Configure menu contains the following options:

- **Audio Notifications**—Enables or disables audio notifications in Calibration Executive.
- **Report Options**—Configures how Calibration Executive displays calibration reports.

- **Database Options**—Determines the database that stores calibration reports.
- **Report Database Backup Copy**—Saves a secondary copy of the current calibration reports database.
- **Users**—Allows you to add new users, edit current user profiles, or delete users.

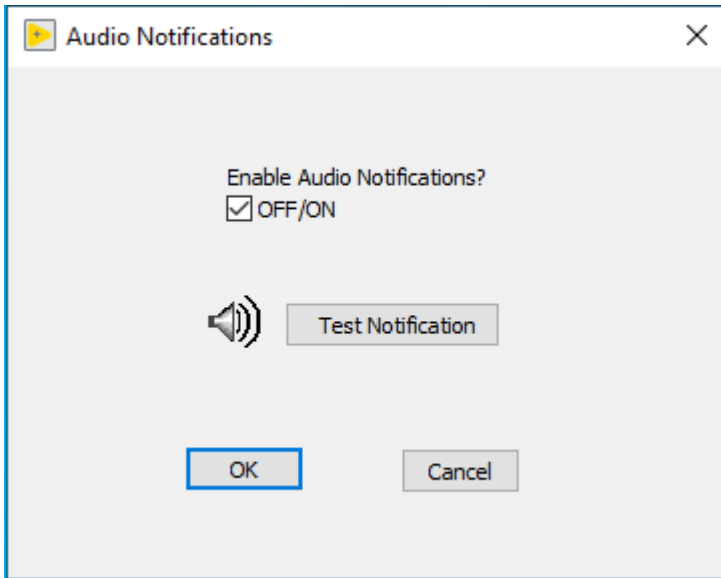
Help

The Help menu contains the following options:

- **Calibration Executive Help**—Launches this help file.
- **Calibration Procedure Help**—Provides procedure help for the device type selected.
- **About Procedure**—Provides specific information about the procedure used to calibrate the device selected.
- **About Calibration Executive**—Displays the version of Calibration Executive you are using.

Configuring Audio Notifications

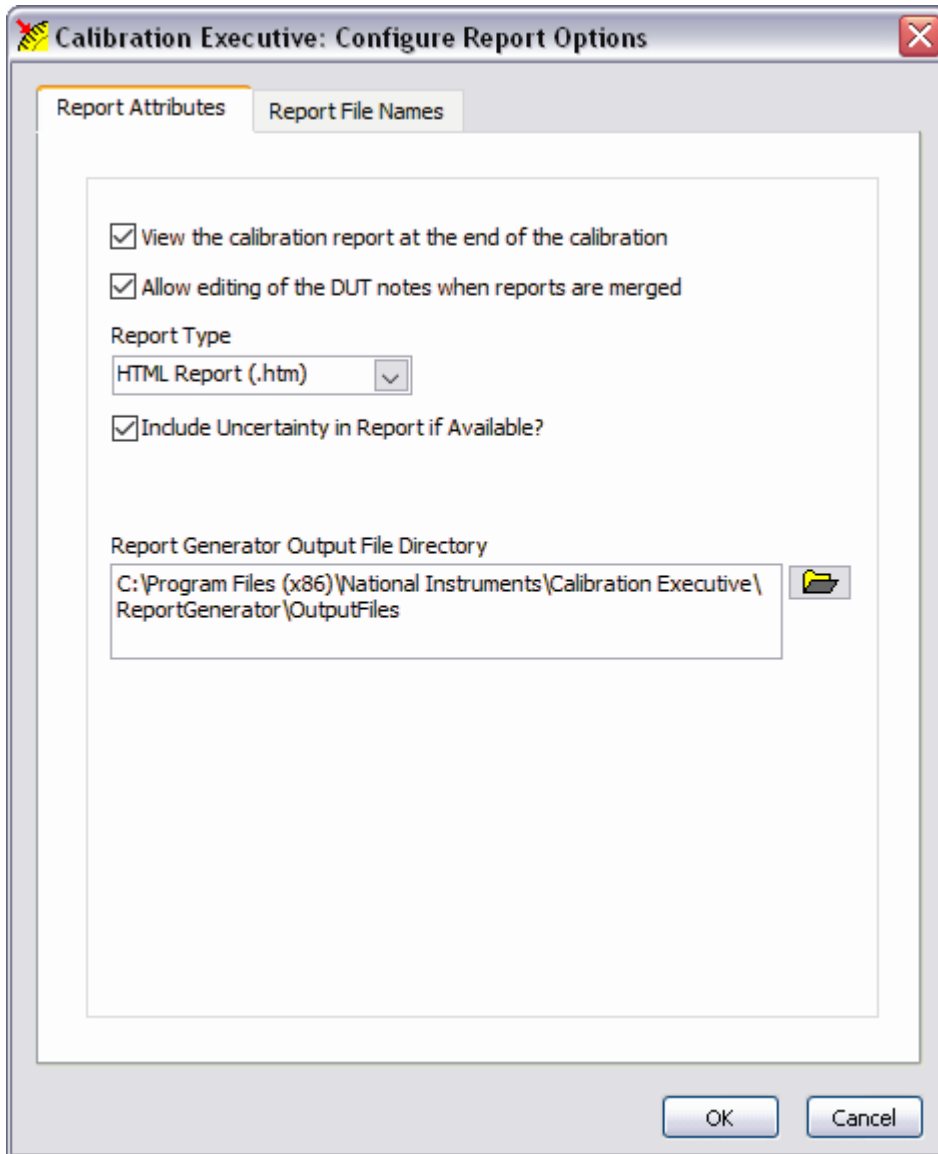
Select **Configure»Audio Notifications** to configure your system to notify you when a test needs attention.



1. Select or deselect **OFF/ON** under **Enable Audio Notifications?** to enable or disable notifications.
2. Click **Test Notification** to test your audio notification.
3. Click **OK** to save your settings.

Configuring Report Options

Select **Configure»Report Options** to specify the format of the calibration report, the location in which to store calibration reports, and customize the report name.



1. Select a format from the Report Type pull-down menu: Text, HTML, PDF, or MS Word.
2. Click the folder icon to the right of the Report Generator Output File Directory field to browse for the directory in which to store your calibration reports.
3. Highlight the name of the directory.
4. Click **Select Cur Dir**.
5. Click **OK**.



Tips Enable

View calibration report at the end of the calibration if

you want the report to display automatically when the calibration completes.

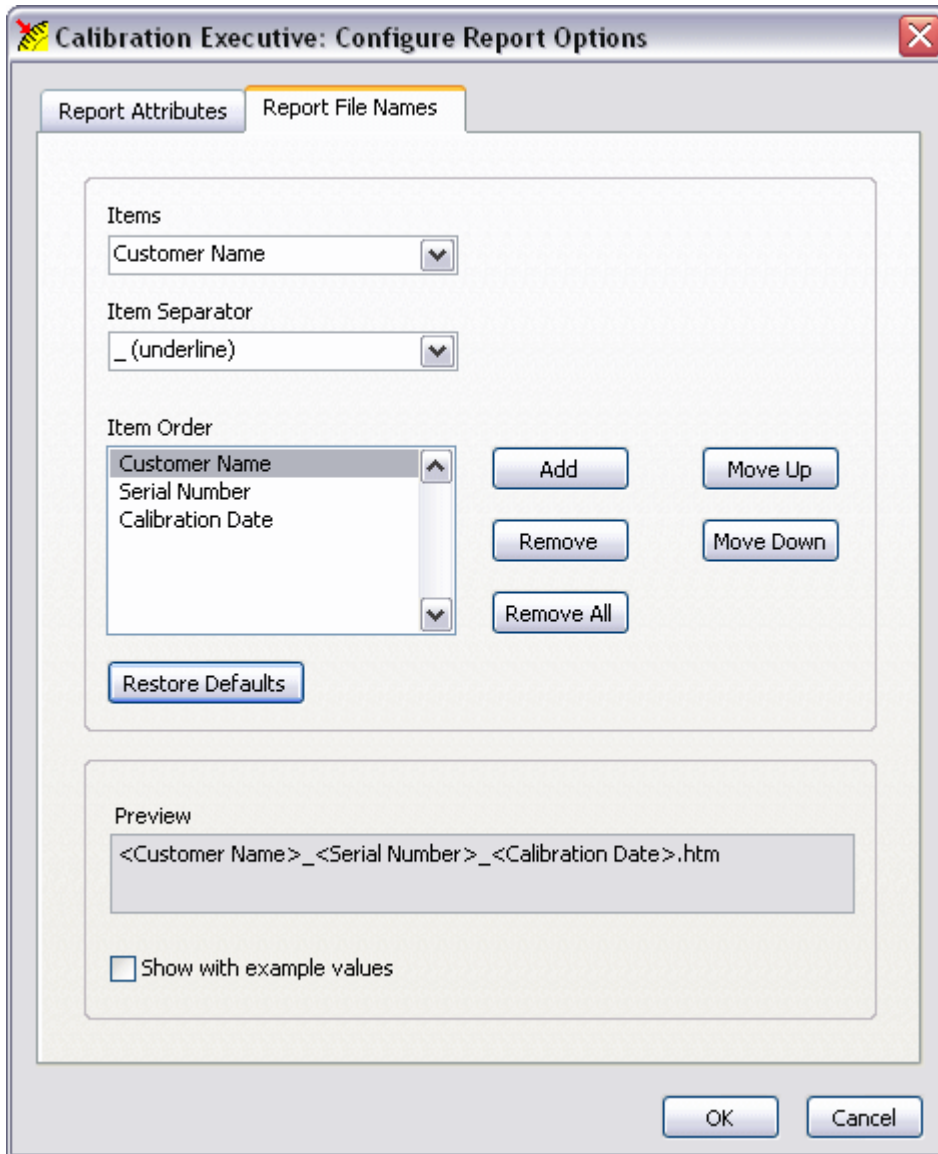
Enable

Allow editing of DUT notes when reports are merged

to edit the DUT notes when merging reports.

Flexible Report Names

Click the **Report File Names** tab to customize the report name.



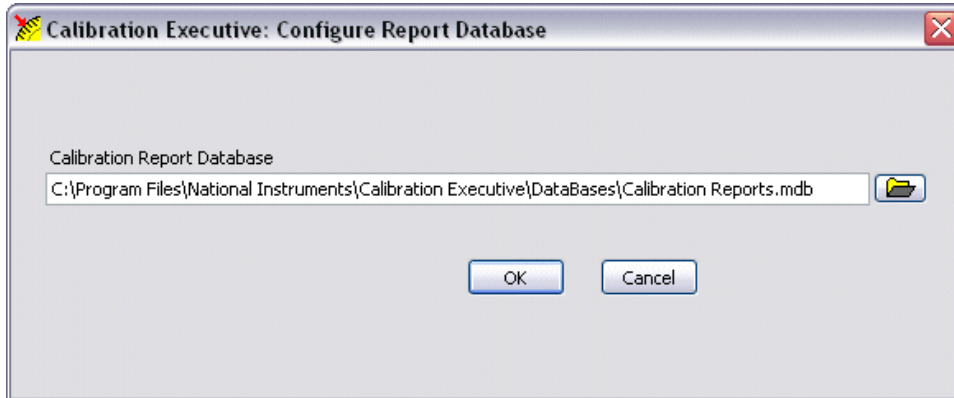
1. Select an item for the report name using the Items pull-down menu.
2. Click **Add** to add the selected item to the report name. Use the **Remove** and **Remove All** buttons to remove any selected items from the report name.
3. Repeat steps 1 and 2 for each item you want to add to the report name.
4. Select a separating character for the report name using the Item Separator pull-down menu.
5. Click **Move Up** and **Move Down** to arrange the items in the Item Order text box. The preview text box displays the customized report name.



Tip Click **Restore Defaults** to restore the default report name.

Configuring Database Options

Select **Configure»Database options** to specify the database that stores calibration reports. The Configure Report Database window contains the path to the location where the database is stored.



To modify this path, complete the following steps:

1. Click the folder icon to the right of the path.
2. Search for the new file location.
3. Highlight the name of the file.
4. Click **Open**.
5. Click **OK**.

Configuring Users

Select **Configure»Users** to open the Configure Users window, from which you can add new users and edit or delete current users.

Adding a New User

1. Click **Add**.

2. Enter the User Name, Full Name, Comment, and Password in the appropriate fields.
3. Re-enter the Password in the **Confirm Password** field.
4. Select a profile in the User Profile control to define an initial set of privileges for a new user. The following table shows specific user privileges.

Feature	Non-Administrator Privilege	Administrator Privilege
Create/edit/delete users	No	Yes
Configure file locations	No	Yes
Delete calibration reports	No	Yes

5. Click **OK** to save your changes.

Deleting a User

To delete a user name, complete the following steps:

1. Highlight the name of the user you want to remove.
2. Click **Delete**.
3. Click **OK** to save your changes.



Note You cannot delete your own login information.

Editing a User Profile

To modify the login name, comments, or password associated with the selected user, complete the following steps:

1. Click **Edit**.
2. Modify the information you want to change.
3. Click **OK** to save your changes.



Note The **Advanced** button displays the Edit Flags dialog box, which contains TestStand property flags you can modify. You need to configure these property flags only when you are developing a relatively sophisticated custom type in TestStand. The **Advanced** button has no function in Calibration Executive.

Viewing a Calibration Report

You can view calibration reports in one of the following formats: text, HTML, PDF, or Microsoft Word.

1. Select **View»Calibration Reports** to display the Calibration Reports window, shown in the following figure.

Customer Name	Work Order	<Calibration Date>	Asset	Serial Number	As Found Status	As Left Status
GLIDDANT CORPORATION	23021287	Monday, August 21, 2017 10:08:06	PCI-5112	DC442D	Passed	Passed
Goodrich Aerospace	2020090	Friday, August 18, 2017 14:59:04	PCI-5112	DC449A	Passed	Passed
Goodrich Aerospace	2020090	Friday, August 18, 2017 14:56:15	SCXI-1102	11C2A24	Passed	Passed
National Instruments	327479	Friday, August 18, 2017 14:50:15	SCXI-1102	11C979A	Passed	Passed
National Instruments	327479	Friday, August 18, 2017 14:46:34	PXI-6052E	10C06D0	Passed	Passed
National Instruments	327479	Friday, August 18, 2017 14:40:57	PXI-5112	10F1C11	Passed	Passed
National Instruments	327479	Friday, August 18, 2017 14:39:51	PXI-5112	10F3818	Passed	Passed
National Instruments	2020090	Friday, August 18, 2017 10:50:36	PXI-4060	D2B53A	Passed	Passed
Dade Behring Inc.	DAN36846N	Friday, August 18, 2017 10:49:36	PCI-6036E	10E6649	Passed	Passed
Dade Behring Inc.	DAN36846N	Friday, August 18, 2017 10:47:08	PCI-6036E	10C5EFB	Passed	Passed
Advanced Bionics	53712	Friday, August 18, 2017 10:22:18	PCI-6251	1171C68	Passed	Passed
National Instruments	327479	Friday, August 18, 2017 10:17:41	PXI-6602	11146C0	Passed	Passed
National Instruments	327479	Thursday, August 17, 2017 16:31:35	PXI-6031E	10B36A3	Passed	Passed

Incomplete Report Uncertainty in Report
 Merged Report Uncertainty Available from DB

Search Column: Calibration Date For: Uncertainty Version:
 # of Records found: 23 Show All Reports Manage Uncertainty Report Type: HTML Report View Merge Reports Close

2. Highlight the report you want to view from the displayed list.
3. Use the **Report Type** field to select Text, PDF, HTML, or MS Word report type.
4. Click **View** to display the report or click **Delete** to remove the report from the database.
5. Click **Close** to close the Calibration Reports window and return to the main Calibration Executive user interface.



Tip The brackets around a column header indicate that the reports are sorted on this field. To sort on a different field, click on another column header.

Launching a Calibration Procedure

This tutorial teaches you how to launch a calibration procedure in NI Calibration Executive. In this tutorial, you will launch a calibration procedure by completing the following tasks:

1. Launching the Setup Wizard
2. Entering the Customer Information
3. Selecting the Required Standards
4. Entering Environmental Information and Selecting Options
5. Selecting a DUT

6. Run-time Dialog Boxes

Next Step

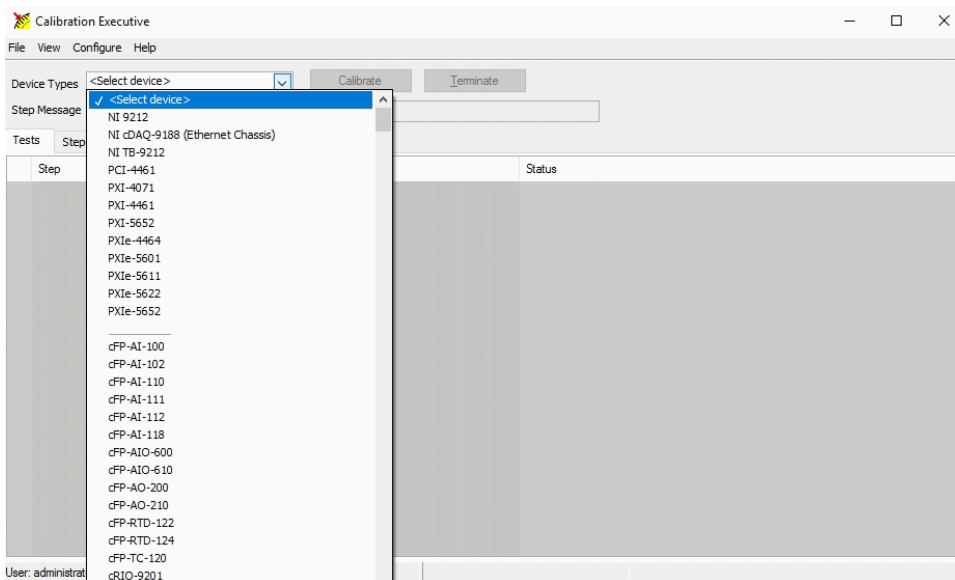


[1. Launching the Setup Wizard](#)

1. Launching the Setup Wizard

Complete the following steps to launch the setup wizard.

1. Select the device to calibrate from the **Device Types** control in the upper left corner of the user interface.
Devices connected to your system that have calibration procedure support are listed at the top of the drop-down list. Devices that appear in the list below the break line are selectable, but they reflect devices that are not automatically detected at the launch of Calibration Executive.



2. Click the **Calibrate** button to launch the setup wizard.



Previous Step

[Launching a
Calibration Procedure](#)

Next Step

[2. Entering the
Customer Information](#)



2. Entering the Customer Information

1. Enter the customer name and address. Calibration Executive stores this information and retrieves it the next time you begin to enter the customer name.



Note To delete a customer entry, begin typing the name in the **Customer Name** field. When a list of matching names appears, use the up/down arrow keys to highlight the name, as shown in the figure below, and press the **Delete** key. Click **Delete** to delete the customer entry from the database.

2. (Optional) Enter information in the **Work Order Number** field.
3. Enter any additional relevant information in the **Notes** field.

4. Click Next.

←	Previous Step 1. Launching the Setup Wizard	Next Step 3. Selecting the Required Standards	→
---	---	---	---

3. Selecting the Required Standards

PXI-4071

Required Standards

Please Select a Calibrator

- Enter Unsupported Instrument
- Fluke 5500A Multifunction Calibrator
- Fluke 5502A Multifunction Calibrator
- Fluke 5520A Multifunction Calibrator
- Fluke 5522A Multifunction Calibrator

National Instruments requires Fluke 5720A calibrator

Tracking No. Calibration Period Calibration Due Date

Notes

Address Refresh

Help Back Next Cancel



Note Each calibration instrument required for your selected calibration procedure has its own page. You must complete the required information for each instrument before proceeding to the next page.

1. Select a supported instrument from the supplied list.




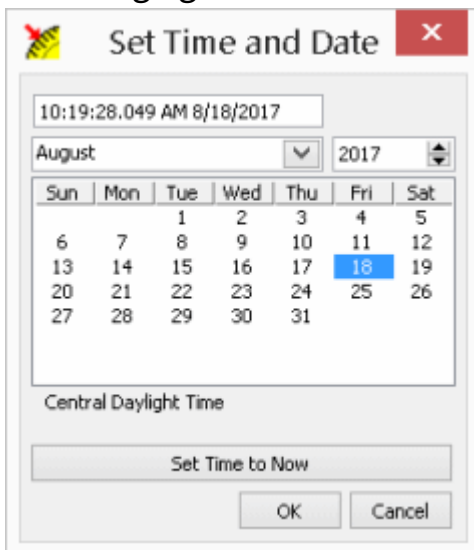
Note The drop-down list contains several models for each category of instrument; however, only a model specified or recommended in the DUT's procedure has been validated to work for that procedure. Unvalidated models may not be supported in software for the DUT's procedure and may error out during operation.



Note If you select

Enter Unsupported Instrument, you are prompted to enter additional information about the instrument in the **Description** field.

2. Enter a tracking number for the instrument in the **Tracking No.** field.
3. Select a calibration interval for the instrument from the **Calibration Interval** list box.
4. Select the calibration due date for the selected instrument in the **Calibration Due Date** field. You can either enter the date from the keyboard or click the calendar icon  to launch the time and date dialog box, shown in the following figure.





5. Enter any additional comments in the **Notes** field.
6. Select the correct address of the instrument from the **Address** list.



Note The **Address** list displays all detected instruments that are connected to your computer. If the address of your instrument is not displayed in the list, ensure that the instrument is connected and click **Refresh**. To run a calibration procedure in automated

mode, you must select the instrument and its address.

7. Click **Next** to proceed to the next Required Standards page.
8. When you complete all required standards information, click **Next**.

	Previous Step 2. Entering the Customer Information	Next Step 4. Entering Environmental Information and Selecting Options	
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Configuring and Using Tracking Numbers

Tracking Numbers

Calibration Executive version 4.1 or later enables you to maintain and view customer-specific tracking numbers using the calibration setup wizard. Two configuration files are created upon the initial launch of Calibration Executive:

- TrackingNumberFilePath.ini - Contains path information for the tracking number configuration file. The user can modify the key under the [TrackingNumberFilePath] section to set the path of the TrackingNumbers.ini file.
- TrackingNumbers.ini - Contains hardware serial numbers paired with associated tracking numbers, if entered, in the format `SerialNumber = TrackingNumber`.

When you add or edit a tracking number for a device in the DUT Selection page, Calibration Executive stores the number in the TrackingNumbers.ini configuration file. Tracking numbers created or edited in the wizard are committed to the configuration file when the user clicks **Finish** and the calibration session is initiated.

Setting Up and Configuring the Tracking Number File

The TrackingNumberPath.ini configuration file holds a single key under the section [TrackingNumberFilePath], which allows the user to set the path of the tracking

number configuration file. The default location as created is Path = C:\<Program Files>\National Instruments\Calibration Executive\Config\TrackingNumbers.ini.

The tracking number configuration file can be renamed and relocated as the user chooses, including network locations accessible to multiple computers, and will function as long as the correct path is defined in the TrackingNumberFilePath.ini file. The file must remain a configuration file with the .ini file extension.

The tracking number configuration file organizes tracking numbers through pairs of SerialNumber = TrackingNumber, where the serial number is as detected in NI-MAX by the system API without leading zeroes.



Note Although the serial number detected by NI-MAX typically matches the serial number printed on the board, it is possible for discrepancies to occur. If you experience issues with tracking numbers that are out of sync, or if serial numbers displayed in Calibration Executive do not match those recorded, you might need to modify the serial number in the tracking number configuration file.

You can manually enter device serial numbers in to the tracking number configuration file in one of two ways by editing the TrackingNumberPath.ini configuration file directly:

- Enter the serial number/tracking number pair under the [UserDefined] section. The setup wizard in Calibration Executive processes tracking numbers associated with detected serial numbers from this section first.
- Enter or modify the associated entry under the section labeled with the product name (for example, [NI PXIe-4464]).

Once a calibration setup is completed, entries in the [UserDefined] section are automatically moved into sections organized by product name. The following example shows serial number/tracking number pairs for two devices in the [UserDefined] section:

```
[UserDefined]
18D771D = "8888"
1A3215A = "1111"
```

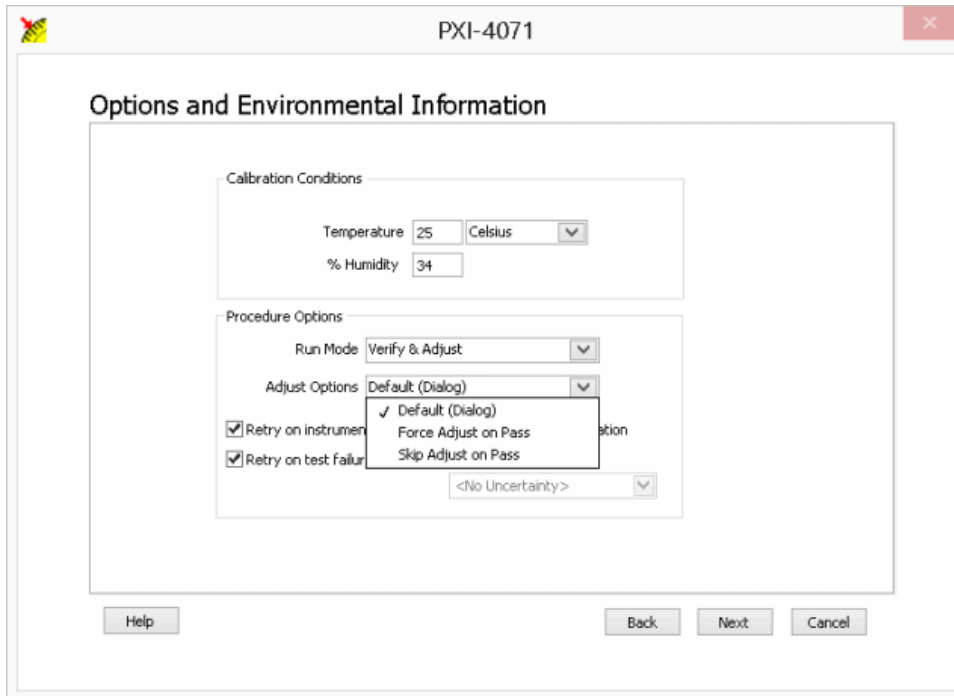
After these devices are configured through the setup wizard, the tracking numbers are moved to a product section, and the information is deleted from the [UserDefined] section:

```
[NI PXIe-4464]
18D771D = "8888"
1A3215A = "1111"

[UserDefined]
```

In addition, you can create and edit tracking numbers on the DUT Selection page of the calibration setup wizard. Tracking numbers created or edited in the setup wizard are only committed to the tracking number configuration file once the calibration session is initiated after the user clicks **Finish**. Tracking numbers created in the wizard are written directly to the specific product name section of the tracking number configuration file.

4. Entering Environmental Information and Selecting Options



Calibration Conditions

1. Enter the ambient temperature.
2. Select the temperature unit (Celsius or Fahrenheit).
3. Enter the % Humidity.



Note The information you enter in the Calibration Conditions section is included on the calibration report.

Procedure Options

1. Select the **Run Mode**. The modes available vary depending on the device you are calibrating. Refer to the calibration procedure for your device for details on available run modes.
 - a. **Verify Only** - This run mode verifies the device against the specifications. This mode does not adjust the performance of the device.
 - b. **Verify & Adjust** - This run mode verifies the device against the As Found specifications. The procedure then executes a series of steps

to adjust the performance of the device. The device will then be re-verified against the As Left specifications.

Devices that support this run mode may also support the Optional Adjust feature. Optional Adjust is a feature that allows you to terminate a procedure being executed in Verify & Adjust run mode after the initial verify. After the initial verify, test results are displayed in a pop-up window, allowing you to terminate the procedure without running adjust and generating a report with the initial verify results.

If supported, Verify & Adjust also enables you to choose when the device gets adjusted, based on the pass/fail status of the initial As Found pass status. Options include the following:

- **Default (Dialog)** - After the As Found verification, a dialog appears that lets you choose whether or not to adjust based on the results of the As Found results.
 - **Force Adjust on Pass** - Adjustment will be performed regardless of the pass/fail status of the As Found verification.
 - **Skip Adjust on Pass** - If the As Found verification passes the As Left limits, the device will not be adjusted. A failure automatically forces an adjustment.
- c. **Adjust Only** - This run mode adjusts only the device performance and does not generate any report. This run mode can be used if a Verify Only has already been performed.



Note NI recommends performing adjustment every calibration cycle to ensure that the device is operating within specification. Devices must be adjusted prior to re-verification in order to reset the calibration cycle.



Note The run mode and adjust options selected for the procedure are stored and retrieved the next time the procedure is run until the mode is changed.

- Complete any additional fields as needed.



Note Not all device procedures present the same Procedure Options. Make sure you complete all required information before proceeding to the next step.

- Click **Next**.

←	Previous Step 3. Selecting the Required Standards	Next Step 5. Selecting a DUT	→
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5. Selecting a DUT

DUT Selection

Device Procedure Name
PXI-4071

DUT	DAQmx Device ID	Name	Location	Serial No	Tracking No
<input checked="" type="checkbox"/> 1	PXI1Slot7	NI PXI-4071	PXI1 Slot7	C71C765	
<input checked="" type="checkbox"/> 2	PXI1Slot8	NI PXI-4071	PXI1 Slot8	Simulated	
<input checked="" type="checkbox"/> 3	PXI1Slot9	NI PXI-4071	PXI1 Slot9	Simulated	
<input checked="" type="checkbox"/> 4	PXI1Slot10	NI PXI-4071	PXI1 Slot10	Simulated	

Calibrate? Select All/None.

Notes

Help Back Finish Cancel

The DUT Selection page displays DUTs detected on the system in an array format, which enables back-to-back calibration of multiple instances of the same model DUTs. Note that the array displays a maximum of four rows of devices at a time; use the scroll bar to view any additional DUTs detected on the system.

The array contains a row for each instance of the DUT detected on the system, and each row contains the following fields:

- **DUT** - Row identifier for an instance of the device under test (DUT). Select this box to enable calibration. Deselect this box to exclude the device from calibration.
- **Device ID** - Unique identifier of the DUT in this device row.
- **Name** - Model name of the DUT in this device row.
- **Location** - Discernable location (if available) of the DUT in this device row.
- **Serial No** - Hardware serial number of the DUT in this device row.
- **Tracking No** - Customer-specific tracking number. Values entered into this field will be cached and recorded for future use.

In the DUT Selection page, do the following:

1. Select the **DUT** row for each device instance to be calibrated, or select **Calibrate?** to toggle the selection of all instances.
2. Unless autopopulated, enter the serial number of each device to be calibrated in the appropriate **Serial No** fields.
3. (Optional) Enter a tracking number for each device to be calibrated in the appropriate **Tracking No** fields.
4. Click **Finish** to launch the calibration procedure.

Device Identifiers

After you launch the procedure, a dialog box appears in which you must enter a device identifier such as a device number, device name, or resource name. This dialog box varies depending on which device you are calibrating.



Note In some device procedures, the device identifier is required in the DUT Selection page, rather than in a separate dialog box.

This device identifier is assigned by Measurement & Automation Explorer (MAX) when you configure the hardware in MAX. To find this information, launch MAX, expand **Devices and Interfaces**, and locate the device in the list.

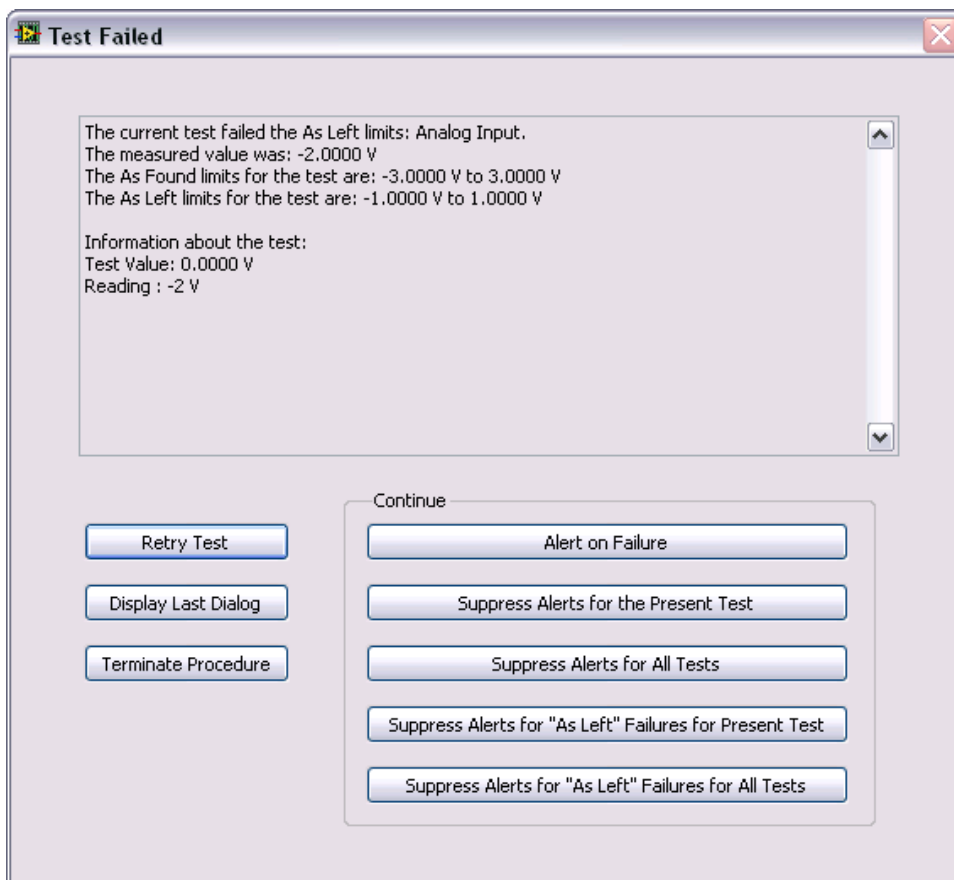
←	Previous Step 4. Entering Environmental Information and Selecting Options	Next Step 6. Run-Time Dialog Boxes	→
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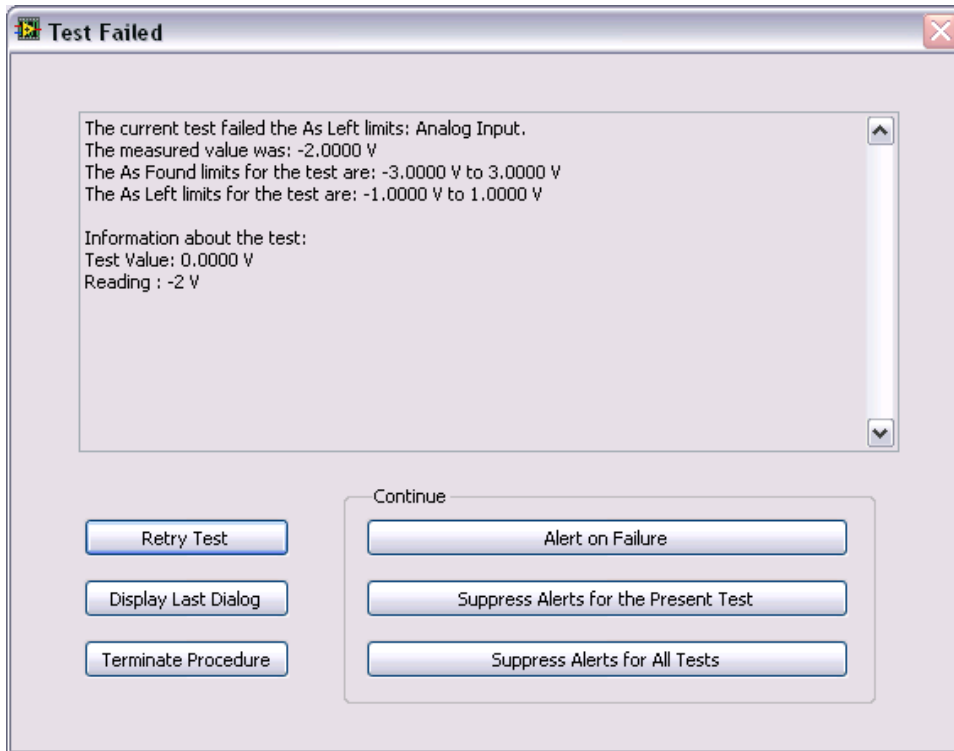
6. Run-Time Dialog Boxes

Run-Time dialog boxes are shown and described below.

Test Failed Dialog Box

During the initial verify, the dialog boxes shown below will appear for As Found and As Left limit failures, respectively, and will describe the details of each failure. As Left limit failures will not result in an overall test failure during the initial verify, but will allow the user to retry the test point if failures are a result of setup issues.





Retry the existing test point or continue to the next test point by selecting one of the available buttons.

- **Retry Test:** Retries the current test point. Allows you to check your connections if you believe the failure to be a connection issue.
- **Display Last Dialog:** Displays the last dialog box to aid in checking your connections.
- **Terminate Procedure:** Terminates the procedure.

All of the **Continue** options will accept the current failure and continue to the next test point.

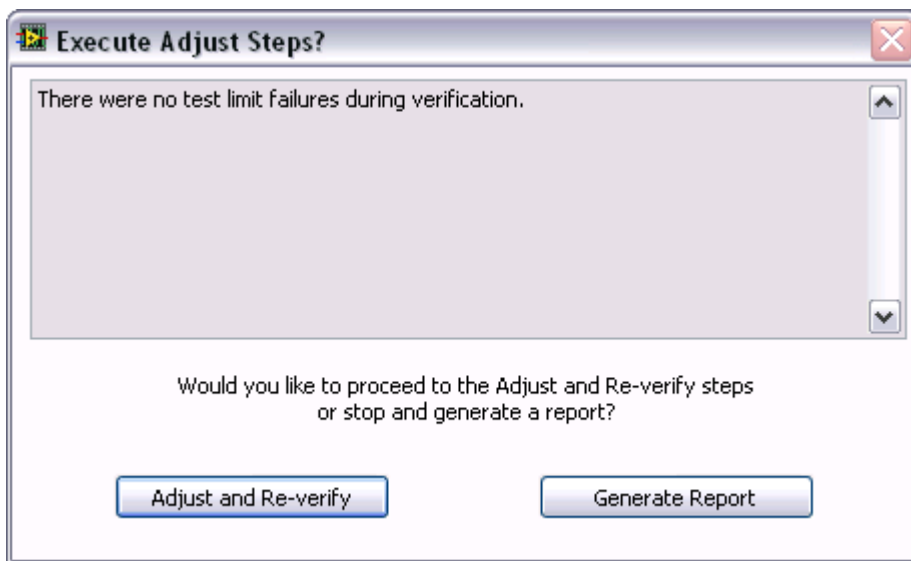
- **Alert on Failure:** Do not suppress future failures.
- **Suppress Alerts for the Present Test:** Suppress all failure only for the current test. The next tests will display this dialog box for any failures.
- **Suppress Alerts for All Tests:** This option will suppress all alerts.
- **Suppress Alerts for "As Left" Failures for Present Test:** This option will suppress alerts only for As Left test limit failures for the present test, but

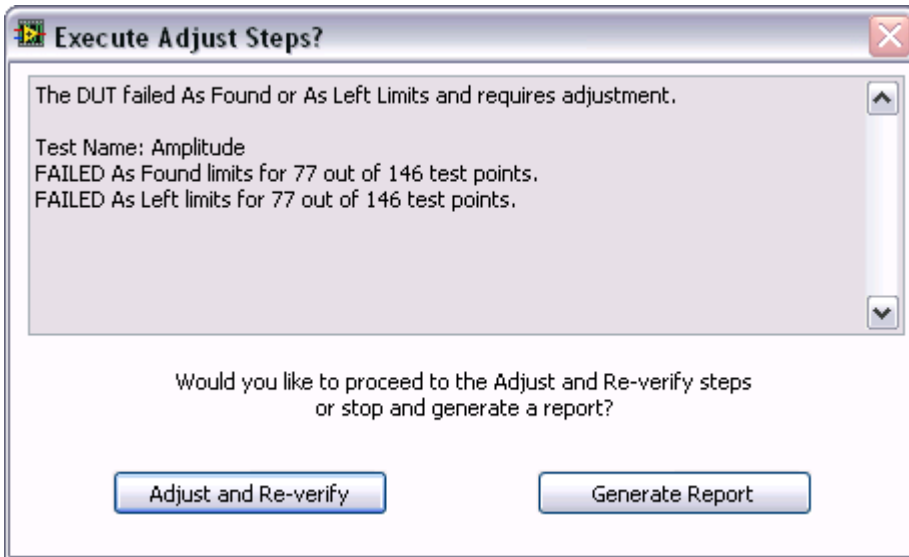
will continue to display failures for As Found test limits. This option is not available during re-verify.

- **Suppress Alerts for "As Left" Failures for All Tests:** This option will suppress only alerts for As Left test limit failures for all tests, but will continue to display failures for As Found test limits. This option is not available during re-verify.

Execute Adjust Steps? Dialog Box

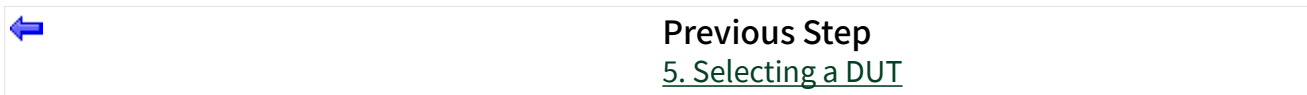
The **Execute Adjust Steps?** dialog box will appear after verification and detail whether or not there were test point failures.





Either dialog box provides the following options:

- **Adjust and Re-verify**
- **Generate Report**



Calibration Reports

Calibration reports are stored in a central database. Calibration Executive retrieves the data from this database and displays the report in the format you have selected (text, HTML, PDF, Microsoft Word, or Microsoft Excel). Each report includes the customer name and address, the purchase order number, calibration date, and DUT type (model) for the calibrated device, as well as similar information about the calibration standards used.

It is recommended that you use a 64-bit version of Microsoft Excel to generate calibration reports in Excel format.

Calibration Executive requires a 64-bit Java Runtime Environment (JRE) to generate reports in RTF (Microsoft Word) and PDF formats. The most recent version of the JRE is available at <https://java.com>. You must use a 64-bit browser to access the 64-bit download.



Note Refer to the **Calibration Executive Readme** for details about supported versions of the JRE. Note that some uses of Java may require a separate license.

Reading the Calibration Report

The following terms are common to all of the calibration report tables.

- **Low Limit** is the lower limit of the reading allowable to meet specifications.
- **High Limit** is the upper limit allowable to meet specifications.
- **Reading** is the actual reading taken during the calibration procedure. For an ideal calibration, the reading value always lies between the upper and lower limits. If the reading is outside this range, the calibration fails.
- **As Found Status** details the response of the DUT prior to any adjustment, or as received at the calibration lab. Therefore, if the DUT is out of calibration, the As Found tests can fail.
- **As Left Status** represents the DUT performance after calibration, or as the DUT left the calibration lab. The DUT should pass the As Left tests.



Note The calibration report includes an error message if an error or a termination occurred that may have invalidated the calibration data.

Calibration Reports Database

The calibration reports database, a Microsoft Access database, contains all of the results for each calibration. By default, the database is named `Calibration Reports.mdb` and is stored in the Databases folder of Calibration Executive. If you installed Calibration Executive in the default location, this database is located in `C:\Program Files\National Instruments\Calibration Executive\DataBases`. The calibration reports database responds to standard structured query language (SQL) commands. Therefore, you can write your own report-handling routine to retrieve data from the database. You could write such a routine in LabVIEW, C, visual Basic, or any other language that supports SQL.

communication. The calibration reports database consists of the following seven tables:

- ASSET contains all of the information about the calibrated DUT.
- CALIBRATION_DATA contains all the data acquired during the calibration, as well as the uncertainty data, if applicable.
- CUSTOMER contains all of the customer information associated with the DUT.
- ENGINE contains information about the operator and the calibration date.
- ENVIRONMENT contains information about the environmental conditions during the calibration.
- STANDARD contains information about the standards, such as calibrators and DMMs, that were used during the calibration.
- REPORT keeps track of all of the relationships between the six other tables.

The REPORT table contains a search value for each of the other tables. The search value is a unique number that represents all of the data associated with a specific calibration report—all the customer information, calibration condition information, and so on. To locate data associated with a given calibration, you must first find the search value for that data in the REPORT table. When you know the search value number for a specific report, you can search for a match to that number in the other search value fields of the table.

Example: Using the Calibration Reports Database

Suppose you want to find out all of the calibration-related information—the calibration conditions, DUT specifics, calibration data, and so on—about the devices you have calibrated for a customer. To find that information, start by opening the CUSTOMER table and locating the name of your client. In the same row that the customer name appears, there is a numeric search value. With that search value, you can open the REPORT table and use that value to search the other tables for that customer's asset information, calibration data, and so on. You could also use that search value to write your own asset-handling routine.

Saving a Calibration Reports Database Backup

This feature allows you to save a secondary copy of the current calibration reports database.

1. Select **Configure»Report Database Backup Copy**.
2. Click the folder icon to the right of the Path to Report Database Backup field to browse for the directory in which to store your calibration reports database backup.



Note Do not select the same directory where the original report database is saved.

3. Highlight the name of the directory.
4. Click **Open**.
5. Select the desired Calibration Executive version from the Select Version pull-down menu.



Note If you select Calibration Executive 3.2 or prior, the report files do not support the Driver Information section. So this information will not be in the source report database.

6. Click **Save As**.

Merge Reports

1. Select **View»Calibration Reports** to display the Calibration Reports window.
2. Highlight the two reports you want to merge. If the two reports appear to be compatible, the Merge Report button enables as shown in the following figure.



Note The Merge Reports button enabling is only a pre-checking function and does not mean that two reports can be merged.

Customer Name	Work Order	<Calibration Date>	Asset	Serial Number	As Found Status	As Left Status
National Instruments		Wednesday, October 14, 2009 16:29	PXI-4110	13D887D	Passed	Passed
National Instruments		Wednesday, October 14, 2009 14:39	PXI-4110	13D887D	Passed	Passed
National Instruments		Wednesday, October 14, 2009 13:05	cRIO-9263 revision E	13E91EF	Passed	Passed
National Instruments		Wednesday, October 14, 2009 13:00	cRIO-9263 revision C	13E91EF	Passed	Passed
National Instruments		Wednesday, October 14, 2009 12:05	PXI-6733	13C34DB	Passed	Passed
National Instruments		Wednesday, October 14, 2009 10:23	PCMCI4-4050	143D140	Passed	Passed
National Instruments		Tuesday, October 13, 2009 15:16:43	PXI-4060	D56506	Passed	Passed
National Instruments		Friday, October 09, 2009 15:45:36	PXI-4070	12	Passed	Passed
National Instruments		Friday, October 09, 2009 15:23:30	PXI-4070	12	Passed	Passed
National Instruments		Thursday, October 08, 2009 12:43:11	SCXI-1121	D6CB23	Failed	Passed
National Instruments		Thursday, October 08, 2009 11:28:38	SCXI-1121	D6CB23	Passed	Passed
National Instruments		Thursday, October 08, 2009 9:50:58	SCXI-1100	D1DDDA	Passed	Passed
National Instruments		Wednesday, October 07, 2009 15:28	SCXI-1125	140C189	Passed	Passed

Search Column: Customer Name for [] # of Records found: 0

Report Type: HTML Report [v] [View] [Merge Reports] [Delete] [Close]

3. Select the report format using the Report Type pull-down menu.
4. Click **Merge Reports** to merge the two highlighted reports.
5. Edit the DUT notes if you enabled **Allow Editing of the DUT notes when reports are merged** on the [Configuring Report Options](#) window.
6. If the two reports are compatible, the merged report appears at the top of the report list, as shown in the following figure. If the reports are not compatible an error appears.

Customer Name	Work Order	<Calibration Date>	Asset	Serial Number	As Found Status	As Left Status
National Instruments		As Found Date: Wednesday, Octobe	PXI-4110	13D887D	Passed	Passed
National Instruments		Wednesday, October 14, 2009 16:29	PXI-4110	13D887D	Passed	Passed
National Instruments		Wednesday, October 14, 2009 14:39	PXI-4110	13D887D	Passed	Passed
National Instruments		Wednesday, October 14, 2009 13:05	cRIO-9263 revision E	13E91EF	Passed	Passed
National Instruments		Wednesday, October 14, 2009 13:00	cRIO-9263 revision C	13E91EF	Passed	Passed
National Instruments		Wednesday, October 14, 2009 12:05	PXI-6733	13C34DB	Passed	Passed
National Instruments		Wednesday, October 14, 2009 10:23	PCMCI4-4050	143D140	Passed	Passed
National Instruments		Tuesday, October 13, 2009 15:16:43	PXI-4060	D56506	Passed	Passed
National Instruments		Friday, October 09, 2009 15:45:36	PXI-4070	12	Passed	Passed
National Instruments		Friday, October 09, 2009 15:23:30	PXI-4070	12	Passed	Passed
National Instruments		Thursday, October 08, 2009 12:43:11	SCXI-1121	D6CB23	Failed	Passed
National Instruments		Thursday, October 08, 2009 11:28:38	SCXI-1121	D6CB23	Passed	Passed
National Instruments		Thursday, October 08, 2009 9:50:58	SCXI-1100	D1DDDA	Passed	Passed

Search Column: Customer Name for [] # of Records found: 0

Report Type: HTML Report [v] [View] [Merge Reports] [Delete] [Close]

Edit Report Attributes

Calibration Executive allows you to edit the following report attributes:

- DUT Notes
- Recommended Calibration Due Dates

Edit DUT Notes

1. Select **View»Calibration Reports** to display the Calibration Reports window.
2. Select a calibration report from the list.
3. Click the **Edit** menu and select **DUT Notes**.



Note **Edit** menu options are disabled if more than one report is selected.

4. In the Edit DUT Notes dialog, modify the DUT notes as needed, and click **OK**.



Note Content in the **DUT Notes** text box must not exceed 255 characters.



Notice If you overwrite existing content in the **DUT Notes** field and click **OK**, the content will be lost. Be sure to review any current note before you modify or delete it, as it may include important information about the procedure.

Edit Recommended Calibration Due Dates

1. Select **View»Calibration Reports** to display the Calibration Reports window.
2. Select a calibration report from the list.
3. Click the **Edit** menu and select **Recommended Calibration Due Date**.



Note **Edit** menu options are disabled if more than one report is selected.

4. In the Edit Cal Due Date dialog box, enter a new date in the **New Recommended Calibration Due Date** field or click the calendar icon to select a new date and time.
5. Click **OK** when the correct date is set in the Edit Cal Due Date dialog box.



Note The Recommended Calibration Due Date is displayed only on certificates generated from a report configuration in which this feature is enabled. For more information, see "Show the Recommended Calibration Due Date" in **Custom Report Configurator**.



Notice When you click **OK** in the Edit Cal Due Date dialog box, the previous Recommended Calibration Due Date is permanently overwritten and therefore lost. Be sure to review the date before modify the **New Recommended Calibration Due Date** field.

Custom Report Configurator

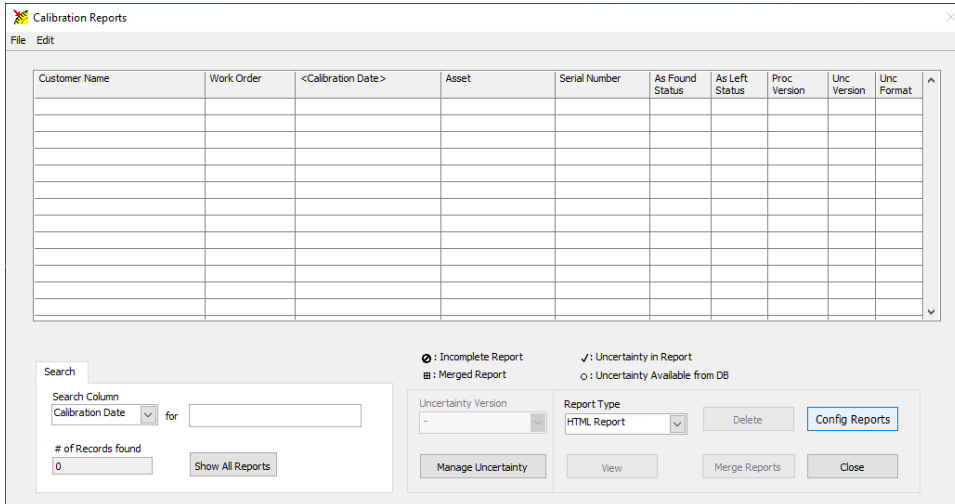
Calibration Executive provides Custom Report Configurator tools that enable you to create custom report types for calibration certificates in PDF format, in addition to the default calibration report types.



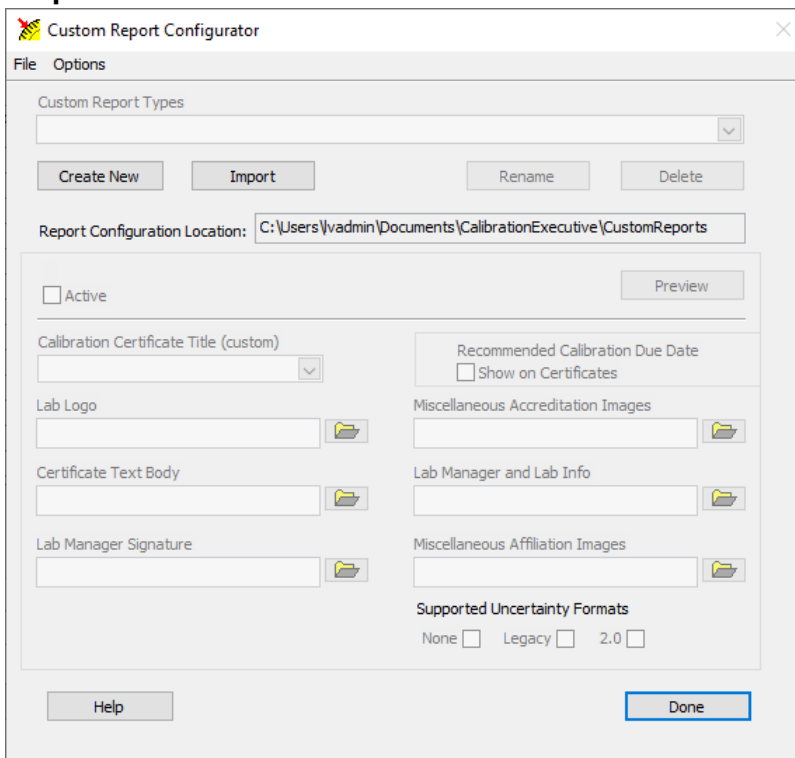
Note Java SE Runtime Environment and a PDF reader application (Adobe Acrobat Reader is recommended) must be installed on your system to generate custom reports.

To display the Custom Report Configurator dialog:

1. Select **View»Calibration Reports** to display the Calibration Reports window.



2. In the lower right corner of the Calibration Reports window, click **Config Reports**.



Note The Custom Report Configurator is only available when you run Calibration Executive in administrator mode. Refer to [Frequently Asked Questions](#) for more information.

From the Custom Report Configurator window, you can do the following:

- [Create a new report configuration](#)
- [Import a report configuration](#)
- [Rename](#) or [Delete](#) a report configuration
- [Preview a report configuration](#)
- [Customize report configuration design](#)
- Configure [supported uncertainty formats](#) and uncertainty and guard band display options

Create a New Report Configuration

To create a new report configuration:

1. In the Custom Report Configurator window, click **Create New**.
2. In the Generate New Report Configuration dialog, provide a name for the new report configuration and click **Create**.

The report configuration name must meet the following criteria:

- Cannot be longer than 60 characters.
 - Characters \, /, :, *, ?, ", <, >, and | are not allowed.
 - Cannot end with a period (.).
 - Cannot be an empty string.
3. At the confirmation message, click **OK**.

Set Report Configurations to Active/Inactive

New and imported report configurations are automatically set to **Active**, making the configurations available in the **Report Type** list on the Calibration Reports window. To keep a report configuration but remove it from the **Report Type** list in Calibration Reports, select the configuration in the **Custom Report Types** list, and deselect the **Active** checkbox.

Select a Calibration Certificate Title

When you create or import a report configuration, you can select one of the following certificate titles, or specify your own title:

- Traceable Calibration Certificate
- Compliant Calibration Certificate
- Accredited Calibration Certificate



Note The Custom Report Configurator does not retain custom titles that you manually enter in the **Calibration Certificate Title** field as selectable options.

Show the Recommended Calibration Due Date

To show the recommended calibration due date on a custom report configuration, select the **Show on Certificates** option in the **Recommended Calibration Due Date** section. For more information about specifying the calibration due date, refer to [Edit Report Attributes](#) in this document.

Import an Existing Report Configuration

Imported configuration(s) are copied into the Report Configuration Location folder and are set to **Active**.

1. In the Custom Report Configurator window, click **Import**.
2. Browse to the folder that contains the report configuration you want to import.



Note To import multiple report configurations, select the folder that contains all of the report configurations that you want to import into the Custom Report Configurator.

3. Select the folder, and click **Select Folder**.
4. At the confirmation message, select **OK**.



Note Refer to [Frequently Asked Questions](#) for more information.

Rename or Delete Report Configurations

Rename a Report Configuration

To rename a report configuration:

1. Select the report you want to rename in the **Custom Report Types** field.
2. Click **Rename**. The Rename Report Configuration dialog box opens.
3. Enter a new name in the field, and click **Rename**.

The new name cannot be the same as the previous name, and it is subject to the same criteria as when you created the report configuration.

Delete a Report Configuration

To delete a report configuration:

1. Select the report configuration you want to delete in the **Custom Report Types** list.
2. Click **Delete**.
3. At the confirmation message, click **Yes** to delete the report configuration.



Note Deleting a report configuration removes the configuration from the Custom Report Configurator, but it does not delete the files. A deleted report configuration can be imported back into the Custom Report Configurator.

Customize Report Configuration Design

You can customize the following elements of a report configuration by modifying the corresponding images or text files.

- Lab Logo (LogoImage.jpg)
- Miscellaneous Accreditation Images (TopRightImage.jpg)

- Certificate Text Body (BodyText.txt)
- Lab Manager and Lab Info (LabInfo.txt)
- Lab Manager Signature (Labsign.jpg)
- Miscellaneous Affiliation Images (BottomRightImage.jpg)

Configure Uncertainty and Guard Band Options

Select Supported Uncertainty Formats

Select one or more of the following **Supported Uncertainty Formats** options to specify which types of uncertainties are enabled for the selected custom report:

- **None:** Custom report supports formats that do not include any uncertainty or guard banding details.
- **Legacy:** Custom report supports uncertainty format used prior to Calibration Executive 6.0, which does not include any guard banding details
- **2.0:** Custom report supports uncertainty format used in Calibration Executive 6.0 and later, which includes uncertainty and guard banding details.

By default, a custom report supports all uncertainty formats. Uncertainty format options can be useful when you configure the display options for different types of reports in the Calibration Reports window.

To determine the uncertainty format used with each report, look for the value in the **Unc Format** column in the Calibration Reports window.

Configure Uncertainty and Guard Band Display Options

When you select a custom report that was generated with a supported uncertainty format, the **Reading Display Options**, **Uncertainty Display Options**, and **Guardband Display Options** tabs appear at the lower left corner of the Calibration Reports window.

Uncertainty and Guard band settings are only available with Custom Reports, and the settings are cached separately for each custom report type. These options can

be modified only when you are logged into Calibration Executive as an administrator.

Reading Display Options

Reading display options enable you to toggle whether the As Found and As Left verify limits are displayed on the custom report. Leave the limits selected to display them on the report; deselect the limits to hide them. Reading display options are supported for all uncertainty formats.

Uncertainty Display Options

Uncertainty display options enable you to toggle whether uncertainty values and uncertainty notes for As Found and As Left appear in the custom report. Leave the options selected to display them on the report, deselect the options to hide them. Uncertainty display options are supported for all uncertainty formats.

Guard Band Display Options

Guard band display options are only supported for 2.0 format uncertainties. Guard band display options include the following:

- **Guardband:** Displays the guard band value.
- **Accept Limits:** Displays the guard banded accept limits.
- **TUR:** Displays the calculated test uncertainty ratio (TUR), formatted as TUR:1 in the report.
- **Conditional P/F?:** Displays the passed/failed conditional character for each test point and for the overall results when a reading is determined to be either a conditional pass or a conditional fail.
- **Guardband Notes:** Displays the description for the guard band methods used in the report, which appears in the report header. If displayed, this also includes the related callout for each method next to the passed/failed result of each test point that was guard banded.
- **Max TUR:** A value of 0 indicates that all TURs are displayed. Otherwise, any TURs greater than the value specified in this field are hidden.

- **Hide Zero Guardband:** When selected, if a guard band calculation results in a value of 0.0, the guard band is displayed as "-" in the report, and the related guard band method callout is not displayed next to the Passed/Failed result.

Additional Options

Preview a Report Configuration

To preview a report configuration, select the report in the **Custom Report Types** list, and click **Preview**. A temporary PDF file is generated, displaying the selected report configuration.

Configure Page Size

You can specify the page size for your custom reports. Available page sizes are **Letter** (8.5 in. x 11 in.) and **A4** (210 mm x 297 mm). The default page size is Letter.

To configure the page size for your custom reports:

1. Press Ctrl + P or click the **Options** menu, and select **Set Page Size** to open the Configure Page Size dialog.
2. Select one of the options, and then click **OK**.

Change the Location of the Report Configuration

By default, the report configuration location is `C:\Users\\Documents\CalibrationExecutive\CustomReports`.

To change the location of the report configuration files:

1. Press Ctrl + L or click the **Options** menu and select **Change Report Configuration Location**.
2. Browse to the location where you want to save report configurations, and then select **Select Folder**.

Frequently Asked Questions

Q: What happens if I try to edit a report configuration in a location that is currently opened by another user on a shared network?

A: When you click **Config Reports**, a Locked Report Configuration Location message is displayed. In this dialog box, you can select one of the following actions:

- **Cancel** — Close the Custom Report Configurator to avoid corruption of configuration files. The **Report Configuration Location** remains the configured path, and you can use the available report formats from the Calibration Reports window.
- **Change Location** — Select a different Report Configuration Location to edit.
- **Force Unlock** — Unlock the current Report Configuration Location. This permits two or more users to edit the configurations at the same time; however, files may become corrupted. Choose this option only if you are sure that no one else is editing configurations at this location.

Q: What happens if I try to import a configuration folder that has the same name as a configuration folder that already exists in my specified location?

A: During import, a pop-up informs you that there is a conflict with the imported configuration. Do one of the following:

- Click **Yes** to overwrite the existing configuration with the configuration you are importing.
- Click **No** to import the new configuration with `_Import#` appended to the end of the configuration name. The number at the end indicates the instance of the imported configuration (`_Import1`, `_Import2`, and so on). After import, you can rename the configuration (select the configuration and click **Rename**).

Q: Why is there a **Migrate Reports** button instead of the **Config Reports** button?

A: Calibration Executive 6.0 uses a new custom reports stylesheet which is required to utilize guard banding features for 2.0 uncertainty formats.

Calibration Executive attempts to migrate stylesheets from your existing custom reports automatically, but if any of the stylesheets have been modified manually, they cannot be migrated without losing information. You may continue to use your reports without migrating, but you will be unable to use any of the new custom report functionality.

When you click **Migrate**, Calibration Executive prompts you to overwrite your modified stylesheets. If you continue, you will lose these modifications and will need to recreate any customizations you wish to retain. Calibration Executive does save a backup of your stylesheet, which you can use for reference.

Uncertainty Reporting

Measurement uncertainty is an estimate of the range of values about the measured value within which the accepted value is believed to lie. A total uncertainty value represents the combination of a measure of the random error and estimated bounds of the systematic error and considers all factors that contribute to the measurement uncertainty. For detailed information about measurement uncertainty, refer to **ANSI/NCSL Z540-2-1997, U.S. Guide to the Expression of Uncertainty in Measurement**.

Calibration Executive provides tools that enable a laboratory to manage the uncertainties for each test point of a procedure based on their lab capabilities, and to capture uncertainties in reports.

Uncertainties can also be used to calculate guard banding that can be applied to each test point at runtime and in the report. Refer to [Measurement Guard Banding](#) for more details on guard banding.

Displaying Measurement Uncertainty in Calibration Executive Reports

In Calibration Executive, use the Uncertainty Management utility to display uncertainties associated with procedures and to include uncertainties and guard banding in reports. Users with Administrator privileges can access this utility from the Calibration Reports window.

Complete the following steps to launch the Uncertainty Management utility.

1. Select View»Calibration Reports.

The Calibration Reports window displays a table with the following columns: Customer Name, Work Order, <Calibration Date>, Asset, Serial Number, As Found Status, As Left Status, Proc Version, Unc Version, and Unc Format. The table contains 15 rows of data, including entries for 'Mock Customer' and various assets like PXIe-5673, NI 9212, NI 9201, and cRIO-9215.

Below the table, there are search and filter options:

- Search:** Search Column (Calibration Date) for []
- # of Records found:** 95
- Show All Reports:** []
- Legend:**
 - Incomplete Report
 - Merged Report
 - Uncertainty in Report
 - Uncertainty Available from DB
- Uncertainty Version:** 0.2 <Report
- Report Type:** HTML Report
- Buttons:** Delete, Config Reports, Manage Uncertainty, View, Merge Reports, Close

2. On the Calibration Reports window, click Manage Uncertainty.

The Uncertainty Export / Import window shows an 'Uncertainty List' table with columns: Device Name, Procedure Version, Last Updated, Version, Format, and Notes. The list includes devices like PXIe-4330, PXIe-4331, cRIO-9201 with DSUB, NI 9201, NI 9205, NI 9206, NI 9211, and NI 9212.

At the bottom, there are filter options and a database path:

- Legend:**
 - No complete reports
 - v2.0 Report Available
 - Legacy Report Available
- DB Path:** C:\ProgramData\National Instruments\Calibration Executive\RMA_GlobalUncertainties.mdb
- Buttons:** HELP, DONE

Use the Uncertainty Export/Import window to export a template that you can use to edit uncertainties and guard bands for each test point in the procedure. Import the edited values into an uncertainties database, which appends the uncertainties to future runs of the procedure.

Exporting and Editing Uncertainty Templates

Export an uncertainty template from an existing report for a procedure that has completed without terminating. You cannot export an uncertainty template if a procedure does not have a completed run with a report.

There are two types of uncertainty templates.

- **Legacy:** Templates exported prior to Calibration Executive v. 6.0, or for any procedures without reports generated in Calibration Executive 6.0 or later. Legacy (1.0) templates do not include any guard banding details.
- **2.0:** Templates exported for procedures with reports generated in Calibration Executive v. 6.0 or later. The 2.0 templates include all uncertainty and guard band fields.

Complete the following steps to export an uncertainty template.

1. In the Calibration Reports window, click **Manage Uncertainty**.
2. From the **Uncertainty List** in the Uncertainty Export/Import window, select the device you want to use for export.
3. Select **Operate»Export to File** or right-click the device name and select **Export Template**.
4. In the Select Export Folder dialog box, select the location to save the exported file, and use the **File Type to Export** drop-down to specify the file type. Calibration Executive supports the following template formats:

- **.xlsx (Single Workbook)** is the recommended format. This format (Office Open XML Spreadsheet) is compatible with many spreadsheet editors, such as Microsoft Excel 2007 SP3 or later, Apache OpenOffice, and Google Sheets.



Note For procedures with more than 1000 test points, uncertainties are exported to a CSV file; refer to the XLSX file for instructions to copy the data manually into the XLSX file. The Open XML parser that Calibration Executive uses is limited to

procedures with fewer than 1000 test points.

- **.csv (comma-delimited)** format generates a single CSV file with all test points listed as comma-separated values, which can then be edited with a variety of text and spreadsheet editors.
- **.txt (tab-delimited)** format generates a single TXT file with all test points listed as tab-separated values, which can then be edited with a variety of text and spreadsheet editors.
- **.xlsx (Legacy Workbook / Device)** is a deprecated format that was used prior to Calibration Executive version 6.0. This file format is not supported for exporting 2.0 version uncertainty templates.

The exported files include instructions for how to add uncertainties.

5. Click **Done** to return to the Calibration Reports window.

Complete the following steps to edit an uncertainty template.

1. Locate the folder where you saved the uncertainty template. The default path begins with `C:\Program Files\National Instruments\Calibration Executive\Uncertainty\`.
2. Open the template, and edit the appropriate fields to add uncertainties. Refer to [Legacy and 2.0 Fields](#) and [2.0-Only Fields](#) for information about template fields that can be edited.
3. Save the updated uncertainty template.

Legacy and 2.0 Fields

The following uncertainty data fields from the Legacy and 2.0 templates are editable:

- **Uncertainty Version:** This field is populated with 1.0 by default for new uncertainty exports. You can change this to any string up to 40 characters in length. Use this field for traceability and to store multiple unique uncertainties in your database. This field is displayed in the Uncertainty Version section of your report.

- **Uncertainty (dbl):** Enter a numeric value that represents the uncertainty to display on your report. Enter 0 or leave the field blank if you want only to display the notes field. The uncertainty value is displayed in scientific format using two digits of precision. The digits of precision for the reading and limits fields will be scaled to match the least significant digit of the uncertainty for each new run of the procedure.

For example, if the uncertainty value for a test point is 0.0012 V , the uncertainty value will be displayed on the report as $1.2\text{E}-3 \text{ V}$. The readings and limits will subsequently display with 4 digits of precision, for example, 1.1234 V .

- **Uncertainty Units:** If left blank, the units are assumed to be base International System of Units (SI). For example, if the limits units are mV, then these units will be populated as V when imported. If you manually enter units, and they are not entered as base units, then the uncertainty value and the units will be converted to base units on import. If the manual base SI units do not match the base SI units of the reading, then the digits of precision will not be scaled automatically, and the default from the procedure will be used.
- **As Found Uncertainty Notes:** Free text field; the notes are appended to the as found uncertainty value before being displayed on the report.
- **As Left Uncertainty Notes:** Free text field; the notes are appended to the as left uncertainty value before being displayed on the report.

2.0-Only Fields

The following uncertainty data fields from the 2.0 templates are editable:

- **As Found/As Left Guardband Type:**
 - none
 - method 5
 - method 6
 - method 6 linear
 - method 6 db
 - method 6 dbv

- `custom_<name>`
- **As Found/As Left Modifiers:** See [Measurement Guard Banding](#) for details about how Calibration Executive uses the values in this field. Use a semicolon (;) to separate multiple modifiers contained in this field. For example, `customval=1.23E-2;UL`.
 - `customval = <value>`, where **<value>** is a floating point numeric (e.g., 1.234) or an exponential (e.g., 1.23E-6)
 - UL (Only the upper limit is valid)
 - LL (Only the lower limit is valid)
 - `nominal = <value>` is a floating point numeric (e.g., 1.234) or an exponential (e.g., 1.23E-6)
 - **nominal=1.0E-1** — If you do not specify units, they are assumed to be equivalent to the limits unit without an SI prefix. That is, if the limits unit column contains **mV**, then the nominal value is assumed to be 1.0E-1 V and will be applied to the TUR formulas with this magnitude.
 - **nominal=1.0E-1 mV** — If you specify units as in this example, then you may also specify an SI prefix. This can make it easier to compare the nominal value to the limits or values with the same prefix. At runtime, the prefix is taken into account and the value is converted to match the magnitude of the limits unit.
- **CMC (dbl):** CMC defines the Scope of Accreditation. If this value is larger than the Uncertainty, it is logged as the uncertainty with the report. This value is not used in guard band calculations.



Note The maximum number of combined characters for **Uncertainty**, **Uncertainty Units**, and **Notes** is 50 characters. Uncertainty data is truncated upon import if it exceeds 50 characters. You must enter at least two characters; fewer than two characters will not be displayed and may affect the formatting of the report.

Importing Uncertainties from a Template File

After you have edited the template file, import the values to the uncertainties database. Calibration Executive imports only the values in uncertainty data fields, but many of the other fields are used as reference and should not be modified. When you import uncertainties from an Open XML spreadsheet and use a formula to calculate your uncertainty, only the resulting value is imported into the database. Calibration Executive supports only formulas resulting in numeric or text values.

Complete the following steps to import uncertainties.

1. From the Calibration Reports window, click **Manage Uncertainty**.
2. In the Uncertainty Export/Import window, select **Operate»Import from File**, and browse to the location of the uncertainty template you want to import.
3. Select the template and click **OK**.
4. In the Uncertainty Export/Import window, click **Done**.

Once the uncertainties have been imported to the database, the template file is no longer needed, but could be useful later for tracking purposes.

Updating Guard Band Notes

Use guard band notes are used to describe the guard band method in the calibration certificate. Calibration Executive adds the notes to the calibration certificate when you run the procedure. You can edit guard band note descriptions and report text for both built-in and custom guard band methods.

To view the **Guardband Notes** table, select **Operate»Edit Guardband Notes** from the menu bar on the Uncertainty Export/Import window.

To edit a **Description** or **Report Text** field, right-click the text and select **Edit Guardband Description** or **Edit Guardband Notes**.

To add a custom guard band, right-click a line of text and select **Insert New Custom Guardband**. After you enter the Tag Name, you can edit the description and the report text.

To delete a custom guard band, right-click the guard band and select **Delete Custom Guardband**. You cannot delete built-in guard band methods.

Updating Uncertainty Version and Notes

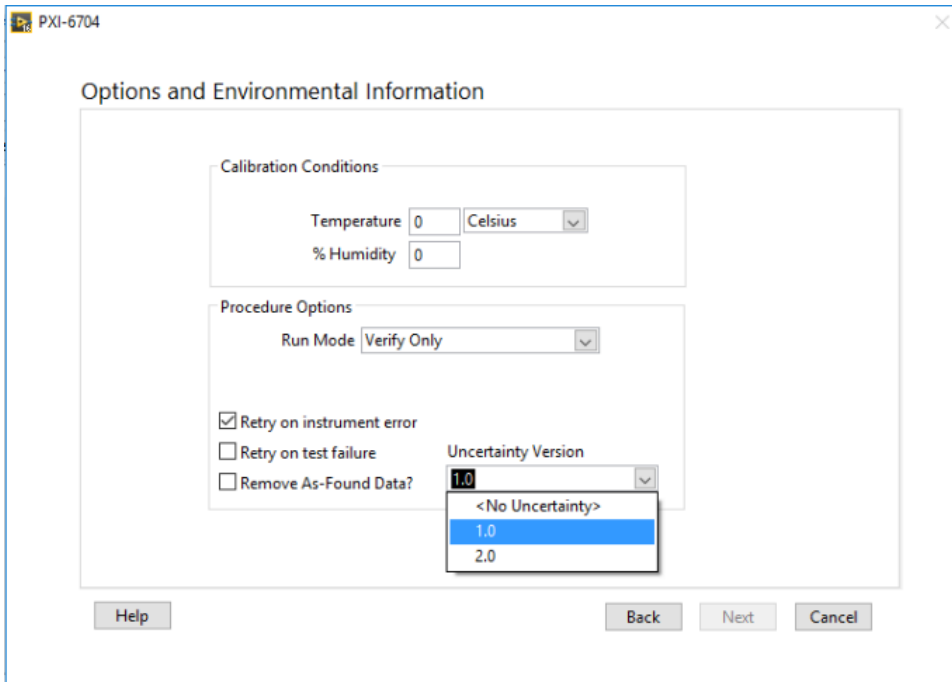
Update uncertainty versions and uncertainty notes directly from the Uncertainty Export/Import window. Right-click the version or note you want to update, and then follow the instructions. These fields are also available in the exported template; you can modify the fields in the template before importing it.

Multiple Uncertainties

Import multiple versions of uncertainties for each procedure so you can use different values under different circumstances. After importing the first version of uncertainties, you can import additional uncertainty versions by adding a unique version to the template worksheet each time you import the file. Calibration Executive adds the values to the database and the new version appears in the list of uncertainties on the Uncertainty Export/Import window.

Adding Uncertainties to a Report

After you add the uncertainties for a procedure, use the Options and Environmental Information page in the setup wizard to select the version of uncertainties to display on the report. The **Uncertainty Version** selection box lists all active versions, along with an option to not report the uncertainty.



If your station does not require uncertainties, disable the Uncertainty Version control by toggling the global uncertainties option under **Configure»Report Options**.

Modifying Uncertainties for a Procedure

If you need to modify the uncertainties for a procedure, change and re-import the previous template or create a new template that is pre-loaded with the current uncertainties. For Legacy uncertainties, you can create a new template only if a valid report exists on the station, similar to the requirement for creating the original template. You do not need a report to export 2.0 uncertainties. To export a 2.0 format uncertainty, select **Operate»Export to File**, or right-click the uncertainty and select **Export**.

Deleting Uncertainties

To delete uncertainties, select **Operate»Delete Items**. Calibration Executive displays all uncertainties stored in the database. Select the uncertainties you want to delete and click **Delete**. Alternatively, you can right-click an uncertainty you want to delete and select **Delete Uncertainty from DB**.



Notice Calibration Executive does not create a backup of the deleted files.

Updating Uncertainties on Existing Reports

NI recommends that you add uncertainties by selecting the appropriate uncertainty before running a procedure. However, you can generate a report with a different set of uncertainties from the Calibration Reports window.

In the Calibration Reports window, use the **Uncertainty Version** control to select which uncertainty version should be displayed on the report. The default is the version with which the report was originally generated.



Notice If you choose to display an uncertainty that is different from the original, beware of these potential issues:

- The digits of precision of the readings and limits will not be changed from the original report. This may result in an undesired discrepancy.
- You will not be able to display guard band information on your report because guard band details are determined at runtime and they will not be re-calculated.

Importing Uncertainties for New Procedure Versions

When upgrading Calibration Executive, procedure versions may change if the procedure has been modified. If this happens, the uncertainties for the previous versions of the procedure will not be compatible with the new versions, and you will need to import a new version of the uncertainties. To do this, each new version of a procedure requires that you generate a new report first, to generate an accurate template.

If you need to add uncertainties for multiple versions of a procedure, then you must create and import a separate template for each version.

You can determine the procedure version of your **stored** uncertainty by viewing this information in the Uncertainty Management utility. To check the **current** procedure version, select the device from the **Device Types** control, and then select **Help»About Procedure**. The About Procedure dialog box displays the procedure name, version of the procedure, and a change list.

Uncertainty Database Options

Use the Uncertainty Management Export/Import window to specify or change the location of the uncertainty database. You can set the location to a networked location that multiple systems can share.

Uncertainties developed on other systems can also be imported into the local system using menu options in the Uncertainty Management Export/Import window.

Related Topics

[Measurement Guard Banding and TUR Support](#)

[Custom Report Configurator](#)

[Example: Calculating the Uncertainty for a Test Point](#)

Example: Calculating the Uncertainty for a Test Point

The following example is the uncertainty calculation for the PCI-MIO-16XE-10 at the 9.98 V analog input Test Point, 20 V range, bipolar mode (± 10 V), using a Fluke 5720A calibrator that was calibrated one year ago.

■

Calibrator uncertainty

The specification for the Fluke 5720A calibrator at 1 year, 95% confidence level ($k = 1.96$ for normal distribution) is 3.5 ppm + 2.5 μ V.

$$3.5 \text{ ppm} \times 9.98 \text{ V} + 2.5 \text{ } \mu\text{V} = 37.43 \text{ } \mu\text{V}$$

$$\text{Standard Uncertainty} = (37.43 \text{ } \mu\text{V}) / 1.96 = 19.1 \text{ } \mu\text{V}$$

■

Resolution of device

Resolution = Range/Number of Levels of 16-bit ADC

$$= 20 \text{ V}/2^{16}$$

$$= 305.175 \mu\text{V}$$

$$\text{Standard Uncertainty} = \frac{1}{2} \left(\frac{\text{Resolution}}{\sqrt{3}} \right) = 88.1 \mu\text{V}$$

■

Noise and other Type A uncertainty

Standard deviation from 10,000 measurements was 207 μV .

$$\text{Standard Uncertainty of Mean} = \frac{\text{Standard Deviation}}{\sqrt{N}}$$

$$= \frac{207 \mu\text{V}}{\sqrt{10,000}}$$

$$= 2.07 \mu\text{V}$$

■

Combined standard uncertainty

Use the square root of sum of squares method.

Combined Standard Uncertainty

$$= \sqrt{19.1 \mu\text{V}^2 + 88.1 \mu\text{V}^2 + 2.07 \mu\text{V}^2}$$

$$= 90.2 \mu\text{V} \text{ (1 sigma normal distribution)}$$

■

Final expanded uncertainty

To convert into 95% confidence level, multiply the standard uncertainty by the coverage factor.

$$90.2 \mu\text{V} \times 1.96 = \pm 177 \mu\text{V}$$

$\pm 177 \mu\text{V}$ is the value printed on the calibration report.

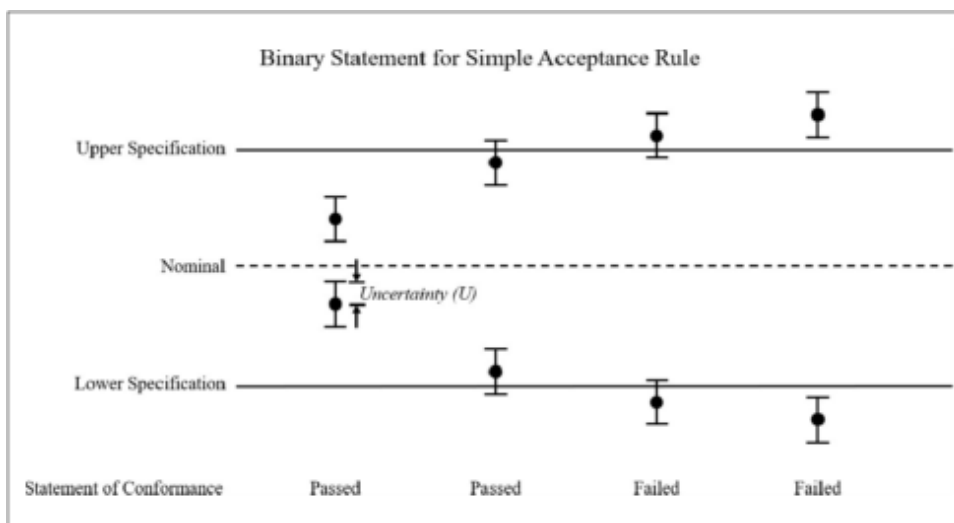
Measurement Guard Banding and TUR Support

The guard band value can be calculated at runtime using different methods, and then applied at runtime to the upper and lower limits to determine if a reading should be represented as Pass, Fail, or Conditional. The figures below illustrate how guard banding is applied to the limits to determine how the results of the reading should be represented.

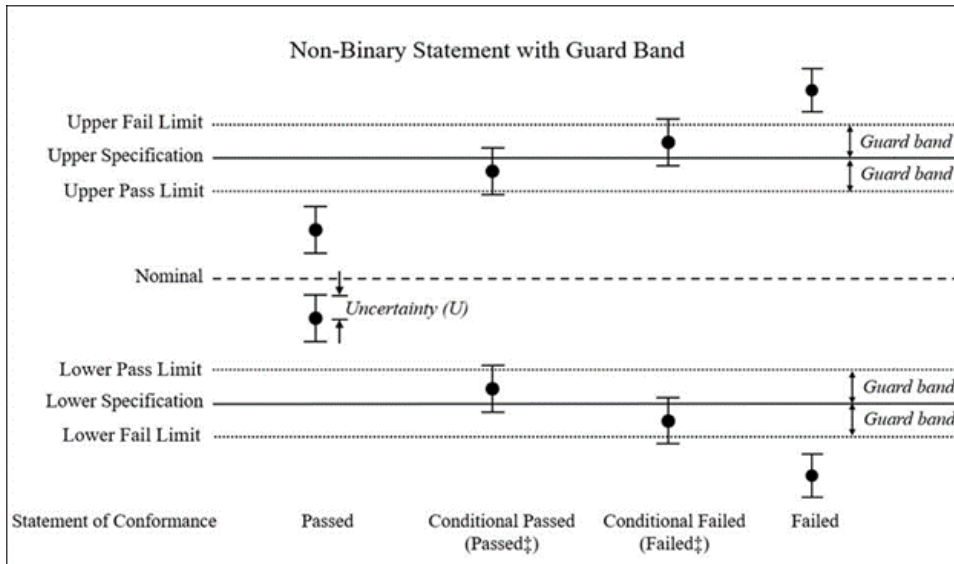
Statement of Conformity

When a statement of conformity to a specification is provided, NI uses decision rules and considers the level of risk to determine conformance with the agreed specification.

By default, the decision rule for test points is ILAC-G8:09/2019 section 4.2.1, **Binary Statement for Simple Acceptance Rule (w=0)**.



For test points with double-sided limits, a guard band is applied if the TUR is less than 4:1. For test points with a single-sided limit, a guard band is always applied. For test points where a guard band is applied (as noted in the status column), the decision rule is ILACG8:09/2019 4.2.3, **Non-binary Statement with Guard Band**.



Guard Band and TUR Calculations Supported by Calibration Executive

For all guard band methods, see the formulas below for the Acceptance Limits and Conditional Pass/Fail Limits calculations.

On the uncertainty worksheet, you can specify whether to apply guard band to only the upper or only the lower limit by adding the modifier "UL" or "LL" to the As-Found or As-Left Modifiers columns. By default, the guard band is applied to both upper and lower limits.

Built-in Guard Band and TUR Calculations

ANSI/NCSL Z540.3-2006 is the American national standard for the calibration of measurement and test equipment. The ANSI/NCSL Z540.3 standard recommends six methods to calculate and apply guard band to ensure a probability of false accepts (PFA) of $\leq 2\%$. ANSI/NCSL Z540.3-2006 Method 5 and Method 6 described in the standard Appendix A are built into Calibration Executive.

In Calibration Executive, the lookup name `method5` uses a formula that complies with ANSI/NCSL Z540.3-2006 Method 5 to calculate guard bands. This method sets the guard band to be equal to the measurement uncertainty for each test point.

The `method6` lookup names in Calibration Executive apply to formulas that comply with Z540.3-2006 Method 6. For `method6`, calculations vary depending on the uncertainty units.

For test points that have valid upper and lower limits, and uncertainty values that are > 0, the Test Uncertainty Ratio (TUR) will be calculated automatically and will be available on custom reports when using the 2.0 uncertainty template. Use the "UL" and "LL" modifiers on the uncertainty worksheet to configure valid limits. The TUR calculation depends on the uncertainty units (Linear, dB, or dBv). The following table describes the Method 6 calculations and TUR calculations according to the uncertainty units.

Uncertainty Unit	Lookup Name	Formulas
dB	method6_db	<p>Pass/Acceptance Limit Formula S:</p> $A_{-}[dB] = Nom[dB] + 10 * \log \left(1 + \frac{A_{-\%}}{100} \right)$ $A_{+}[dB] = Nom[dB] + 10 * \log \left(1 + \frac{A_{+\%}}{100} \right)$ $A_{-\%} = Spec_{-\%} + U_{-\%} * M$ $A_{+\%} = Spec_{+\%} - U_{+\%} * M$ <p>Fail Limit Formulas:</p> $F_{-}[dB] = Nom[dB] + 10 * \log \left(1 + \frac{Spec_{-\%} - U_{-\%} * M}{100} \right)$ $F_{+}[dB] = Nom[dB] + 10 * \log \left(1 + \frac{Spec_{+\%} + U_{+\%} * M}{100} \right)$ $M = 1.04 - e^{(0.38 \ln(TUR) - 0.54)}$ $Spec_{+\%} = \left(10^{\left(\frac{UL[dB] - Nom[dB]}{10} \right)} - 1 \right) * 10$ $Spec_{-\%} = \left(10^{\left(\frac{LL[dB] - Nom[dB]}{10} \right)} - 1 \right) * 100$ $TUR = \frac{10^{\frac{(UL[dB] - Nom[dB])}{10}} - 10^{\frac{(LL[dB] - Nom[dB])}{10}}}{0.02 * U\%}$

		$U\% = \frac{\left(10^{\left(\frac{U[dB]}{5}\right)} - 1\right) * 100}{\left(10^{\left(\frac{U[dB]}{5}\right)} + 1\right)}$
dBv	method6_dbv	<p>Pass/Acceptance Limit Formula S:</p> $A_{-}[dBv] = Nom[dBv] + 20 * \log\left(1 + \frac{A_{-\%}}{100}\right)$ $A_{+}[dBv] = Nom[dBv] + 20 * \log\left(1 + \frac{A_{+\%}}{100}\right)$ $A_{-\%} = Spec_{-\%} + U_{-\%} * M$ $A_{+\%} = Spec_{+\%} - U_{+\%} * M$ <p>Fail Limit Formulas:</p> $F_{-}[dBv] = Nom[dBv] + 20 * \log\left(1 + \frac{Spec_{-\%} - U_{-\%} * M}{100}\right)$ $F_{+}[dBv] = Nom[dBv] + 20 * \log\left(1 + \frac{Spec_{+\%} + U_{+\%} * M}{100}\right)$ $M = 1.04 - e^{((0.38 \ln(TUR) - 0.54))}$ $Spec_{+\%} = \left(10^{\left(\frac{UL[dBv] - Nom[dBv]}{20}\right)} - 1\right) * 100$ $Spec_{-\%} = \left(10^{\left(\frac{LL[dBv] - Nom[dBv]}{20}\right)} - 1\right) * 100$ $TUR = \frac{10^{(UL[dBv] - Nom[dBv])/20} - 10^{(LL[dBv] - Nom[dBv])/20}}{0.02 * U\%}$ $U\% = \frac{\left(10^{\left(\frac{U[dBv]}{10}\right)} - 1\right) * 100}{\left(10^{\left(\frac{U[dBv]}{10}\right)} + 1\right)}$
Units other than dB and dBv	method6_linear	$Guardband = U * (1.04 - e^{((0.38 \ln(TUR) - 0.54))})$ $TUR = \frac{UL - LL}{2 * U}$ $A_{-} = LL + Guardband$ $A_{+} = UL + Guardband$ $F_{-} = LL + Guardband$

$$F_+ = UL + \textit{Guardband}$$

A₋ = Lower Pass/Acceptance Limit

A₊ = Upper Pass/Acceptance Limit

Nom = Nominal Value

F₋ = Lower Fail Limit

F₊ = Upper Fail Limit

Spec₋ = Lower Specification Limit

Spec₊ = Upper Specification Limit

U₋ = Lower Uncertainty

U₊ = Upper Uncertainty

LL = Lower Limit

UL = Upper Limit

TUR = Test Uncertainty Ratio

When using the value `method6`, the uncertainty worksheet automatically selects the correct formula based on the uncertainty units. The method 6 formulas in the table are only applied when both the upper limit and lower limit are valid, and when the calculated Test Uncertainty Ratio (TUR) is determined to be ≤ 4 . For values greater than 4, the calculated guard band is determined to be 0.

If a nominal value (**Nom**) is not specified, Calibration Executive uses a default nominal value:

$$Nom = \frac{(UL + LL)}{2}$$

Custom Guard Band Calculations

In addition to the built-in guard bands, you can add user-defined custom guard bands, which modify the limits by a fixed value that is specified for each test point.

When a custom guard band is added, the prefix `Custom_` is added to the user-provided tag name to form the Lookup ID for the custom guard band. For example, if you insert a new custom guard band and enter the tag name `NewCalc`, the Lookup ID for the guard band becomes `Custom_NewCalc`.

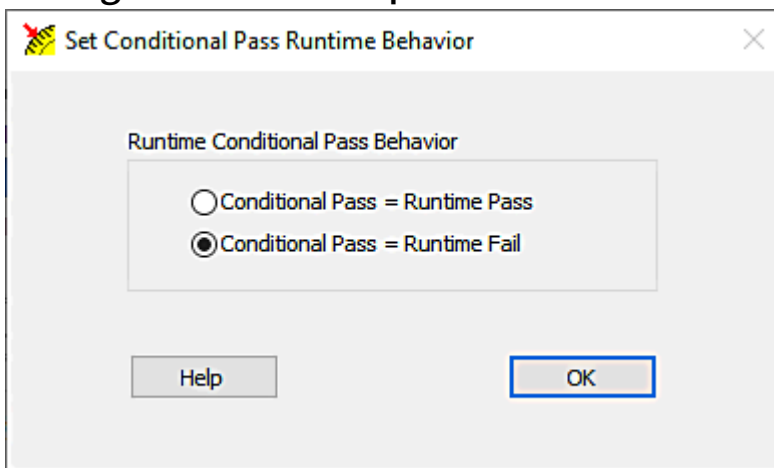
In this way, you can define a custom description for the guard band to display on the report. You must configure the guard band notes from within the Calibration Executive application.

Conditional Pass Runtime and Reporting Behavior

Many runtime and reporting behaviors in Calibration Executive are evaluated as simply "Passed" or "Failed" as long as the result falls within the specified range. However, you can configure runtime options to specify whether a conditional pass should evaluate to "Passed" or "Failed" for these specific behaviors.

To configure the execution and reporting behavior for a Conditional Pass:

1. From the toolbar in the main Calibration Executive window, select **Configure»Runtime Options**.



2. Select an option to specify whether a Conditional Pass is a Runtime Pass or a Runtime Fail.

By default, Calibration Executive evaluates a conditional pass as a runtime fail. This is equivalent to using the Accept Limits that are calculated from the guard band to dictate the passed failed behavior.

The following tables show the result type for specific behaviors when guard banding is taking into consideration. A Binary type means that the result will be either "Passed" or "Failed." Conditional means that a double dagger symbol (§) will be appended to the "Passed" or "Failed" result.

Runtime Status and Behavior

Behavior	Result Type (Binary or Conditional)
Failed Test Point Dialog Display Condition	Binary

Step message log pass/fail status	Conditional
Test step pass/fail result in execution dialog	Binary
Overall test result dialog	Binary

Printed Report Status

Behavior	Result Type (Binary or Conditional)
Overall As Found Result	Conditional
Overall As Left Result	Binary
Individual Test Point Result (as found and as left)	Conditional

Device Calibration Procedures

The following links provide more information about running specific calibration procedures.

C Series Devices

- [NI 9201](#)
- [NI 9202](#)
- [NI 9203](#)
- [NI 9205](#)
- [NI 9206](#)
- [NI 9207](#)
- [NI 9208](#)
- [NI 9209](#)
- [NI 9210](#)
- [NI 9211](#)
- [NI 9212](#)
- [TB-9212](#)
- [NI 9213](#)
- [NI 9214](#)
- [TB-9214](#)

- NI 9215
- NI 9216/9226
- NI 9217
- NI 9218
- NI 9219
- NI 9220
- NI 9221
- NI 9222
- NI 9223
- NI 9224
- NI 9225
- NI 9227
- NI 9228
- NI 9229
- NI 9230
- NI 9231
- NI 9232
- NI 9234
- NI 9235
- NI 9236
- NI 9237
- NI 9238
- NI 9239
- NI 9242/9244
- NI 9246/9247
- NI 9250/9251
- NI 9252
- NI 9260
- NI 9262/9263/9264/9265

- [NI 9266](#)
- [NI 9269](#)
- [NI 9361](#)

Counter/Timer Devices

- [PXIe-6614](#)
- [NI 6624](#)
- [NI 6652/6653/6672](#)
- [PXIe-6674T](#)
- [PXI-6683/6683H](#)

Data Acquisition (DAQ) Devices

Analog Output

- [NI 6703/6704](#)
- [NI 6711/6713](#)
- [NI 6722/6723](#)
- [NI 6731/6733](#)
- [PCIe-6738](#)
- [PXIe-6738/6739](#)

CompactDAQ

- [cDAQ-9171](#)
- [cDAQ-9174](#)
- [cDAQ-9178](#)
- [cDAQ-9179](#)
- [cDAQ-9181](#)
- [cDAQ-9184](#)
- [cDAQ-9185](#)
- [cDAQ-9188](#)
- [cDAQ-9189](#)

- [cDAQ-9191](#)

DSA

- [USB-4431/4432](#)
- [NI 4461/4462/4465](#)
- [PXIe-4463](#)
- [PXIe-4464](#)
- [NI 4472/4474/4472B](#)
- [PXIe-4480/4481](#)
- [NI 4492/4495/4496/4497/4498/4499](#)
- [PXIe-4610](#)

FieldDAQ

- [FD-11613/11614](#)

MIO 62xx Models (formerly M Series)

- [USB-6210/6211/6212/6215/6216/6218](#)
- [NI 6220/6221/6224/6225/6229](#)
- [NI 6230/6232/6233/6236/6238/6239](#)
- [NI 6250/6251/6254/6255/6259](#)
- [NI 6280/6281/6284/6289](#)

R Series

- [NI 7841R/7842R](#)
- [NI 7845R/7846R/7855R/7856R](#)
- [NI 7851R/7852R/7853R/7854R](#)
- [PXIe-7847R](#)
- [PXIe-7857R](#)
- [PXIe-7858R](#)

S Series

- [NI 6110/6111/6115](#)

- [NI 6120/6122/6123](#)
- [PXIe-6124](#)
- [NI 6132/6133](#)
- [NI 6143](#)
- [PCI-6154](#)

SC Express

- [PXIe-4300](#)
- [PXIe-4302/4303](#)
- [TB-4302C](#)
- [PXIe-4304/4305](#)
- [PXIe-4309](#)
- [PXIe-4310](#)
- [PXIe-4322](#)
- [PXIe-4330/4331](#)
- [PXIe-4339](#)
- [RM-4339](#)
- [PXIe-4353](#)
- [TC-4353](#)
- [PXIe-4357](#)

MIO 63xx Models (formerly X Series)

- [NI 6320](#)
- [NI 6321](#)
- [NI 6323](#)
- [NI 6341](#)
- [NI 6343](#)
- [PXIe-6345](#)
- [PCIe-6346](#)
- [USB-6346](#)

- [NI 6349](#)
- [NI 6351](#)
- [NI 6353](#)
- [PXIe-6355](#)
- [NI 6356](#)
- [PXIe-6358](#)
- [NI 6361](#)
- [NI 6363](#)
- [PXIe-6365](#)
- [NI 6366](#)
- [PXIe-6368](#)
- [PCle-6374](#)
- [PXIe-6375](#)
- [PCle-6376](#)
- [PXIe-6376](#)
- [PXIe-6378](#)
- [PXIe-6386](#)
- [PXIe-6396](#)

Modular Instruments

DMMs

- [NI 4065](#)
- [NI 4070](#)
- [PXI-4071](#)
- [NI 4072](#)
- [PXIe-4080/4082](#)
- [PXIe-4081](#)

Digitizers

- [NI 5105](#)

- [PXIe-5110/5111/5113](#)
- [NI 5114](#)
- [NI 5122](#)
- [NI 5124](#)
- [USB-5132](#)
- [USB-5133](#)
- [NI 5142](#)
- [NI 5152](#)
- [NI 5153](#)
- [NI 5154](#)
- [PXIe-5160](#)
- [PXIe-5162](#)
- [PXIe-5163](#)
- [PXIe-5164](#)
- [PXIe-5170R/5171R](#)
- [PXIe-5172](#)
- [PXIe-5185 \(50 \$\Omega\$ \)](#)
- [PXIe-5185 \(1 M \$\Omega\$ \)](#)
- [PXIe-5186 \(50 \$\Omega\$ \)](#)
- [PXIe-5186 \(1 M \$\Omega\$ \)](#)
- [PXIe-5622](#)
- [PXIe-5624](#)
- [NI 5922](#)

High-Speed Digital I/O

- [PXIe-6555/6556](#)
- [PXIe-6570/6571](#)

Power Measurement Conditioners

- [RM-26999](#)

Power Supplies and SMUs

- [PXI-4110](#)
- [PXIe-4112/4113](#)
- [PXI-4130](#)
- [PXI-4132](#)
- [PXIe-4135 and PXIe-4135 \(40W\)](#)
- [PXIe-4136/4137 and PXIe-4137 \(40W\)](#)
- [PXIe-4138/4139 and PXIe-4139 \(40W\)](#)
- [PXIe-4140/4141/4142/4143](#)
- [PXIe-4144/4145](#)
- [PXIe-4147](#)
- [PXIe-4154](#)
- [RMX-4124/4125](#)

RF

- [PXIe-5601](#)
- [PXIe-5606](#)
- [PXIe-5611](#)
- [PXIe-5644R/5646R](#)
- [PXIe-5645R](#)
- [NI 5650](#)
- [NI 5651](#)
- [NI 5652](#)
- [PXIe-5653](#)
- [PXIe-5654](#)
- [PXIe-5654 \(with PXIe-5696\)](#)
- [PXIe-5655](#)
- [PXIe-5663](#)
- [PXIe-5663E](#)
- [PXIe-5665 \(3.6 GHz\)](#)

- [PXIe-5665 \(14 GHz\)](#)
- [PXIe-5667](#)
- [PXIe-5668R](#)
- [PXIe-5673](#)
- [PXIe-5673E](#)
- [PXIe-5693](#)
- [PXIe-5698](#)
- [PXIe-5840](#)
- [PXIe-5841](#)
- [Wireless Test System \(WTS\)](#)

Signal Generators

- [NI 5402](#)
- [PXI-5404](#)
- [NI 5406](#)
- [NI 5412](#)
- [PXIe-5413](#)
- [NI 5421](#)
- [PXI-5422](#)
- [PXIe-5423](#)
- [PXIe-5433](#)
- [NI 5441](#)
- [PXIe-5442](#)
- [PXIe-5450](#)
- [PXIe-5451](#)

PXI Chassis

- [PXIe-1092](#)
- [PXIe-1095](#)

Semiconductor Test System

- [STS-DIO-01 Timing CLB](#)

STS-DIO-01 Timing CLB Calibration Procedure

This topic contains information for calibrating the STS-DIO-01 Timing Calibration Load Board (CLB) using Calibration Executive.

Calibration Executive Procedure Features:

Adjustment ✓	Manual Mode ⊘	Selectable Test Points ⊘
-----------------	------------------	-----------------------------

Approximate Test Time:

Verify Only 35 minutes	Verify & Adjust 70 minutes
---------------------------	-------------------------------

[Test Equipment](#)

[Test Conditions](#)

[Device Setup](#)

[Test Limit Equations](#)

Test Equipment

The following table lists the test equipment required to calibrate the STS-DIO-01 Timing CLB.

Instrument	Recommended Model	Where Used	Requirements
Oscilloscope with TDR Module	Tektronix DSA8300 and Tektronix 80E04	Cable Characterization Relative Signal Path Skew Verification Relative Signal Path Skew Adjustment	Bandwidth: >20 MHz Absolute Accuracy: <17.5 ps Relative Accuracy: <3 ps
External reference time base	PXIe-6674T or Rubidium Symmetricom 8400	Cable Characterization Relative Signal Path Skew Verification Relative Signal Path Skew Adjustment	10 MHz Reference: <0.1 μ Hz/Hz

2.92 mm cable	Maury Microwave Stability Plus Cable SP-292-MM-24	Cable Characterization Relative Signal Path Skew Verification Relative Signal Path Skew Adjustment	Length: <24 in Velocity of Prop: >70% Attenuation: <0.15 dB @ 1 GHz
STS T1 M2	NI P/N 866286-01	Relative Signal Path Skew Verification Relative Signal Path Skew Adjustment	—
BNC-to-2.92 mm adapter	—	Cable Characterization Relative Signal Path Skew Verification Relative Signal Path Skew Adjustment	—
Air source	—	Relative Signal Path Skew Verification Relative Signal Path Skew Adjustment	90–100 psi
5/16-inch torque wrench for 2.92 mm connections	—	Cable Characterization Relative Signal Path Skew Verification Relative Signal Path Skew Adjustment	8 in-lbs ± 0.5 in-lbs
Calibration Executive controller	—	—	Dedicated Ethernet port Configured as described

Test Conditions

The following setup and environmental conditions are required to ensure the STS-DIO-01 Timing CLB meets published specifications.

- Keep cabling as short as possible. Long cables and wires act as antennas, picking up extra noise that can affect measurements.
- Use shielded copper wire for all cable connections to the DUT. Use twisted-pair wire to eliminate noise and thermal offsets.
- Verify that all connections, including front panel connections and screws, are secure.
- Maintain an ambient temperature of 23 °C ±5 °C.
- Keep relative humidity below 80%, non-condensing.
- Allow a warm-up time of at least 30 minutes after the DUT is connected to the STS T1M2 frame and powered on. The warm-up time ensures that measurement circuitry is at a stable operating temperature.
- Ensure that the PXI chassis fan speed is set to HIGH, that the fan filters are clean, and that the empty slots contain filler panels. For more information, refer to the **Maintain Forced-Air Cooling Note to Users** document available at ni.com/manuals.

First Time Setup

The STS and the Calibration Executive controller must be configured to communicate directly over an Ethernet connection.

STS System

Follow the instructions to configure the system for autologin and static IP.

1. Disconnect the Ethernet connection between the STS and the Calibration Executive controller.
2. Use a USB flash drive to copy the following to the STS:
`C:\Program Files\National Instruments\Calibration Executive\UserResources\STS Timing CLB\Test Fixture`
3. On the STS, right-click `TimingCLBFixture.bat` and select **Run as administrator**.
4. Accept UAC Permissions to launch as administrator.

- When prompted, enter the user name and password for the current login. This will configure autologin.

```

C:\WINDOWS\System32\cmd.exe

=====
Running Admin shell
=====
      1 file(s) copied.
      1 file(s) copied.
Enter the local user ID: username
Enter the Password:

```

- When prompted, connect the Ethernet cable between the CalExec controller and the STS, and press a key.

```

C:\WINDOWS\System32\cmd.exe

=====
Running Admin shell
=====
      1 file(s) copied.
      1 file(s) copied.
Enter the local user ID:
Enter the Password:
connected devices found:
Ethernet
Ethernet 2
connect the STS Fixture into the Cal-exec ethernet port
Press any key to continue . . .

```

- Once the new connection is detected, the connection will be displayed.
- Once the IP address is set, close the command window. The batch file sets the STS IP address to 10.0.20.30.

```

Administrator: C:\WINDOWS\System32\cmd.exe

=====
Running Admin shell
=====
      1 file(s) copied.
      1 file(s) copied.
Enter the local user ID:
Enter the Password:
connected devices found:
Ethernet
Ethernet 2
connect the STS Fixture into the Cal-exec ethernet port
Press any key to continue . . .
connected devices found:
Ethernet
Ethernet 2
New connection found
Ethernet
will be set to static IP press ctrl+C to cancel
Press any key to continue . . .
IP address set

```

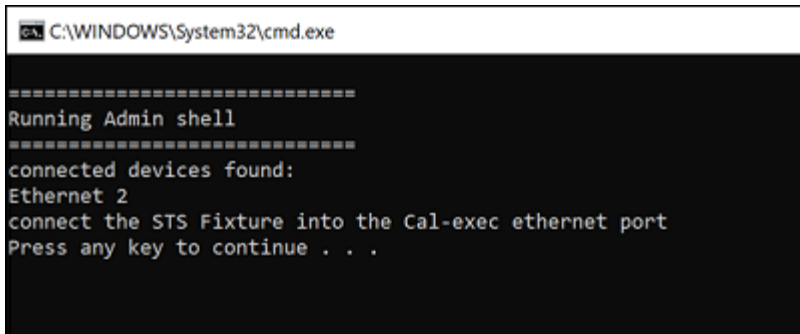
Calibration Executive Controller

Follow the instructions to set the Ethernet port to static IP.

1. Disconnect the Ethernet connection between the STS and the Calibration Executive controller.
2. On the CalExec system, execute the following script, accepting elevated permissions:

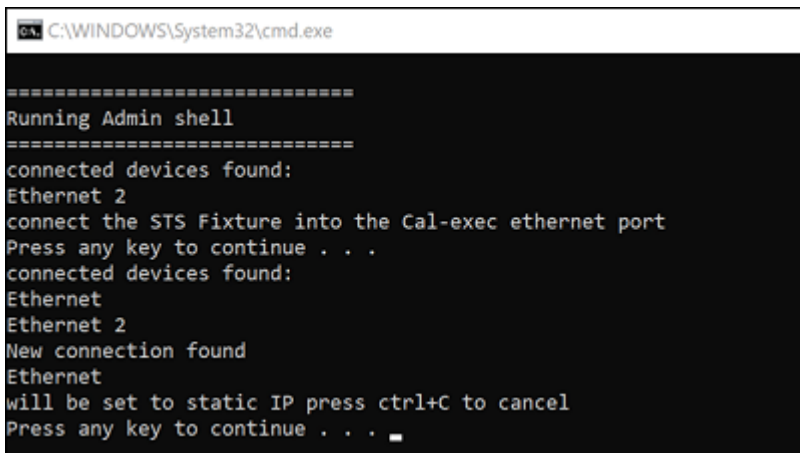
```
C:\Program Files\National Instruments\Calibration Executive\UserResources\STS Timing CLB\CalExec System\CalExecSystemOneTimeSetup.bat
```

3. When prompted, connect the STS to the CalExec Ethernet port and press a key to continue.



```
C:\WINDOWS\System32\cmd.exe
=====
Running Admin shell
=====
connected devices found:
Ethernet 2
connect the STS Fixture into the Cal-exec ethernet port
Press any key to continue . . .
```

4. When prompted, press any key to accept static IP, and then close the command window. The script sets the return IP address for the Calibration Executive controller to 10.10.0.20.5.



```
C:\WINDOWS\System32\cmd.exe
=====
Running Admin shell
=====
connected devices found:
Ethernet 2
connect the STS Fixture into the Cal-exec ethernet port
Press any key to continue . . .
connected devices found:
Ethernet
Ethernet 2
New connection found
Ethernet
will be set to static IP press ctrl+C to cancel
Press any key to continue . . .
```

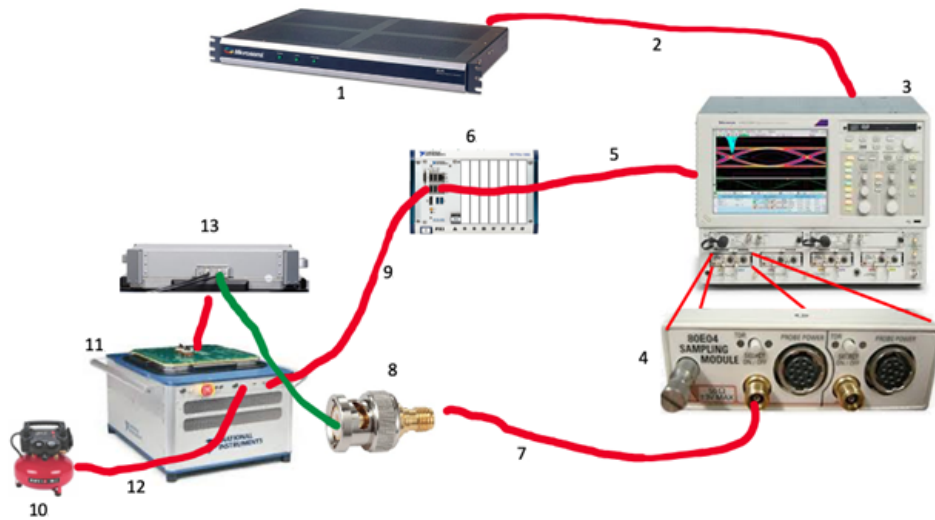
Device Setup

1. Connect the 10 MHz clk reference from the timebase to the back of the oscilloscope.
2. Connect the TDR module to the first block on the front of the oscilloscope.
3. Power on the STS system.
4. Check that air is connected to the STS. Follow "Air Setup Requirements" in the **STS Site Preparation and Bring Up Manual**. If necessary, contact NI support to obtain a copy of the **STS Site Preparation and Bring Up Manual** (P/N 377702x-01).
 - a. Install STS-DIO-01 Timing CLB on the top of the STS, respecting proper orientation.
 - b. There are two buttons on either side of the front of the STS, approximately two arm-lengths apart, and located towards the top.

Press the two buttons simultaneously. You should hear and see the STS-DIO-01 device interface board (DIB) lock with air.

5. Connect the STS-DIO-01 Timing CLB to your system using an Ethernet cable.
6. [Launch](#) the Calibration Executive procedure and complete the setup wizard.
7. Connect CH 0 of the TDR module to the channel on the STS Timing CLB that is prompted by Calibration Executive.

Figure 1 STS-DIO-01 Timing CLB Initial Test Connections



- | | |
|----|----------------------------------|
| 1 | External reference timebase |
| 2 | BNC-to-BNC cable |
| 3 | Oscilloscope (Tektronix DSA8300) |
| 4 | TDR Module (Tektronix 80E04) |
| 5 | GPIB cable |
| 6 | Calibration Executive controller |
| 7 | 2.92 mm cable |
| 8 | BNC-to-2.92 mm adapter |
| 9 | Ethernet cable |
| 10 | Air source |
| 11 | Semiconductor Test System (STS) |
| 12 | Airhose cable |
| 13 | DUT |

Test Limit Equations

Absolute Signal Path Delay Functional Test: Test Limits = Nominal ± 500 ps

Relative Signal Path Skew: Test Limits = 0 ps to 30 ps

Reference Path Repeatability: Test Limits = ± 3 ps

DMM Instrument Standard Considerations

The PXI-4070/4071/4072 digital multimeter (DMM) is a recommended instrument standard for the following devices. Do not substitute the PXIe-4080/4081/4082 as DMM to calibrate these devices; doing so can cause the Calibration Executive procedure to produce errors or terminate.

- [USB-5132/5133](#)
- [NI 5402/5406](#)
- [NI 5412/5421/5441](#)
- [PXIe-5645R](#)
- [NI 6731/6733](#)
- [NI 6711/6713](#)
- [NI 6722/6723](#)
- [NI 9218](#)
- [NI 9219](#)
- [NI 9260](#)
- [NI 9269](#)

Glossary



Prefixes

Symbol	Prefix	Value
p	pico	10
n	nano	10
μ	micro	10
m	milli	10
k	kilo	10
M	mega	10
G	giga	10
T	tera	10

Numbers/Symbols

nV	nanovolts	10 volts
μ V	microvolts	10 volts
$\mu\Omega$	microohms	10 ohms
m Ω	milliohms	10 ohms
M Ω	megaohms	10 ohms
pA	picoamps	10 amperes
nA	nanoamps	10 amperes
μ A	microamps	10 amperes
mA	milliamps	10 amperes

A

adjust

To correct the measurement error of a device by adjusting the calibration constants and storing the new calibration constants in the EEPROM. The host computer reads the calibration constants and the software uses them to compensate for errors in the data and to present calibrated data to the user.

C

calibration

A set of operations that compares the values indicated by a measuring instrument or measuring system to the corresponding values realized by external standards. The result of a calibration can be used to determine the measurement error and can correct for it in the adjustment process.

combined standard uncertainty

The standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or covariances of these other quantities weighted according to how the measurement result varies with changes in these quantities.

confidence	The probability that a predicted result will occur.
confidence level	Confidence, expressed either as a fraction (between 0 and 1) or a percentage.
coverage factor	A numerical factor used as a multiplier of the standard uncertainty to obtain an expanded uncertainty.

D

degrees of freedom	Any of the unrestricted, statistically independent values of a sample that are used to determine a property of the sample.
DLL	Dynamic-Link Library for Windows—libraries that link to a program and load at run time instead of being compiled into the program.
driver	Software that controls specific hardware device such as a DAQ device or a GPIB interface board.
DUT	Device Under Test—the device you are calibrating.

E

expanded uncertainty	A quantity defining an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the quantity being measured.
----------------------	--

G

GPIB	General Purpose Interface Bus—the standard bus used for controlling electronic instruments with a computer.
------	---

H

HTML	Hyper Text Markup Language—a hypertext document format used on the Web.
------	---

I

IVI

Interchangeable virtual Instrumentation—an advanced architecture for instrument drivers that includes features such as simulation and state caching.

M

MB

Megabytes of memory.

MHz

Megahertz

N

NI-VISA

The National Instruments implementation of the VISA standard—an interface-independent software that provides a unified programming interface for vXI, GPIB, and serial instruments.

R

resolution

The smallest signal increment that can be detected by a measurement system. Resolution can be expressed in bits, proportions, digits, or percent of full scale.

S

SCXI

Signal Conditioning eXtensions for Instrumentation—the National Instruments product line for conditioning low-level signals within an external chassis near sensors.

standard

An instrument used in calibration such as a calibrator, DMM, or counter.

standard uncertainty

The uncertainty of the result of a measurement expressed as a standard deviation.

structured query language (SQL)

An industry-standard language for retrieving, updating, and managing data.

T

TestStand

A test executive program that allows you to organize and execute sequences of reusable test modules. In Calibration Executive, TestStand manages the calibration procedures used to calibrate a device.

Type A evaluation (of uncertainty)

A method of evaluation of uncertainty by the statistical analysis of a series of observations.

Type B evaluation (of uncertainty)

A method of evaluation of uncertainty by means other than the statistical analysis of a series of observations.

U

uncertainty

An estimate of the range of values about the measured value in which the accepted value is believed to lie.

uncertainty of measurement

A parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the quantity being measured.

V

verify

To compare the measured performance of a device to an external standard of known measurement uncertainty to confirm that the device meets or exceeds its specifications.

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- Receive critical part notifications, software updates, and service expirations.

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