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**PXIe-4162**

## GETTING STARTED GUIDE

# PXIe-4162

PXIe, 12-Channel,  $\pm 24$  V, 100 mA PXI Source Measure Unit

This document explains how to install, configure, and test the PXIe-4162. The PXIe-4162 ships with NI-DCPower driver software, which you can use to program the module.



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

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## Verifying the System Requirements

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

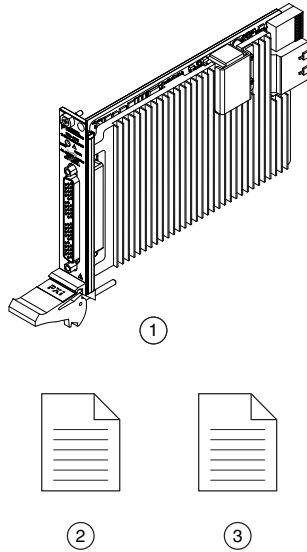
Refer to the product readme, which is available on the driver software media or online at [ni.com/manuals](http://ni.com/manuals), for more information about minimum system requirements, recommended system, and supported application development environments (ADEs).

## Unpacking the Kit

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Refer to the following figure to identify the contents of the PXIe-4162 kit.

**Figure 1. PXIe-4162 Kit Contents**



1. PXIe-4162
2. PXIe-4162 Safety, Environmental, and Regulatory Information
3. Maintain Forced-Air Cooling Note to Users



**Notice** To prevent electrostatic discharge (ESD) from damaging the module, 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 module from the package and inspect it for loose components or other signs of damage.



**Notice** Never touch the exposed pins of connectors.



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

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

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

# Other Equipment

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There are several required items not included in your PXIe-4162 kit that you need to operate the PXIe-4162. Your application may require additional items not included in your kit to install or operate your PXIe-4162.

## Required Items

- A PXI Chassis and chassis documentation
- A PXI Controller or PC with a Device for PXI Remote Control system that meets the system requirements specified in this guide and chassis documentation

## Optional Items

- PXI Slot Blocker Kit (NI part number 199198-01)
- SHDB62M-DB62M-LL Low Leakage Cable for SMU, 62 D-Sub Male to 62 D-Sub Male
  - 1 m (NI part number 142947B-01)
  - 2 m (NI part number 142947B-02)
- SHDB62M-BW-LL Low Leakage Cable for SMU, 62 D-Sub Male to Bare Wire Male
  - 1 m (NI part number 142948A-01)
  - 2 m (NI part number 142948A-02)
- 62-Pin Connector Kit for PXIe-416x SMUs (NI part number 785582-01)

Visit [ni.com](http://ni.com) for more information about these additional items.

# Preparing the Environment

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Ensure that the environment you are using the PXIe-4162 in meets the following specifications:

## Temperature and Humidity

### Temperature

Operating	
Chassis with slot cooling capacity $\geq 58$ W <sup>1</sup>	0 °C to 55 °C
All other compatible chassis	0 °C to 40 °C
Storage	
	-40 °C to 71 °C

---

<sup>1</sup> Not all chassis with slot cooling capacity  $\geq 58$  W can achieve this ambient temperature range. Refer to PXI chassis specifications to determine the ambient temperature ranges your chassis can achieve.

## Humidity

Operating	10% to 90%, noncondensing
Storage	5% to 95%, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)



**Notice** This model is intended for use in indoor applications only.

### Related Information

[Refer to the PXIe-4162 Specifications at ni.com for complete specifications.](#)

## 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. Visit [ni.com/downloads/drivers](#) and search for NI-DCPower.
3. Download the latest version of NI-DCPower by clicking **Download** and then running the executable (.exe) file.

Driver support for the PXIe-4162 was first available in NI-DCPower 17.6.

4. 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.

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

## Installing the PXIe-4162



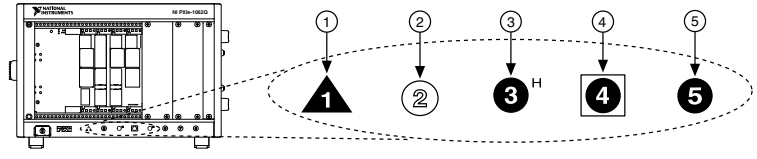
**Notice** To prevent damage to the PXIe-4162 caused by ESD or contamination, handle the module using the edges or the metal bracket.

The PXIe-4162 is a single-slot module with one backplane connector. The module may be installed into any PXI Express-compatible slot.

1. Ensure the AC power source is connected to the chassis before installing the PXIe-4162.  
The AC power cord grounds the chassis and protects it from electrical damage while you install the PXIe-4162.
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. Position the chassis so that inlet and outlet vents are not obstructed.  
For more information about optimal chassis positioning, refer to the chassis documentation.
5. Remove the black plastic covers from all the captive screws on the module front panel.
6. Identify a supported slot in the chassis. The following figure shows the symbols that indicate the slot types.

**Figure 2. Chassis Compatibility Symbols**

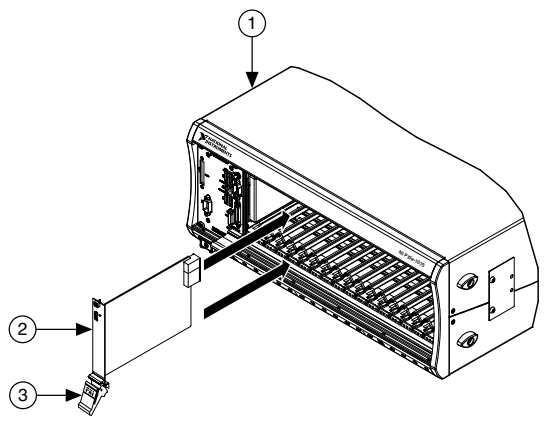


- |                                       |                                   |
|---------------------------------------|-----------------------------------|
| 1. PXI Express System Controller Slot | 4. PXI Express System Timing Slot |
| 2. PXI Peripheral Slot                | 5. PXI Express Peripheral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

PXIe-4162 modules can be placed in PXI Express peripheral slots, PXI Express hybrid peripheral slots, or PXI Express system timing slots.

7. Touch any metal part of the chassis to discharge static electricity.
8. Ensure that the ejector handle is in the downward (unlatched) position.
9. 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.

**Figure 3. Module Installation**



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

10. Latch the module in place by pulling up on the ejector handle.

11. 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.

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

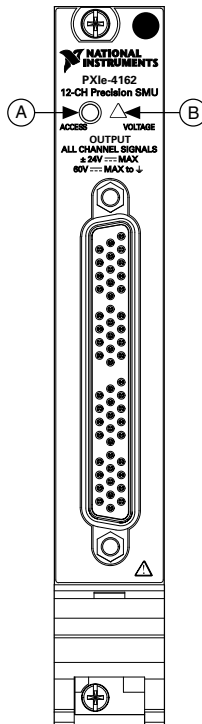
## Related Information

[Why Is the ACCESS LED Off When the Chassis Is On?](#) on page 17

# PXIe-4162 Pinout and LEDs

## Front Panel

Refer to the following figures and tables for information about the PXIe-4162 front panel connector pins, channels, and LEDs.



	Item
A	LED Access Status indicator
B	LED Voltage Status Indicator

**Table 1.** LED Access Status Indicator

Status Indicator	Device State
(Off)	Not Powered
Green	Powered
Amber	Device is being accessed

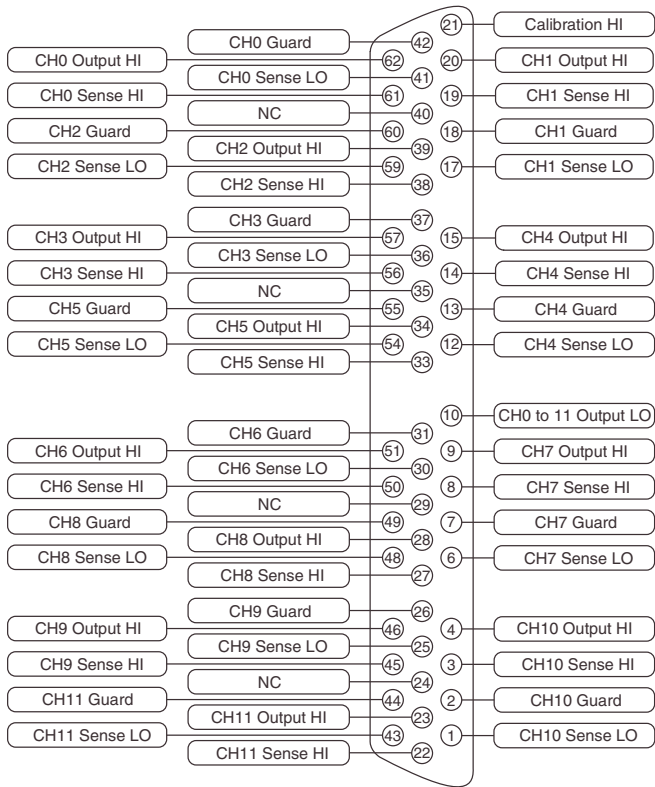
**Table 2.** LED Voltage Status Indicator

Status Indicator	Output Channel State
(Off)	All device outputs are disconnected from their voltage generation sources through output disconnect relays.
Green	At least one device output is connected to a voltage generation source.
Red	The device has a fault or is in error due to the voltage generated or measured by the device. Refer to the driver software for possible sources. The device will not operate until the error is cleared and/or the device is reset.

## Pinout

The following figure and table provide detailed signal information for the PXIe-4162 connector.





**Table 3. PXIe-4162 Signal Descriptions**

<b>Bundle</b>	<b>Channel</b>	<b>Pin</b>	<b>Signal Description</b>
A	0	62	Output HI
		61	Sense HI
		41	Sense LO
		42	Guard <sup>2</sup>
	1	20	Output HI
		19	Sense HI
		17	Sense LO
		18	Guard <sup>2</sup>
	2	39	Output HI
		38	Sense HI
		59	Sense LO
		60	Guard <sup>2</sup>
B	3	57	Output HI
		56	Sense HI
		36	Sense LO
		37	Guard <sup>2</sup>
	4	15	Output HI
		14	Sense HI
		12	Sense LO
		13	Guard <sup>2</sup>
	5	34	Output HI
		33	Sense HI
		54	Sense LO
		55	Guard <sup>2</sup>

<sup>2</sup> Guard terminals are not supported in the highest current ranges: 60 mA or 100 mA.

**Table 3. PXIe-4162 Signal Descriptions (Continued)**

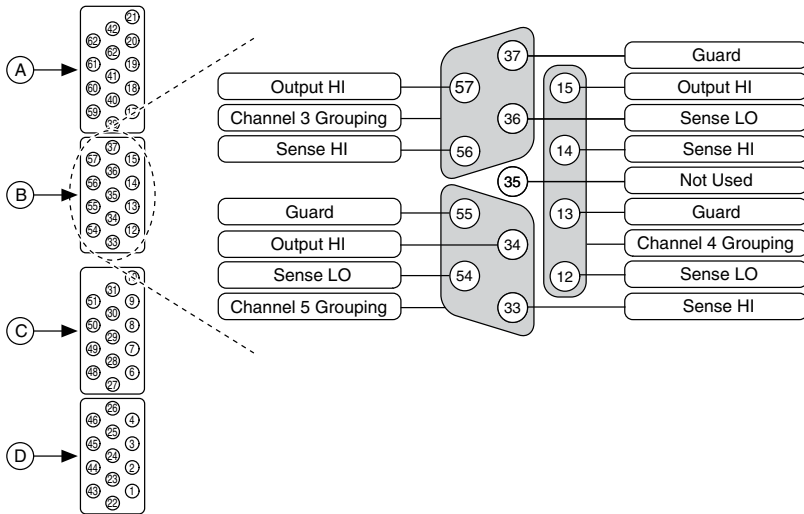
<b>Bundle</b>	<b>Channel</b>	<b>Pin</b>	<b>Signal Description</b>	
C	6	51	Output HI	
		50	Sense HI	
		30	Sense LO	
		31	Guard <sup>2</sup>	
	7	9	Output HI	
		8	Sense HI	
		6	Sense LO	
		7	Guard <sup>2</sup>	
	8	28	Output HI	
		27	Sense HI	
		48	Sense LO	
		49	Guard <sup>2</sup>	
	D	9	46	Output HI
			45	Sense HI
			25	Sense LO
			26	Guard <sup>2</sup>
10		4	Output HI	
		3	Sense HI	
		1	Sense LO	
		2	Guard <sup>2</sup>	
11		23	Output HI	
		22	Sense HI	
		43	Sense LO	
		44	Guard <sup>2</sup>	
A, B, C, D		0 to 11	10	Output LO

**Table 3. PXIe-4162 Signal Descriptions (Continued)**

<b>Bundle</b>	<b>Channel</b>	<b>Pin</b>	<b>Signal Description</b>
—	—	21	Calibration HI
		24	Not used
		29	
		35	
		40	
		5	Void
		11	
		16	
		32	
		47	
		52	
		53	
		58	

### Cable Bundles

The PXIe-4162 has 12 channels organized into four cable bundles (A, B, C, D) for use with associated cable accessories. The following figure and table provide detailed bundle information.



Bundle	Channels
A	0 to 2
B	3 to 5
C	6 to 8
D	9 to 11

## Configuring the PXIe-4162 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-DCPower.

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 PXIe-4162.
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.

### Related Information

[What Should I Do if the PXIe-4162 Doesn't Appear in MAX?](#) on page 16

[What Should I Do if the PXIe-4162 Fails the Self-Test?](#) on page 17

## Self-Calibrating the PXIe-4162

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Self-calibration adjusts the PXIe-4162 for variations in the module environment. Perform a complete self-calibration after the first time you install the PXIe-4162.

1. Install the PXIe-4162 and let it warm up for 30 minutes.



**Note** Warm up begins when the PXI Express chassis has been powered on and the operating system has completely loaded.

2. Self-calibrate the PXIe-4162 by clicking the **Self-Calibrate** button in MAX or calling `niDCPower Cal Self Calibrate` or `niDCPower_CalSelfCalibrate`.

The PXIe-4162 modules are externally calibrated at the factory but you should perform a self-calibration in all of the following situations:

- After first installing the PXIe-4162 in a chassis
- After any module that is in the same chassis as the PXIe-4162 is installed, uninstalled, or moved
- When the PXIe-4162 is in an environment where the ambient temperature varies or the PXIe-4162 temperature has drifted more than  $\pm 5$  °C from the temperature at the last self-calibration
- Within 24 hours of the previous self-calibration


### Related Information

[What Should I Do if the PXIe-4162 Fails the Self-Test?](#) on page 17

# Programming the PXIe-4162

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You can generate signals interactively using InstrumentStudio or you can use the NI-DCPower instrument driver to program your device in the supported ADE of your choice.

Software	Location	Description
InstrumentStudio	 <p><b>Note</b> InstrumentStudio is supported only on 64-bit systems. If you are using a 32-bit system, use your driver's specific soft front panel instead of InstrumentStudio.</p> <p>InstrumentStudio is automatically installed when you install the NI-DCPower driver. You can access InstrumentStudio in any of the following ways:</p> <ul style="list-style-type: none"> <li>• From the Windows start menu, select <b>National Instruments»[Driver] Soft Front Panel</b>. This launches InstrumentStudio and runs a soft front panel populated with NI-DCPower devices.</li> <li>• From the Windows start menu, select <b>National Instruments» InstrumentStudio 2018</b>. This launches InstrumentStudio and runs a soft front panel populated with devices detected on your system.</li> <li>• From Measurement &amp; Automation Explorer (MAX), select a device and then click <b>Test Panels...</b> This launches InstrumentStudio and runs a soft front panel for the device you selected.</li> </ul>	<p>When you install NI-DCPower on a 64-bit system, you can monitor, control, and record measurements from supported devices using InstrumentStudio. InstrumentStudio is a software-based soft front panel application that allows you to perform interactive measurements on several different device types in a single program.</p>



Software	Location	Description
NI-DCPower Instrument Driver	LabVIEW—Available on the LabVIEW Functions palette at <b>Measurement I/O»NI-DCPower</b> . Examples are available from the <b>Start</b> menu in the <b>National Instruments</b> folder.	The NI-DCPower API configures and operates the module hardware and performs basic acquisition and measurement functions.
	LabVIEW NXG—Available from the diagram at <b>Hardware Interfaces»Electronic Test»NI-DCPower</b> . Examples are available from the <b>Learning</b> tab in the <b>Examples»Hardware Input and Output</b> folder.	
	LabWindows/CVI—Available at <b>Program Files»IVI Foundation»IVI»Drivers»NI-DCPower</b> . LabWindows/CVI examples are available from the <b>Start</b> menu in the <b>National Instruments</b> folder.	
	C/C++—Available at <b>Program Files»IVI Foundation»IVI</b> . Refer to the <i>Creating an Application with NI-DCPower in 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. NI-DCPower does not ship with installed C/C++ examples.	

## Troubleshooting

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

### What Should I Do if the PXIe-4162 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
------------------	-------------

<b>Windows 10/8.1</b>	Right-click the Start button, and select <b>Device Manager</b> .
-----------------------	--

Operating System	Description
------------------	-------------

Windows 7	Select <b>Start</b> » <b>Control Panel</b> » <b>Device Manager</b> .
-----------	--

5. Verify the PXIe-4162 appears in the Device Manager.
  - a) Under an NI entry, confirm that a PXIe-4162 entry appears.



**Note** If you are using a PC with a device for PXI remote control system, under **System Devices**, also confirm that no error conditions appear for the **PCI-to-PCI Bridge**.

- b) If error conditions appear, reinstall NI-DCPower and the PXIe-4162.

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

Before proceeding, verify that the PXIe-4162 appears in MAX.

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



**Notice** Apply external signals only while the PXIe-4162 is powered on. Applying external signals while the module is powered off may cause damage.

1. Disconnect any signals from the module front panels.
2. Power off the chassis.
3. Remove the module from the chassis and inspect it for damage. Do not reinstall a damaged module.
4. Install the module in a different chassis slot from which you removed it.
5. Power on the chassis.



**Note** If you are using a PC with a device for PXI remote control system, power on the chassis before powering on the computer.

6. Verify that the module appears in MAX.
7. Reset the module in MAX and perform a self-test.

### Related Information

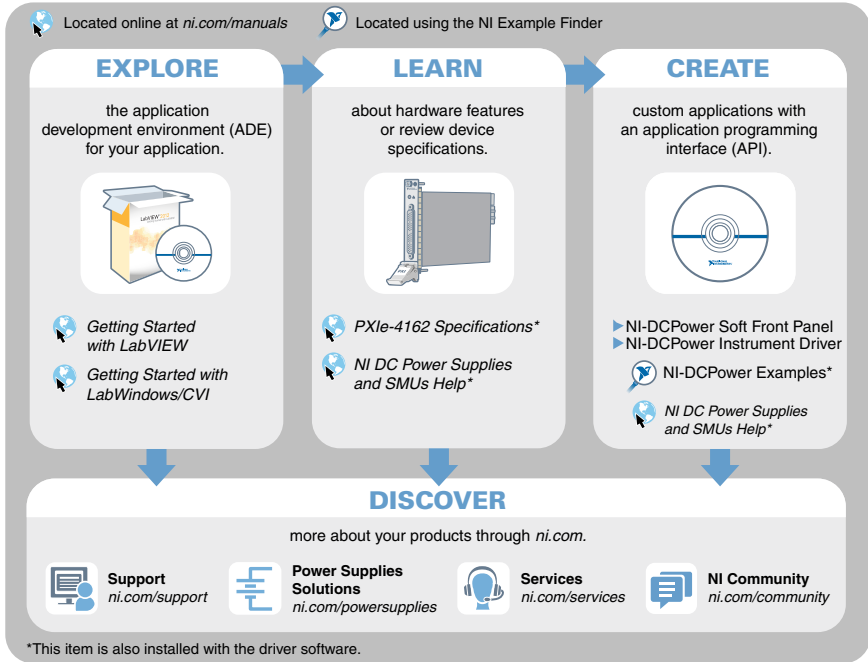
[PXIe-4162 Pinout and LEDs](#) on page 6

## What Should I Do if the PXIe-4162 Fails the Self-Test?

1. Restart the system.
2. Launch MAX.
  - Failed self-test
    1. Perform self-calibration, then perform the self-test again. The PXIe-4162 must be calibrated to pass the self-test.
  - Failed self-calibration
    1. Perform self-calibration 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



## 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 information about the services NI offers.

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

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377401B-01 January 25, 2019