NATIONAL INSTRUMENTS* Data Acquisition

Taking an NI-DAQ™mx Measurement in LabVIEW™

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This tutorial teaches you how to take an NI-DAQmx measurement in LabVIEW 7.x or later using the DAQ Assistant. The DAQ Assistant is a graphical interface for configuring measurement tasks, channels, and scales. You also can use the DAQ Assistant to generate NI-DAQmx code from the task.

In this tutorial, you create a voltage measurement task using the DAQ Assistant. You then learn how to edit the task and generate code from the task in LabVIEW.



Note This tutorial assumes you are familiar with LabVIEW. If you are a new user of LabVIEW or are unfamiliar with the LabVIEW Express VIs, refer to the *Getting Started with LabVIEW* manual.

This document describes NI-DAQmx. For information on Traditional NI-DAQ (Legacy), refer to the *Measurement and Automation Explorer Help for Traditional NI-DAQ (Legacy)*.

To navigate this help file, use the **Contents**, **Index**, and **Search** tabs to the left of this window.

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Conventions

This help file uses the following conventions:

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.

bold Bold text denotes items that you must select or click on in the software, such as menu items and dialog box options. Bold text also denotes parameter names, emphasis, or an introduction to a key concept.

dark red Text in this color denotes a caution.

Underlined text in this color denotes a link to a help topic, green help file, or Web address.

italic Italic text denotes variables or cross references. This font also denotes text that is a placeholder for a word or value that you must supply.

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

Introduction to Taking an NI-DAQmx Measurement in LabVIEW

This tutorial teaches you how to take an NI-DAQmx measurement in LabVIEW 7.x or later using the DAQ Assistant. The DAQ Assistant is a graphical interface for configuring measurement tasks, channels, and scales. You also can use the DAQ Assistant to generate NI-DAQmx code from the task.

In this tutorial, you create a voltage measurement task using the DAQ Assistant. This tutorial teaches you how to:

- Launch the DAQ Assistant by using the DAQ Assistant Express VI in LabVIEW
- Configure a voltage task in the DAQ Assistant
- Test the task using test panels
- Edit the task
- Generate the code to run the task



Note This tutorial assumes you are familiar with LabVIEW. If you are a new user of LabVIEW or are unfamiliar with the LabVIEW Express VIs, refer to the Getting Started with LabVIEW manual.

Next: Before You Begin

Before You Begin

To use this tutorial, you must have the following software and hardware installed in your system:

- LabVIEW 8.x or later
- NI-DAQmx from NI-DAQ 8.x or later, including LabVIEW 7.x or later support files
- A data acquisition (DAQ) device, physical or simulated, that is supported by NI-DAQmx and is connected to a voltage signal. Refer to the Measurement & Automation Explorer Help for NI-DAQmx for instructions on creating an NI-DAQmx simulated device. Refer to the NI-DAQ Readme file to see if NI-DAQmx supports your device.

Refer to the *DAQ Getting Started Guide* and the device documentation for information about installing and configuring the software and hardware.

<u>Previous: Introduction to Taking an</u> NI-DAQmx Measurement in LabVIEW Next: Channels and Tasks in NI-DAQmx

Channels and Tasks in NI-DAQmx

A *physical channel* is a terminal or pin at which you can measure or generate an analog or digital signal. A *virtual channel* is a collection of property settings such as a name, a physical channel, input terminal connections, the type of measurement or generation, and can include scaling information. In NI-DAQmx, virtual channels are integral to every measurement. In Traditional NI-DAQ (Legacy) and earlier versions, configuring virtual channels is an optional way to record which channels are being used for different measurements.

In NI-DAQmx, you can configure virtual channels with the DAQ Assistant, which you can open from MAX or your application software. You also can configure virtual channels with the NI-DAQmx API in your application program. In Traditional NI-DAQ (Legacy), you configure virtual channels using MAX.

A *task*, an important concept for NI-DAQmx, is a collection of one or more virtual 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 of the configuration information in a task and use the task in an application.

In NI-DAQmx, you can configure virtual channels as part of a task or separate from a task. Virtual channels created inside a task are *local virtual channels*. Virtual channels defined outside a task are *global virtual channels*. You can create global virtual channels in MAX or in your application software and then save them in MAX. You can use global virtual channels in any application or add them to a number of different tasks. If you modify a global virtual channel, the change affects all tasks in which you reference that global virtual channel.

Previous: Before You Begin Next: 1. Launch the Assistant

1. Launch the DAQ Assistant Express VI

You can launch the DAQ Assistant in <u>several ways</u>. Complete the following steps to launch the DAQ Assistant by placing the DAQ Assistant Express VI on the block diagram in LabVIEW.

- 1. Open a blank VI in LabVIEW.
- 2. Place the DAQ Assistant Express VI on the block diagram.

The DAQ Assistant launches, starting with the Create New dialog box.

Previous: Channels and Tasks in NI-DAQmx Next: 2. Create the Task

2. Create the Task

In the **Create New Express Task** dialog box of the DAQ Assistant, complete the following steps to create a task to measure voltage from the DAQ device.

- 1. Select Acquire Signals.
- 2. Select **Analog Input** for the I/O type.
- 3. Select **Voltage** for the measurement to perform.
- 4. In **Supported Physical Channels**, select the physical channel on the DAQ device to which you connected the voltage signal.
- 5. Click Finish.

The DAQ Assistant task configuration screen launches.

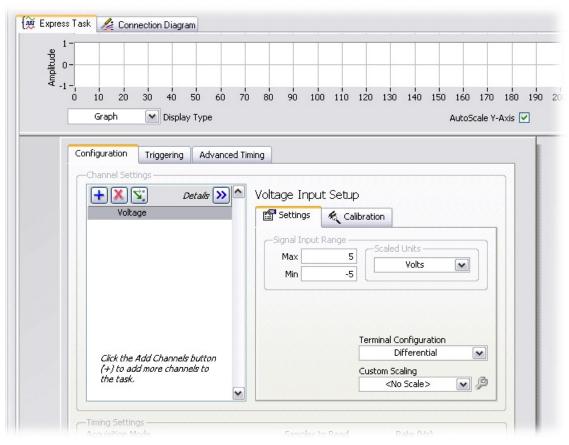
Previous: 1. Launch the DAQ Assistant Next: 3. Configure the Task

3. Configure the Task

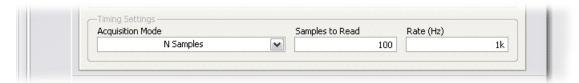
After you create a task, you can configure channel-specific settings such as custom scaling, input range, and terminal configuration. You also can configure task-specific settings such as timing and triggering.

To configure the voltage measurement task, complete the following steps.

- 1. Specify the input range. You can use the default values.
- 2. Select the terminal configuration you used to connect the signal.



3. Under **Timing Settings**, select **N Samples** as the **Acquisition Mode**. Enter 100.00 for **Samples To Read**, and enter 1000.00 for **Rate (Hz)**, as shown in the following figure.

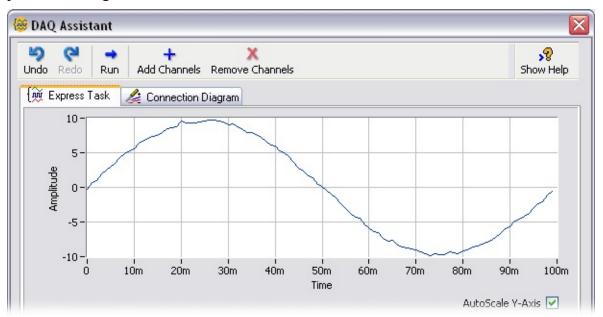


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Note This example does not use custom scaling or triggering. To learn about scaling and triggering, refer to the *NI-DAQmx Help*.

4. Test the Task

You can view data acquired in the DAQ Assistant to test the task and signal connection. Click **Run** to test the task. Data acquired appears in the graph. Verify that you are acquiring expected data and that you connected the signal properly. If necessary, modify any settings and run your task again.



Click **OK** when you finish testing your task.

Previous: 3. Configure the Task

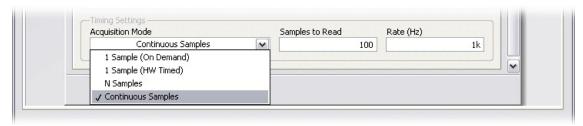
Next: 5. Edit the Task

5. Edit the Task

If you want to make changes to your task later, you can open the task using the DAQ Assistant Express VI in LabVIEW.

Complete the following steps to edit the voltage task to acquire data continuously:

- Double-click the DAQ Assistant Express VI on the block diagram in LabVIEW.
- 2. When the DAQ Assistant launches, select **Continuous Samples** for the Acquisition Mode.



- 3. Click OK.
- 4. Save the VI as MyVoltageTask.vi.

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6. Generate Code

Using the DAQ Assistant, you have three options for generating code in LabVIEW from a task or channel:

Example—Generates all the code necessary to run the task or channel, such as VIs needed to read or write samples, VIs to start and stop the task, loops, and graphs. Choose this option if you want to run the task or channel you created to verify that it works or to use your configuration in a simple application. In LabVIEW, this option adds to the VI you are working in. The generated code is a simple NI-DAQmx example that you can then modify for your application.

Configuration—Generates the code that replicates the configuration of the tasks and channels. LabVIEW replaces the DAQmx task name control with a subVI that contains VIs and property nodes used for channel creation and configuration, timing configuration, and triggering configuration used in the task or channel. Choose this option if you want to deploy your application to another system. Refer to *Deployment* in the *NI-DAQmx Help* located at **Start»All Programs»National Instruments»NI-DAQ** for more information.

When you generate **Configuration** code, the link between the application and the DAQ Assistant is lost. Any changes you make to the configuration code are not reflected in the DAQ Assistant. You can regenerate **Configuration** code from the DAQ Assistant, but the regenerated code does not incorporate previous changes that you made to the code.



Caution Although generated configuration code includes code to create virtual channels and tasks, it does not include code to create scales. If you generate configuration code for deployment of applications that include scales, you must ensure that the scales are configured in the target computer. Refer to *Deployment* in the *NI-DAQmx Help* located at **Start»All Programs»National Instruments»NI-DAQ** for more information.

Configuration and Example—Generates both **Configuration** code and **Example** code for the task or channel in one step.

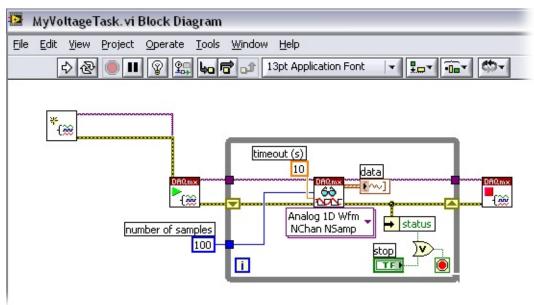


Tip If you configure a task using the DAQ Assistant Express VI, you can right-click the VI and select **Generate NI-DAQmx Code** to

generate configuration and example code. The code replaces the DAQ Assistant Express VI.

Complete the following steps to generate code to run the voltage task.

- 1. Right-click the DAQ Assistant Express VI on the block diagram, and select **Generate NI-DAQmx Code** from the shortcut menu.
- 2. The DAQ Assistant generates all the code necessary to run the task, as shown in the following block diagram.



- 3. Save the VI as MyVoltageTask.vi.
- 4. Display the front panel. Click the **Run** button to start the application.



Note Any changes you make to the generated code apply only to the VI and are not saved into the task configuration stored in MAX.

Previous: 5. Edit the Task Next: What's Next

What's Next

In this tutorial, you learned how to

- Launch the DAQ Assistant by using the DAQ Assistant Express VI in LabVIEW
- Configure the task in the DAQ Assistant
- Test the task using test panels
- Edit the task
- Generate the code to run the task

Related Documentation

The following documents contain information that you might find helpful as you use NI-DAQmx and LabVIEW:

- DAQ Assistant Help—This help file contains information about using the DAQ Assistant to interactively configure common measurement tasks, channels, or scales. In LabVIEW 7.x or later, LabWindows™/CVI™ 7.x or later, or Measurement Studio 7.x or later, you also can use the DAQ Assistant to generate NI-DAQmx code from the tasks and channels.
- DAQ Getting Started Guide—This guide describes how to install NI-DAQmx driver software and data acquisition (DAQ) devices and how to confirm that the device is operating properly.
- Getting Started with LabVIEW—This manual contains information you use to familiarize yourself with the LabVIEW graphical programming environment and the basic LabVIEW features you use to build data acquisition and instrument control applications. Select Start»All Programs»National Instruments»LabVIEW»Search the LabVIEW Bookshelf.
- LabVIEW Help—This help file contains information about LabVIEW palettes, menus, tools, VIs, and functions. This help file also includes step-by-step instructions for using LabVIEW features. In LabVIEW, select Help.
- Measurement & Automation Explorer Help for NI-DAQmx—This help file contains information on configuring and testing DAQ devices, SCXI devices, SCC devices, and RTSI cables using Measurement & Automation Explorer (MAX) for NI-DAQmx and information about special considerations for operating systems. In MAX, select Help»NI-DAQmx.

To learn more about tasks, channels, and other NI-DAQmx concepts, refer to the *NI-DAQmx Help* located at **Start»All Programs»National Instruments»NI-DAQmx Help**.

The *LabVIEW Help* also includes information about creating and using tasks in LabVIEW and reference information for the NI-DAOmx VIs.

You also can look at the examples that ship with NI-DAQmx. Use the NI Example Finder located at **Help»Find Examples** to search for examples related to NI-DAQmx.

Previous: 6. Generate Code

Launching the DAQ Assistant

When you configure a task using the DAQ Assistant Express VI, the task is local to the application and is not saved to MAX for use in other applications. The DAQ Assistant Express VI contains the code you need to run the task, except any loops. You must convert the DAQ Assistant Express VI to an NI-DAQmx Task to save the task to MAX for use in other applications. You can also generate code from the DAQ Assistant Express VI. Right-click the DAQ Assistant Express VI on the block diagram in LabVIEW and select Generate NI-DAQmx Code.

To launch the DAQ Assistant from a task name control in LabVIEW, complete the following steps:

- 1. Open a blank VI in LabVIEW.
- 2. Place the DAQmx task name control from the DAQmx Name Controls palette on the front panel.
- 3. Right-click the control and select **New NI-DAQmx Task»MAX** from the shortcut menu.

You can launch the DAQ Assistant from MAX in the following ways:

- Right-click Data Neighborhood and select Create New from the shortcut menu. In the Create New window, select NI-DAQmx Task.
- Right-click your device under Devices and Interfaces in MAX and select Create New.

Converting the DAQ Assistant Express VI to an NI-DAQmx Task

When you configure a task using the DAQ Assistant Express VI, the task is local to the application and cannot be used in other applications. You can convert a DAQ Assistant Express VI to an NI-DAQmx task if you want to save the task to MAX for use in other applications or to generate code.



Note If you are working within a project in LabVIEW 8.0, converting the DAQ Assistant Express VI to a task saves the task to the project.

Complete the following steps to convert the DAQ Assistant Express VI to an NI-DAQmx task.

- 1. Right-click the DAQ Assistant Express VI and select **Convert to NI-DAQmx Task** from the shortcut menu.
- The DAQ Assistant launches, and you can modify the task, if necessary.
- 3. Click the **OK** button.
- 4. An NI-DAQmx task replaces the DAQ Assistant Express VI.