

# PXI Express™

PXIe-1073 User Manual

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## Electromagnetic Compatibility Information

This hardware has been tested and found to comply with the applicable regulatory requirements and limits for electromagnetic compatibility (EMC) as indicated in the hardware's Declaration of Conformity (DoC)<sup>1</sup>. These requirements and limits are designed to provide reasonable protection against harmful interference when the hardware is operated in the intended electromagnetic environment. In special cases, for example when either highly sensitive or noisy hardware is being used in close proximity, additional mitigation measures may have to be employed to minimize the potential for electromagnetic interference.

While this hardware is compliant with the applicable regulatory EMC requirements, there is no guarantee that interference will not occur in a particular installation. To minimize the potential for the hardware to cause interference to radio and television reception or to experience unacceptable performance degradation, install and use this hardware in strict accordance with the instructions in the hardware documentation and the DoC<sup>1</sup>.

If this hardware does cause interference with licensed radio communications services or other nearby electronics, which can be determined by turning the hardware off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the antenna of the receiver (the device suffering interference).
- Relocate the transmitter (the device generating interference) with respect to the receiver.
- Plug the transmitter into a different outlet so that the transmitter and the receiver are on different branch circuits.

Some hardware may require the use of a metal, shielded enclosure (windowless version) to meet the EMC requirements for special EMC environments such as, for marine use or in heavy industrial areas. Refer to the hardware's user documentation and the DoC<sup>1</sup> for product installation requirements.

When the hardware is connected to a test object or to test leads, the system may become more sensitive to disturbances or may cause interference in the local electromagnetic environment.

Operation of this hardware in a residential area is likely to cause harmful interference. Users are required to correct the interference at their own expense or cease operation of the hardware.

Changes or modifications not expressly approved by National Instruments could void the user's right to operate the hardware under the local regulatory rules.

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<sup>1</sup> The Declaration of Conformity (DoC) contains important EMC compliance information and instructions for the user or installer. 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.

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# About This Manual

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The *PXIe-1073 User Manual* contains information about installing, configuring, using, and maintaining the PXIe-1073 chassis.



**Note** For PXIe-1073 specifications, refer to the *PXIe-1073 Specifications* on [ni.com](http://ni.com).

## Related Documentation

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The following documents contain information that you might find helpful as you read this manual:

- IEEE 1101.1-1991, *IEEE Standard for Mechanical Core Specifications for Microcomputers Using IEC 603-2 Connectors*
- IEEE 1101.10, *IEEE Standard for Additional Mechanical Specifications for Microcomputers Using IEEE 1101.1 Equipment Practice*
- *PICMG EXP.0 R1.0 CompactPCI Express Specification*, PCI Industrial Computers Manufacturers Group
- *PCI Express Base Specification*, Revision 1.1, PCI Special Interest Group
- *PXI-5 PXI Express Hardware Specification*, Revision 2.0, PXI Systems Alliance
- *CompactPCI PICMG 2.0 R3.0 Specification*, PCI Industrial Computers Manufacturing Group
- *PXIe-1073 Rack Mount Installation Guide*



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# Getting Started

This chapter describes the key features of the PXIe-1073 chassis and lists the kit contents and optional equipment you can order from National Instruments.

## Unpacking

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Carefully inspect the shipping container and the chassis for damage. Check for visible damage to the metal work. Check to make sure all handles, hardware, and switches are undamaged. Inspect the inner chassis for any possible damage, debris, or detached components. If damage appears to have been caused during shipment, file a claim with the carrier. Retain the packing material for possible inspection and/or reshipment.

## What You Need to Get Started

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The PXIe-1073 chassis kit contains the following items:

- PXIe-1073 chassis
- Filler panels
- AC power cable—refer to Table 1-1 for AC power cables
- *PXIe-1073 User Manual*
- *Read Me First: Safety and Electromagnetic Compatibility*
- Driver CD-ROM containing NI PXI chassis software
- Chassis number labels
- MXI-Express x1 cable
- MXI-Express x1 host controller card

**Table 1-1.** AC Power Cables

Power Cable	Reference Standards
Standard 120 V, 15 A (USA)	NEMA 5-15 (gray color)
Switzerland 220 V	SEV
Australia 240 V	AS C112
Universal Euro 230 V	CEE (7), II, IV, VII IEC83
North America 240 V, 15 A	NEMA 6-15 (gray color)
United Kingdom 230 V	BS 1363/IEC83
Japan 100 V, 15 A	JIS C8303 (gray color)

If you are missing any of the items listed in Table 1-1, or if you have the incorrect AC power cable, contact National Instruments.

## Key Features

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The PXIe-1073 combines a 5-slot PXI backplane with a structural design that has been optimized for maximum usability in a wide range of applications.

The key features of the chassis include the following:

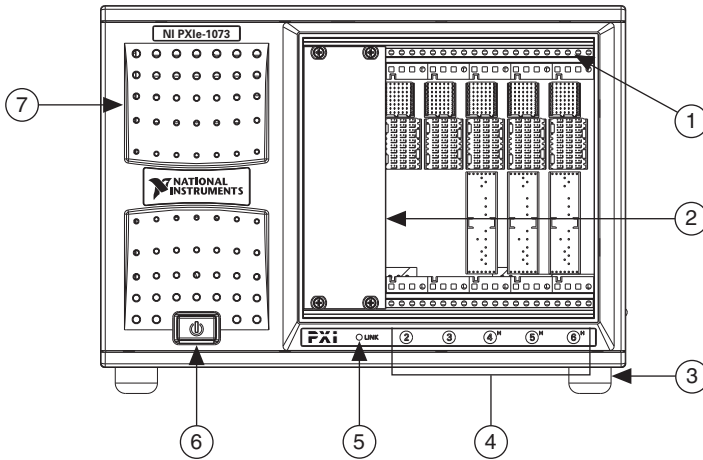
- Accepts 3U PXI Express, CompactPCI Express, and hybrid slot compatible PXI-1/CompactPCI (PICMG EXP.0 R1.0) modules
- 5 peripheral slots in a rugged, compact chassis with universal AC input, and automatic voltage/frequency ranging
- Integrated MXI-Express controller
- On/Standby momentary power switch on the front panel for easy access
- AUTO/HIGH temperature-controlled fan speed based on air-intake temperature to minimize audible noise
- Carrying handle for portability (Optional)
- Rack mountable

## Chassis Description

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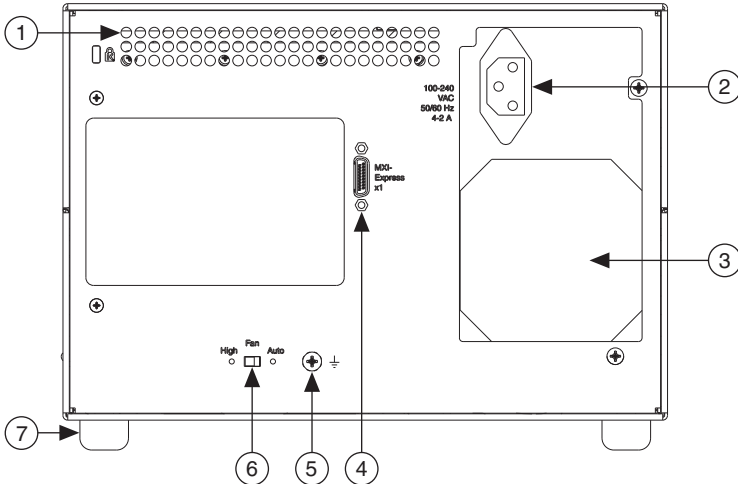
Figure 1-1 and Figure 1-2 show the key features of the PXIe-1073 chassis front and rear panels. Figure 1-1 shows the front view of the PXIe-1073. Figure 1-2 shows the rear view of the PXIe-1073. Figure 1-3 shows the bottom of the chassis.

**Figure 1-1. Front View of the PXIe-1073 Chassis**



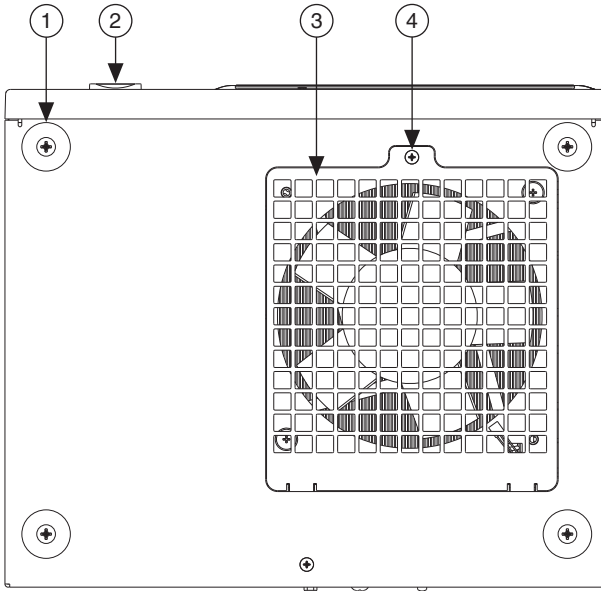
- |   |                          |   |                                   |
|---|--------------------------|---|-----------------------------------|
| 1 | Captive Screw            | 5 | Link LED                          |
| 2 | PXI Filler Panel         | 6 | Power Switch                      |
| 3 | Rubber Foot              | 7 | Power Supply Airflow Intake Vents |
| 4 | Generic Peripheral Slots |   |                                   |

**Figure 1-2. Rear View of the PXIe-1073 Chassis**



- |   |   |   |                                     |
|---|---|---|-------------------------------------|
| 1 | Rear Exhaust Vents                          | 5 | Chassis Ground Screw                |
| 2 | AC Input                                    | 6 | Auto/High Fan Speed Selector Switch |
| 3 | Power Supply Fan Exhaust                    | 7 | Rubber Foot                         |
| 4 | NI MXI-Express Chassis Controller Connector |   |                                     |

**Figure 1-3.** Bottom View of the PXIe-1073 Chassis



- 1 Rubber Foot
- 2 Power Switch

- 3 Fan Intake Cover
- 4 Fan Intake Cover Screw

## Optional Equipment

Contact National Instruments to order the following options for the PXIe-1073 chassis.

### EMC Filler Panels

Optional EMC filler panel kits are available from National Instruments.

### Slot Blockers

Optional slot blocker kits are available from National Instruments for improved thermal performance when all slots are not used.

### Rack Mount Kit

A rack mount kit option is available for mounting the PXIe-1073 chassis into a 19 in. instrument cabinet. Refer to the *PXIe-1073 Specifications* on [ni.com](http://ni.com) for more information.

### Handle/Feet Kit

An optional side handle and rubber feet kit is available from National Instruments to provide a handle for portability.

# PXIe-1073 Chassis Backplane Overview

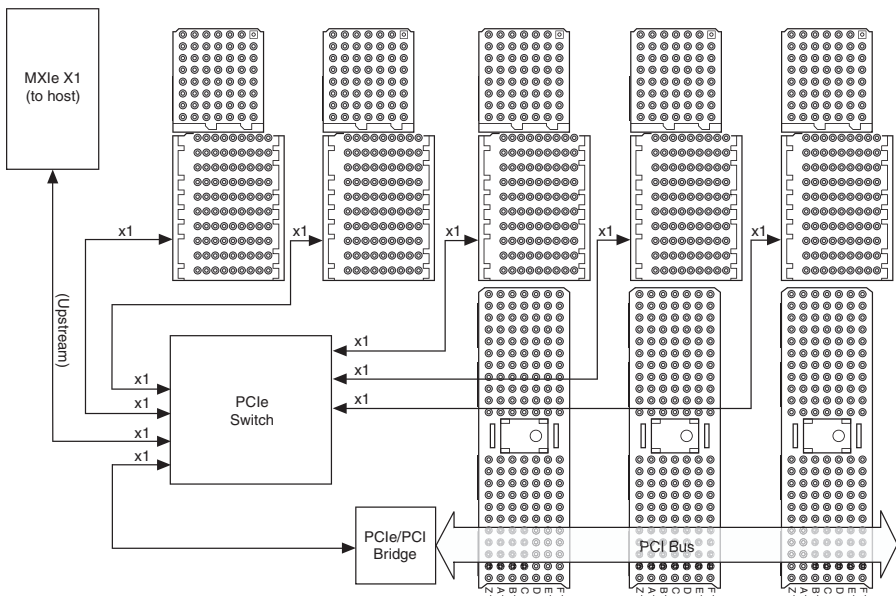
## Interoperability with CompactPCI

The design of the PXIe-1073 provides you the flexibility to use the following devices in a single PXI Express chassis:

- PXI Express compatible products
- CompactPCI Express compatible Type-2 peripheral products
- PXI hybrid slot compatible peripheral products
- Standard CompactPCI peripheral products

Refer to Figure 1-4 for an overview of the PXIe-1073 architecture.

**Figure 1-4.** PXIe-1073 Backplane Architecture



The chassis backplane has +5 V V(I/O). Refer to the *CompactPCI PICMG 2.0 R 3.0 Specification* for details regarding V(I/O).

## MXI Interface

The PXIe-1073 chassis has a built-in x1 MXI-Express interface that can be accessed through the MXI-Express chassis controller connector on the back of the chassis, as shown in Figure 1-2.

The MXIe interface can be cabled to a remote system with a host card using a x1 MXI-Express cable to provide control of the PXIe-1073 chassis.



**Note** The PXIe-1073 chassis does not have a slot number 1 because it is replaced by the MXIe interface rear connector.

## Hybrid Peripheral Slots

The chassis provides three (3) hybrid peripheral slots (slot numbers 4–6) as defined in the *PXI-5 PXI Express Hardware Specification*. These hybrid peripheral slots can accept the following peripheral modules:

- A PXI Express Peripheral with a x1 PCI Express link through the PCI Express switch to the upstream PC.
- A CompactPCI Express Type-2 Peripheral with a x1 PCI Express link through a PCI Express switch to the upstream PC.
- A hybrid-compatible PXI Peripheral module that has been modified by replacing the J2 connector with an XJ4 connector installed in the upper eight rows of J2. Refer to the PXI Express Specification for details. The PXI Peripheral communicates through the backplane's 32-bit PCI bus.
- A CompactPCI 32-bit peripheral on the backplane's 32-bit PCI bus.

The hybrid peripheral slots provide full PXI Express functionality and 32-bit PXI functionality except for PXI Local Bus. The hybrid peripheral slot only connects to PXI Local Bus 6 left and right.

## PXI Express Peripheral Slots

There are two (2) PXI Express peripheral slots: slots 2 and 3. PXI Express peripheral slots can accept the following modules:

- A PXI Express Peripheral with a x1 PCI Express link through the PCI Express switch to the upstream PC.
- A CompactPCI Express Type-2 Peripheral with a x1 PCI Express link through a PCI Express switch to the upstream PC.

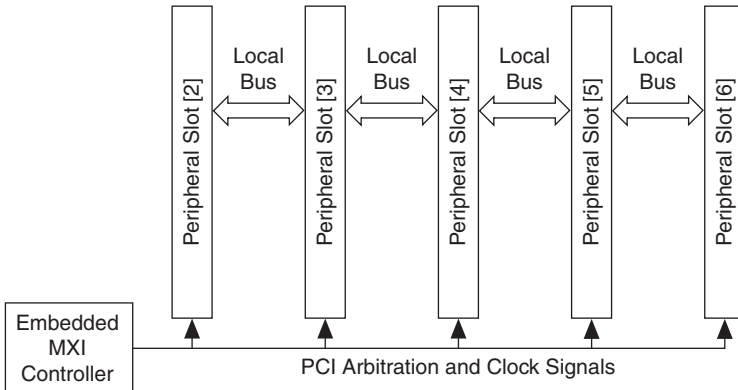
## PXI Local Bus

The PXI backplane local bus is a daisy-chained bus that connects each peripheral slot with the adjacent peripheral slots to the left and right (refer to Figure 1-5).

The backplane routes PXI Local Bus 6 between adjacent PXI slots. The left local bus 6 from slot 2 is not routed anywhere and the right local bus signal from slot 6 is not routed anywhere.

Local bus signals may range from high-speed TTL signals to analog signals as high as 42 V.

**Figure 1-5. Local Bus Routing**



## PXI Trigger Bus

All slots share eight PXI trigger lines. You can use these trigger lines in a variety of ways. For example, you can use triggers to synchronize the operation of several different PXI peripheral modules. Modules can pass triggers to one another, allowing precisely timed responses to asynchronous external events the system is monitoring or controlling.

The PXI trigger lines allow you to send trigger signals to, and receive trigger signals from, every slot in the chassis. Static trigger routing (user-specified line assignments) can be configured through Measurement & Automation Explorer (MAX). Dynamic routing of triggers (automatic line assignments) is supported through certain National Instruments drivers like NI-DAQmx.

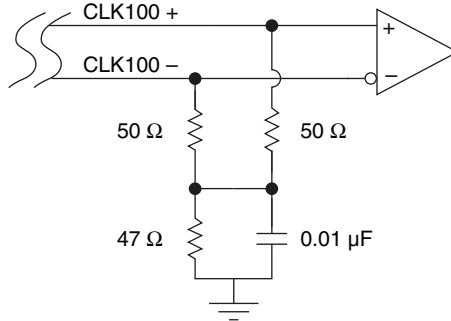
## System Reference Clock

The PXIe-1073 provides a 10 MHz clock (PXI\_CLK10) and 100 MHz clock (PXIe\_CLK100) to each peripheral slot. The 100 MHz clock is a high speed LVPECL clock, while the 10 MHz clock is a TTL/CMOS clock. The backplane also provides a PXIe\_SYNC100 signal which asserts a 10 ns pulse which is synchronous to PXIe\_CLK100.

An independent buffer (having a source impedance matched to the backplane and a skew of less than 250 ps between slots) drives PXI\_CLK10 to each peripheral slot. You can use this common reference clock signal to synchronize multiple modules in a measurement or control system.

An independent buffer drives PXIe\_CLK100 to each peripheral slot. These clocks are matched in skew to less than 100 ps. The differential pair must be terminated on the peripheral with LVPECL termination for the buffer to drive PXIe\_CLK100 so that when there is no peripheral or a peripheral that does not connect to PXIe\_CLK100, there is no clock being driven on the pair to that slot. Refer to Figure 1-6 for a termination example.

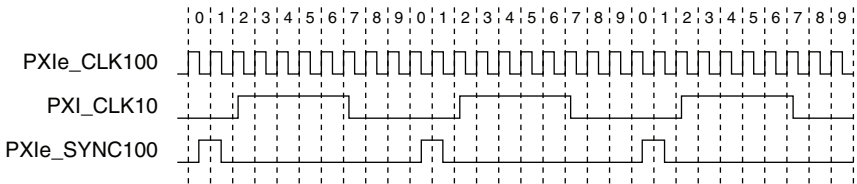
**Figure 1-6.** CLK100 Termination



An independent buffer drives PXIe\_SYNC100 to each peripheral slot. The differential pair must be terminated on the peripheral with LVPECL termination for the buffer to drive PXIe\_SYNC100 so that when there is no peripheral or a peripheral that does not connect to PXIe\_SYNC100, there is no SYNC100 signal being driven on the pair to that slot. Refer to Figure 1-6 for a termination example.

PXI\_CLK10, PXIe\_CLK100, and PXIe\_SYNC100 are driven to every peripheral slot and have the default timing relationship described in Figure 1-7.

**Figure 1-7.** System Reference Clock Default Behavior





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# Installation and Configuration

This chapter describes how to install, configure, and use the PXIe-1073 chassis.

Before connecting the chassis to a power source, read this chapter and the *Read Me First: Safety and Electromagnetic Compatibility* document included with your chassis.

## Safety Information

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**Caution** Before undertaking any troubleshooting, maintenance, or exploratory procedure, carefully read the following caution notices.

This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.

- **Chassis Grounding**—The chassis requires a connection from the premise wire safety ground to the chassis ground. The earth safety ground must be connected during use of this equipment to minimize shock hazards. Refer to the [Connecting Safety Ground](#) section for instructions on connecting safety ground.
- **Live Circuits**—Operating personnel and service personnel *must not* remove protective covers when operating or servicing the chassis. Adjustments and service to internal components must be undertaken by qualified service technicians. During service of this product, the mains connector to the premise wiring must be disconnected. Dangerous voltages may be present under certain conditions; use extreme caution.
- **Explosive Atmosphere**—Do *not* operate the chassis in conditions where flammable gases are present. Under such conditions, this equipment is unsafe and may ignite the gases or gas fumes.
- **Part Replacement**—Only service this equipment with parts that are exact replacements, both electrically and mechanically. Contact National Instruments for replacement part information. Installation of parts with those that are not direct replacements may cause harm to personnel operating the chassis. Furthermore, damage or fire may occur if replacement parts are unsuitable.
- **Modification**—Do *not* modify any part of the chassis from its original condition. Unsuitable modifications may result in safety hazards.

# Chassis Cooling Considerations

The PXIe-1073 chassis is designed to operate on a bench or in an instrument rack. Determine how you want to use the chassis and follow the appropriate installation instructions.

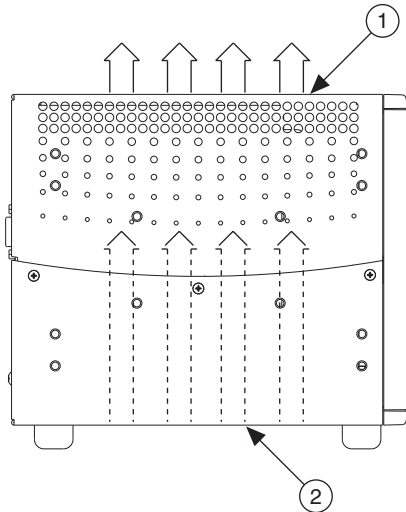
## Providing Adequate Clearance



**Caution** Failure to provide adequate clearances may result in thermal-related failures in the chassis or modules.

Apertures in the top, bottom, front, rear, and along the right side of the chassis facilitate power supply and module cooling. Air enters through a fan intake in the bottom of the chassis for module cooling. It then exits through the upper sections at the right side, back, and through the top, as shown in Figure 2-1. Air cooling the power supply enters the front of the chassis, which is shown in Figure 1-1, *Front View of the PXIe-1073 Chassis*, then exits through the rear of the chassis, which is shown in Figure 1-2, *Rear View of the PXIe-1073 Chassis*. Place the chassis on a bench top or in an instrument rack so that the fans (air intakes) and the air outlet apertures along the right side, the top, and the back of the chassis have adequate ventilation. Provide at least 44.5 mm (1.75 in.) clearance above, behind, and on the sides of the unit for adequate venting. High-power applications may require additional clearance.

**Figure 2-1.** PXIe-1073 Module Cooling Airflow Side View



1 Air Outlets

2 Air Intake

## Chassis Ambient Temperature Definition

The chassis fan control system uses intake air temperature as the input for controlling fan speeds when in Auto Fan Speed mode. Because of this, the chassis ambient temperature is defined as the temperature that exists just outside of the fan intake vent on the bottom of the chassis. Note that this temperature may be higher than ambient room temperature depending on the surrounding equipment and/or blockages present. It is the user's responsibility to ensure that this ambient temperature does not exceed the rated ambient temperature as stated in the *PXIe-1073 Specifications* on [ni.com](http://ni.com).

## Setting Fan Speed

The AUTO/HIGH fan-speed selector switch is on the rear panel of the PXIe-1073. Refer to Figure 1-2, *Rear View of the PXIe-1073 Chassis*, to locate the fan-speed selector switch. Select HIGH for maximum cooling performance (recommended) or AUTO for quieter operation. When set to AUTO, the fan speed is determined by chassis intake air temperature.

## Installing Filler Panels

To improve module cooling performance, install filler panels (provided with the chassis) in unused or empty slots. Secure with the captive mounting screws provided.

## Installing Slot Blockers

The cooling performance of the chassis can be improved by installing optional slot blockers. Refer to [ni.com](http://ni.com) for more details.

## Rack Mounting

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Rack mount applications require the optional rack mount kits available from National Instruments. Refer to the *PXIe-1073 Specifications* on [ni.com](http://ni.com) and the instructions supplied with the rack mount kits to install your chassis in an instrument rack.



**Note** You may want to remove the feet from the chassis when rack mounting. To do so, remove the screws holding the feet in place.

## Connecting Safety Ground

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**Caution** The PXIe-1073 chassis is designed with a three-position inlet that connects the cord set ground line to the chassis ground. To minimize shock hazard, make sure the electrical power outlet you use to power the chassis has an appropriate earth safety ground.

# Connecting to Power Source

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**Caution** Do *not* install modules prior to performing the following power-on test.

To completely remove power, you *must* disconnect the power cable.

Attach input power through the rear AC inlet using the appropriate AC power cable supplied. Refer to Figure 1-2, *Rear View of the PXIe-1073 Chassis*, to locate the AC inlet.

The power switch allows you to power on the chassis or place it in standby mode. Press the power switch to turn on the chassis. Observe that the fan becomes operational.

## Getting Started With The System

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To set up and use your MXI-Express cards, you need the following:

- One NI MXI-Express x1 host card (PCI Express or ExpressCard) and one PXIe-1073
- A MXI-Express x1 cable
- A host PC with an available x1 (or wider) PCI Express slot or a laptop with an available ExpressCard slot

## Unpacking The MXI-Express Host Card

---

Your MXI-Express card is shipped in antistatic packages to prevent electrostatic damage (ESD) to the devices. ESD can damage several components on the device.



**Caution** *Never* touch the exposed pins of connectors. Doing so may damage the device.

To avoid such damage in handling the device, take the following precautions:

- Ground yourself using a grounding strap or by holding a grounded object.
- Touch the antistatic package to a metal part of the computer chassis before removing the device from the package.

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

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

# Hardware Installation

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The following are general instructions for installing the MXI-Express card. Consult your computer user manual or technical reference manual for specific instructions and warnings.



**Note** The software for your MXI-Express kit is included with the current NI driver CD, and is installed with the PXI platform software included as part of NI-VISA and other NI driver software products.

## Installing an NI ExpressCard Module

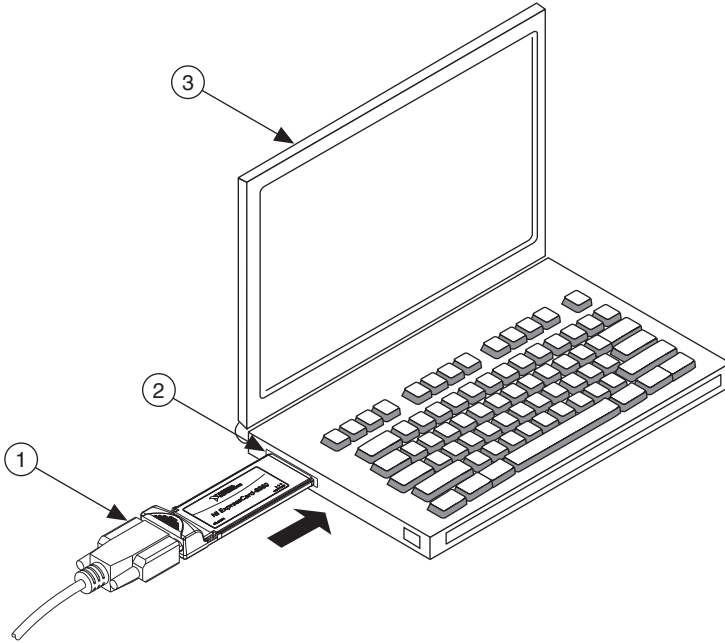
Because a laptop is not grounded, follow this procedure to safely connect it to your PXI system:

1. Unpack the NI ExpressCard module as directed in the previous section.
2. Touch the NI ExpressCard module and a metal part of the PXI chassis simultaneously.
3. Connect the cable to the NI ExpressCard module and the PXIe-1073 chassis.
4. Plug the NI ExpressCard module into an available ExpressCard slot.

If your computer is already running (or hibernating) when you install NI ExpressCard module, you must reboot to detect the PXI system. Otherwise, the PXI system is detected when you start your computer.

Figure 2-2 shows how to insert the NI ExpressCard module and connect the cable.

**Figure 2-2.** Installing the NI ExpressCard Module



1 MXI-Express Cable

2 ExpressCard Slot

3 Portable Computer

## Installing an NI PCI Express Host Card

The following steps detail the process of installing an NI PCI Express host card. Refer to Figure 2-3 to assist you in completing this procedure.

1. Power off your computer, but leave it plugged in while installing the NI PCI Express host card. The power cord grounds the chassis and protects it from electrical damage while you install the card.



**Caution** To protect both yourself and the computer from electrical hazards, your computer should remain off until you finish installing the NI PCI Express host card.

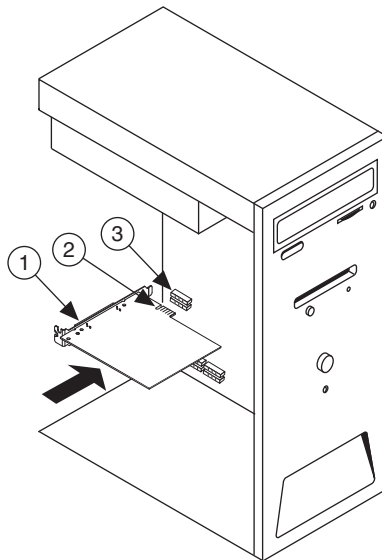
2. Remove the top cover or access port to the PCI Express bus.
3. Select any available PCI Express expansion slot (x1 or wider).



**Note** The BIOS or motherboard may not support the NI PCI Express host card in a slot intended for a graphics card.

4. Locate the metal bracket that covers the cut-out in the back panel of the computer for the slot you have selected. Remove and save the bracket-retaining screw and the bracket cover.
5. Touch the metal part of the power supply case inside the computer to discharge any static electricity that might be on your clothes or body.
6. Line up the NI PCI Express host card with the slot on the back panel. Slowly push down on the top of the NI PCI Express host card until its card-edge connector is resting on the expansion slot receptacle. Using slow, evenly distributed pressure, press the NI PCI Express host card straight down until it seats in the expansion slot.
7. Reinstall the bracket-retaining screw to secure the NI PCI Express host card to the back panel rail.
8. Replace the computer cover.

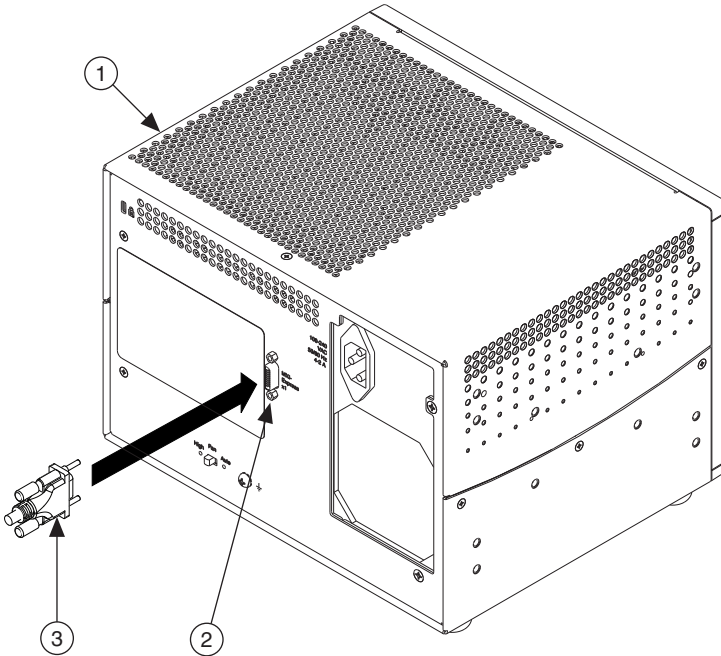
**Figure 2-3.** Installing the NI PCI Express Host Card



- |                                      |                    |
|--------------------------------------|--------------------|
| 1 NI PCI Express Host Card           | 3 PCI Express Slot |
| 2 PCI Express x1 Card-Edge Connector |                    |

Figure 2-4 shows the cable connection with which a PCI Express host card controls the PXIe-1073 chassis.

**Figure 2-4.** NI PCI Express Host Card Cable Connection



1 PXIe-1073 Chassis

3 MXI-Express Cable Connector

2 NI MXI-Express Chassis Controller Connector

## Cabling

Connect the appropriate MXI-Express cable to the NI PCI Express card and PXIe-1073 chassis. The cables have no polarity, so either end may be connected to either connector.



**Caution** Do *not* remove the cable after the system is powered on. Doing so can hang or cause errors in applications communicating with devices behind MXI-Express. If a cable becomes unplugged, plug it back into the system.



**Note** For more information about cables, refer to the *MXI-Express Cable Options* section of this chapter.



## Powering Up the MXI-Express System

1. Power on the chassis.
2. Power on the host.

Typical PCI-PCI bridges are used to add PCI devices to a PCI hierarchy in which all the bridges and devices are contained within a single chassis. Because of this, BIOSes and operating systems make the assumption that all PCI devices in the entire hierarchy will be available as soon as code execution begins at power-up time. This assumption means that all of the expansion chassis must be turned on before the host PC for the BIOS and OS to correctly configure a MXI-Express system.



**Note** The PXIe-1073 chassis will assert a wake signal on power up. The host PC also will power on if it supports this functionality.

## Powering Down the MXI-Express System

Because operating systems and drivers commonly make the assumption that PCI Express/PCI devices will be present in the system from power-up to power-down, it is important not to power off the expansion chassis until after the host PC is powered off. Powering off the expansion chassis while the host is still on can cause crashes or hangs. As a result, the user must press and hold the power button for 3 seconds in order to power down a linked-up PXIe-1073. The order in which expansion chassis are powered off, relative to each other, is not important.



**Note** If the PXIe-1073 experiences a fan or power supply failure, the chassis will power down and remain in standby indefinitely until AC power has been cycled. This failure could cause the upstream system to crash or hang.

## Checking LEDs for Status

After powering on the PXIe-1073 chassis you should check the LEDs for status to ensure that all connected systems have linked. The following table defines the LED states.

**Table 2-1.** LED Status for the PXIe-1073 Chassis

LED	Color	Meaning
PWR	Off	No power
	Green	Power is within spec
	Red	Fan failure
	Blinking Red	Power is out of spec
LINK	Off	Link not established
	Green	Link established



**Notes** If the system fan fails the chassis will shut down automatically, preventing the chassis and modules from damage due to overheating. The chassis will not attempt another power on until AC power has been cycled.

If the power supply has a failure, the chassis will prevent potential damage by shutting down automatically. The chassis will not attempt another power on until AC power has been cycled.

## Functional Overview

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MXI-Express is based on PCI Express technology. A MXI-Express kit uses a PCI Express switch and PCI Express-to-PCI bridge to enable control of a PXI or CompactPCI chassis from a PC with an available PCI Express slot. The PCI Express-to-PCI bridge architecture is transparent to device drivers, so no additional software is needed to support using PXI and CompactPCI devices in a chassis connected using MXI-Express.

The link between the PC and the chassis is a x1 cabled PCI Express link. This link is a dual-simplex communication channel comprised of a low-voltage, differentially driven signal pair. The link can transmit at a rate of 2.5 Gbps in each direction simultaneously.

## MXI-Express Cable Options

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MXI-Express is available with cables of various lengths. Table 2-2 shows the cables available from National Instruments.

**Table 2-2.** National Instruments MXI-Express Cables

Cable Length (Meters)	Description	NI Part Number
1 m	MXI-Express copper cable	779500-01
3 m	MXI-Express copper cable	779500-03
7 m	MXI-Express copper cable	779500-07

# Installing Peripheral Modules

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**Caution** The PXIe-1073 chassis has been designed to accept a variety of peripheral module types in different slots. To prevent damage to the chassis, ensure that the peripheral module is being installed into a slot designed to accept it. Refer to Chapter 1, *Getting Started*, for a description of the various slot types.

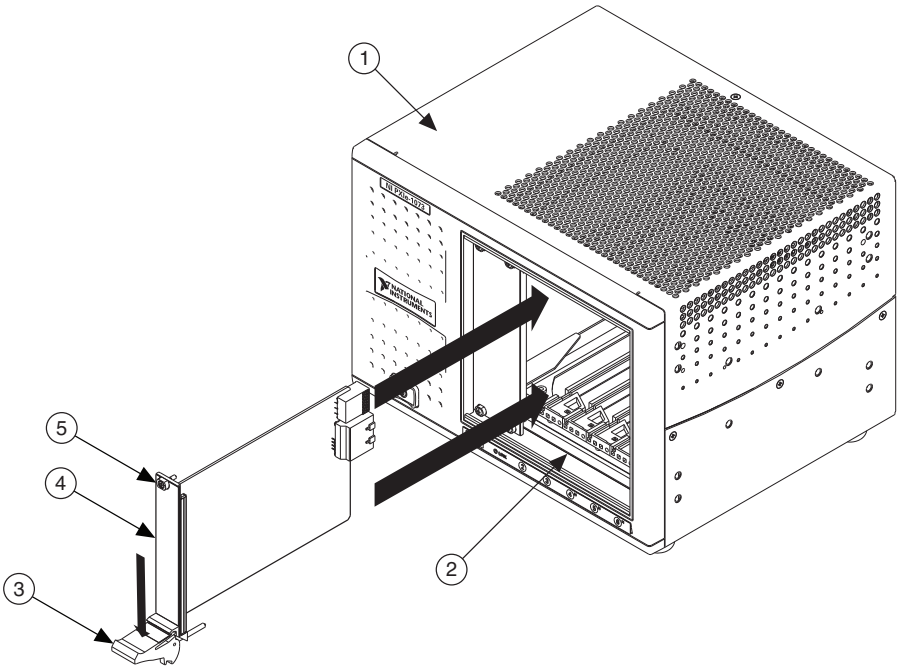
This section contains general installation instructions for installing a peripheral module in a PXIe-1073 chassis. Refer to your peripheral module user manual for specific instructions and warnings. To install a module, complete the following steps:

1. Inspect the slot for any physical damage or bent pins before installing the peripheral module.
2. Connect the AC power source to the PXI Express chassis before installing the module. The AC power cord grounds the chassis and protects it from electrical damage while you install the module.
3. Ensure that the chassis is powered off.
4. Install a module into a chassis slot by first placing the module card PCB into the front of the card guides (top and bottom), as shown in Figure 2-5. Slide the module to the rear of the chassis, making sure that the injector/ejector handle is pushed down as shown in Figure 2-5.
5. When you begin to feel resistance, push up on the injector/ejector handle to fully seat the module into the chassis frame. Secure the module front panel to the chassis using the module front-panel mounting screws.



**Note** You must install the driver software provided on the NI Driver CD supplied with your kit before you can use the modules in the chassis.

**Figure 2-5.** Installing PXI or CompactPCI Modules



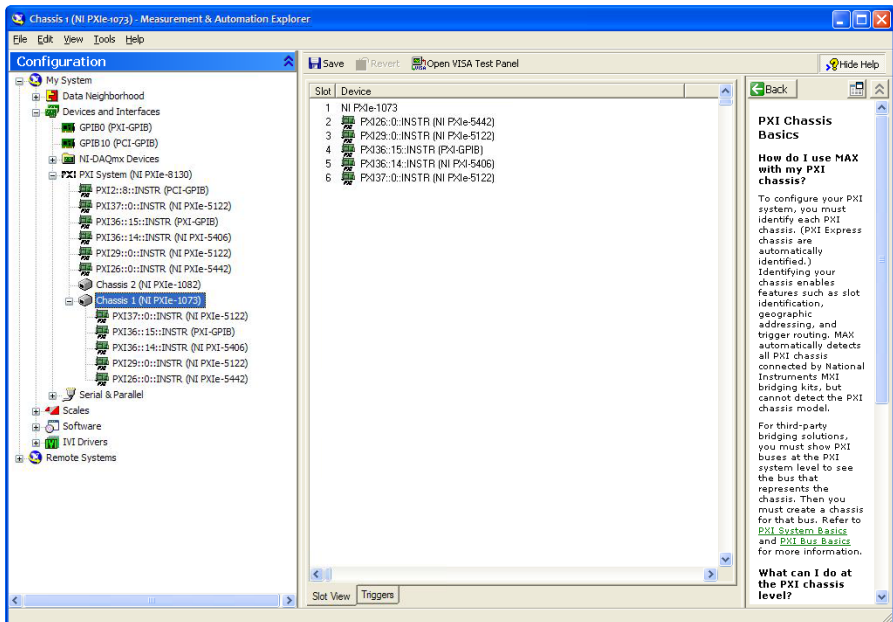
- 
- |                           |                              |
|---------------------------|------------------------------|
| 1 PXIe-1073 Chassis       | 4 PXI Express Module         |
| 2 Injector/Ejector Rail   | 5 Front Panel Mounting Screw |
| 3 Injector/Ejector Handle |                              |
-

# PXI Express System Configuration with MAX

The PXI Platform Services software included with your chassis automatically identifies your PXI Express system components to generate a `pxiesys.ini` file. You can configure your entire PXI system and identify PXI-1 chassis through Measurement & Automation Explorer (MAX), included with your system controller. MAX creates the `pxiesys.ini` and `pxisys.ini` files, which define your PXI system parameters. MAX also provides an interface to route and reserve triggers so dynamic routing, through drivers such as DAQmx, avoids double-driving and potentially damaging trigger lines. For more information about routing and reserving PXI triggers, refer to KnowledgeBase **3TJDOND8** at [ni.com/support](http://ni.com/support).

The configuration steps for single or multiple-chassis systems are the same.

**Figure 2-6.** Chassis Configuration in MAX



## Basic PXI System Configuration

The *Platform Services 2.5.1* (or higher) software provided on the NI Driver CD-ROM will automatically detect your PXIe-1073 chassis. To manually configure your chassis follow the steps outlined below. Refer to Figure 2-7 while completing the following steps:

1. Launch MAX.
2. In the **Configuration** tree, click the **Devices and Interfaces** branch to expand it.
3. If the PXI system controller has not yet been configured, it is labeled **PXI System (Unidentified)**. Right-click this entry to display the pop-up menu, then select the appropriate system controller model from the **Identify As** submenu.
4. Click the PXI system controller. The chassis (or multiple chassis, in a multichassis configuration) is listed below it. Identify each chassis by right-clicking its entry, then selecting the appropriate chassis model through the **Identify As** submenu. Further expanding the **PXI System** branch shows all devices in the system that can be recognized by NI-VISA. When your system controller and all your chassis are identified, the required `pxisys.ini` or `pxiesys.ini` file is complete.
5. Apply the chassis number labels (shown in Figure 2-8) included with your kit to each chassis in your PXI system, and write in the chassis number accordingly in the white space.

**Figure 2-7.** Chassis Number Label



The PXI specification allows for many combinations of PXI chassis and system modules. To assist system integrators, the manufacturers of PXI chassis and system modules must document the capabilities of their products. PXI Express devices must provide a driver and `.ini` file for identification. These files are provided as part of the PXI Platform Services software included with your system controller. The minimum documentation requirements for PXI-1 are contained in `.ini` files, which consist of ASCII text. System integrators, configuration utilities, and device drivers can use these `.ini` files.

The capability documentation for a PXI-1 chassis is contained in a `chassis.ini` file provided by the chassis manufacturer. The information in this file is combined with information about the system controller to create a single PXI-1 system initialization file called `pxisys.ini` (PXI System Initialization). The NI system controller uses MAX to generate the `pxisys.ini` file from the `chassis.ini` file.

Device drivers and other utility software read the `pxiesys.ini` and `pxisys.ini` file to obtain system information. For detailed information about initialization files, refer to the PXI specification at [www.pxisa.org](http://www.pxisa.org).

# Trigger Configuration in MAX

Each chassis has one or more trigger buses, each with eight lines numbered 0 through 7 that can be reserved and routed statically or dynamically. Static reservation “pre-allocates” a trigger line to prevent its configuration by a user program. Dynamic reservation/routing/deallocation is performed *on the fly* within a user program based upon National Instruments APIs such as NI-DAQmx. Static reservation of trigger lines can be implemented by the user in MAX through the **Triggers** tab. Reserved trigger lines will not be used by PXI modules dynamically configured by programs such as NI-DAQmx. This prevents the instruments from double-driving the trigger lines, possibly damaging devices in the chassis. For example, if trigger line 3 is asserted, by default it will not be automatically asserted by any other module.

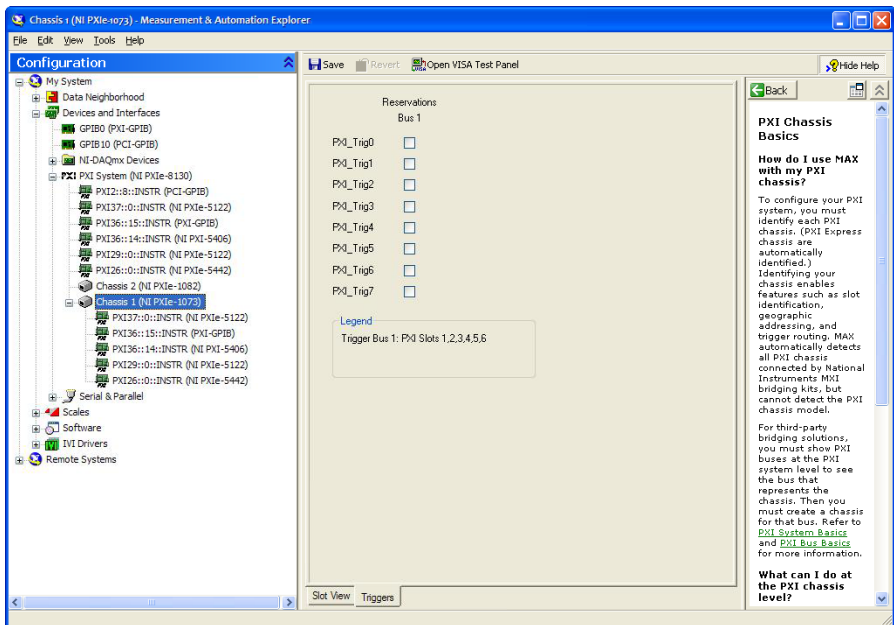
Complete the following steps to reserve these trigger lines in MAX.

1. In the **Configuration** tree, click the PXI chassis branch you want to configure.
2. Click the **Triggers** tab at the bottom of the right-hand pane.
3. Select which trigger lines you want to statically reserve, as shown in Figure 2-8.
4. Click the **Apply** button.



**Note** For more information about routing and reserving PXI triggers refer to KnowledgeBase **3TJDOND8** at [ni.com/support](http://ni.com/support).

**Figure 2-8.** Configuring Triggers in MAX



# Using System Configuration and Initialization Files

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The PXI Express specification allows many combinations of PXI Express chassis and system modules. To assist system integrators, the manufacturers of PXI Express chassis and system modules must document the capabilities of their products. The minimum documentation requirements are contained in `.ini` files, which consist of ASCII text. System integrators, configuration utilities, and device drivers can use these `.ini` files.

The capability documentation for the PXIe-1073 chassis is contained in the `chassis.ini` file on the software media that comes with the chassis. The information in this file is combined with information about the system controller to create a single system initialization file called `pxisys.ini` (PXI System Initialization). The system controller manufacturer either provides a `pxisys.ini` file for the particular chassis model that contains the system controller or provides a utility that can read an arbitrary `chassis.ini` file and generate the corresponding `pxisys.ini` file. System controllers from NI provide the `pxisys.ini` file for the PXIe-1073 chassis, so you should not need to use the `chassis.ini` file. Refer to the documentation provided with the system controller or to [ni.com/support](http://ni.com/support) for more information on `pxisys.ini` and `chassis.ini` files.

Device drivers and other utility software read the `pxisys.ini` file to obtain system information. The device drivers should have no need to directly read the `chassis.ini` file. For detailed information regarding initialization files, refer to the PXI Express specification at [www.pxisa.org](http://www.pxisa.org).



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# Maintenance

This chapter describes basic maintenance procedures you can perform on the PXIe-1073 chassis.



**Caution** Disconnect the power cables prior to servicing the chassis.

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## Service Interval

Clean dust from the chassis exterior (and interior) as needed, based on the operating environment. Periodic cleaning increases reliability and cooling performance.

---

## Preparation

The information in this chapter is designed for use by qualified service personnel. Read the *Read Me First: Safety and Electromagnetic Compatibility* document included with your kit before attempting any procedures in this chapter.



**Caution** Many components within the chassis are susceptible to static discharge damage. Service the chassis only in a static-free environment. Observe standard handling precautions for static-sensitive devices while servicing the chassis. Always wear a grounded wrist strap or equivalent while servicing the chassis.

---

## Cleaning



**Caution** Always disconnect the AC power cable before cleaning or servicing the chassis.

Cleaning procedures consist of exterior and interior cleaning of the chassis. Refer to your module user documentation for information on cleaning individual CompactPCI or PXI modules.

## Interior Cleaning

Use a dry, low-velocity stream of air to clean the interior of the chassis. Use a soft-bristle brush for cleaning around components.

## Exterior Cleaning



**Cautions** Avoid getting moisture inside the chassis during exterior cleaning, especially through the top vents. Use just enough moisture to dampen the cloth.

Do *not* wash the front- or rear-panel connectors or switches. Cover these components while cleaning the chassis.

Do *not* use harsh chemical cleaning agents; they may damage the chassis. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

Clean the exterior surfaces of the chassis with a dry lint-free cloth or a soft-bristle brush. If any dirt remains, wipe with a cloth moistened in a mild soap solution. Remove any soap residue by wiping with a cloth moistened with clear water. Do *not* use abrasive compounds on any part of the chassis.

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# Pinouts

This appendix describes the connector pinouts for the PXIe-1073 backplane.

Figure A-1 illustrates the types of PXI Express connectors by providing a layout of a PXI Express Hybrid peripheral slot.

Table A-1 shows the XP4 Connector Pinout for the PXI Express and Hybrid peripheral slots.

Table A-2 shows the XP3 Connector Pinout for the PXI Express and Hybrid peripheral slots.

Table A-3 shows the P1 connector pinout for the Hybrid peripheral slots.

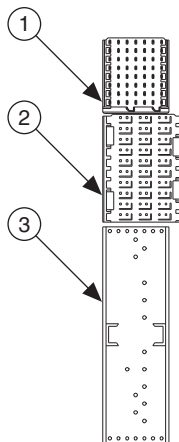
For more detailed information, refer to the *PXI-5 PXI Express Hardware Specification*, Revision 2.0. Contact the PXI Systems Alliance for a copy of the specification.

## Hybrid Slot Pinouts

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**Figure A-1.** PXI Express System Hybrid Slot Layout

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XP4 Connector

2 XP3 Connector

P1 Connector

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**Table A-1.** XP4 Connector Pinout for the PXI Express/Hybrid Slot

Pin	Z	A	B	C	D	E	F
1	GND	GA4	GA3	GA2	GA1	GA0	GND
2	GND	5Vaux	GND	SYSEN#	WAKE#	ALERT#	GND
3	GND	12V	12V	GND	GND	GND	GND
4	GND	GND	GND	3.3V	3.3V	3.3V	GND
5	GND	PXI_TRIG3	PXI_TRIG4	PXI_TRIG5	GND	PXI_TRIG6	GND
6	GND	PXI_TRIG2	GND	ATNLED	PXI_STAR	PXI_CLK10	GND
7	GND	PXI_TRIG1	PXI_TRIG0	ATNSW#	GND	PXI_TRIG7	GND
8	GND	RSV	GND	RSV	PXI_LBL6	PXI_LBR6	GND

**Table A-2.** XP3 Connector Pinout for the PXI Express/Hybrid Slot

Pin	A	B	ab	C	D	cd	E	F	ef
1	PXLe_CLK100+	PXLe_CLK100-	GND	PXLe_SYNC100+	PXLe_SYNC100-	GND	PXLe_DSTARC+	PXLe_DSTARC-	GND
2	PRSNT#	PWREN#	GND	PXLe_DSTARB+	PXLe_DSTARB-	GND	PXLe_DSTARA+	PXLe_DSTARA-	GND
3	SMBDAT	SMBCLK	GND	RSV	RSV	GND	RSV	RSV	GND
4	MPWRGD*	PERST#	GND	RSV	RSV	GND	1RefClk+	1RefClk-	GND
5	1PETp0	1PETn0	GND	1PERp0	1PERn0	GND	1PETp1	1PETn1	GND
6	1PETp2	1PETn2	GND	1PERp2	1PERn2	GND	1PERp1	1PERn1	GND
7	1PETp3	1PETn3	GND	1PERp3	1PERn3	GND	1PETp4	1PETn4	GND
8	1PETp5	1PETn5	GND	1PERp5	1PERn5	GND	1PERp4	1PERn4	GND
9	1PETp6	1PETn6	GND	1PERp6	1PERn6	GND	1PETp7	1PETn7	GND
10	RSV	RSV	GND	RSV	RSV	GND	1PERp7	1PERn7	GND

**Table A-3.** P1 Connector Pinout for the Hybrid Slot

Pin	Z	A	B	C	D	E	F
25	GND	5V	REQ64#	ENUM#	3.3V	5V	GND
24	GND	AD[1]	5V	V(I/O)	AD[0]	ACK64#	GND
23	GND	3.3V	AD[4]	AD[3]	5V	AD[2]	GND
22	GND	AD[7]	GND	3.3V	AD[6]	AD[5]	GND
21	GND	3.3V	AD[9]	AD[8]	M66EN	C/BE[0]#	GND
20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	GND	3.3V	AD[15]	AD[14]	GND	AD[13]	GND
18	GND	SERR#	GND	3.3V	PAR	C/BE[1]#	GND
17	GND	3.3V	IPMB_SCL	IPMB_SDA	GND	PERR#	GND
16	GND	DEVSEL#	GND	V(I/O)	STOP#	LOCK#	GND
15	GND	3.3V	FRAME#	IRDY#	BD_SEL#	TRDY#	GND
12–14	Key Area						
11	GND	AD[18]	AD[17]	AD[16]	GND	C/BE[2]#	GND
10	GND	AD[21]	GND	3.3V	AD[20]	AD[19]	GND
9	GND	C/BE[3]#	IDSEL	AD[23]	GND	AD[22]	GND
8	GND	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
7	GND	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
6	GND	REQ#	GND	3.3V	CLK	AD[31]	GND
5	GND	BRSVP1A5	BRSVP1B5	RST#	GND	GNT#	GND
4	GND	IPMB_PWR	HEALTHY#	V(I/O)	INTP	INTS	GND
3	GND	INTA#	INTB#	INTC#	5V	INTD#	GND
2	GND	TCK	5V	TMS	TDO	TDI	GND
1	GND	5V	–12V	TRST#	+12V	5V	GND

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# NI Services

NI provides global services and support as part of our commitment to your success. Take advantage of product services in addition to training and certification programs that meet your needs during each phase of the application life cycle; from planning and development through deployment and ongoing maintenance.

To get started, register your product at [ni.com/myproducts](https://ni.com/myproducts).

As a registered NI product user, you are entitled to the following benefits:

- Access to applicable product services.
- Easier product management with an online account.
- Receive critical part notifications, software updates, and service expirations.

Log in to your MyNI user profile to get personalized access to your services.

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## Services and Resources

- **Maintenance and Hardware Services**—NI helps you identify your systems' accuracy and reliability requirements and provides warranty, sparing, and calibration services to help you maintain accuracy and minimize downtime over the life of your system. Visit [ni.com/services](https://ni.com/services) for more information.
  - **Warranty and Repair**—All NI hardware features a one-year standard warranty that is extendable up to five years. NI offers repair services performed in a timely manner by highly trained factory technicians using only original parts at an NI service center.
  - **Calibration**—Through regular calibration, you can quantify and improve the measurement performance of an instrument. NI provides state-of-the-art calibration services. If your product supports calibration, you can obtain the calibration certificate for your product at [ni.com/calibration](https://ni.com/calibration).
- **System Integration**—If you have time constraints, limited in-house technical resources, or other project challenges, National Instruments Alliance Partner members can help. To learn more, call your local NI office or visit [ni.com/alliance](https://ni.com/alliance).

- **Training and Certification**—The NI training and certification program is the most effective way to increase application development proficiency and productivity. Visit [ni.com/training](https://ni.com/training) for more information.
  - The Skills Guide assists you in identifying the proficiency requirements of your current application and gives you options for obtaining those skills consistent with your time and budget constraints and personal learning preferences. Visit [ni.com/skills-guide](https://ni.com/skills-guide) to see these custom paths.
  - NI offers courses in several languages and formats including instructor-led classes at facilities worldwide, courses on-site at your facility, and online courses to serve your individual needs.
- **Technical Support**—Support at [ni.com/support](https://ni.com/support) includes the following resources:
  - **Self-Help Technical Resources**—Visit [ni.com/support](https://ni.com/support) for software drivers and updates, a searchable KnowledgeBase, product manuals, step-by-step troubleshooting wizards, thousands of example programs, tutorials, application notes, instrument drivers, and so on. Registered users also receive access to the NI Discussion Forums at [ni.com/forums](https://ni.com/forums). NI Applications Engineers make sure every question submitted online receives an answer.
  - **Software Support Service Membership**—The Standard Service Program (SSP) is a renewable one-year subscription included with almost every NI software product, including NI Developer Suite. This program entitles members to direct access to NI Applications Engineers through phone and email for one-to-one technical support, as well as exclusive access to online training modules at [ni.com/self-paced-training](https://ni.com/self-paced-training). NI also offers flexible extended contract options that guarantee your SSP benefits are available without interruption for as long as you need them. Visit [ni.com/ssp](https://ni.com/ssp) for more information.
- **Declaration of Conformity (DoC)**—A 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).

For information about other technical support options in your area, visit [ni.com/services](https://ni.com/services), or contact your local office at [ni.com/contact](https://ni.com/contact).

You also can visit the Worldwide Offices section of [ni.com/niglobal](https://ni.com/niglobal) to access the branch office websites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

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