

## GETTING STARTED GUIDE

# NI PXIe-4138/4139

## Single-Channel System SMU



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

This document explains how to install, configure, and test the NI PXIe-4138/4139 (NI 4138/4139). The NI 4138/4139 is a single channel system source measurement unit (SMU).

To access NI 4138/4139 documentation, navigate to **Start»All Programs»National Instruments»NI-DCPower»Documentation**.

## Contents

---

Electromagnetic Compatibility Guidelines.....	1
Verifying the System Requirements.....	2
Unpacking the Kit.....	2
Kit Contents.....	3
Other Equipment.....	3
Preparing the Environment.....	4
Safety.....	4
Installing the Software.....	4
Installing the NI 4138/4139.....	5
Configuring the NI 4138/4139 in MAX.....	6
Programming the NI 4138/4139.....	7
Troubleshooting.....	8
What Should I Do if the NI 4138/4139 Doesn't Appear in MAX?.....	8
Why Is the ACCESS LED Off When the Chassis Is On?.....	8
Where To Go Next.....	9
Worldwide Support and Services.....	9

## 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.



**Caution** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.



**Caution** To ensure the specified EMC performance, the length of all I/O cables must be no longer than 3 m (10 ft).



**Caution** To ensure the specified EMC performance, you must install PXI EMC Filler panels, NI part number 778700-01, in all open chassis slots. A kit of six single slot EMC Filler Panels can be ordered at [ni.com](http://ni.com).

## Verifying the System Requirements

---

To use the NI-DCPower instrument driver, your system must meet certain requirements.

Refer to the product readme, which is available on the driver software media or online at [ni.com/manuals](http://ni.com/manuals), for more information about minimum system requirements, recommended system, and supported application development environments (ADEs).

## 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.



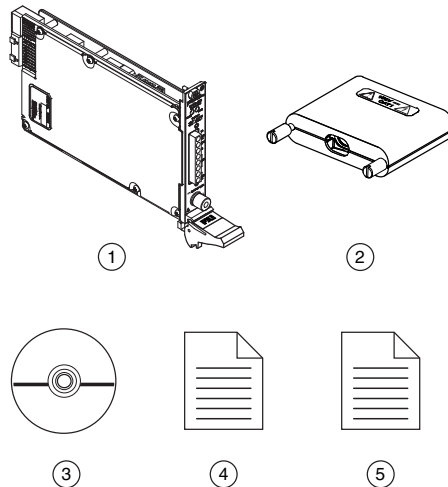
**Note** Do not install a device if it appears damaged in any way.

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

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

# Kit Contents

Figure 1. NI 4138/4139 Kit Contents



- |  |  |
|--|--|
| 1. NI PXIe-4138/4139 System SMU Device | 4. NI PXIe-4138/4139 Getting Started Guide (this document) |
| 2. Output Connector Assembly           | 5. Maintain Forced-Air Cooling Note to Users               |
| 3. Driver Software DVD                 |  |

## Other Equipment

There are several required items not included in your device kit that you need to operate the NI 4138/4139. Your application may require additional items not included in your kit to install or operate your device.

### Required Items

- A PXI Express chassis and chassis documentation. For more information about compatible chassis options, refer to [ni.com](http://ni.com).
- A PXI Express embedded controller or MXI controller system that meets the system requirements specified in this guide and chassis documentation.



**Note** If your device is hardware revision F or earlier, a snap-on ferrite bead is required to remain in EMC compliance. Refer to the *NI 4138/4139 Getting Started Guide* included in your original shipping kit for information about this bead.

To determine which revision of a device you have, open Measurement & Automation Explorer (MAX) and select the device in question. The hardware revision is displayed in the settings pane on right-hand side.

## Optional Items

- NI screwdriver (part number 781015-01).

# Preparing the Environment

---

Ensure that the environment you are using the NI 4138/4139 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](https://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 4138/4139. NI is not liable for any damage or injuries resulting from incorrect signal connections.

## Related Information

*For information about connecting signals for specific devices, refer to the ranges reference of the NI DC Power Supplies and SMUs Help.*

# 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.

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

## Installing the NI 4138/4139



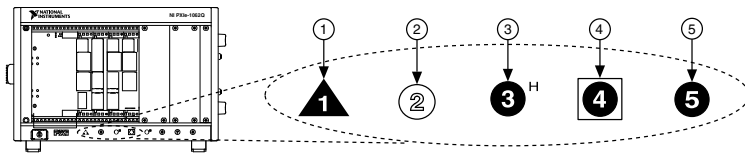
**Caution** To prevent damage to the device caused by ESD or contamination, handle the device using the edges or the metal bracket.

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

The AC power cord grounds the chassis and protects it from electrical damage while you install the modules.

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 connectors 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**

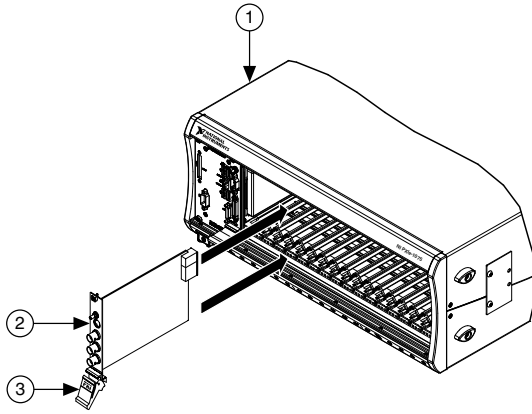


- |                                       |                                   |
|---------------------------------------|-----------------------------------|
| 1. PXI Express System Controller Slot | 4. PXI Express System Timing Slot |
| 2. PXI Peripheral Slot                | 5. PXI Express Peripheral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

NI 4138/4139 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 unlatched (downward) position.
8. Place the module edges into the module guides at the top and bottom of the chassis. Slide the device into the slot until it is fully inserted.

**Figure 3. Module Installation**



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

9. Latch the module in place by pulling up on the ejector handle.
10. Secure the device 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 filler panels or slot blockers to maximize cooling air flow.
12. Connect the output connector assembly to the device. Tighten any thumbscrews on the output connector assembly to hold it in place.
13. Power on the chassis.

## Configuring the NI 4138/4139 in MAX

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

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

Installed devices appear under the name of their associated chassis.

3. Expand your **Chassis** tree item.

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



**Note** If you do not see your device listed, press <F5> to refresh the list of installed devices. If the device is still not listed, power off the system, ensure the device is correctly installed, and restart.

4. Record the device identifier MAX assigns to the hardware. Use this identifier when programming the NI 4138/4139.
5. Self-test the device by selecting the device 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 4138/4139

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

**Table 1.** NI 4138/4139 Programming Options

Application Programming Interface (API)	Location	Description
NI-DCPower SFP	Available from the start menu at <b>Start»All Programs»National Instruments»NI-DCPower»NI-DCPower Soft Front Panel</b> .	The NI-DCPower SFP acquires, controls, and presents data. The NI-DCPower SFP operates on the PC, to provide additional display capabilities.
NI-DCPower Instrument Driver	LabVIEW—Available on the LabVIEW Functions palette at <b>Measurement I/O»NI-DCPower</b> .	NI-DCPower 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 <b>Program Files»IVI Foundation»IVI Drivers»NI-DCPower</b> .	
	Microsoft Visual C/C++—NI-DCPower does not ship with installed C/C++ examples.	Refer to the <i>Creating an Application with Microsoft Visual C and C++</i> topic of the <a href="#">NI DC Power Supplies and SMUs Help</a> to manually add all required include and library files to your project.

# Troubleshooting

If an issue persists after you complete a troubleshooting procedure, contact NI technical support or visit [ni.com/support](https://ni.com/support).

## What Should I Do if the NI 4138/4139 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 devices, 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 8	Right-click the Start screen, and select <b>All apps&gt;Control Panel&gt;Hardware and Sound&gt;Device Manager</b> .
Windows 7	Select <b>Start&gt;Control Panel&gt;Device Manager</b> .
Windows Vista	Select <b>Start&gt;Control Panel&gt;System and Maintenance&gt;Device Manager</b> .
Windows XP	Select <b>Start&gt;Control Panel&gt;System&gt;Hardware&gt;Device Manager</b> .

5. If you are using a PXI or PXI Express controller, verify that a **National Instruments** entry appears in the system device list. Reinstall NI-DCPower and the device 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.

## Why Is the ACCESS LED Off When the Chassis Is On?

The LEDs may not illuminate until the device has been configured in MAX. Before proceeding, verify that the NI 4138/4139 appears in MAX.

If the ACCESS LED fails to illuminate after you power on the PXI Express chassis, a problem may exist with the PXI Express power rails, a hardware module, or the LED.

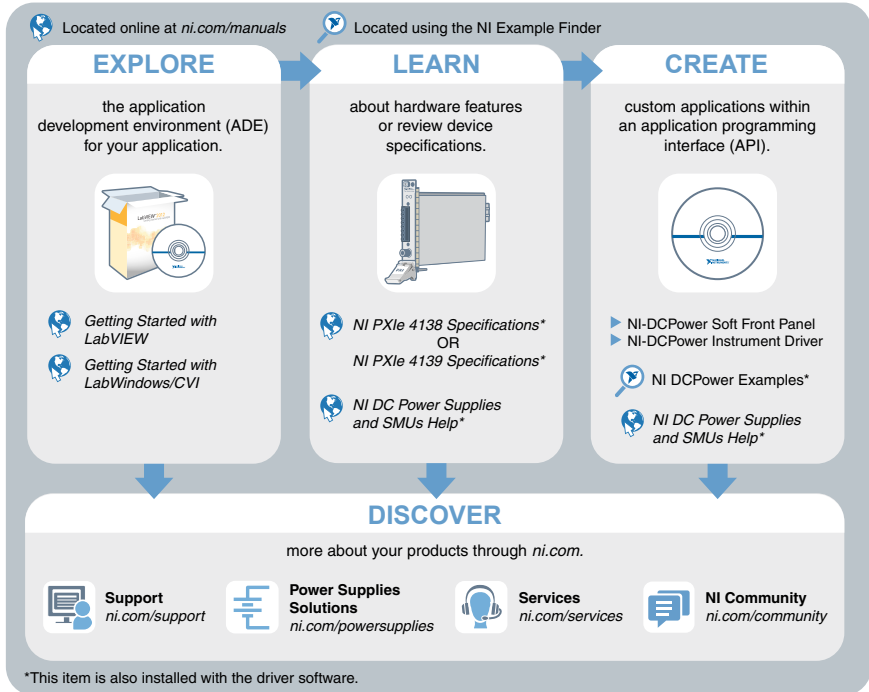
1.  **Caution** Apply external signals only while the NI 4138/4139 is powered on. Applying external signals while the device is powered off may cause damage. Disconnect any signals from the PXI Express module front panels.
2. Remove any front panel connections from the NI 4138/4139.
3. Power off the PXI Express chassis.
4. Remove the module from the PXI Express chassis and inspect it for damage. Do not reinstall a damaged device.



5. Install the module in a different PXI Express chassis slot from which you removed it.
6. Power on the PXI Express chassis.
7. Verify that the device appears in MAX.
8. Reset the device in MAX and perform a self-test.

If the ACCESS LED still fails to illuminate and failures continue, contact NI technical support or visit [ni.com/support](http://ni.com/support).

## Where To Go Next



## Worldwide Support and Services

The NI website is your complete resource for technical support. At [ni.com/support](http://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.

Visit [ni.com/services](http://ni.com/services) for NI Factory Installation Services, repairs, extended warranty, and other services.

Visit [ni.com/register](https://ni.com/register) to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting [ni.com/certification](https://ni.com/certification). If your product supports calibration, you can obtain the calibration certificate for your product at [ni.com/calibration](https://ni.com/calibration).

NI corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. NI also has offices located around the world. For telephone support in the United States, create your service request at [ni.com/support](https://ni.com/support) or dial 1 866 ASK MYNI (275 6964). For telephone support outside the United States, visit the *Worldwide Offices* section of [ni.com/global](https://ni.com/global) to access the branch office websites, 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](https://ni.com/trademarks) for information on NI trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering NI products/technology, refer to the appropriate location: **Help»Patents** in your software, the `patents.txt` file on your media, or the *National Instruments Patent Notice* at [ni.com/patents](https://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](https://ni.com/legal/export-compliance) for the NI global trade compliance policy and how to obtain relevant HTS codes, ECCNs, and other import/export data. NI MAKES NO EXPRESS OR IMPLIED WARRANTIES AS TO THE ACCURACY OF THE INFORMATION CONTAINED HEREIN AND SHALL NOT BE LIABLE FOR ANY ERRORS. U.S. Government Customers: The data contained in this manual was developed at private expense and is subject to the applicable limited rights and restricted data rights as set forth in FAR 52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.

© 2014—2016 National Instruments. All rights reserved.

374671B-01 Jan16