GETTING STARTED GUIDE

NI-DAQ™mx Base 1.*x*

This guide describes how to install and configure the NI-DAQmx Base 1.*x* software and a data acquisition (DAQ) device. This guide also describes how to verify that the device is operating properly.

✎ **Note** For information about NI-DAQmx Base for Linux and Mac OS, refer to `ni.com/info` and enter `rddqld`.

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NATIONAL INSTRUMENTS™

Conventions

The following conventions are used in this guide.

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

This icon denotes a tip, which alerts you to advisory information.

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

This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. When this symbol is marked on the device, refer to the *Read Me First: Safety and Radio-Frequency Interference* document, shipped with the device, for precautions to take.

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

italic   Italic text denotes a cross reference, an introduction to a key concept, or a placeholder for a word or value that you must supply.

monospace	Text in this font denotes text or characters you should enter from the keyboard, the proper names of disk drives, paths, directories, programs, functions, filenames, and extensions.
monospace italic	Italic text in this font denotes text that is a placeholder for a word or value that you must supply.

Related Documentation

The following documents contain information you might find helpful as you read this guide:

- Software Documentation
  - *NI-DAQmx Base Help*
  - *NI-DAQmx Base 1.x Readme*
  - *NI-DAQmx Help*
  - *Getting Started with the LabVIEW PDA Module*
  - *LabVIEW PDA Module User Manual*
  - *LabVIEW Help*, available by selecting **Help»VI, Function, & How-To Help**
  - *LabVIEW User Manual*, available in PDF format by selecting **Start»Programs»National Instruments»LabVIEW 7.1» Search the LabVIEW Bookshelf** and clicking the LabVIEW User Manual link
  - *E Series Help*
- Hardware Documentation
  - *USB-9211 Operating Instructions*
  - *USB-9215 Operating Instructions*
  - *USB-6008/6009 User Guide*
  - *USB-6501 User Guide*
  - *CF-6004 User Guide*
- Documentation for the Personal Digital Assistant (PDA) device you use

Overview

National Instruments measurement devices are packaged with NI-DAQmx or NI-DAQmx Base driver software. NI-DAQmx Base includes an extensive library of VIs and ANSI C functions that you can call from your application software, such as LabVIEW or LabWindows™/CVI™, to program all the features of your NI measurement devices. The NI-DAQmx

Base driver software has an application programming interface (API), which is a library of VIs and ANSI C functions for creating applications for your device.

NI-DAQmx Base

NI-DAQmx Base is a driver that allows you to build applications that run on a PDA and Windows. NI-DAQmx Base includes the following features:

- NI-DAQmx Base is a subset of the NI-DAQmx API and is similar in functionality to NI-DAQmx.

- NI-DAQmx Base consists of a LabVIEW VI framework, which allows you to customize the driver, if needed, when using LabVIEW.

- NI-DAQmx Base provides a high-level interface on LabVIEW PDA for Pocket PC 2003 and certain USB devices on Windows 2000/XP.

Note If you are familiar with NI-DAQmx, refer to the *NI-DAQmx Base Readme* for information about the differences between NI-DAQmx Base and NI-DAQmx.

Device Support

NI-DAQmx Base 1.4 supports the following devices under LabVIEW 7.0, 7.1, and ANSI C:

- NI USB-6008

- NI USB-6009

- NI-USB-6501

- NI USB-9211

- NI USB-9215

NI-DAQmx Base 1.0.1 supports the following devices under LabVIEW 7.1 PDA for Pocket PC 2003:

- NI CF-6004

- NI DAQCard-6024E

- NI DAQCard-6062E

- NI DAQCard-6036E

- NI DAQCard-AI-16E-4

Note For specific device model names or a list of newly supported devices, refer to the *NI-DAQmx Base Readme* on the CD, or select **Start»Programs»National Instruments» NI-DAQmx Base**.

Operating System, Application Software, Programming Language, and Device Support in NI-DAQmx Base 1.*x*

Operating System Support

NI-DAQmx Base 1.*x* supports Windows 2000/XP. The development environment for devices on LabVIEW 7.1 PDA is supported on Windows 2000/XP.

Note Only one version of NI-DAQmx Base (such as NI-DAQmx Base 1.4) can be installed on the same computer at the same time.

Install Application Software

Install the NI application software, including LabVIEW, LabWindows/CVI, and Measurement Studio. PDA users must use LabVIEW 7.1 or later with NI-DAQmx Base 1.0 for Pocket PC. Refer to the *Operating System, Application Software, Programming Language, and Device Support in NI-DAQmx Base 1.x* section for more information. Also, refer to *Getting Started with the LabVIEW PDA Module* and the *LabVIEW PDA Module User Manual* for more information.

Note PDA users should make sure LabVIEW PDA is completely installed and configured before continuing.

Step 1. Install the NI-DAQmx Base Software

The following sections describe how to install the NI-DAQmx Base software.

Insert the CD

Note Install your driver software before installing new hardware devices, or the operating system might not detect your device, and you might see warnings asking you to install the driver.

Inserting the CD launches the NI-DAQmx Base install window.
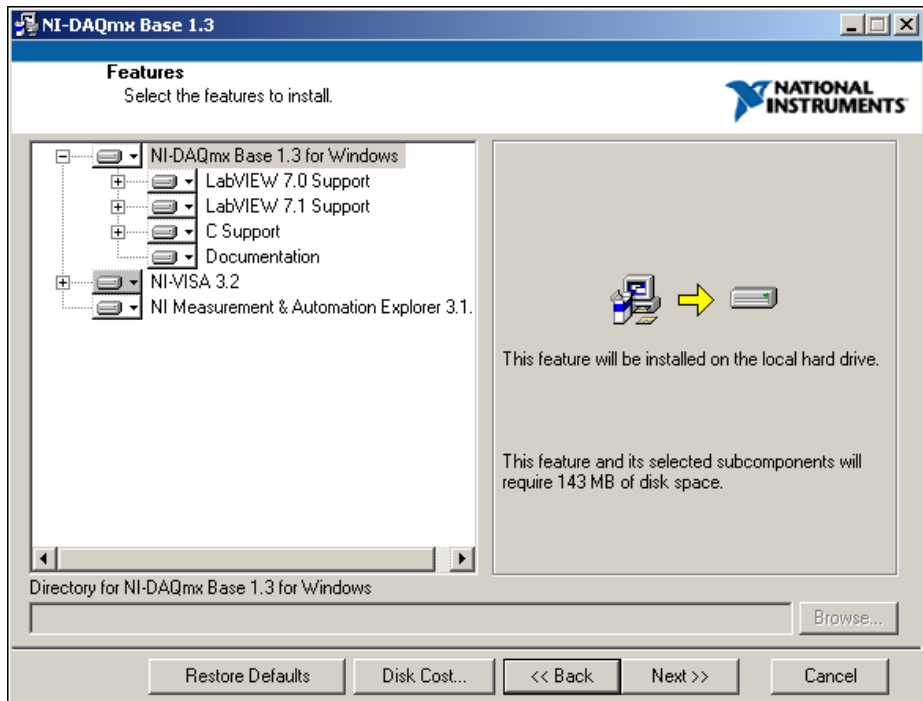
If the NI-DAQmx Base install window does not open automatically, complete the following steps:

1. Select **Start»Run**.
2. Enter x:\setup.exe, where *x* is the letter of the CD drive.
3. Click **Install NI-DAQmx Base**.

Install Support Files

The NI-DAQmx Base installer detects the NI software installed on the operating system and automatically selects the latest versions of the driver, application software, and language support files from the CD.

The NI-DAQmx Base installer displays which features will be installed on your computer, as shown.
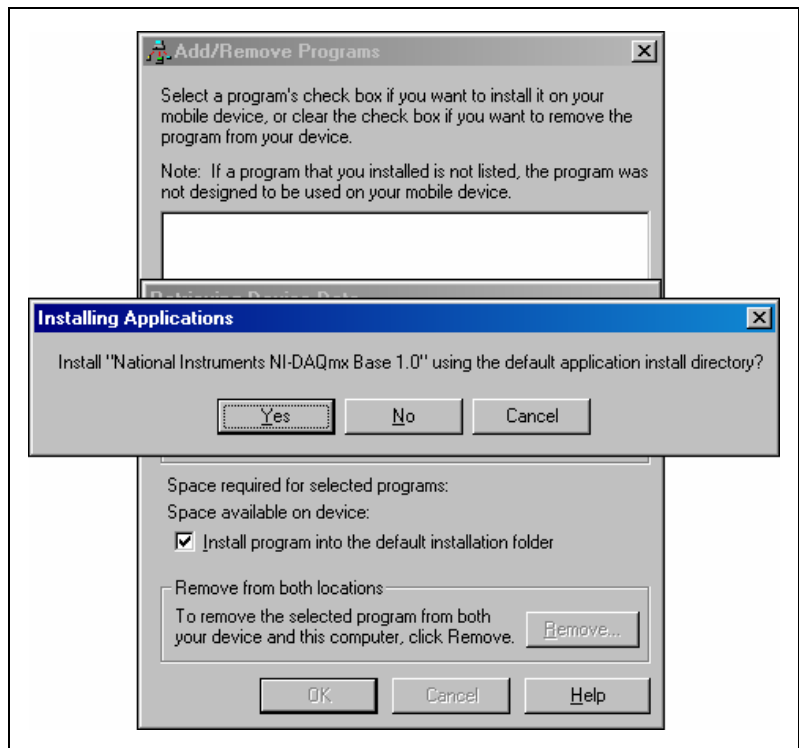

Complete the following steps to install NI-DAQmx Base.

1. In the Features window, shown in the previous figure, verify that the installer detected and selected the correct support files and the correct version number of the application software.

2. Click the **+** in front of the feature to expand the list of feature subcomponents as shown in the previous figure. You can select additional options to install the support files, examples, and documentation.

3. Follow the software prompts.

4. Click **Finish** and wait for the installer to complete. NI-DAQmx Base might require you to reboot your computer to complete installation.

Step 2. For Devices on LabVIEW 7.1 PDA Only—Run the PDA Setup Utility

After running the NI-DAQmx Base installation, you must copy the driver files to the PDA. Complete the following steps to run the Pocket PC Driver Installation utility.

1. Select **Start»Programs»National Instruments»NI-DAQmx Base**.

2. Click **PocketPC Driver Installation**. Clicking **PocketPC Driver Installation** launches the Pocket PC Add/Remove Programs utility window, as shown in the following figure.

3. Click **Yes** to install the device driver into the default application install directory.

4. Check the Pocket PC screen to see if any additional steps are requested, such as replacing an older driver.

If there are no error messages, you have completed the steps to install the driver files onto the PDA.

Step 3. Unpack the Devices, Accessories, and Cables

Your device ships in an antistatic package to prevent electrostatic discharge (ESD) damage to the device. ESD can damage several components on the device.

⚠ **Caution** *Never* touch the exposed pins of connectors.

To avoid such damage, take the following precautions:

• Ground yourself using a grounding strap or by touching a grounded object.

• Touch the antistatic package to a metal part of the computer chassis before removing the device from the package.

Remove the device from the package and inspect the device for loose components or any sign of damage. Notify NI if the device appears damaged in any way. Do *not* install a damaged device in the computer, PDA, or PXI chassis.

Store the device in the antistatic package when the device is not in use.

For safety and compliance information, refer to the device documentation packaged with your device.

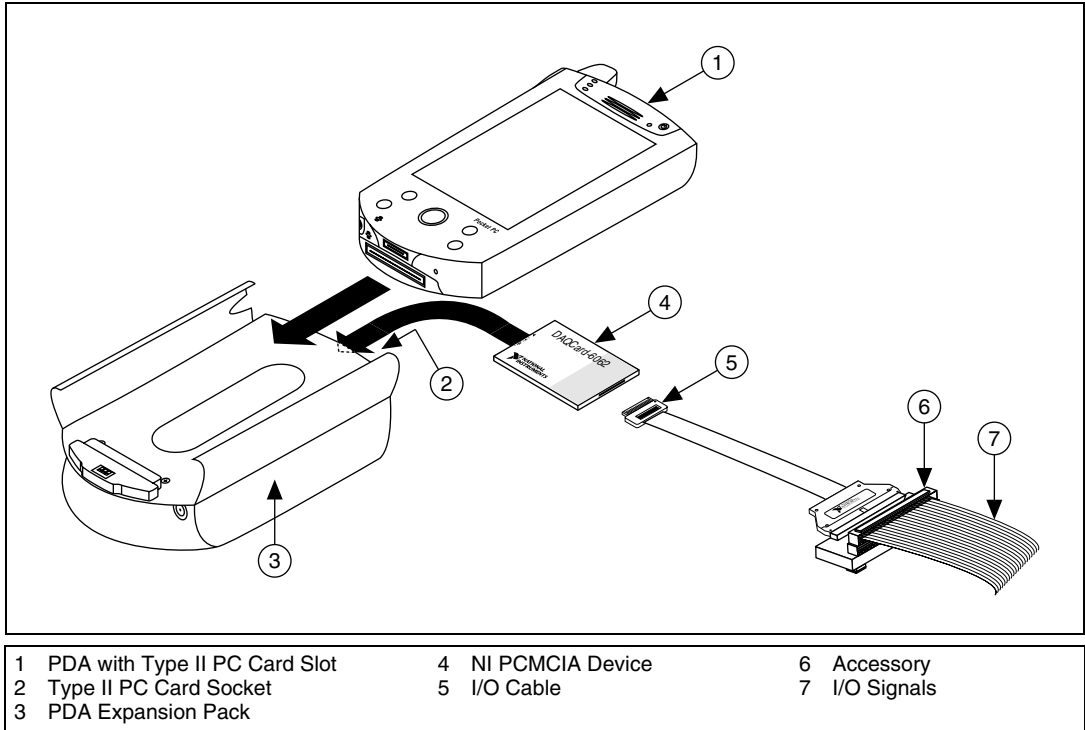# Step 4. Install the Devices, Accessories, and Cables

NI PCMCIA Device Installation

⚠ **Caution** Follow proper ESD precautions to ensure you are grounded before installing the hardware.

The NI PCMCIA device supports hot insertion on the PDA, which means the NI PCMCIA device can be installed and removed without rebooting the PDA. You can install an NI PCMCIA device in any available Type II PC Card slot.

To install the NI PCMCIA device, refer to the following figure while completing the following steps.

1	PDA with Type II PC Card Slot	4	NI PCMCIA Device	6	Accessory
2	Type II PC Card Socket	5	I/O Cable	7	I/O Signals
3	PDA Expansion Pack				

1. Attach the Type II PC cardsleeve or expansion pack to the PDA, if necessary.

2. NI PCMCIA devices have two connectors: a 68-pin PCMCIA bus connector on one end and an I/O connector on the other end. The NI PCMCIA device is keyed so that you can insert it only one way. Insert the NI PCMCIA device in the slot until the connector is firmly seated.

⚠️ **Caution** Always grasp the cable by the connector you are inserting or removing. *Never* pull directly on the I/O cable to unplug it from the PCMCIA device.

3. Attach the I/O cable. Be careful not to put strain on the I/O cable when inserting or removing the cable connector.
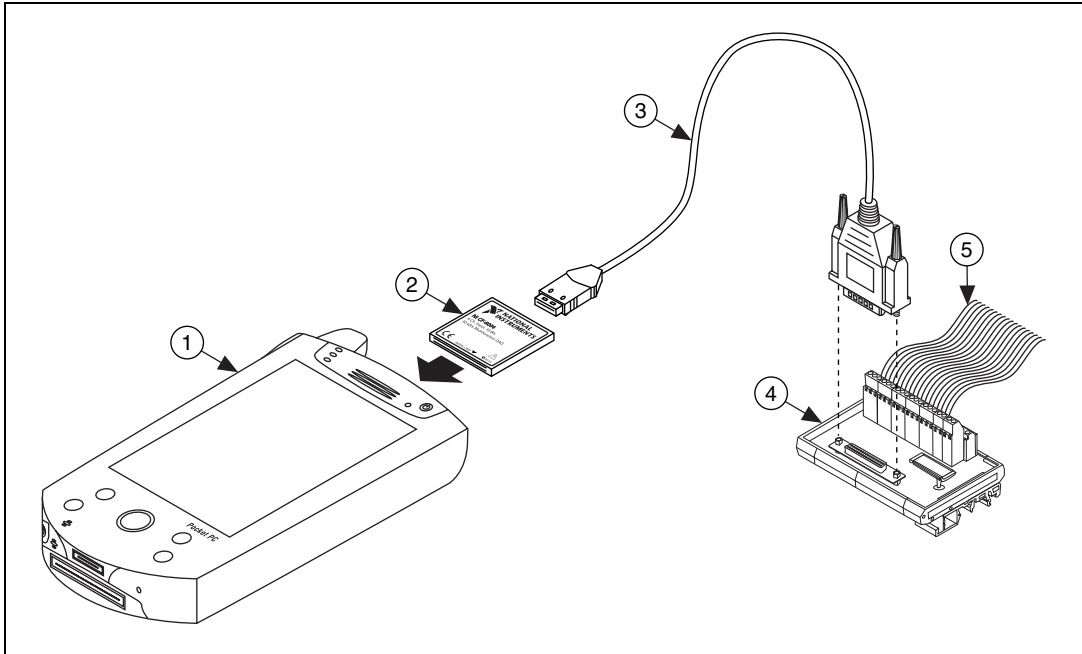
NI CompactFlash Device Installation

⚠️ **Caution** Follow proper ESD precautions to ensure you are grounded before installing the hardware.

The NI CompactFlash device supports hot insertion on the PDA, which means you can install and remove the NI CompactFlash device without rebooting the PDA. You can install an NI CompactFlash device in any available Type II CompactFlash slot.

To install the NI CompactFlash device, refer to the following figure while completing the following steps.

| 1 | PDA with Type II CompactFlash Slot | 3 | I/O Cable | 5 | I/O Signals |
| 2 | NI CompactFlash Device | 4 | Accessory | | |

1. NI CompactFlash devices have two connectors: a 50-pin CompactFlash bus connector on one end, and an I/O connector on the other. The NI CompactFlash device is keyed so that you can insert it only one way. Insert the CompactFlash device in the slot until the connector is firmly seated.
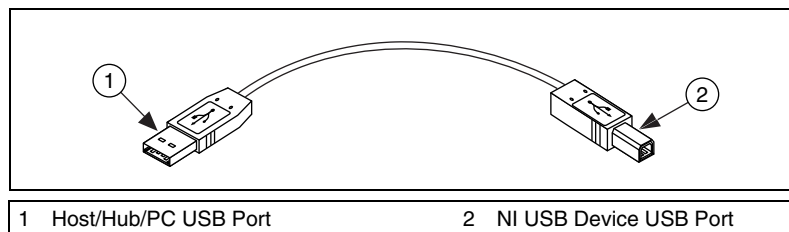
⚠ **Caution** Always grasp the device by the connectors you are inserting or removing. *Never* pull directly on the I/O to unplug it from the CompactFlash device.

2. Attach the I/O cable. Be careful not to put strain on the I/O cable when inserting or removing the cable connector.

NI USB Device Installation

Complete the following steps to install an NI USB device.

1. Connect the cable from the computer USB port or from any other hub that provides USB bus power to the USB port on the device. Connect the other end of the USB cable to the USB port on the device. The following figure shows the USB cable and its connectors.

| 1 | Host/Hub/PC USB Port | 2 | NI USB Device USB Port |

2. Power on your computer or PXI chassis. On some Windows systems, the Found New Hardware wizard opens with a dialog box for every NI device installed. Click **Next** or **Yes** to install the software for each device.

Accessories

Install accessories and/or terminal blocks according to the instructions in their user guides.

Step 5. Confirm That Your Device Is Recognized

The following sections discuss how to confirm that your device is recognized.
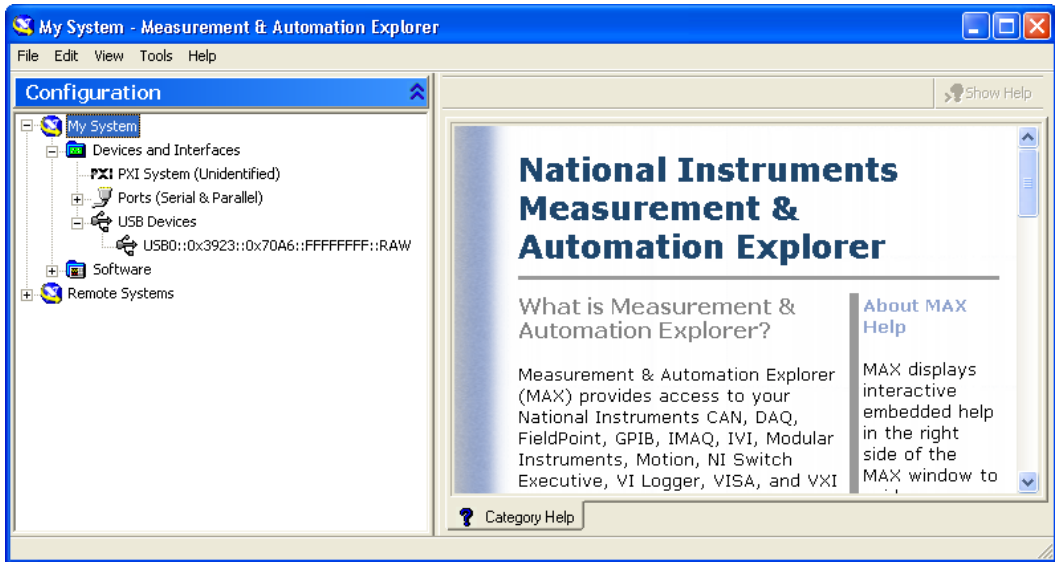
Devices on LabVIEW 7.1 PDA

Pocket PC only indicates whether a hardware installation error occurred. If there are no error messages, you have successfully installed the features and the device is recognized by the NI-DAQmx Base driver. If you receive an Unknown Device error message, you have not correctly installed NI-DAQmx Base on the PDA. Refer to *Step 1. Install the NI-DAQmx Base Software* for more information about how to install the Pocket PC features of the NI-DAQmx Base driver.

USB Devices

To verify that the USB device is recognized, complete the following steps:

1. Double-click the **Measurement & Automation** icon on the desktop to open Measurement & Automation Explorer (MAX).

2. Expand **Devices and Interfaces**.

3. Verify that the device appears under **USB Devices**. If the device does not appear, press <F5> to refresh the view in MAX. If the device is still not recognized, refer to ni.com/support/install for troubleshooting information.

4. Choose a VISA alias to identify the USB device in your application. To create an alias, right-click the device name and select **Properties**. Enter a new VISA alias and click **OK** to accept the changes. Confirm the new name in the MAX Configuration window.

Step 6. For USB Devices Only—Launch Ready-To-Run Datalogging Software

NI-DAQmx Base includes ready-to-run datalogging software for certain analog input USB devices. This datalogging software lets you begin making measurements without creating a program first. The applications are located at **Start»All Programs»National Instruments»NI-DAQmx Base»Datalogging Software**.

Step 7. Create and Configure Tasks

A *task*, an important concept for NI-DAQmx and NI-DAQmx Base, is a collection of one or more channels with timing, triggering, and other properties. Conceptually, a task represents a measurement or generation

you want to perform. You can set up and save all configuration information in a task and use the task in an application.

Using the NI-DAQmx Base Task Configuration Utility

The following sections describe how to use the NI-DAQmx Base Task Configuration Utility.
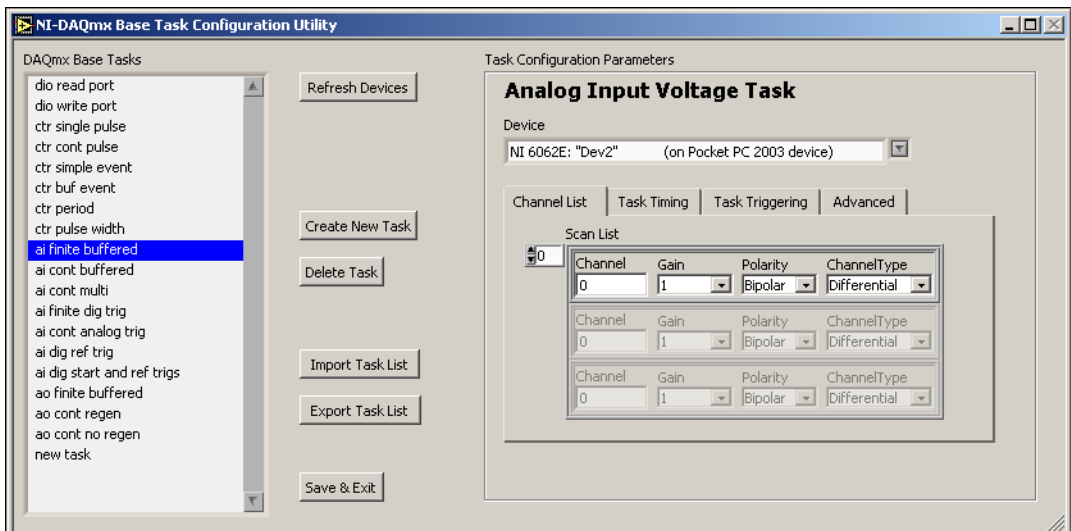
USB Devices with Windows

Using the NI-DAQmx Base Task Configuration Utility is not required for USB devices. Most device parameters are adjustable through the NI-DAQmx Base API. However, some advanced features cannot be programmatically set and must be statically configured as part of the task. With the NI-DAQmx Base Task Configuration Utility, you can create multiple tasks, each with a unique configuration, and switch between them in your application.

Devices with LabVIEW 7.1 PDA

Using the NI-DAQmx Base Task Configuration Utility is required when using devices with LabVIEW PDA 7.1. In NI-DAQmx Base for Pocket PC 2003, task information is embedded in the built application. Prior to building and downloading your VI to the PDA, you must configure and save the tasks you want to use.

To use the Task Configuration Utility, complete the following steps:

1. Select **Start»Programs»National Instruments»NI-DAQmx Base**.
2. Click **NI-DAQmx Base Task Configuration Utility**. The Task Configuration Utility launches.
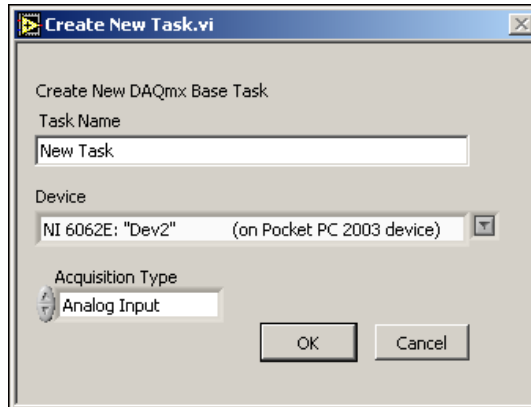
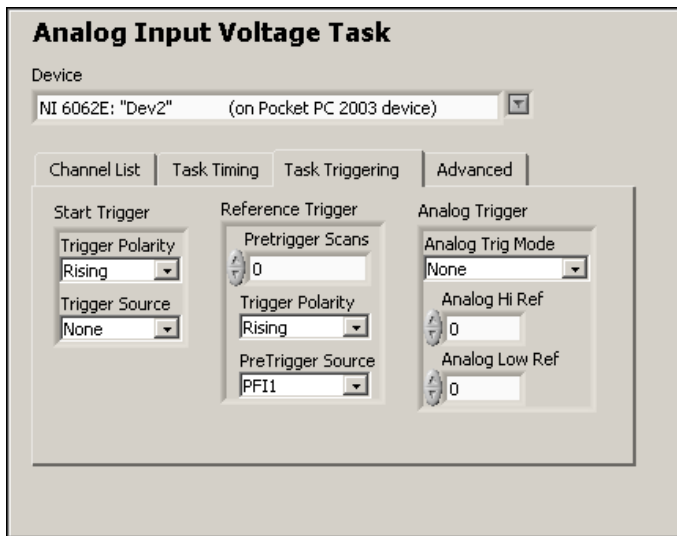## Create, Modify, and Configure a Task in NI-DAQmx Base

Create a new task or modify an existing task in the Task Configuration Utility task list. The pre-installed tasks are configured to work with the examples without modifications. To modify an existing task, select it in the task list. To create a new task, complete the following steps:

1. Click **Create New Task**. The Create New Task.vi window opens.

2. Enter a name for the new task.
3. Select the device. For devices on LabVIEW 7.1 PDA, select the device that matches your installed hardware.
4. Select the acquisition type.

Each acquisition type contains a set of tabbed dialog boxes for configuring the task.

Analog Input Voltage Task

> **Tip** You can view context help for the Task Configuration Utility by pressing <Ctrl-H>.

5. Click **Exit** when you are finished configuring your tasks. The task configuration is automatically saved into LabVIEW global variables. You do not need to explicitly save the configuration.

To transfer the task configuration to other computers, click **Export Configuration** and save the tasks to a file. You then can use **Import Configuration** to import the task configuration.

> **Note** The Import Configuration and Export Configuration options operate on the entire set of tasks shown in the Task Configuration Utility. Importing a configuration replaces any existing tasks, including the predefined tasks for the example programs.

Devices on LabVIEW 7.1 PDA

When you are using devices on LabVIEW 7.1 PDA, the task configuration is built into the target application. You *cannot* retrieve the task information after it is embedded in a built application. Exporting the configuration allows you to preserve the task in case of accidental deletion when using the Task Configuration Utility.

Using Tasks in an Application

To use a preconfigured task in your application, complete the following steps:

1. Right-click the **task/channels in** terminal on a NI-DAQmx Base VI.

2. Select **Create»Control** or **Create»Constant**.

3. Type the name of the task in the control or constant.

4. To set the value as the default for the control, right-click the control and select **Data Operations»Make Current Value Default**.

Documentation

The NI-DAQmx Base software kit includes online documentation for supported devices and accessories, including PDF and help files describing device terminals, specifications, features, and operation.

After installation, the documents are accessible from **Start»Programs» National Instruments»NI-DAQmx Base»Documentation**.

✎ **Note** You must have Internet Explorer version 5.0 or later to use some features of the NI-DAQmx Base 1.*x* documentation, including the help system.
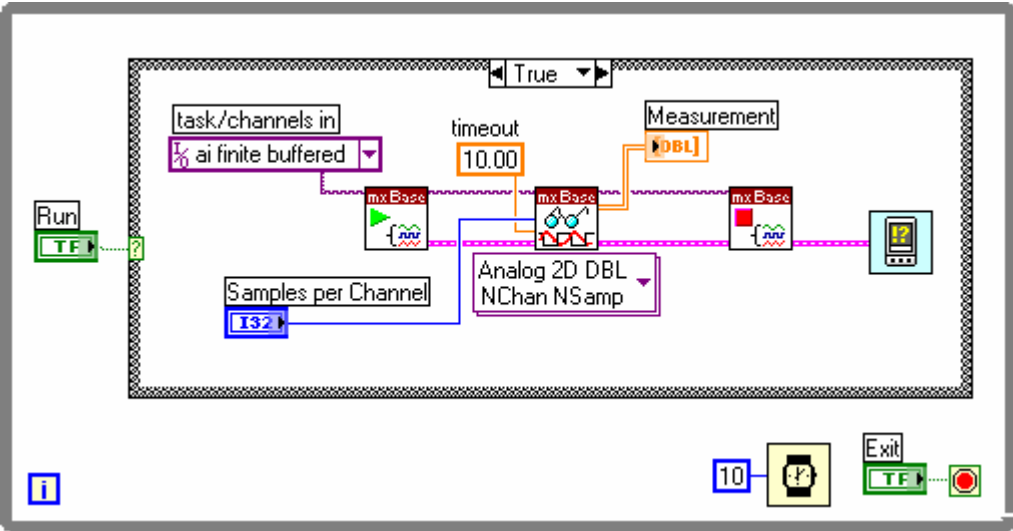
Getting Started Developing an Application

Examples

Each API includes a collection of programming examples to help you start developing an application. You can modify example code and save it in an application. You can use examples to develop a new application or add example code to an existing application.

- NI-DAQmx Base examples for LabVIEW are located in the `Program Files\National Instruments\LabVIEW\examples\ DAQmxBase` directory.

- NI-DAQmx Base examples for ANSI C are located in the `Program Files\National Instruments\NI-DAQ\examples\ DAQmxBase\C` directory.

The following figure illustrates a typical NI-DAQmx Base application in LabVIEW. The pictured task uses a preconfigured task to acquire and display a finite number of points for multiple channels.

Devices on LabVIEW 7.1 PDA

Refer to *Getting Started with the LabVIEW PDA Module* and the *LabVIEW PDA Module User Manual* for more information about how to create a PDA application.

Obtaining Information about Measurement Applications and Devices

Each application software package and driver includes information about writing applications for taking measurements and controlling measurement devices. The following references assume you have NI-DAQmx Base and, where applicable, LabVIEW 7.1 installed on your computer.

LabVIEW

If you are a new user, complete *Getting Started with LabVIEW* to get acquainted with LabVIEW. Select **Start»Programs»National Instruments»LabVIEW»Search the LabVIEW Bookshelf**.

The *LabVIEW NI-DAQmx Base VI Reference Help* describes the LabVIEW VIs and properties. In LabVIEW, select **Help»LabVIEW Help** and the VI reference help section for NI-DAQmx Base.

ANSI C

The *NI-DAQmx Base C Function Reference Help* contains an API overview. Select **Start»Programs»National Instruments»NI-DAQmx Base C Function Reference Help**.

Training Courses

National Instruments offers training courses for those interested in receiving more help developing an application with NI products. To enroll in a course or obtain a detailed course outline, refer to `ni.com/training`.

Worldwide Technical Support

For additional support, refer to `ni.com/support` or `ni.com/zone`.

For further support information for signal conditioning products, refer to the *Signal Conditioning Technical Support Information* document packaged with your device.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs.