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GETTING STARTED GUIDE
NI Digital Multimeters

This document explains how to install, configure, test, and set up the NI PCMCIA-4050, NI PXI/PCI-4060, NI PXI/PCI-4070, NI PXI-4071, and NI PXI-4072 National Instruments digital multimeters (DMMs) for common measurements.

For more information on these DMMs, such as features and programming information, refer to the *NI Digital Multimeters Help*, which is located at **Start»Programs»National Instruments»NI-DMM»Documentation» NI Digital Multimeters Help**. For the most current versions of specifications and other documentation, visit `ni.com/manuals`. For the latest version of NI-DMM driver software, visit `ni.com/idnet`.

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Conventions

The following conventions are used in this manual:

»	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.
♦	The ♦ symbol indicates that the following text applies only to a specific product.
	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 a product, refer to the *Read Me First: Safety and Radio-Frequency Interference* document included 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. Bold text also denotes parameter names.

DMM	Digital multimeter—refers to the NI PCMCIA-4050, NI PXI-4060, NI PCI-4060, NI PXI-4070, NI PCI-4070, NI PXI-4071, or NI PXI-4072.
italic	Italic text denotes variables, emphasis, a cross reference, hardware labels, or an introduction to a key concept. 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 and programming examples. This font is also used for the proper names of disk drives, paths, directories, programs, and filenames.
`monospace italic`	Italic text in this font denotes placeholder text for a word or value that you must supply.
NI 4050	Refers to the NI PCMCIA-4050.
NI 4060	Refers to the NI PXI/PCI-4060.
NI 4070	Refers to the NI PXI/PCI-4070.
NI 4071	Refers to the NI PXI-4071.
NI 4072	Refers to the NI PXI-4072.
NI 407*x*	Refers to the NI 4070, NI 4071, and NI 4072.

1. Verifying the System Requirements

This section specifies the minimum system requirements and recommended system for NI-DMM 2.4.

Minimum System Requirements

- Processor—Pentium 200 MHz or equivalent
- RAM—64 MB
- Microsoft Internet Explorer 5.5 or later
- A screen resolution of 800 × 600 with 256 colors
- Windows 2000/NT/XP, with all available critical updates and service packs

Recommended System

- Processor—Pentium III/Celeron 600 MHz or equivalent
- RAM—256 MB
- A screen resolution of 1024 × 768

Application Development Environments

- LabVIEW 7.0 or later (LabVIEW 7.1 or later is required to use the NI-DMM Express VI)
- LabVIEW Real-Time Module 7.1
- LabWindows™/CVI™ 6.0 or later
- Microsoft Visual C++ (MSVC) 6.0 or later
- Microsoft Visual Basic 6.0



Note Waveform acquisition performance at full rate (1.8 MS/s) on the NI 407*x* depends highly on system-specific factors such as CPU speed, memory architecture, and system chipset characteristics. Simultaneous acquisitions on multiple NI 407*x* devices or acquisitions of longer durations may require a faster processor or more memory. Other applications running at the same time may also affect performance.

2. Unpacking

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



Caution *Never* touch the exposed pins of connectors.

To avoid damage while handling the DMM, 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 DMM from the package.

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

Store the DMM in the antistatic envelope when not in use.

3. Verifying the Kit Contents

To set up and use the DMM, you need the following items, which are contained in the shipping kit:

- ❑ NI 4050, NI 4060, or NI 407*x*
- ❑ Test probes
- ❑ NI-DMM instrument driver DVD-sized case, which contains the following items:
  - NI-DMM driver software CDs, which include the *NI Digital Multimeters Help* and the *NI-DMM Readme File*



Note The NI PCI-4070 requires NI-DMM 2.2 or later, the NI 4072 requires NI-DMM 2.3 or later, and the NI 4071 requires NI-DMM 2.4 or later.

  - *NI Digital Multimeters Getting Started Guide*
  - *NI-DMM Instrument Driver Quick Reference Guide*
- ❑ Other included documents:
  - Specifications document included with the DMM
  - *Read Me First: Safety and Radio-Frequency Interference*

Other Required Items

In addition to the items contained in the kit, you also need the following items:

- ❑ 1/8 in. flathead screwdriver
- ❑ One of the following configurations:
  - For PCI devices—A desktop computer with its documentation
  - For PXI devices—A PXI, PXI/CompactPCI, or PXI/SCXI combination chassis, chassis documentation, and a controller



Note If you are using the MXI interface to control a PXI chassis, the MXI Optimization Application must be run prior to using a National Instruments DMM. By default, this application runs automatically when Windows starts. If you have an initialization or performance issue with the DMM, or if you are not certain that the application ran, select **Start»Programs»National Instruments MXI»MXI Optimization** to run the application. If you continue to have initialization or performance issues, refer to the MXI documentation at **Start»Programs»National Instruments MXI**, or visit NI Technical Support at `ni.com/support`.

4. Installing the Software

Complete the following steps to install the software before installing the DMM:

1. (Optional) Install an application development environment (ADE), such as LabVIEW or LabWindows/CVI, if you are developing an application for the DMM.
2. Insert into the CD drive Disk 1 of 2 of the NI-DMM CD set, and follow the instructions in the installation window.



Note If the installation window does *not* appear, navigate to the CD drive, double-click the drive, and double-click `setup.exe`.

3. When the installer completes, a dialog box appears that asks if you want to restart, shut down, or exit. Select **Restart**.
4. If you are using a system running the LabVIEW Real-Time Module, download NI-DMM to the target using Measurement & Automation Explorer (MAX). Refer to the *Measurement & Automation Explorer Remote Systems Help* by selecting **Help»Help Topics»Remote Systems** in MAX.

5. Installing the Hardware



Cautions You *must* power off the PC or PXI chassis before installing the DMM hardware.

To prevent damage due to ESD or contamination, handle the DMM using the metal bracket or edges. Refer to the *Read Me First: Safety and Radio-Frequency Interference* document for more information.

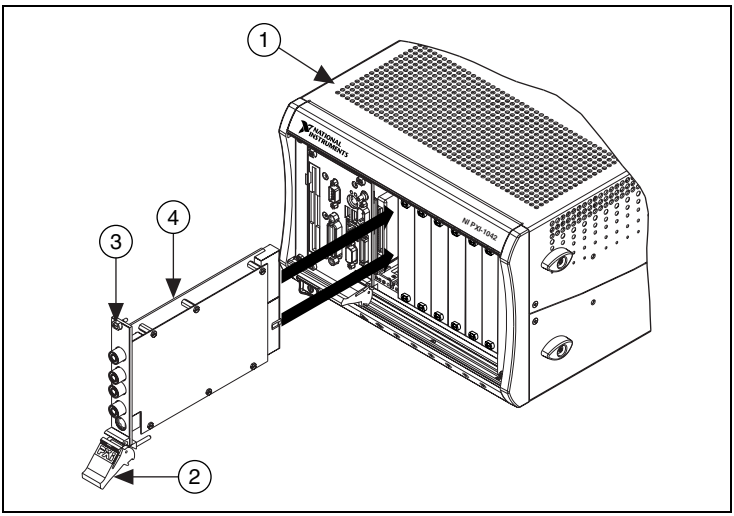


Notes Install the NI-DMM software before installing the hardware.

Refer to *Appendix B: Chassis Recommendations* for more information about installing the DMM in a PC or PXI chassis.

Installing a PXI DMM

To install a PXI DMM, refer to Figure 1 and complete the following steps.



1 PXI Chassis 2 Ejector Handle 3 Captive Screw 4 PXI DMM

Figure 1. PXI Installation

1. Power off and unplug the PXI chassis.
2. Slide the PXI DMM into an available slot until the ejector handle locks in the up position, and tighten the captive screw(s).
3. Plug in and power on the PXI chassis.

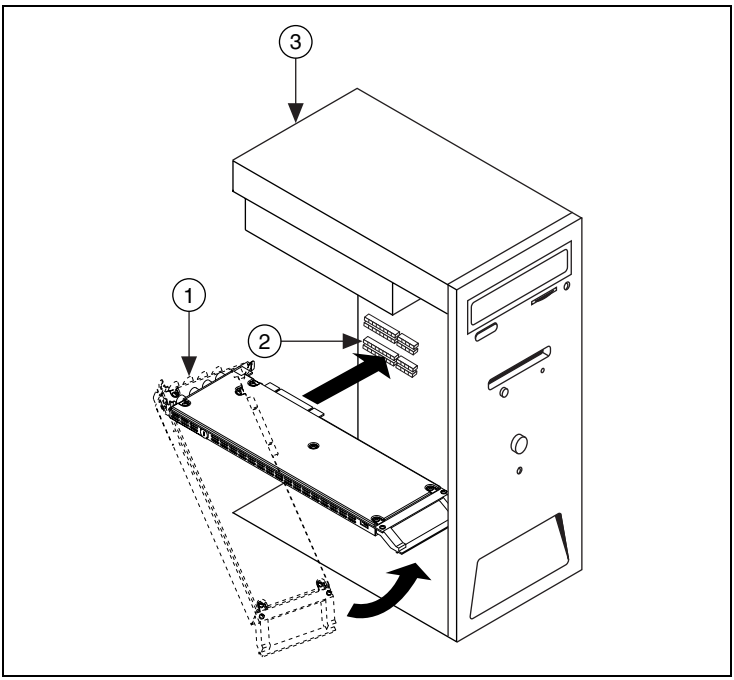
Uninstalling a PXI DMM

Caution During operation, the metal surfaces of PXI DMMs may become hot. Be careful when removing the DMM from the chassis or when moving it to a different peripheral slot. When removing the DMM, hold it by the ejector handle and front panel *only*.

When removing a PXI DMM from the chassis, ensure that you are grounded with a grounding strap or are touching a grounded metal surface. To avoid ESD, do *not* touch the exposed connector pins or any exposed circuitry on the device. When not in use, store the PXI DMM in the original antistatic envelope to avoid damage.

Installing a PCI DMM

To install a PCI DMM, refer to Figure 2 and complete the following steps.



1 PCI DMM	2 PCI Slot	3 Desktop Computer

Figure 2. PCI Installation

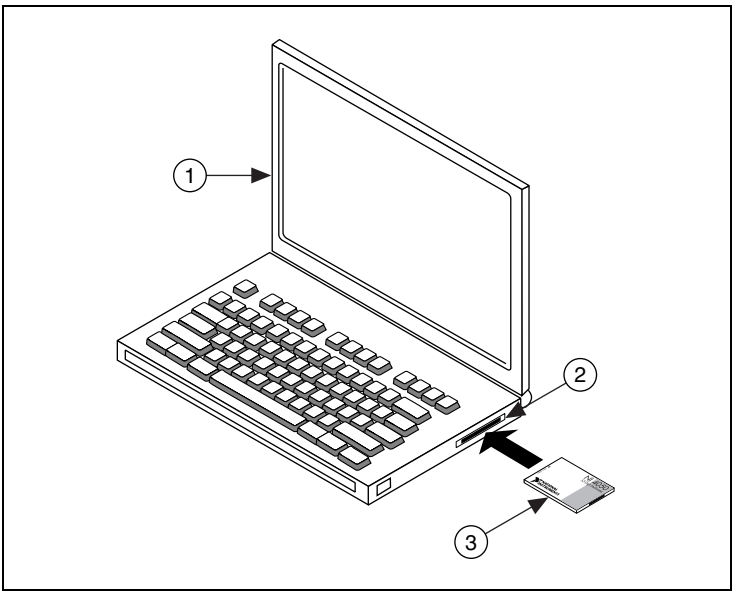
1. Power off and unplug the PC.
2. Remove the PC cover.
3. Insert the PCI DMM into an open PCI slot.
4. Secure the PCI DMM with the screw provided.

Caution It is important to completely screw the DMM into the PCI slot for both mechanical stability and to create a solid ground connection, which will reduce electrical noise. Improperly secured DMMs may affect the accuracy of the specifications.

5. Replace the PC cover.
6. Plug in and power on the computer.

Installing a PCMCIA DMM

To install the PCMCIA DMM, insert the PCMCIA DMM into an available PCMCIA slot as shown in Figure 3.



1 Laptop	2 PCMCIA Slot	3 NI 4050

Figure 3. PCMCIA Installation

6. Configuring and Testing in MAX

To configure and test the DMM in MAX, complete the following steps:

1. Launch MAX (**Start»Programs»National Instruments» Measurement & Automation**). MAX automatically detects the DMM you installed.
2. Expand **Devices and Interfaces**.

   If you are using a DMM with the LabVIEW Real-Time Module, expand **Remote Systems**. Find the target device IP address or name, expand it, and then expand **Devices and Interfaces**.

Note Only NI-DAQmx devices are listed under **Remote Systems» Devices and Interfaces**.

3. Verify that the DMM appears under Devices and Interfaces.

   The DMMs appear in the NI-DAQmx and Traditional NI-DAQ folders in Devices and Interfaces, as follows.

Device	Folder Name(s)
NI PCI-4070, NI 4071, NI 4072	NI-DAQmx
NI PXI-4070	NI-DAQmx and Traditional NI-DAQ
NI 4050, NI 4060	Traditional NI-DAQ



Notes If the DMM is not listed, press <F5> to refresh. If the DMM is still not listed, repeat the steps in the *5. Installing the Hardware* section. If the DMM still does not appear, visit NI Technical Support at `ni.com/support`. For more information about using MAX, refer to the available help files within MAX.

When the NI PXI-4070, which is supported by both NI-DAQmx and Traditional NI-DAQ, is present with both versions of NI-DAQ, the NI PXI-4070 is listed with a different name under the NI-DAQmx and Traditional NI-DAQ folders in Devices and Interfaces.

4. Right-click the DMM in the list, and select **Properties** to launch the Configuring Device window.

5. Record the device number or device name assigned to the DMM. You need this number when programming the DMM.

   - NI-DAQmx—The assigned device name is appended to the DMM in its configuration tree label. For example, after installing the NI PXI-4070, the device configuration tree label may appear as `NI PXI-4070: "Dev1"`, where *Dev1* is the device name that MAX assigned to the DMM. When developing your application, the resource name for the DMM is this device name.
   - Traditional NI-DAQ—Select the DMM to see its properties in the configuration view. The device number appears in the Values column. When developing your application, the resource name for the DMM is `DAQ::`*n*, where *n* is the device number MAX assigned to the DMM.



Note To avoid modifying existing applications that use a Traditional NI-DAQ device number, change the assigned NI-DAQmx device name. To change an NI-DAQmx device name, right-click the DMM, select **Rename**, and enter the Traditional NI-DAQ device number used in your application. For more

information about device naming conventions, refer to the *niDMM Initialize* or *niDMM_init* topic in the *NI Digital Multimeters Help*, which is located at **Start»Programs» National Instruments»NI-DMM»Documentation» NI Digital Multimeters Help**.

6. Perform a self-test on the DMM to verify installation.

   - NI-DAQmx—Right-click the DMM and select **Self-Test**. If you need help during the self-test, open the *Measurement & Automation Explorer Help for NI-DAQmx* by selecting **Help»Help Topics» NI-DAQmx»MAX Help for NI-DAQmx**.
   - Traditional NI-DAQ—Right-click the DMM, select **Properties**, and click **Test Resources**.

   A dialog box appears and indicates whether the DMM passed the test.



Note If the DMM does not pass the test, repeat the steps in the *5. Installing the Hardware* section. If the DMM still does not pass the test, visit NI Technical Support at `ni.com/support`.

- Step 7 only applies to the DMMs that appear in the NI-DAQmx folder in Devices and Interfaces.

7. Select **Self-Calibrate** to perform self-calibration. The DMM must warm up for at least 60 minutes before self-calibrating.

- Steps 8 and 9 apply to the NI 4050/4060 only.

8. To run the functional test panels and to use the DMM, right-click the NI 4050/4060 and click **Test Panels**. Refer to the *7. Connecting Signals* section to connect a signal to the DMM.



Note The **Run Test Panels** option currently is *not* available for the NI 407*x*. Launch the DMM Soft Front Panel (SFP) to run functional tests of the NI 407*x*. You can launch the DMM SFP from **Start»Programs»National Instruments»NI-DMM» NI-DMM Soft Front Panel**.

9. Click **Close** to close the test panels for the NI 4050/4060.

7. Connecting Signals

The following sections explain 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 **Start»Programs»National Instruments» NI-DMM»Documentation»NI Digital Multimeters Help**.

Caution Always refer to the specifications document included with the DMM *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 DMM. NI is *not* liable for any damage or injuries resulting from incorrect signal connections.

DC and AC Voltage

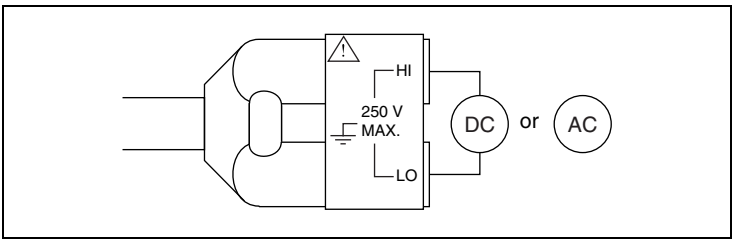
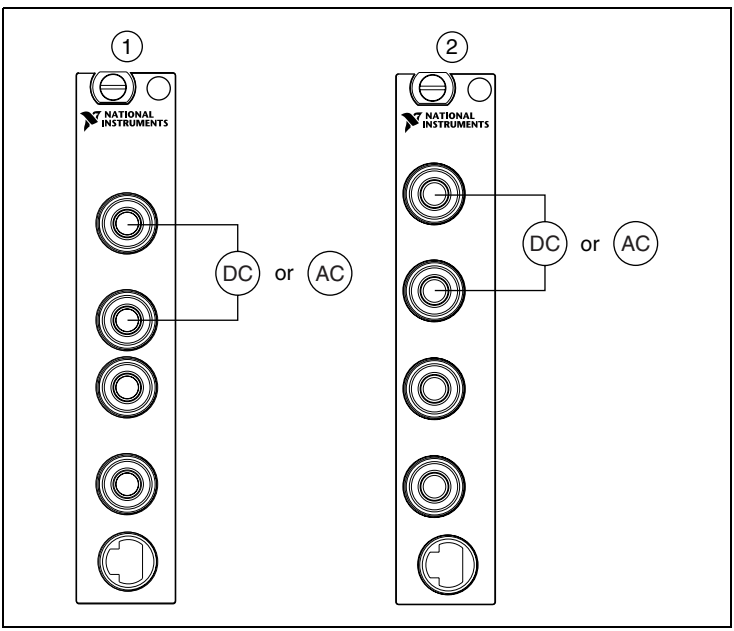


Figure 4. NI 4050 Signal Connections for Voltage Measurements



1 NI 4060 2 NI 407*x*

Figure 5. NI 4060 and NI 407*x* Signal Connections for Voltage Measurements

DC and AC Current

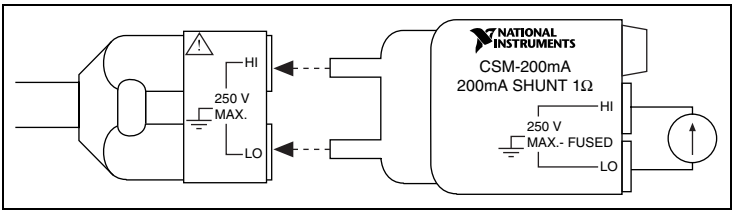
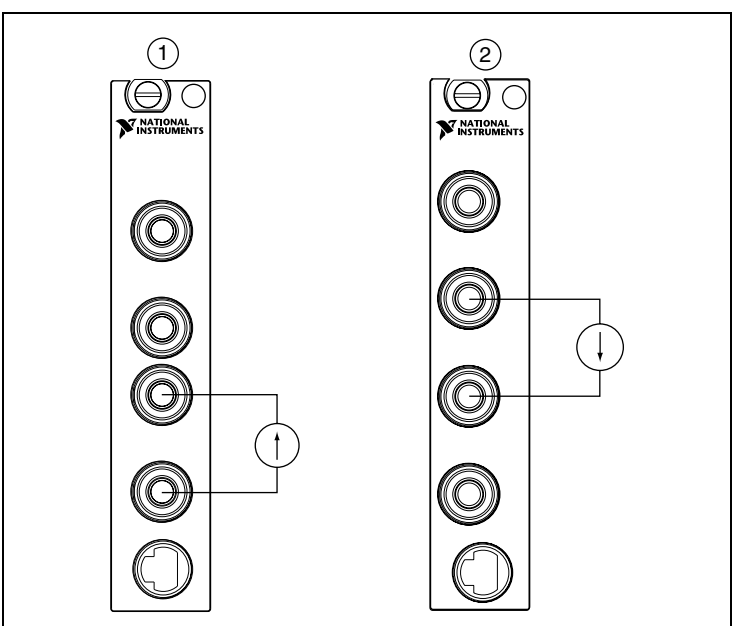


Figure 6. NI 4050 Signal Connections for Current Measurements

Note To measure current, the NI 4050 requires the NI CSM-200mA or NI CSM-10A current shunt module (shown in Figure 6), which is available from NI. Refer to the *NI CSM-10A/200mA Installation Guide* at `ni.com/manuals`. Refer to `ni.com/instruments` for purchasing information.



1 NI 4060 2 NI 407*x*

Figure 7. NI 4060 and NI 407*x* Signal Connections for Current Measurements

Tip To measure current beyond the specifications of the NI 4060 and NI 407*x*, a 10 A current shunt module, the NI CSM-10A, is available from NI. Refer to the *NI CSM-10A/200mA Installation Guide* at `ni.com/manuals`. Refer to `ni.com/instruments` for purchasing information.

2-Wire Resistance

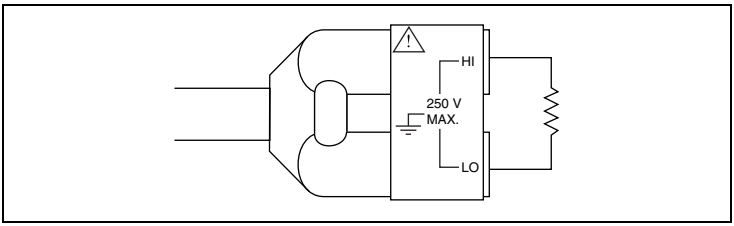
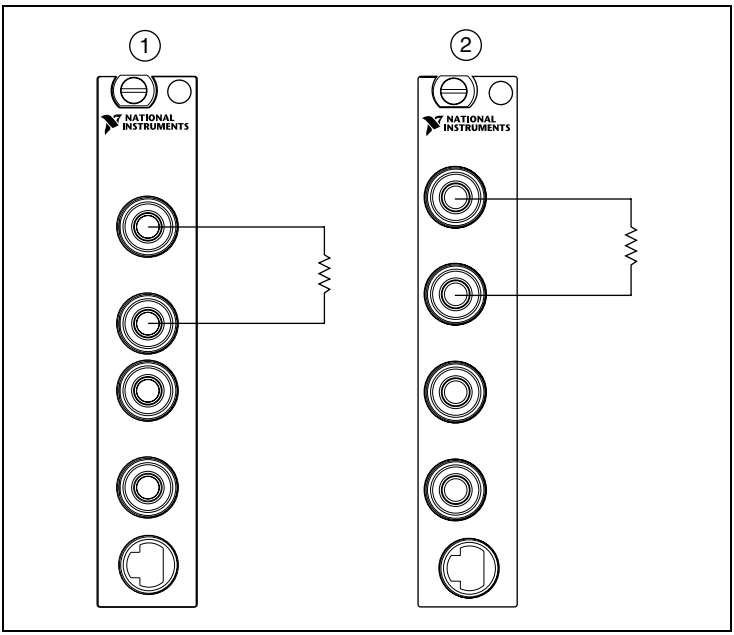


Figure 8. NI 4050 Signal Connections for 2-Wire Resistance Measurements



1 NI 4060	2 NI 407*x*

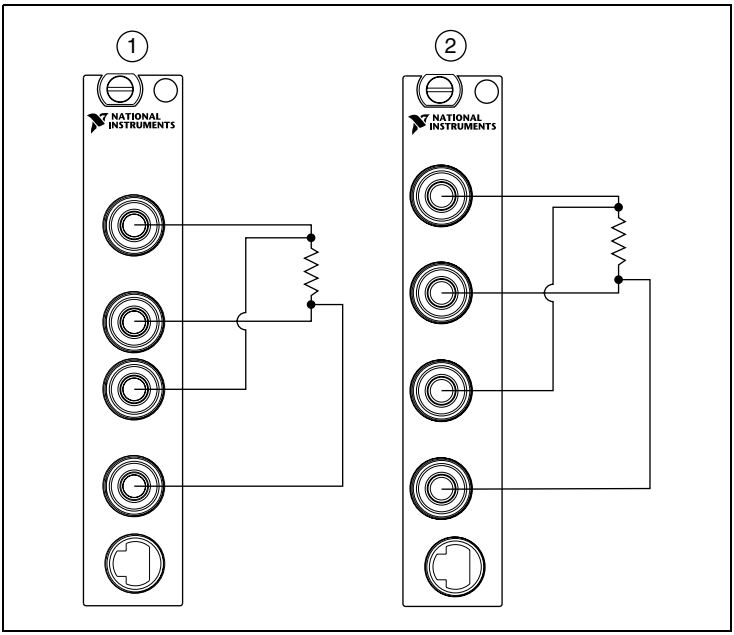
Figure 9. NI 4060 and NI 407*x* Signal Connections for 2-Wire Resistance Measurements

4-Wire Resistance

- NI 4060 and NI 4070 only

4-wire resistance measurements use both pairs of terminals. This type of configuration allows you to measure low resistances accurately by eliminating the effects of lead resistance.

Note The NI 4050 does *not* support 4-wire resistance measurements.

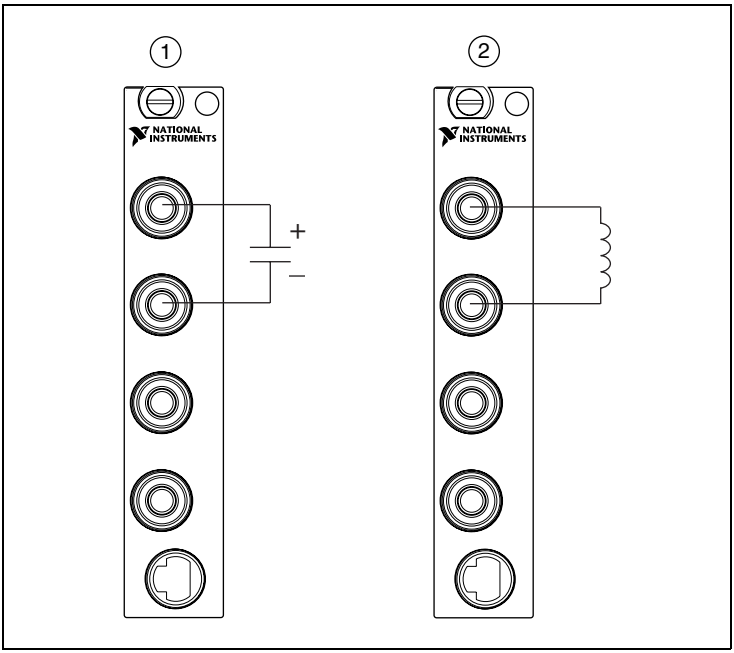


1 NI 4060 2 NI 407*x*

Figure 10. NI 4060 and NI 407*x* Signal Connections for 4-Wire Resistance Measurements

Capacitance and Inductance

- NI 4072 only



1 Capacitance Connections 2 Inductance Connections

Figure 11. NI 4072 Signal Connections for Capacitance and Inductance Measurements

Voltage Drop Across a Diode

The DMM can excite a device under test and read the resulting voltage drop, which is useful for testing diodes.

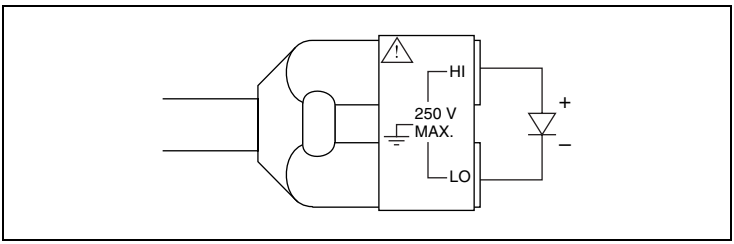
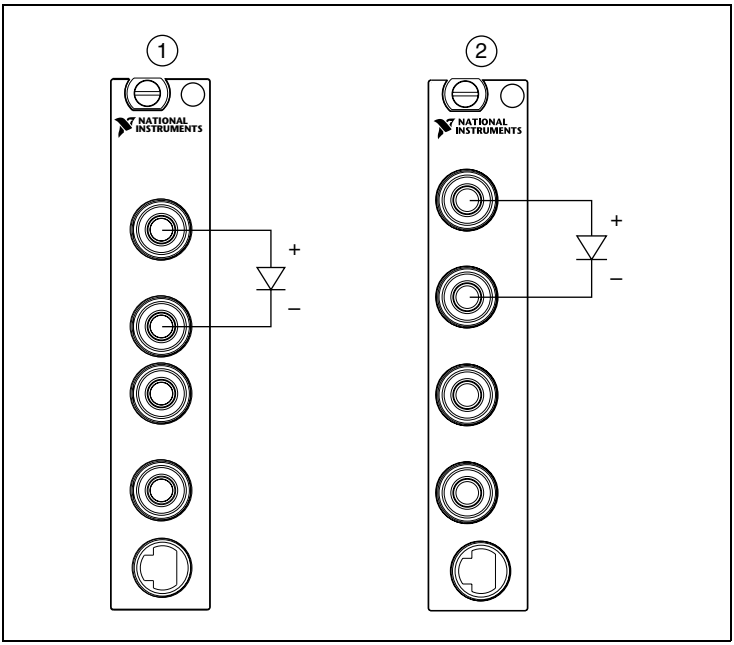


Figure 12. NI 4050 Signal Connections for Diode Measurements



1 NI 4060 2 NI 407*x*

Figure 13. NI 4060 and NI 407*x* Signal Connections for Diode Measurements

Using 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 not supplied by NI, 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 V_{rms} and 42 V_{pk}, or 60 VDC.

Cautions **NI 4050 users**—To prevent possible safety hazards, the maximum voltage between either of the inputs and the ground of the computer should never exceed ±250 VDC or 250 V_{rms}.

NI 4060 users—To prevent possible safety hazards, the maximum voltage between either of the inputs and the ground of the computer should never exceed ±300 VDC or 300 V_{rms}. The maximum current that the NI 4060 can measure between the current inputs is ±200 mA DC or 200 mA_{rms}.

NI 4071 users—To prevent possible safety hazards, the maximum voltage between either of the inputs and the ground of the computer is 500 VDC or 500 V_{rms} (sine wave), except between the HI terminal and ground, where the maximum voltage is 1000 VDC or 700 V_{rms} (sine wave). The maximum current that the NI 407*x* can measure between the current inputs is ±3 A DC or 3 A_{rms}.

NI 4070/4072 users—To prevent possible safety hazards, the maximum voltage between either of the inputs and the ground of the computer should never exceed ±300 VDC or 300 V_{rms}. The maximum current that the NI 407*x* can measure between the current inputs is ±1 A DC or 1 A_{rms}.

8. Programming the DMM

You can acquire data with the DMM by using the DMM SFP or the NI-DMM instrument driver in your application, and you can run the NI-DMM examples to demonstrate the functionality of the DMMs.

DMM Soft Front Panel

The DMM SFP is a software representation of a traditional benchtop DMM. Use the DMM SFP to test the basic functionality of the DMM and to become familiar with its operation. You can launch the DMM SFP from **Start» Programs»National Instruments»NI-DMM»NI-DMM Soft Front Panel**.

NI-DMM Instrument Driver

NI-DMM features a set of operations and attributes that exercise all the functionality of the DMM, including configuration, control, and other module-specific functions. NI-DMM controls all NI digital multimeters.

Refer to the *Programming* section of the *NI Digital Multimeters Help* at **Start»Programs»National Instruments»NI-DMM»Documentation» NI Digital Multimeters Help** for information on using NI-DMM in your applications.

NI-DMM Examples

The NI-DMM examples are instructional tools that demonstrate some of the functionality of the DMMs that you can use or integrate into your systems. NI-DMM includes examples covering single point measurements, multipoint measurements, triggering, waveform acquisitions (NI 407*x* only), and performance (NI 407*x* only).

The following table shows the location of the NI-DMM examples for all supported ADEs.

ADE	Location
LabVIEW	`<LabVIEW>\examples\instr\niDMM`
CVI	`<CVI>\samples\niDMM`
C/C++[1,2]	`<Measurement Studio>\VC\Examples\niDMM`
VB[1,2]	`<Measurement Studio>\VB\Samples\niDMM`

[1] Not all examples are available for Visual C/C++ and Visual Basic.

[2] Any C and VB examples installed by a previous version of NI-DMM are copied to `VXIpnp\WinNT\NIDMM\Examples`*xx*, where *xx* is the previous version number of NI-DMM. Delete this directory if you do not need the old examples.

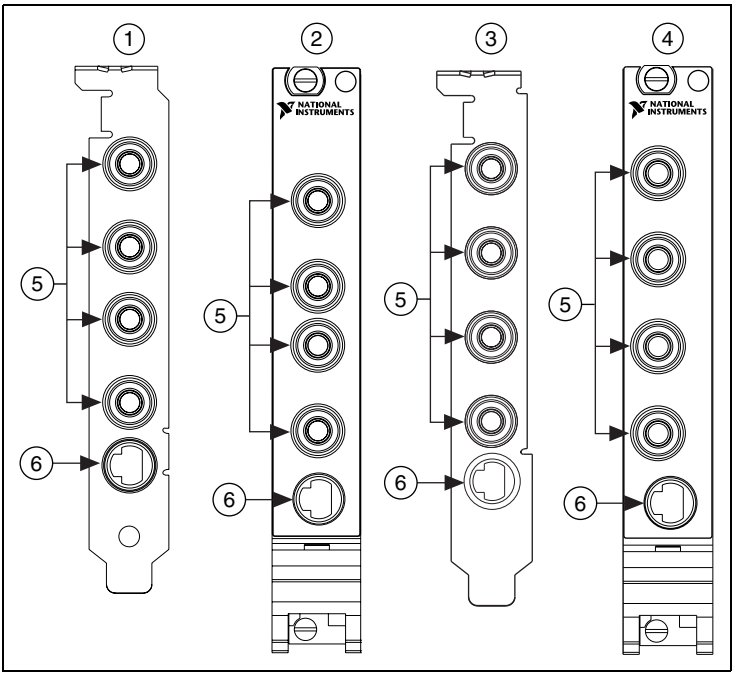
Tip For best accuracy, NI 407*x* users should run the Self-Cal example after the DMM has been installed and has warmed up.

Refer to the *Examples* section of the *NI Digital Multimeters Help* at **Start»Programs»National Instruments»NI-DMM»Documentation»NI Digital Multimeters Help** for a complete example list. Refer to `ni.com/zone` for examples that use National Instruments DMMs with National Instruments switch modules.

Appendix A: Front Panels

PXI/PCI

The PXI and PCI front panels contain five connectors—four shrouded banana plug connectors and one 9-pin connector. Refer to Figure 14 for the front panels for the NI 4060 and the NI 407*x*.



1	NI PCI-4060	3	NI PCI-4070	5	Banana Plug Connectors
2	NI PXI-4060	4	NI PXI-4070/4071/4072	6	9-Pin Connectors

Figure 14. Front Panel Connectors on the PXI and PCI DMMs

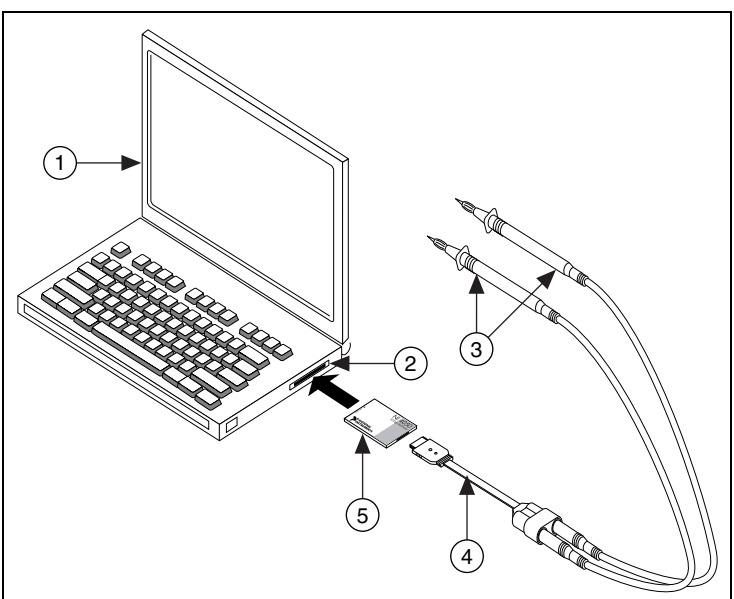
The four banana plug connectors are high-voltage, safety signal connectors. The 9-pin connector labeled *AUX I/O* is a digital signal connector, which carries TTL-level triggering signals for use with external scanning equipment. Refer to the *NI Digital Multimeters Help*, located at **Start»Programs»National Instruments»NI-DMM»Documentation» NI Digital Multimeters Help**, for information about scanning.

PCMCIA

Caution To measure current with the NI PCMCIA-4050, you *must* use a current shunt module. Refer to the *DC and AC Current* section for more information.

An accessory cable connects the NI PCMCIA-4050 to a pair of test probes equipped with shrouded banana plugs. Both the accessory cable and the test probes ship with the NI PCMCIA-4050.The accessory cable connector is polarized and cannot be plugged in incorrectly.

Refer to Figure 15 to connect the accessory cable to the NI PCMCIA-4050.



1	Laptop Computer	3	Test Probes	5	NI PCMCIA-4050
2	PCMCIA Slot	4	Accessory Cable		

Figure 15. Connecting Cables and Probes to the NI PCMCIA-4050

Appendix B: Chassis Recommendations

This appendix specifies the recommended chassis components and conditions for a system that includes National Instruments DMMs.

PXI Chassis Recommendations

The NI PXI-4060, NI PXI-4070, NI PXI-4071, and NI PXI-4072 are designed to operate in any PXI-compliant chassis. Temperature on these DMMs can vary with slot position in the chassis. Complete the following recommendations to minimize this temperature variation and to ensure normal operating conditions for these DMMs:

- Perform routine maintenance of the chassis cooling fan filters, including cleaning. Such maintenance ensures continuous cooling effectiveness, keeps dust off of the components of the PXI DMMs, and ensures accurate high-resistance measurements. NI recommends cleaning the chassis fan filters at a maximum interval of six months and keeping the chassis environment clean to minimize the amount of dust that enters the chassis. For more information about cleaning the chassis fan filters, refer to the *NI PXI-1042 User Manual* at `ni.com/manuals`.
- Install PXI filler panels in all empty slots.
- Verify that the PXI chassis fans that provide forced air remain unobstructed and can allow for proper cooling of the PXI chassis, devices, and controller.

PCI Chassis Recommendations

The NI PCI-4060 and NI PCI-4070 are designed to operate in any ATX-compliant industrial or personal computer. Complete the following recommendations to ensure normal operating conditions for these DMMs:



Caution For optimal electromagnetic compatibility (EMC) performance and input protection, you *must* install the front panel screw.

- Verify that the PCI front panel brackets on the NI PCI-4060 and NI PCI-4070 have a firm, direct, metal-to-metal mounting connection for proper grounding. Some computer manufacturers use a securing lever made of plastic; such a lever is unacceptable for safety reasons, and you must remove it. Also, you must screw down the PCI devices. If the computer chassis does not allow you to meet these requirements, you must use a different computer chassis.
- Install all covers for the industrial chassis or personal computer.
- Install PCI filler panels in all unused PCI slots.

Additional Recommendations for the NI PCI-4070

The cooling capability of most industrial and personal computers is less than the cooling capability of a PXI chassis. The NI PCI-4060 dissipates low enough power that additional cooling is not needed in most computers. The NI PCI-4070 dissipates higher power, and NI strongly recommends that NI PCI-4070 users implement the following precautions to maximize the cooling capability of the computer:

- Install an additional 80 mm, 32 cubic ft/min (CFM) fan that forces air towards the NI PCI-4070. Most computer chassis contain one or two mounting locations for this type of fan. These fans are inexpensive and readily available at most computer supply stores.

Note If the hard drive mounts vertically in front of the fan mounting location(s) in the computer chassis, you must move the hard drive to a horizontal 3.5 in. drive bay or to another suitable location that does not obstruct the fan mounting location(s).

- Add additional fans, such as PCI fan cards and chassis fans, to increase the air circulation inside the computer.

Appendix C: Fuse Replacement

This appendix explains how to replace the fuse in the NI 4060 and NI 407*x*.

Caution For protection against fire, replace the fuse only with fuses of the same type and rating. Refer to Table 1 for fuse types.

Notes The NI 4050 does *not* have a user-replacable fuse.

To replace the fuse in the NI CSM-10A or NI CSM-200mA current shunt module, refer to the *NI CSM-10A/200mA Installation Guide at* `ni.com/manuals`.

Table 1. Appropriate Fuses for the NI 4060 and NI 407*x*

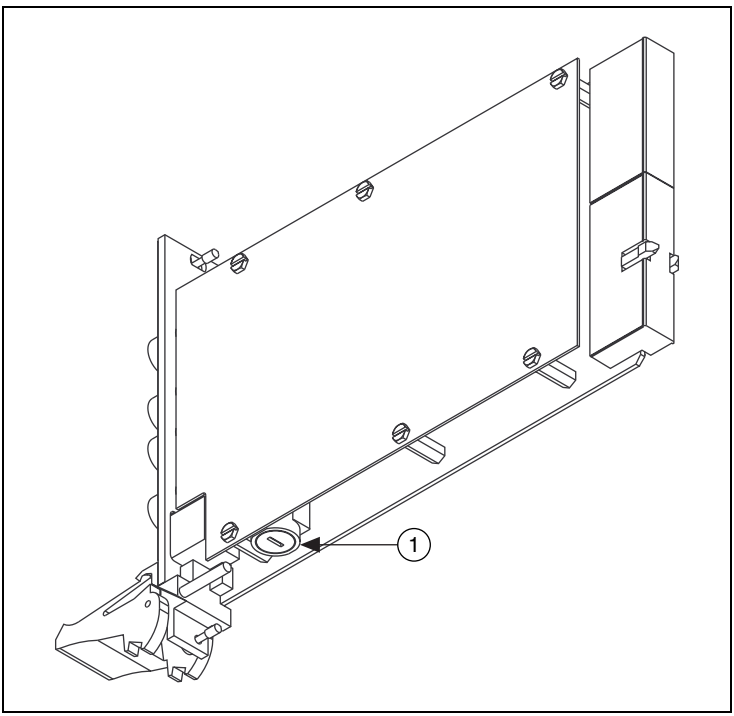
DMM	Fuse Rating	Fuse Type	Manufacturer
NI 4060	500 mA/250 V	Fast acting	Schurter
	500 mA/250 V	Fast acting	Littelfuse
NI 4070/4072	1.25 A/250 V	Fast acting	Littelfuse
NI 4071	3.15 A/250 V	Fast acting	Littelfuse

NI 4060

To replace the fuse, complete the following steps.

- NI PXI-4060

1. Remove all front panel connections from the NI PXI-4060.
2. Power down the chassis and remove the device.
3. Hold the device at the angle shown in Figure 16, and locate the fuse holder.



1 Fuse Holder

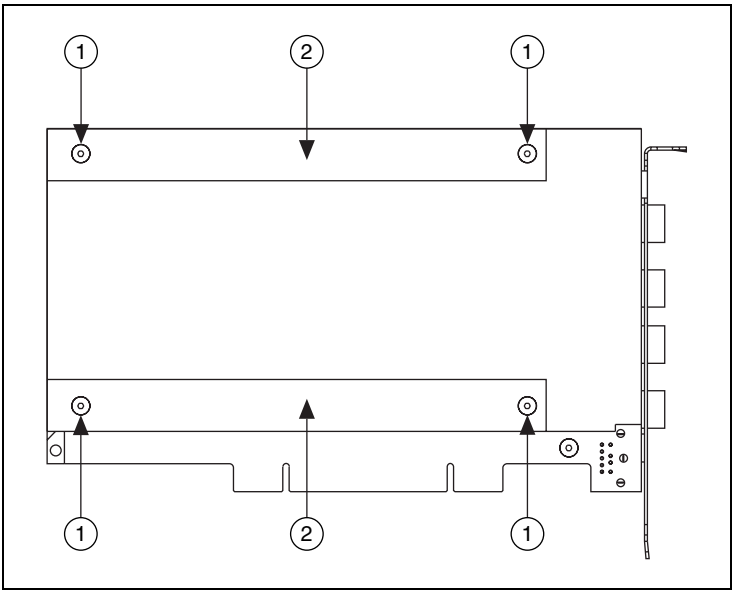
Figure 16. Removing the Fuse from the NI PXI-4060

4. Insert a screwdriver into the slot on the fuse holder.
5. Turn counterclockwise.
6. Pull out the holder and remove the 5×20 mm glass fuse.
7. Visually verify that the fuse is blown.

8. Insert a new fuse into the holder and slide the holder back into place.
9. Turn the fuse holder clockwise until it snaps shut.

♦ NI PCI-4060

1. Remove all front panel connections from the NI PCI-4060.
2. Power off the computer and remove the device.
3. Remove the four screws that secure the top and bottom insulators onto the device, as shown in Figure 17.

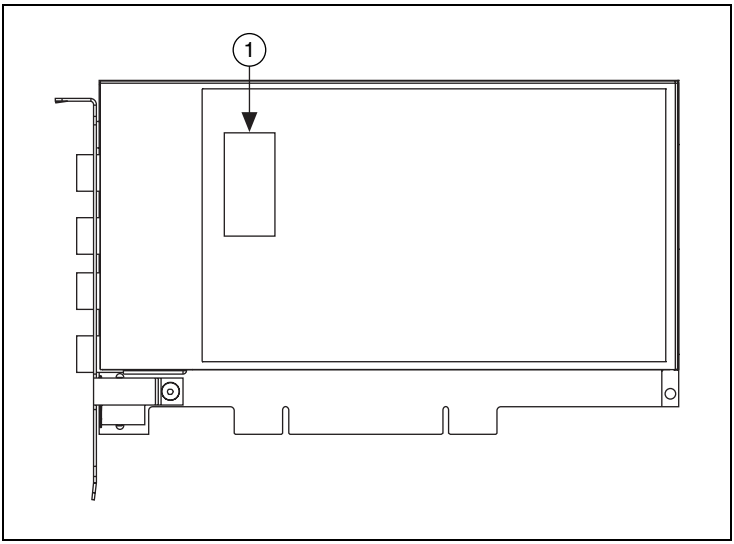


1 Screws Securing Insulators 2 Insulators

Figure 17. Removing the Insulators from the NI PCI-4060

4. Remove the top and bottom insulators.

5. Locate the 5 × 20 mm glass fuse shown in Figure 18.



1 Glass Fuse

Figure 18. Removing the Fuse from the NI PCI-4060

6. Visually verify that the fuse is blown and remove it.
7. Press the new fuse into the silver holding fixture until you hear a snap.

Caution Do *not* operate the NI PCI-4060 without both insulators replaced and secured.

8. Reattach the top and bottom insulators in the opposite order that you removed them.

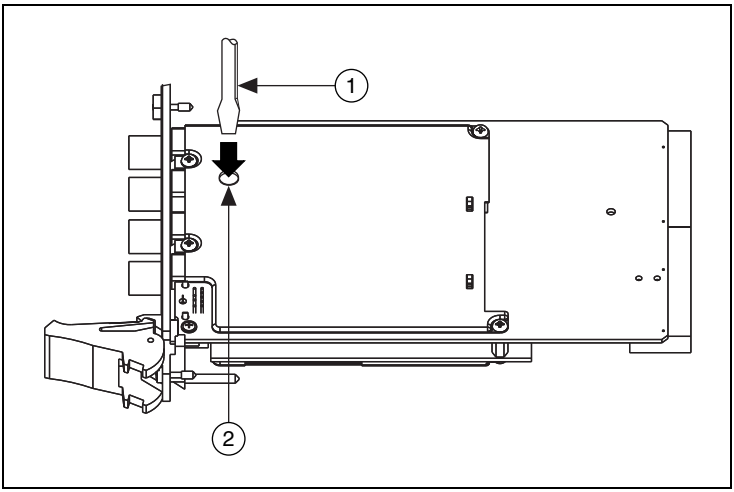
NI 407*x*

To replace the fuse, complete the following steps.

- NI PXI-4070, NI PXI-4071, and NI PXI-4072

1. Remove all front panel connections from the NI PXI-4070, NI PXI-4071, or NI PXI-4072.
2. Power off the chassis and remove the NI PXI-4070, NI PXI-4071, or NI PXI-4072.

3. Locate the fuse hole shown in Figure 19.



1	Screwdriver	2	Fuse Hole

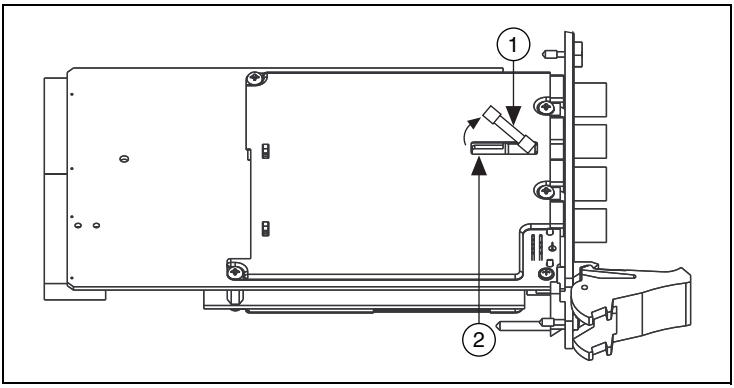
Figure 19. Removing the Fuse from the NI PXI-4070, NI PXI-4071, or NI PXI-4072

4. Insert a screwdriver into the hole.

Caution Do *not* cover the fuse slot on the opposite side of the NI PXI-4070, NI PXI-4071, or NI PXI-4072 with your hand, as doing so may cause injury.

5. Gently press the fuse with the screwdriver until one of the fuse clamps releases.

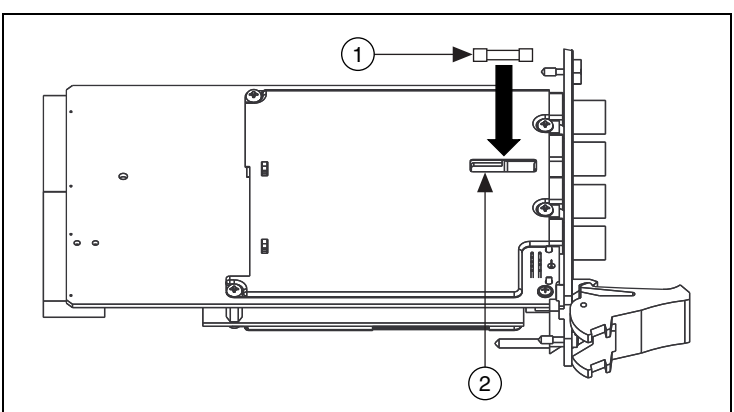
6. Locate the fuse slot shown in Figure 20.



1 Fuse	2 Fuse Slot

Figure 20. Removing the Fuse from the NI PXI-4070, NI PXI-4071, or NI PXI-4072

7. Pry the fuse loose from the slot.
8. Visually verify that the fuse is blown.
9. Insert a new fuse into the fuse slot as shown in Figure 21.



1 Fuse	2 Fuse Slot

Figure 21. Replacing the Blown Fuse in the NI PXI-4070, NI PXI-4071, or NI PXI-4072

10. Gently press the fuse with the screwdriver until both fuse clamps snap the fuse into place.

- NI PCI-4070

1. Remove all front panel connections from the NI PCI-4070.
2. Power down the chassis and remove the device.
3. Hold the NI PCI-4070 at the angle shown in Figure 22, and locate the fuse holder.

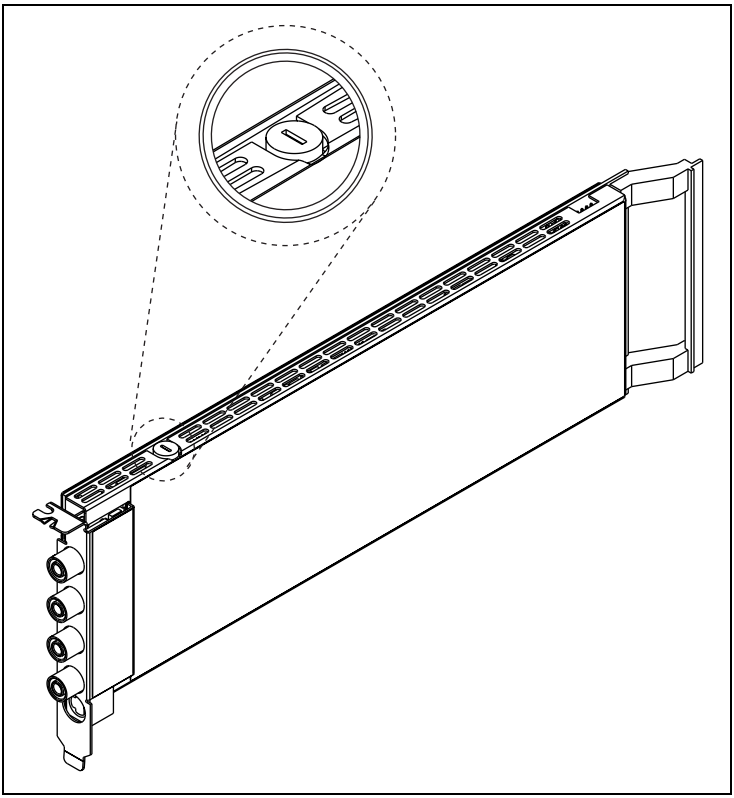


Figure 22. Locating the Fuse on the NI PCI-4070

4. Insert a screwdriver into the slot on the fuse holder.
5. Turn counterclockwise.
6. Pull out the fuse holder and remove the 5×20 mm fuse.
7. Visually verify that the fuse is blown.
8. Insert a new fuse into the holder and slide the holder back into place.
9. Turn the fuse holder clockwise until it snaps shut.

Appendix D: 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.

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Finland 385 0 9 725 725 11, France 33 0 1 48 14 24 24,
Germany 49 0 89 741 31 30, India 91 80 51190000, Israel 972 0 3 6393737,
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Malaysia 603 9131 0918, Mexico 01 800 010 0793,
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Norway 47 0 66 90 76 60, Poland 48 22 3390150,
Portugal 351 210 311 210, Russia 7 095 783 68 51,
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