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Find the *National Instruments PXIe-4081* at our website: *Click HERE*

GETTING STARTED GUIDE

NI PXIe-4080/4081/4082

1.8 MS/s Digital Multimeter

Note Before you begin, install and configure your chassis and controller.

This document explains how to install, configure, and test the NI 4080/4081/4082. The NI 4080/4081/4082 is a digital multimeter that ships with NI-DMM, which you use to program the device.

To access NI 4080/4081/4082 documentation, navigate to **Start»All Programs»National Instruments»NI-DMM Documentation**.

Caution The protection provided by this device may be impaired if the device is used in a manner not specified in this document.

Contents

Electromagnetic Compatibility Guidelines....2
Verifying the System Requirements....2
Unpacking the Kit....2
Preparing the Environment....3
Safety....3
Kit Contents....4
    Other Equipment....4
Installing the Software....4
Installing the NI 4080/4081/4082....5
Hardware Front Panel Connectors....6
    Connecting Signals....7
Requirements for Cables and Probes....10
Configuring the NI 4080/4081/4082 in MAX....11
Programming the NI 4080/4081/4082....11
    NI-DMM Examples....13
Troubleshooting....14
    What Should I Do if the NI 4080/4081/4082 Doesn't Appear in MAX?....14
    What Should I Do if the Module Fails the Self-Test?....15
Where to Go Next....15
Worldwide Support and Services....15

NATIONAL INSTRUMENTS

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Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

Verifying the System Requirements

To use the NI 4080/4081/4082, your system must meet certain requirements. For more information about minimum system requirements, recommended system, and supported application development environments (ADEs), refer to the readme, which is available on the software media or online at *ni.com/updates*.

Unpacking the Kit

Caution To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.

   Caution Never touch the exposed pins of connectors.

   Note Do not install a device if it appears damaged in any way.

3. Unpack any other items and documentation from the kit.

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

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Preparing the Environment

Ensure that the environment you are using the NI 4080/4081/4082 in meets the following specifications.

Operating Environment	
Ambient temperature range	0 °C to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)
Storage ambient temperature range	-40 °C to 70 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Pollution Degree	2

Indoor use only.

Note Refer to the device specifications on *ni.com/manuals* for complete specifications.

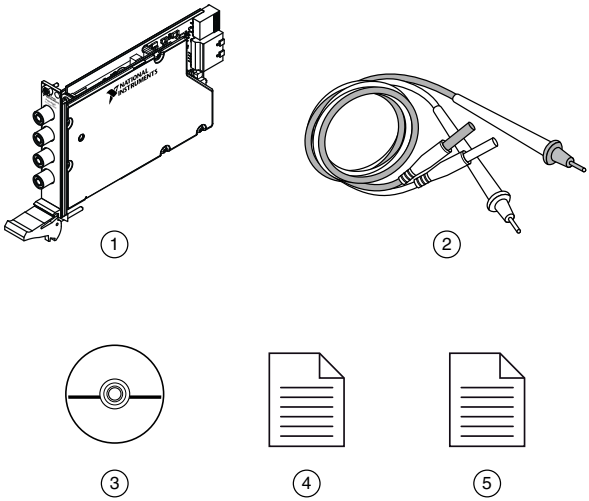
Safety

Caution Always refer to the specifications document for your device before connecting signals. Failure to observe the specified maximum signal ratings can cause shock, a fire hazard, or damage to the devices connected to the NI 4080/4081/4082. NI is not liable for any damage or injuries resulting from incorrect signal connections.

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Kit Contents

Figure 1. NI 4080/4081/4082 Kit Contents



1. NI PXIe-4080/4081/4082 Device
2. Test probes
3. Driver Software DVD
4. NI PXIe-4080/4081/4082 Getting Started Guide (this document)
5. Maintain Forced-Air Cooling Note to Users

Other Equipment

There are several required items not included in your device kit that you need to install or operate the NI 4080/4081/4082.

- 1/8 in. flathead screwdriver
- A PXI Express chassis with a controller and the chassis documentation

Installing the Software

You must be an Administrator to install NI software on your computer.

1. Install an ADE, such as LabVIEW or LabWindows™/CVI™.
2. Insert the driver software media into your computer. The installer should open automatically.

   If the installation window does not appear, navigate to the drive, double-click it, and double-click `autorun.exe`.
3. Follow the instructions in the installation prompts.

Note Windows users may see access and security messages during installation. Accept the prompts to complete the installation.

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4. When the installer completes, select **Restart** in the dialog box that prompts you to restart, shut down, or restart later.

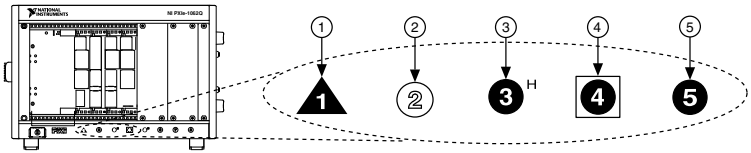
Installing the NI 4080/4081/4082

Caution To prevent damage to the NI 4080/4081/4082 caused by ESD or contamination, handle the module using the edges or the metal bracket.

1. Ensure the AC power source is connected to the chassis before installing the module.

   The AC power cord grounds the chassis and protects it from electrical damage while you install the module.
2. Power off the chassis.
3. Inspect the slot pins on the chassis backplane for any bends or damage prior to installation. Do not install a module if the backplane is damaged.
4. Remove the black plastic covers from all the captive screws on the module front panel.
5. Identify a supported slot in the chassis. The following figure shows the symbols that indicate the slot types.

Figure 2. Chassis Compatibility Symbols

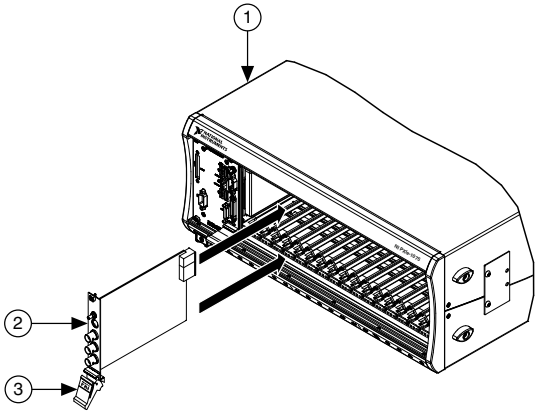


1. PXI Express System Controller Slot
2. PXI Peripheral Slot
3. PXI Express Hybrid Peripheral Slot
4. PXI Express System Timing Slot
5. PXI Express Peripheral Slot

   NI 4080/4081/4082 modules can be placed in PXI Express peripheral slots, PXI Express hybrid peripheral slots, or PXI Express system timing slots.
6. Touch any metal part of the chassis to discharge static electricity.
7. Ensure that the ejector handle is in the downward (unlatched) position.
8. Place the module edges into the module guides at the top and bottom of the chassis. Slide the module into the slot until it is fully inserted.

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Figure 3. Module Installation



1. Chassis
2. Hardware Module
3. Ejector Handle in Downward (Unlatched) Position

9. Latch the module in place by pulling up on the ejector handle.
10. Secure the module front panel to the chassis using the front-panel mounting screws.

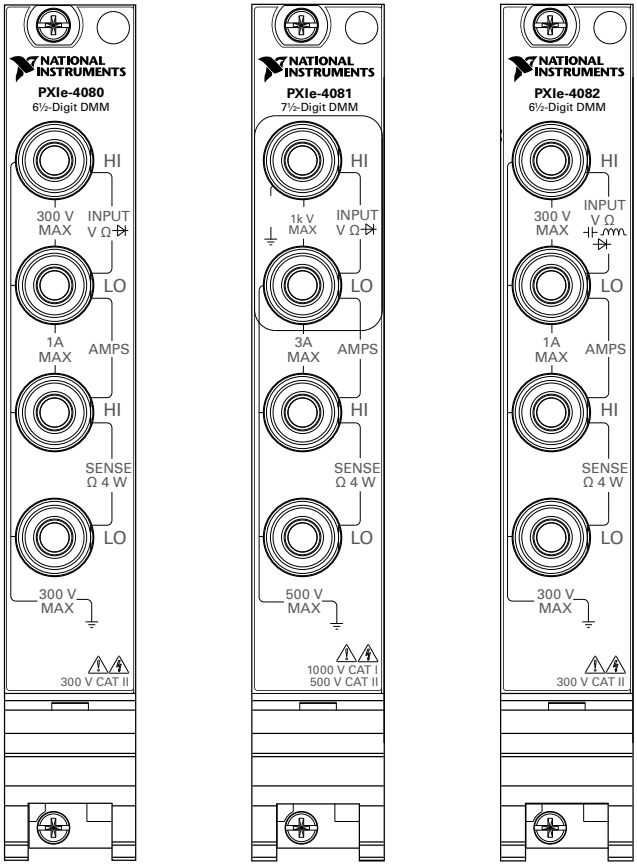
Note Tightening the top and bottom mounting screws increases mechanical stability and also electrically connects the front panel to the chassis, which can improve the signal quality and electromagnetic performance.

11. Cover all empty slots using EMC filler panels or fill using slot blockers to maximize cooling air flow, depending on your application.
12. Power on the chassis.

Hardware Front Panel Connectors

Refer to the following figure for the NI 4080/4081/4082 front panels. The front panels have four shrouded banana plug connectors.

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Connecting Signals

The following figures show how to connect signals to the DMM front panel connectors for common measurements.

For more information about these common measurements, refer to the *NI Digital Multimeters Help* at *ni.com/manuals*.

Caution Always refer to the device specifications before connecting signals. Failure to observe the specified maximum signal ratings can cause shock, a fire

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hazard, or damage to the devices connected to the DMM. NI is not liable for any damage or injuries resulting from incorrect signal connections.

Figure 4. DC and AC Voltage

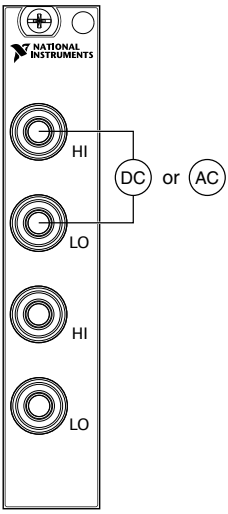
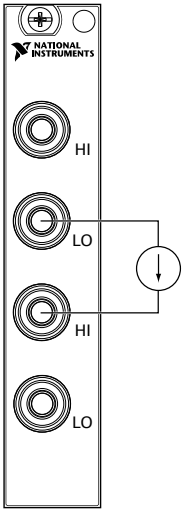
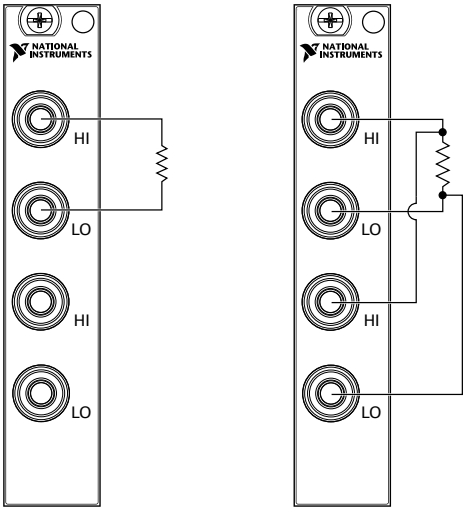


Figure 5. DC and AC Current



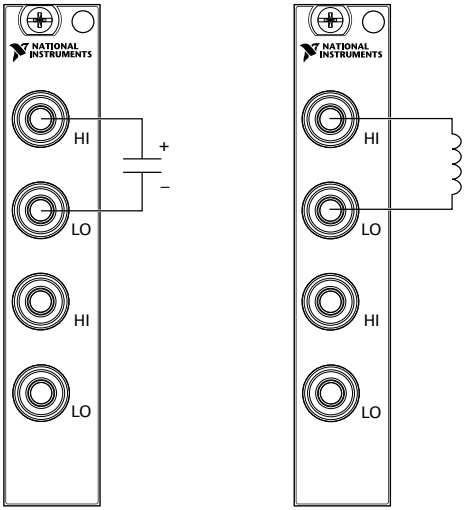
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Figure 6. 2-Wire and 4-Wire Resistance



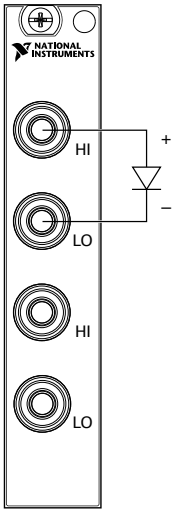
Note 4-wire resistance measurements use both pairs of terminals. Use the configuration to measure low resistances accurately by eliminating the effects of lead resistance.

Figure 7. Capacitance and Inductance



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Figure 8. Voltage Drop Across a Diode



Requirements for Cables and Probes

The DMM shipping kit contains a pair of test probes with safety banana plugs. These probes meet international safety requirements, including UL 3111 and IEC-1010-1, for the full range of applications supported by the DMM.

Caution Before using any probes or accessories, ensure that they meet applicable safety requirements for the signal levels you may encounter.

Connect the test probes to the banana plug connectors on the DMM front panel using safety banana plugs. The shrouds around the banana plugs prevent you from contacting potentially hazardous voltages connected to the test probes. You can also connect the cable to standard, unshrouded banana plug probes or accessories. Use unshrouded probes or accessories only when the voltages are less than 30 Vrms and 42 Vpk, or 60 VDC.

Caution (NI 4081 users) To prevent possible safety hazards, the maximum voltage between any of the inputs and the ground of the PXI Express chassis is 500 VDC or 500 Vrms (sine wave), except between the HI terminal and ground, where the maximum voltage is 1,000 VDC or700 Vrms (sine wave). The maximum current the NI 4081 can measure through the current inputs is ±3 ADC or 3 Arms.

Caution (NI 4080/4082 users) To prevent possible safety hazards, the maximum voltage between any of the inputs and the ground of the computer is 300 VDC or 300 Vrms. The maximum current the NI 4080/4082 can measure through the current inputs is ±1 ADC or 1 Arms.

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Configuring the NI 4080/4081/4082 in MAX

Use Measurement & Automation Explorer (MAX) to configure your NI hardware. MAX informs other programs about which NI hardware products are in the system and how they are configured. MAX is automatically installed with NI-DMM.

1. Launch MAX.
2. In the configuration tree, expand **Devices and Interfaces** to see the list of installed NI hardware.

   Installed modules appear under the name of their associated chassis.
3. Expand your **Chassis** tree item.

   MAX lists all modules installed in the chassis. Your default names may vary.

   Note If you do not see your module listed, press <F5> to refresh the list of installed modules. If the module is still not listed, power off the system, ensure the module is correctly installed, and restart.
4. Record the identifier MAX assigns to the hardware. Use this identifier when programming the NI 4080/4081/4082.
5. Self-test the hardware by selecting the item in the configuration tree and clicking **Self-Test** in the MAX toolbar.

   The MAX self-test performs a basic verification of hardware resources.

Programming the NI 4080/4081/4082

You can acquire data interactively using the NI-DMM Soft Front Panel (SFP), or you can use the NI-DMM instrument driver to program your device in the supported ADE of your choice.

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Table 1. NI-DMM Programming Options

Application Programming Interface (API)	Location	Description
NI-DMM Soft Front Panel (SFP)	Available from the start menu at **Start»All Programs»National Instruments»NI-DMM» NI-DMM Soft Front Panel**.	The NI-DMM SFP allows users to take measurements and to test the functionality of NI DMM devices. The NI-DMM SFP provides an interface that allows users to interact with an NI DMM as if it were a traditional benchtop instrument. If you have multiple NI DMM devices, you can run multiple sessions of the NI-DMM SFP simultaneously.

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Table 1. NI-DMM Programming Options (Continued)

Application Programming Interface (API)	Location	Description
NI-DMM Instrument Driver	LabVIEW—Available on the LabVIEW Functions palette at **Measurement I/O»NI-DMM**.	NI-DMM configures and operates the device hardware and performs basic acquisition and measurement options using LabVIEW VIs or LabWindows/CVI functions.
	C or LabWindows/CVI—Available at **Program Files»IVI Foundation»IVI»Drivers»niDMM**	
	Microsoft Visual C/C++—Use examples located in the `<NIDocDir>\NI-DMM\examples` directory, where `<NIDocDir>` is one of the following directories: • Windows 8/7/Vista—`Users\Public\Documents\National Instruments` • Windows XP—`Documents and Settings\All Users\Shared Documents\National Instruments`	You can modify an NI-DMM C example to create an application with Microsoft Visual C/C++. Copy an NI-DMM example to copy required project settings for include paths and library files. Alternatively, refer to the *Using NI-DMM in Visual C++* topic of the *NI Digital Multimeters Help* to manually add all required include and library files to your project.

NI-DMM Examples

The NI Example Finder is a utility available for some ADEs that organizes examples into categories and allows you to easily browse and search installed examples. You can see descriptions and compatible hardware models for each example, or see all the examples compatible with one particular hardware model.

To locate examples, refer to the following table.

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Table 2. Locating NI-DMM Examples

Application Development Environment (ADE)	Location
LabVIEW or LabWindows/CVI	Locate examples with the NI Example Finder. Within LabVIEW or LabWindows/CVI, select **Help»Find Examples**, and navigate to **Hardware Input and Output»Modular Instruments»NI-DMM (Digital Multimeters)**.
ANSI C or Visual Basic	Locate examples in the `<NIDocDir>\NI-DMM\examples` directory, where `<NIDocDir>` is one of the following directories: • Windows 8/7/Vista—`Users\Public\Public Documents\National Instruments` • Windows XP—`Documents and Settings\All Users\Shared Documents\National Instruments`

Troubleshooting

If an issue persists after you complete a troubleshooting procedure, contact NI technical support or visit *ni.com/support*.

What Should I Do if the NI 4080/4081/4082 Doesn't Appear in MAX?

1. In the MAX configuration tree, expand **Devices and Interfaces**.
2. Expand the **Chassis** tree to see the list of installed hardware, and press <F5> to refresh the list.
3. If the module is still not listed, power off the system, ensure that all hardware is correctly installed, and restart the system.
4. Navigate to the Device Manager.

Operating System	Description
Windows 10/8.1	Right-click the Start button, and select **Device Manager**.
Windows 7	Select **Start»Control Panel»Device Manager**.

5. If you are using a PXI or PXI Express controller, verify that a **National Instruments** entry appears in the **System Devices** list. Reinstall NI-DMM and the module if error conditions appear in the list. If you are using an MXI controller, right-click **PCI-to-PCI Bridge**, and select **Properties** from the shortcut menu to verify that the bridge is enabled.

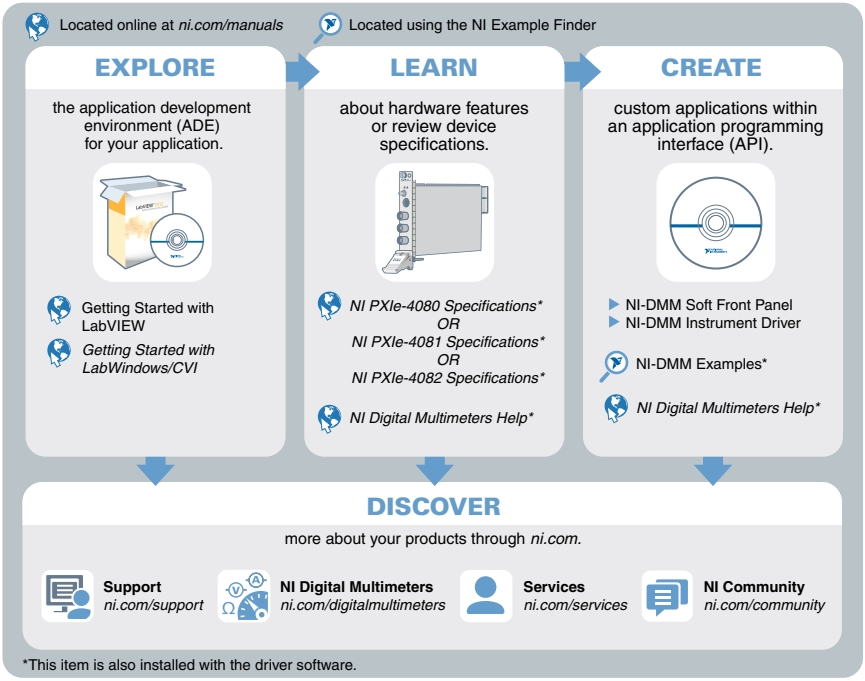
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What Should I Do if the Module Fails the Self-Test?

1. Restart the system.
2. Launch MAX, and perform the self-test again.
3. Power off the chassis.
4. Reinstall the failed module in a different slot.
5. Power on the chassis.
6. Perform the self-test again.

Where to Go Next

Refer to the following figure for information about other product tasks and associated resources for those tasks.



Worldwide Support and Services

The NI website 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.

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Visit *ni.com/services* for NI Factory Installation Services, repairs, extended warranty, and other services.

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