

## GETTING STARTED

# NI PCIe-8233

## Quad Port Gigabit Ethernet Interface Device

The NI PCIe-8233 (NI 8233) is a quad port PCI Express (PCIe) Gigabit Ethernet interface device. The NI 8233 supports Power over Ethernet (PoE). This document describes how to install and configure the necessary hardware and software components to begin using the NI 8233.

## What You Need to Get Started

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You need the following items to set up and use the NI 8233.

- NI 8233 GigE interface device
- GigE Vision Camera
- Ethernet cable



- Computer running Microsoft Windows 7 (32-bit or 64-bit versions)/Vista (32-bit or 64-bit versions)/XP SP3 (32-bit) with at least one available x4 or larger PCIe slot
- NI-IMAQdx 4.1 or later driver software, included with NI Vision Acquisition Software February 2013
- Optional software for developing machine vision applications:
  - NI Vision Builder for Automated Inspection
  - NI Vision Development Module, which requires one of the following application development environments:
    - LabVIEW
    - LabWindows™/CVI™
    - Microsoft Visual Studio

## Safety Information

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**Caution** The following paragraphs contain important safety information you *must* follow when installing and operating the device.

Do *not* operate the device in a manner not specified in the documentation. Misuse of the device may result in a hazard and may compromise the safety protection built into the device. If the device is damaged, turn it off and do *not* use it until service-trained personnel can check its safety. If necessary, return the device to National Instruments for repair.

Keep away from live circuits. Do *not* remove equipment covers or shields unless you are trained to do so. If signal wires are connected to the device, hazardous voltages can exist even when the equipment is turned off. To avoid a shock hazard, do *not* perform procedures involving cover or shield removal unless you are qualified to do so. Disconnect all field power prior to removing covers or shields.

If the device is rated for use with hazardous voltages ( $>30 V_{\text{rms}}$ ,  $42.4 V_{\text{pk}}$ , or  $60 V_{\text{dc}}$ ), it may require a safety earth-ground connection wire. Refer to the device specifications for maximum voltage ratings.

Because of the danger of introducing additional hazards, do *not* install unauthorized parts or modify the device. Use the device only with the chassis, modules, accessories, and cables specified in the installation instructions. All covers and filler panels *must* be installed while operating the device.

Do *not* operate the device in an explosive atmosphere or where flammable gases or fumes may be present. Operate the device only at or below the pollution degree stated in the specifications.

Pollution consists of any foreign matter—solid, liquid, or gas—that may reduce dielectric strength or surface resistivity. The following is a description of pollution degrees.

- Pollution Degree 1—No pollution or only dry, nonconductive pollution occurs. The pollution has no effect.
- Pollution Degree 2—Normally only nonconductive pollution occurs. Occasionally, nonconductive pollution becomes conductive because of condensation.
- Pollution Degree 3—Conductive pollution or dry, nonconductive pollution occurs. Nonconductive pollution becomes conductive because of condensation.

Clean the device and accessories by brushing off light dust with a soft, nonmetallic brush. Remove other contaminants with a stiff, nonmetallic brush. The unit *must* be completely dry and free from contaminants before returning it to service.

You *must* insulate signal connections for the maximum voltage for which the device is rated. Do *not* exceed the maximum ratings for the device. Remove power from signal lines before connection to or disconnection from the device.



**Caution** National Instruments measurement products may be classified as either Measurement Category I or II. Operate products at or below the Measurement Category level specified in the hardware specifications.

**Measurement Category<sup>1</sup>:** Measurement circuits are subjected to working voltages<sup>2</sup> and transient stresses (overvoltage) from the circuit to which they are connected during measurement or test. Measurement Category establishes standardized impulse withstand voltage levels that commonly occur in electrical

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<sup>1</sup> Measurement Categories as defined in electrical safety standard IEC 61010-1.

<sup>2</sup> Working voltage is the highest rms value of an AC or DC voltage that can occur across any particular insulation.

distribution systems. The following is a description of Measurement (Installation<sup>1</sup>) Categories:

- Measurement Category I is for measurements performed on circuits *not* directly connected to the electrical distribution system referred to as MAINS<sup>2</sup> voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.
- Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet (e.g., 115 V for U.S. or 230 V for Europe). Examples of Measurement Category II are measurements performed on household appliances, portable tools, and similar products.

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<sup>1</sup> Measurement Category is also referred to as Installation Category.

<sup>2</sup> MAINS is defined as the (hazardous live) electrical supply system to which equipment is designed to be connected for the purpose of powering the equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

- Measurement Category III is for measurements performed in the building installation at the distribution level. This category refers to measurements on hard-wired equipment such as equipment in fixed installations, distribution boards, and circuit breakers. Other examples are wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and stationary motors with permanent connections to fixed installations.
- Measurement Category IV is for measurements performed at the primary electrical supply installation (<1,000 V). Examples include electricity meters and measurements on primary overcurrent protection devices and on ripple control units.

## Electromagnetic Compatibility Guidelines

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

## Installing Application Software and Driver

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Before installing the NI 8233, you must install the application software and device driver. National Instruments provides two options for developing machine vision applications.

- **NI Vision Builder for Automated Inspection** (Vision Builder AI)—Interactive, menu-driven configuration software for developing, benchmarking, and deploying machine vision applications. You must also install NI-IMAQdx.



- **NI Vision Development Module**—Programming library for developing machine vision and scientific imaging applications. The NI Vision Development Module requires an application development environment—LabVIEW, LabWindows/CVI, or Visual Studio—and NI-IMAQdx.

## Installing Vision Builder AI

Install the following software to use Vision Builder AI to develop applications.

1. **NI-IMAQdx**—Refer to the *NI Vision Acquisition Software Release Notes* on the NI Vision Acquisition Software installation media for system requirements and installation instructions for the NI-IMAQdx driver.

Documentation for the NI-IMAQ driver software is available by selecting **Start»All Programs»National Instruments»Vision»Documentation»NI-IMAQ**.

2. **Vision Builder AI**—Refer to the *NI Vision Builder for Automated Inspection Readme* for installation instructions.

Documentation for Vision Builder AI is available by selecting **Start»All Programs»National Instruments»Vision Builder AI»Documentation**.

## Installing the Vision Development Module

Install the following software to use the Vision Development Module to develop applications.

1. One of the following application development environments:
  - **LabVIEW**—Refer to the *LabVIEW Release Notes* for installation instructions and system requirements for the LabVIEW software. Refer to the *LabVIEW Upgrade Notes* for additional information about upgrading to the most recent version of LabVIEW.

Documentation for LabVIEW is available by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals**.

- **LabWindows/CVI**—Refer to the *LabWindows/CVI Release Notes* for installation instructions and system requirements for the LabWindows/CVI software.

Documentation for LabWindows/CVI is available by selecting **Start»All Programs»National Instruments»LabWindows CVI**.

- **Visual Studio**—Refer to the Visual Studio product documentation for installation instructions.

2. **NI-IMAQdx**—Refer to the *NI Vision Acquisition Software Release Notes* on the NI Vision Acquisition Software installation media for system requirements and installation instructions for the NI-IMAQdx driver.

Documentation for the NI-IMAQdx driver software is available by selecting **Start»All Programs»National Instruments»Vision»Documentation»NI-IMAQdx**.

3. **NI Vision Development Module**—Refer to the *NI Vision Development Module Readme* on the NI Vision Development Module installation media for system requirements and installation instructions.

Documentation for the NI Vision Development Module is available by selecting **Start»All Programs»National Instruments»Vision»Documentation»NI Vision**.

# Installing the Hardware

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This section describes how to unpack and install the device. You must install the software before installing the hardware.

## Unpacking

The NI 8233 ships in an antistatic package to prevent electrostatic discharge from damaging device components. To avoid such damage in handling the device, take the following precautions:

1. Ground yourself using a grounding strap or by touching a grounded object, such as the computer chassis.
2. Touch the antistatic package to a metal part of the computer chassis before removing the device from the package.



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

3. Remove the device from the package and inspect it for loose components or any other signs of damage. Notify National Instruments if the device appears damaged in any way. *Do not* install a damaged device in the computer.

Store the NI 8233 in the antistatic package when not in use.

## Installing

The following are general instructions for installation. Refer to the documentation provided by your computer manufacturer for specific instructions and warnings.

1. Power off and unplug the computer.



**Caution** To protect yourself and the hardware from electrical hazards, the computer *must* remain unplugged until the installation is complete.

2. Remove the computer cover to expose the expansion slots.



**Caution** Installing a PCIe device into any non-PCIe slot can damage both the computer motherboard and the device. If you are unsure of the difference between connector types, do not install the device. Refer to the documentation provided by your computer manufacturer to determine the correct slot in which to install the device.

3. Touch a metal part of the computer to discharge any static electricity that might be on your clothes or body. Static electricity can damage the device.

4. Choose an unused x4 or larger PCIe slot, and remove the corresponding expansion slot cover on the back panel of the computer.
5. Remove the device from the antistatic package and gently rock the device into the PCIe slot. The connection may be tight, but do *not* force the device into place.



**Note** Check that the bracket of your device aligns with the hole in the back panel rail of the computer chassis.

6. Secure the device mounting bracket to the back panel rail of the computer.
7. This step is required to enable Power over Ethernet. Connect an available 4-pin peripheral ATX power connector from the computer's power supply to the PoE power input on the device.
8. Replace the computer cover.
9. Connect an Ethernet cable to a GigE Vision camera, then connect the camera to the NI 8233 front panel.
10. Plug in and power on the computer.



**Note** The first time you start the development computer after installing the hardware, allow several seconds for the drivers to load.

The NI 8233 is now installed and the camera is now connected.

## Confirming the Device is Recognized

To confirm that the device is properly installed and the hardware is recognized, complete the following steps:

1. Select **Start»All Programs»National Instruments»Measurement & Automation Explorer** to open Measurement & Automation Explorer (MAX).
2. Verify that the camera connected to the NI 8233 appears under **My System»Devices and Interfaces»NI-IMAQdx Devices**.

## Configuring the Device in MAX

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After you have installed the device and powered on the computer, the computer will recognize the device and assign resources to it. Use MAX to configure the device for acquisition. For additional information about configuring your device, refer to the *Measurement & Automation Explorer Help for NI-IMAQdx* by

opening MAX and selecting **Help»Help Topics»NI Vision»NI-IMAQdx**.

## Specifications

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The following specifications apply to the NI 8233 interface device. These specifications are typical at 25 °C, unless otherwise stated.

### Physical Characteristics

Dimensions .....	16.7 cm × 11.12 cm (6.6 in. × 4.4 in.)
Camera Interface.....	Four RJ45 connectors

### Gigabit Ethernet Interface

Standard .....	IEEE 802.3 10BASE-T, 100BASE-TX, 1000BASE-T
Number of ports .....	4
Interface .....	RJ45
Speed.....	10, 100, 1000 Mbps



## PCI Express Interface

PCI Express compliance .....	2.0
Native link width .....	x4
Up-plugging link width availability .....	x8, x16

## Power over Ethernet

Standard .....	IEEE 802.3af compatible
Supported power classes.....	0, 1, 2, and 3
Power output.....	15.4 W per port, maximum of 40 W combined

## Power Requirements

+12 V ATX peripheral (PoE inputs) .....	5.6 A
+3.3 V PCIe bus.....	2.4 A

## Operating Environment

The NI 8233 is intended for indoor use only.

Ambient temperature range .....	0 °C to 45 °C at 40 W total PoE power
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Operating relative humidity ..... 50% to 85%, noncondensing  
Pollution Degree ..... 2



**Caution** Do *not* use the NI 8233 for connection to signals within Measurement Categories II, III, or IV.

Approved at altitudes up to 2,000 m.

## Storage Environment

Ambient temperature range ..... -40 °C to 70 °C

Relative humidity ..... 50% to 85%, noncondensing

## Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1



**Note** For UL and other safety considerations, refer to the product label, or visit [ni.com/certification](http://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

## Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



**Note** In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.



**Note** Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

## CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2004/108/EC; Electromagnetic Compatibility Directive
- 73/23/EEC; Low-Voltage Directive (safety)



**Note** Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit [ni.com/certification](http://ni.com/certification), search by model number or

product line, and click the appropriate link in the Certification column.

## Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* web page at [ni.com/environment](http://ni.com/environment). This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

## Waste Electrical and Electronic Equipment (WEEE)



**EU Customers** At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit [ni.com/environment/weee](http://ni.com/environment/weee).

## 电子信息产品污染控制管理办法（中国 RoHS）



**中国客户** National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 [ni.com/environment/rohs\\_china](http://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](http://ni.com/environment/rohs_china).)

## Where to Go for Support

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The National Instruments Web site 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.

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](http://ni.com/certification). If your product supports calibration, you can obtain the calibration certificate for your product at [ni.com/calibration](http://ni.com/calibration).

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at [ni.com/support](http://ni.com/support) and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, visit the Worldwide Offices

section of [ni.com/niglobal](http://ni.com/niglobal) to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

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