

COMPREHENSIVE SERVICES

We offer competitive repair and calibration services, as well as easily accessible documentation and free downloadable resources.

SELL YOUR SURPLUS

We buy new, used, decommissioned, and surplus parts from every NI series. We work out the best solution to suit your individual needs.

 Sell For Cash  Get Credit  Receive a Trade-In Deal

OBSOLETE NI HARDWARE IN STOCK & READY TO SHIP

We stock **New, New Surplus, Refurbished, and Reconditioned** NI Hardware.



Bridging the gap between the manufacturer and your legacy test system.

 1-800-915-6216

 www.apexwaves.com

 sales@apexwaves.com

All trademarks, brands, and brand names are the property of their respective owners.

Request a Quote

 **CLICK HERE**

NI-9269

CALIBRATION PROCEDURE

NI 9269

Français Deutsch 日本語 한국어 简体中文
ni.com/manuals

This document contains the verification and adjustment procedures for the National Instruments 9269. For more information about calibration solutions, visit ni.com/calibration.

Contents

Software.....	1
Documentation.....	2
Test Equipment.....	2
Test Conditions.....	3
Initial Setup.....	3
Verification.....	3
Accuracy Verification.....	3
Adjustment.....	5
Accuracy Adjustment.....	5
EEPROM Update.....	6
Reverification.....	6
Accuracy Under Calibration Conditions.....	6
Where to Go for Support.....	7

Software

Calibrating the NI 9269 requires the installation of NI-DAQmx 9.6 or later on the calibration system. You can download NI-DAQmx from ni.com/downloads. NI-DAQmx supports LabVIEW, LabWindows™/CVI™, ANSI C, and .NET. When you install NI-DAQmx, you only need to install support for the application software that you intend to use.

Documentation

Consult the following documents for information about the NI 9269, NI-DAQmx, and your application software. All documents are available on ni.com and help files install with the software.



NI cDAQ-9174/9178 Quick Start
NI-DAQmx installation and hardware setup



NI 9269 Operating Instructions and Specifications
NI 9269 specific information, specifications, and calibration interval



NI-DAQmx Readme
Operating system and application software support in NI-DAQmx



LabVIEW Help
LabVIEW programming concepts and reference information about NI-DAQmx VIs and functions



NI-DAQmx C Reference Help
Reference information for NI-DAQmx C functions and NI-DAQmx C properties



NI-DAQmx .NET Help Support for Visual Studio
Reference information for NI-DAQmx .NET methods and NI-DAQmx .NET properties, key concepts, and a C enum to .NET enum mapping table

Test Equipment

Table 1 lists the equipment recommended for the performance verification and adjustment procedures. If the recommended equipment is not available, select a substitute using the requirements listed in Table 1.

Table 1. Recommended Equipment

Equipment	Recommended Model	Requirements
DMM	NI 4070 DMM	Use a multiranging 6 1/2 digit DMM with a voltage accuracy of ± 40 ppm.
Chassis	NI cDAQ-9178	—

Test Conditions

The following setup and environmental conditions are required to ensure the NI 9269 meets published specifications.

- Keep connections to the NI 9269 as short as possible. Long cables and wires act as antennae, picking up extra noise that can affect measurements.
- Verify that all connections to the NI 9269 are secure.
- Use shielded copper wire for all cable connections to the NI 9269. Use twisted-pair wire to eliminate noise and thermal offsets.
- Maintain an ambient temperature of $23\text{ °C} \pm 5\text{ °C}$. The NI 9269 temperature will be greater than the ambient temperature.
- Keep relative humidity below 80%.
- Allow a warm-up time of at least 10 minutes to ensure that the NI 9269 measurement circuitry is at a stable operating temperature.

Initial Setup

Complete the following steps to set up the NI 9269.

1. Install NI-DAQmx.
2. Make sure that the NI cDAQ-9178 power source is not connected.
3. Insert the module into slot 8 of the NI cDAQ-9178 chassis. Leave slots 1 through 7 of the NI cDAQ-9178 chassis empty.
4. Connect the NI cDAQ-9178 chassis to your host computer.
5. Connect the power source to the NI cDAQ-9178 chassis.
6. Launch Measurement & Automation Explorer (MAX).
7. Right-click the device name and select **Self-Test** to ensure that the device is working properly.

Verification

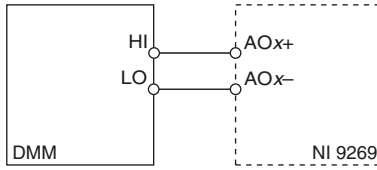
The following performance verification procedure describes the sequence of operation and test points required to verify the NI 9269 and assumes that adequate traceable uncertainties are available for the calibration references.

Accuracy Verification

Complete the following procedure to determine the As-Found status of the NI 9269.

1. Set the DMM to Standby mode (STBY).
2. Connect the DMM to the NI 9269 as shown in Figure 1.

Figure 1. Accuracy Verification Connections



3. Set the DMM to read DC voltage in the minimum range required to cover the NI 9269 output range of ± 10 V.
4. Acquire a sample.
 - a. Create and configure an AO voltage channel according to Table 2.

Table 2. NI 9269 AO Voltage Channel Configuration

Input Range		Scaled Units	Terminal Configuration
Min	Max		
-10	10	Volts	Differential

- b. Start the task.
- c. Generate a voltage output according to Table 3.

Table 3. NI 9269 Output Configuration

Samples Per Channel	Timeout
1	10.0

- d. Wait the appropriate amount of time for the DMM measurement to settle.
- e. Read the NI 9269 output voltage measurement from the DMM.
- f. Clear the task.
5. Compare the DMM measurement to the test limits in Table 4.
6. Repeat steps 3 through 5 for each test point in Table 4.
7. Disconnect the DMM from the NI 9269.
8. Repeat steps 1 through 7 for each channel on the NI 9269.

Table 4. NI 9269 Accuracy Verification Test Limits

Range (V)		Test Point		1-Year Limits	
Min	Max	Location	Value (V)	Lower Limit (V)	Upper Limit (V)
-10.000	10.000	Max	9.500000	9.492730	9.507271
-10.000	10.000	Mid	0.000000	-0.001571	0.001571
-10.000	10.000	Min	-9.500000	-9.507271	-9.492730



Note Test limits in Table 4 are derived using the values in Table 6.

Adjustment

The following performance adjustment procedure describes the sequence of operation required to adjust the NI 9269.

Accuracy Adjustment

Complete the following procedure to adjust the accuracy performance of the NI 9269.

1. Adjust the NI 9269.
 - a. Initialize a calibration session on the NI 9269. The default password is NI.
 - b. Input the external temperature in degrees Celsius.
 - c. Call the NI 9269 get C Series adjustment points function to obtain an array of recommended calibration voltages for the NI 9269.
 - d. Connect the DMM to the NI 9269 as shown in Figure 1.
 - e. Set the DMM to read DC voltage in the minimum range required to cover the NI 9269 output range of ± 10 V.
 - f. Call and configure the NI 9269 setup calibration function with the DAC value obtained from the array of recommended calibration voltages.
 - g. Wait the appropriate amount of time for the DMM measurement to settle.
 - h. Read the NI 9269 output voltage measurement from the DMM.
 - i. Call and configure the NI 9269 adjustment function according to Table 5.

Table 5. Adjustment Configuration

Physical Channel	Reference Value
cDAQMod8/aox	The NI 9269 output voltage measured from the DMM.

- j. Repeat steps f to i for each calibration voltage in the array.
 - k. Close the calibration session.
 - l. Disconnect the DMM from the NI 9269.
2. Repeat step 1 for each channel on the NI 9269.

EEPROM Update

When an adjustment procedure is completed, the NI 9269 internal calibration memory (EEPROM) is immediately updated.

If you do not want to perform an adjustment, you can update the calibration date and onboard calibration temperature without making any adjustments by initializing an external calibration, setting the C Series calibration temperature, and closing the external calibration.

Reverification

Repeat the [Verification](#) section to determine the As-Left status of the device.



Note If any test fails Reverification after performing an adjustment, verify that you have met the [Test Conditions](#) before returning your device to NI. Refer to [Where to Go for Support](#) for assistance in returning the device to NI.

Accuracy Under Calibration Conditions

The values in the following table are based on calibrated scaling coefficients, which are stored in the onboard EEPROM.

The following accuracy table is valid for calibration under the following conditions:

- Ambient temperature $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$
- NI 9269 installed in slot 8 of an NI cDAQ-9178 chassis
- Slots 1 through 7 of the NI cDAQ-9178 chassis are empty

Table 6. NI 9269 Accuracy Under Calibration Conditions

Gain Error	Offset Error
0.060%	0.015%
* Range equals 10.47 V	



Note For operational specifications, refer to the most recent *NI 9269 Operating Instructions and Specifications* online at ni.com/manuals.

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, visit the Worldwide Offices section of ni.com/global to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

Refer to the *NI Trademarks and Logo Guidelines* at ni.com/trademarks for more information on National Instruments trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering National Instruments products/technology, refer to the appropriate location: **Help»Patents** in your software, the `patents.txt` file on your media, or the *National Instruments Patents Notice* at ni.com/patents. You can find information about end-user license agreements (EULAs) and third-party legal notices in the readme file for your NI product. Refer to the *Export Compliance Information* at ni.com/legal/export-compliance for the National Instruments global trade compliance policy and how to obtain relevant HTS codes, ECCNs, and other import/export data.

© 2013 National Instruments. All rights reserved.