



# NATIONAL INSTRUMENTS NI PXI/PCI-1411 Monochrome and Color Image Acquisition Device Owner's Manual

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## Getting Started with the NI PXI/PCI-1411

The NI PXI/PCI-1411 (NI 1411) is a monochrome and color image acquisition device for PXI, PCI, or CompactPCI. This document describes how to install and configure the necessary hardware and software components to begin

using the NI 1411.

## What You Need to Get Started

You need the following items to set up and use the NI 1411:

- NI 1411 image acquisition device
- Video camera or other video device
- BNC cable, included with the NI 1411
- S-Video cable (optional)
- PXI, PCI, or CompactPCI computer running Microsoft Windows Vista/XP/2000 with at least one available slot.



**Note** Visit [ni.com/info](http://ni.com/info) and enter rdvisionvista for more information about National Instruments image acquisition device compatibility with Windows Vista.

- NI Vision Acquisition Software 8.0 or later, which includes the NI-IMAQ driver software
- Optional software for developing applications:
  - NI Vision Builder for Automated Inspection
  - NI Vision Development Module
  - LabVIEW
  - Lab Windows™/CVI™
  - Microsoft Visual Basic

## Related Documentation

The following documents contain additional information that you may find helpful:

- **NI PXI/PCI-1411** User Manual—Contains information about programming options, hardware functionality, and signal connections.
- **NI** Vision Acquisition Software Release Notes—Contains information about new functionality, minimum system requirements, and installation instructions for the NI-IMAQ driver software.
- **Measurement & Automation Explorer Help for NI-IMAQ**—Describes how to configure the NI-IMAQ driver software, NI image acquisition devices, and cameras using Measurement & Automation Explorer (MAX).
- **NI-IMAQ Help**—Contains fundamental programming concepts for the NI-IMAQ driver software and terminology for using NI image acquisition devices.

## Safety Information



**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 ( $>30$  Vrms, 42.4 Vpk, or 60 Vdc), 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!** 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 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.
- 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.

1. Measurement Categories as defined in electrical safety standard IEC 61010-1.
2. Working voltage is the highest rms value of an AC or DC voltage that can occur across any particular insulation.

## Unpacking

The NI 1411 ships in an antistatic package to prevent electrostatic discharge from damaging device components. To avoid such damage in handling your 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 1411 in the antistatic package when not in use.

## Installation

The following instructions are for general installation. Refer to the documentation provided by your computer manufacturer for specific instructions and warnings. Refer to the Specifications section for typical power requirements for the NI 1411.

### NI PXI-1411

You can install an NI PXI-1411 in any available 5 V peripheral slot in a PXI or CompactPCI chassis.

1. Install the NI Vision Acquisition Software before installing the NI PXI-1411. Refer to the NI Vision Acquisition Software Release Notes for specific installation instructions.
2. Power off and unplug the PXI or CompactPCI chassis.



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

3. Choose an unused PXI or CompactPCI 5 V slot that supports bus arbitration or bus-master cards. PXI-compliant chassis must have bus arbitration for all slots.
4. Remove the filler panel for the slot you have chosen.
5. Touch a metal part of the chassis to discharge any static electricity that might be on your clothes or body. Static electricity can damage the device.

6. Insert the NI PXI-1411 in the selected 5 V slot. Use the injector/ejector handle to fully inject the device into place.
7. Secure the front panel of the NI PXI-1411 to the front panel mounting rails of the PXI or CompactPCI chassis.
8. Connect the BNC cable included with the NI PXI-1411 to the camera. Refer to your camera manufacturer documentation for specific instructions about how to connect the cable to your camera.
9. Connect the BNC cable to the VIDEO connector on the NI PXI-1411 front panel.
10. Plug in and power on the PXI or CompactPCI chassis.

The NI PXI-1411 is now installed and the camera is connected.

1 Measurement Category is also referred to as Installation Category.

2 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.

### **NI PCI-1411**

1. Install the NI Vision Acquisition Software before installing the NI PCI-1411. Refer to the NI Vision Acquisition Software Release Notes for specific installation instructions.
2. Power off and unplug the computer.



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

3. Remove the computer cover to expose the expansion slots.
4. 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.
5. Choose an unused PCI slot, and remove the corresponding expansion slot cover on the back panel of the computer.
6. Remove your device from the antistatic package and gently rock the device into the slot. The connection may be tight, but do not force the device into place.



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

7. Secure the device mounting bracket to the back panel rail of the computer.
8. Replace the computer cover.
9. Connect the BNC cable included with the NI PCI-1411 to the camera. Refer to your camera manufacturer documentation for specific instructions about how to connect the cable to your camera.
10. Connect the BNC cable to the VIDEO connector on the NI PCI-1411 front panel.
11. Plug in and power on the computer.

The NI PCI-1411 is now installed and the camera is connected.

After you have installed the NI 1411 and powered on the computer, the computer will recognize the device and assign resources to it. Use Measurement & Automation Explorer (MAX), the National Instruments configuration utility, to configure the NI 1411 for acquisition. Refer to the Measurement & Automation Explorer Help for NI-IMAQ for additional information about configuring the NI 1411.

**Note** Before configuring the device in MAX, ensure that you installed the NI-IMAQ driver software.

## Specifications

The following specifications apply to the NI 1411 image acquisition device. These specifications are typical at 25 °C unless otherwise specified.

### Formats Supported

Input formats  
RS-170/NTSC.....29.97 frames/s  
CCIR/PAL.....25 frames/s  
Output formats  
RGB .....32-bit  
HSL.....32-bit  
R, G, B, H, S, or L .....8-bit  
Pixel aspect ratio.....Square pixel

### Video Input

Quantity .....1 (VIDEO)  
VIDEO.....Composite video on BNC (RSE), Y/C on S-Video  
connector (RSE)  
Input impedance.....75  $\Omega \pm 1\%$   
Input range (blank to white).....700 mV (calibrated) or  
400 mV to 1.00 V (variable gain)  
(PCI-1411 revision C and later,  
PXI-1411 revision A and later)  
Frequency response (luminance)  
Full range .....12 MHz (–3 dB) typ  
(all filters off)  
Programmable.....Decimation and lowpass filters

### Accuracy

Absolute accuracy1  
Luma gain ..... $\pm 2.5\%$  of reading  
Chroma gain..... $\pm 2.5\%$  of reading  
Temperature drift .....<250 ppm/°C

### A/D Conversion

Quantity .....One 8-bit 2X oversampling for composite video  
Two 8-bit 2X oversampling for Y/C (S-Video)  
Dynamic range.....46 dB typ  
Sampling Frequency  
RS-170/NTSC.....27.54 MHz (double rate of square pixel)  
CCIR/PAL.....29.5 MHz (double rate of square pixel)

### Color Decoding

Composite video  
Luma path .....Chroma trap filter and/or line comb  
Chroma path.....Bandpass filter and/or line comb

## **Memory**

Onboard memory .....16 MB synchronous dynamic RAM  
LUTs .....Three 256 × 8 (RGB only)

## **External Connections**

Trigger sense.....TTL  
Trigger level.....Programmable (rising or falling)

## **PCI Interface**

PCI initiator (master) capability .....Supported  
PCI target (slave) capability.....Supported  
Data path .....32 bits  
Board voltage.....5 V, 12 V, –12 V  
Board type.....32-bit half-size card  
Parity generation/checking, error reporting .....Supported  
Target decode speed.....Medium (1 clock)  
Target fast back-to-back capability .....Supported  
Resource locking.....Supported as a master and slave  
PCI interrupts.....Interrupts passed on INTA# signal  
Base address registers .....BAR0 (16 KB)  
BAR1 (64 KB)  
Expansion ROM.....4 KB  
PCI master performance  
Ideal .....133 Mbytes/s  
Sustained.....100 Mbytes/s

### 1 Calibration conditions:

White level 700 mV  
Contrast 1.00  
Saturation 1.00  
Brightness 1.00  
Luma bandwidth Full  
Ambient temperature 25 °C nominal

## **Power Requirements**

Voltage .....+5 V (1.00 A)  
+12 V (75 mA)

## **Physical**


Dimensions  
PCI-1411.....10.7 × 17.5 cm (4.2 × 6.9 in.)  
PXI-1411.....10 × 16 cm (3.9 × 6.3 in.)  
Weight  
PCI-1411.....0.136 kg (0.3 lb)  
PXI-1411.....0.154 kg (0.34 lb)

## **Environment**

Operating temperature ..... 0 °C to 55 °C



Storage temperature .....	–20 °C to 70 °C
Relative humidity.....	5%–90%, noncondensing
MTBF.....	839,653 h at 30 °C
Emissions.....	EN 55011:1991 Group 1 Class A at 10 m FCC Class A at 10 m
Functional shock (PXI only).....	MIL-T-28800 E Class 3 (per Section 4.5.5.4.1)
Half-sine shock pulse, 11 ms duration, 30 g peak, 30 shocks per face	
Operational random vibration (PXI only) .....	5 to 500 Hz, 0.31 grms, 3 axes
Nonoperational random vibration (PXI only) .....	5 to 500 Hz, 2.5 grms, 3 axes




**Note** Random vibration profiles were developed in accordance with MIL-T-28800E and MIL-STD-810E Method 514. Test levels exceed those recommended in MIL-STD-810E for Category 1 (Basic Transportation, Figures 514.4-1 through 514.4-3).  
Approved at altitudes up to 2,000 m.

**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 certifications, refer to the product label or visit [ni.com/certification](https://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

**Electromagnetic Compatibility**

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

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A



**Note** For EMC compliance, operate this device to product documentation.

**CE Compliance**

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

- 73/23/EEC; Low-Voltage Directive (safety)
- 89/336/EEC; Electromagnetic Compatibility Directive (EMC)



**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](https://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

## Waste Electrical and Electronic Equipment (WEEE)



**EU Customers** At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit [ni.com/environment/weee.htm](https://ni.com/environment/weee.htm).

## Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At [ni.com/support](https://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 electronic 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).

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](https://ni.com/support) and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 662 457990-0, Belgium 32 (0) 2 757 0020,  
Brazil 55 11 3262 3599, Canada 800 433 3488, China 86 21 6555 7838,  
Czech Republic 420 224 235 774, Denmark 45 45 76 26 00, Finland 385 (0) 9 725 72511,  
France 33 (0) 1 48 14 24 24, Germany 49 89 7413130, India 91 80 41190000, Israel 972 3 6393737,  
Italy 39 02 413091, Japan 81 3 5472 2970, Korea 82 02 3451 3400, Lebanon 961 (0) 1 33 28 28,  
Malaysia 1800 887710, Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466,  
New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60, Poland 48 22 3390150,  
Portugal 351 210 311 210, Russia 7 495 783 6851, Singapore 1800 226 5886,  
Slovenia 386 3 425 42 00, South Africa 27 0 11 805 8197, Spain 34 91 640 0085,  
Sweden 46 (0) 8 587 895 00, Switzerland 41 56 2005151, Taiwan 886 02 2377 2222,  
Thailand 662 278 6777, Turkey 90 212 279 3031, United Kingdom 44 (0) 1635 523545

## Customer Support

### COMPREHENSIVE SERVICES

We offer competitive repair and calibration services, as well as easily accessible documentation and free downloadable resources.

### Sell Your Surplus

We buy new, used decommissioned, and surplus parts from every Ni Series . We work out the best solution to suit your individuals needs.



Sell for cash



Get Credit



Receive a Trade- In Deal

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## Documents / Resources

	<p><a href="#">NATIONAL INSTRUMENTS NI PXI/PCI-1411 Monochrome and Color Image Acquisition Device</a> [pdf] Owner's Manual</p> <p>PXI-1411, PCI-1411, NI PXI PCI-1411 Monochrome and Color Image Acquisition Device, NI PXI, NI PCI-1411, NI PXI Monochrome and Color Image Acquisition Device, NI PCI-1411 Monochrome and Color Image Acquisition Device, Monochrome and Color Image Acquisition Device, Monochrome Acquisition Device, Color Image Acquisition Device, Acquisition Device, Acquisition Device</p>
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## References

- [NI Engineer Ambitiously - NI](#)
- [NI Engineer Ambitiously - NI](#)
- [NI Calibration Services - NI](#)
- [NI Product Certifications - NI](#)
- [NI Product Take-Back Program and Recycling - NI](#)
- [NI Using Info Codes - NI](#)
- [NI Legal Information - NI](#)

-  [National Instruments Patents - NI](#)
-  [Support - NI](#)
-  [PXI-1411 National Instruments IMAQ Device | Apex Waves](#)

Manuals+.