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Find the *National Instruments cDAQ-9172* at our website: *Click HERE*

CALIBRATION PROCEDURE

NI cDAQ Chassis

Français Deutsch 日本語 한국어 简体中文

ni.com/manuals

This document contains information for calibrating the National Instruments cDAQ chassis. For more information on calibration, visit ni.com/calibration.

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Software Requirements

Calibrating the NI cDAQ chassis requires installing the latest NI-DAQmx driver on the calibration system. You can download the NI-DAQmx instrument driver from ni.com/downloads. NI-DAQmx supports programming an External Calibration in the LabVIEW, LabWindows™/CVI™, C/C++, C#, and Visual Basic .NET. application development environments (ADEs). When you install NI-DAQmx, you only need to install support for the ADE that you intend to use.

Documentation Requirements

For information about NI-DAQmx and NI cDAQ chassis, you can consult the following documents:

- *DAQ Getting Started* guides—These guides provide instructions for installing and configuring NI-DAQ devices.
- *NI DAQmx Help*—This help file contains general information about measurement concepts, key NI-DAQmx concepts, and common applications that apply to all programming environments.
- *NI-DAQmx C Reference Help*—This help file contains C reference and general information about measurement concepts.

The documents above are installed with NI-DAQmx. You also can find the latest versions of the documentation at ni.com/manuals.

- *NI cDAQ-91xx User Guide and Specifications*—This document includes detailed information about your NI cDAQ chassis and provides the published specification values for NI cDAQ chassis. Refer to the most recent User Guide and Specifications online at ni.com/manuals for specifications.

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- *NI cDAQ-9188 Ethernet Chassis Quick Start*—This document explains how to install the application and NI-DAQmx driver software, set up your NI cDAQ-9188 Ethernet chassis and I/O modules, confirm the system is operating properly, and take your first measurement. You can find this document at `ni.com/manuals`.

Calibration Interval

National Instruments recommends a calibration interval of one year for the NI cDAQ chassis. Adjust the recommended calibration interval based on the measurement accuracy demands of your application.

Test Equipment

National Instruments recommends that you use the equipment in Table 1 for calibrating an NI cDAQ chassis.

Table 1. Recommended Equipment

Equipment	Recommended Model	Minimum Requirements
Counter	Agilent 53131A	If this instrument is unavailable, use a counter accurate to ±5 ppm.
C Series Digital I/O Module	NI 9401 or NI 9402	—
C Series Connection Accessory	NI 9934	**(NI 9401)** 25-pin DSUB connector kit.

Test Conditions

The following setup and environmental conditions are required to ensure the NI cDAQ chassis meets published specifications.

- Keep connections to the C Series module as short as possible. Long cables and wires act as antennae, picking up extra noise that can affect measurements.
- Maintain an ambient temperature of 23 ±5 °C. The device temperature will be greater than the ambient temperature.
- Keep relative humidity below 90%.
- Allow a warm up time of at least 10 minutes to ensure that the measurement circuitry is at a stable operating temperature.

Calibration Procedures

The calibration process includes the following steps:

1. *Initial Setup*—Install the device and configure it in Measurement & Automation Explorer (MAX).
2. *Verification*—Verify the existing operation of the device. This step confirms whether the device is operating within the published specifications prior to adjustment.
3. *Adjustment*—If the device does not fall within the desired specifications, return the device to NI for repair. Refer to *Where to Go for Support* for assistance in returning the chassis to NI.
4. *Reverification*—Repeat the verification procedure to ensure that the device is operating within the published specifications after adjustment.

The first two procedures are described in more detail in the following sections.

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Initial Setup

Refer to the *DAQ Getting Started* guides for instructions on installing the software, hardware, and configuring the NI cDAQ chassis. NI cDAQ-9188 users should refer to the *NI cDAQ-9188 Ethernet Chassis Quick Start*.

Verification

This section provides instructions for verifying the counter on an NI cDAQ chassis.

1. Connect the counter to the C Series digital I/O module. Refer to Figure 1 for a connection diagram of the NI 9401 and NI 9402.
   a. Connect the positive input of the counter to DIO 0 on the C Series module.
   b. Connect the negative input of the counter to COM or GND on the C Series module.

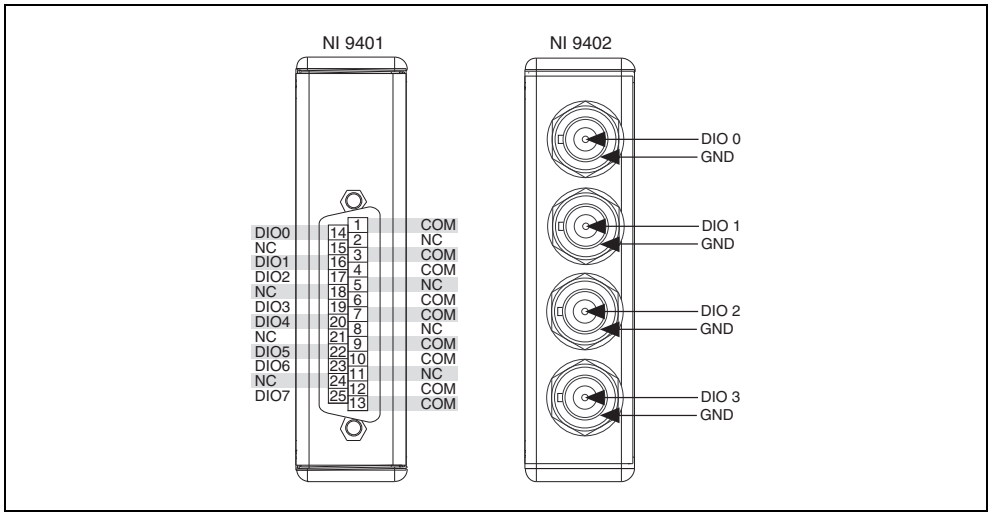


Figure 1. NI 9401 and NI 9402 Pin Assignments

2. Create and configure a counter output channel according to Table 2.

Table 2. Counter Output Configuration

Frequency	Scaled Units	Idle State	Initial Delay	DAQmx Timing Instance	Generation Mode	Samples to Write
5000000	Seconds	Low	0	Implicit	Continuous Pulses	1000

3. Start the generation of a square wave.
4. Configure the counter to measure frequency and use a 1 MΩ impedance.
5. Take a measurement of the square wave.
6. Compare the counter reading to the limits in Table 3.

Table 3. NI cDAQ Chassis Counter Limits

Set Point (MHz)	Lower Limit (MHz)	Upper Limit (MHz)
5	4.99975	5.00025

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7. Stop the generation.
8. Clear the generation.
9. Disconnect the counter from the C Series module.

The counter on the NI cDAQ chassis is now verified.

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At `ni.com/support` you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

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. For telephone support in the United States, create your service request at `ni.com/support` and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 662 457990-0, Belgium 32 (0) 2 757 0020,
Brazil 55 11 3262 3599, Canada 800 433 3488, China 86 21 5050 9800,
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Malaysia 1800 887710, Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466,
New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60, Poland 48 22 328 90 10,
Portugal 351 210 311 210, Russia 7 495 783 6851, Singapore 1800 226 5886,
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373718A-01 Oct10

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