USER GUIDE

PXIe-1090

2-Slot PXI Express Chassis

This document describes the features of the PXIe-1090 chassis and contains information about configuring the chassis, installing the modules, and operating the chassis.

Contents

Getting Started

Unpacking

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 the chassis was damaged during shipment, file a claim with the carrier. Retain the packing material for possible inspection and/or reshipment.

What You Need to Get Started

The PXIe-1090 chassis kit contains the following items:

- PXIe-1090 chassis
- Filler panel
- Software media with *PXI Platform Services 20.5* or newer
- Chassis number labels

Note You also will need an AC power cable, sold separately. Refer to the following table for more information about AC power cables.

Table 1. AC Power Cables

Power Cable	Reference Standards
Standard 120 V (USA)	ANSI C73.11/NEMA 5-15-P
Switzerland 220 V	SEV 6534-2
Australia 240 V	AS C112
Universal Euro 230 V	CEE (7), II, IV, VII
United Kingdom 230 V	BS 1363
Japan 100 V	JIS 8303

If you are missing any of the items or have the incorrect AC power cable, contact NI.

Key Features

The PXIe-1090 chassis combines a high-performance 2-slot PXI Express backplane with a power supply and a structural design that has been optimized for maximum usability in a wide

range of applications. The PXIe-1090 chassis fully complies with the *PXI-5 PXI Express Hardware Specification*.

The PXIe-1090 chassis includes the following key features:

High Performance for Instrumentation Requirements

- Up to 985 MB/s (single direction) per PXI Express slot dedicated bandwidth (x1 Gen-3 PCI Express)
- 58 W per slot cooling to meet increased PXI Express cooling requirements; refer to the *PXIe-1090 Specifications* for more details
- Low-jitter internal 10 MHz reference clock for PXI/PXI Express slots with ± 25 ppm stability
- Low-jitter internal 100 MHz reference clock for PXI Express slots with ± 25 ppm stability
- Quiet operation for 0 °C to 30 °C at 33.7 dBA
- Variable speed fan controller to optimize cooling and acoustic emissions

High Reliability

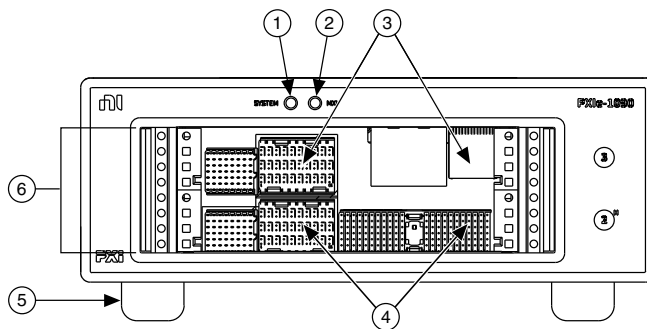- 0 °C to 50 °C temperature range
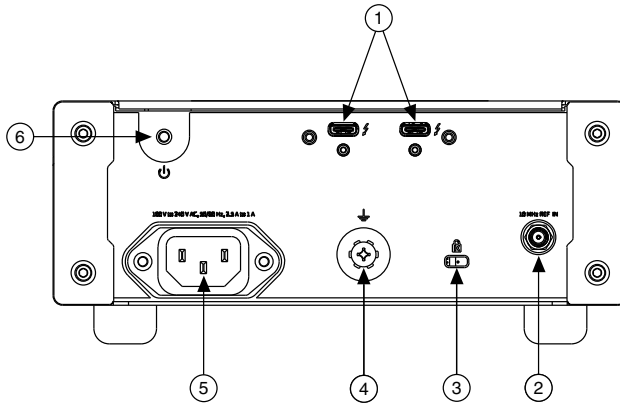- Power supply, temperature, and fan monitoring

Chassis Components

The following figures show key features of the PXIe-1090 chassis front and back panels.

Figure 1. PXIe-1090 Front Panel Features

1. System LED	4. PXI Express Hybrid Peripheral Slot
2. MXI LED	5. Rubber Foot
3. PXI Express Peripheral Slot	6. Backplane Connectors

Figure 2. PXIe-1090 Back Panel Features

1. Thunderbolt 3 MXI-Express Ports	4. Chassis Grounding Terminal
2. 10 MHz REF IN SMA Connector	5. Universal AC Input
3. Kensington Slot	6. Power Inhibit Switch

PXIe-1090 Backplane Overview

Interoperability with CompactPCI

The PXIe-1090 design provides 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 peripheral products modified to fit in a hybrid slot
- Standard CompactPCI peripheral products modified to fit in a hybrid slot

Thunderbolt™ 3 Interface

The PXIe-1090 chassis has a built-in Intel Thunderbolt 3 interface accessible through two Thunderbolt 3 ports on the back of the chassis. This enables control of the PXIe-1090 from a host PC that includes a Thunderbolt 3 port and is running a native (nonvirtualized) operating system that supports Thunderbolt connectivity.

> **Note** The PXIe-1090 chassis does not include a slot 1; the Thunderbolt 3 ports replace this slot.

Thunderbolt technology is transparent to device drivers, so no additional software is needed for CompactPCI Express-level support for PXI Express devices in connected chassis.

Note For full PXI/PXI Express functionality such as chassis and controller identification, trigger routing, and slot detection, install the latest version of PXI Platform Services. This software is included with your kit; you also can find it at *ni.com/downloads* by searching for PXI Platform Services.

The link between the PC and the chassis is a Thunderbolt 3 link. The link can transmit at a rate of up to 40 Gbps in each direction simultaneously.

Basic MXI-Express Thunderbolt Systems

The simplest MXI-Express Thunderbolt system consists of a PC connected to a PXIe-1090 via a Thunderbolt port on the chassis, as shown in the following figure.

Figure 3. Example of a Basic MXI-Express Thunderbolt Link Topology
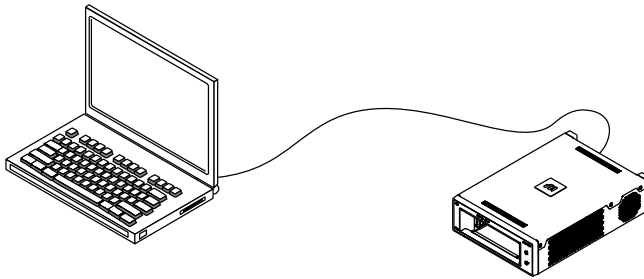
Thunderbolt Bus Extension

You can daisy-chain from a PXIe-1090 controlled by a PC to an additional Thunderbolt 3 compatible device. The following figure shows how you can use a PXIe-1090 to connect multiple Thunderbolt 3 compatible devices to a PC in a daisy-chain topology.

Figure 4. Example of a Daisy-Chain Thunderbolt Link Topology

Hybrid Peripheral Slot

The hybrid peripheral slot can accept the following peripheral modules:

- A PXI Express peripheral with x8, x4, or x1 PCI Express link.
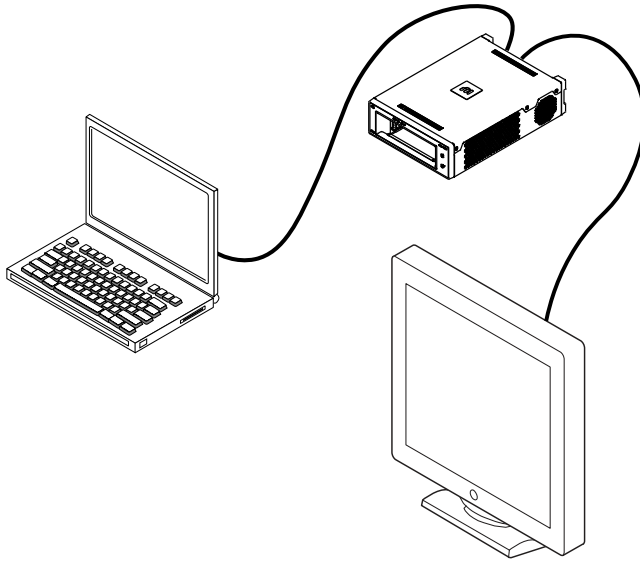- A CompactPCI Express Type-2 Peripheral with x8, x4, or x1 PCI Express link.
- A hybrid-compatible PXI Peripheral module modified by replacing the J2 connector with an XJ4 connector installed in the upper eight rows of J2. Refer to the *PXI Express Specification* for details. The PXI peripheral communicates through the backplane's 32-bit PCI bus.
- A CompactPCI 32-bit peripheral on the backplane's 32-bit PCI bus.

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

PXI Local Bus

The PXI backplane local bus is a daisy-chained bus that connects each peripheral slot with adjacent peripheral slots.

The backplane routes PXI Local Bus 6 between PXI slots. The left local bus 6 from slot 2 and right local bus 6 from slot 3 are not routed anywhere.

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

Initialization software uses the configuration information specific to each adjacent peripheral module to evaluate local bus compatibility.

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 on the lines, allowing precisely timed responses to asynchronous external events the system is monitoring or controlling.

Dynamic routing of triggers (automatic line assignments) is supported through certain NI drivers like NI-DAQmx.

Note Although any trigger line may be routed in either direction, it cannot be routed in more than one direction at a time.

System Reference Clock

The PXIe-1090 chassis supplies PXI_CLK10, PXIe_CLK100, and PXIe_SYNC100 to every peripheral slot with an independent driver for each signal.

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.

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.

PXI_CLK10, PXIe_CLK100, and PXIe_SYNC100 have the default timing relationship described in the following figure.

Figure 5. System Reference Clock Default Behavior
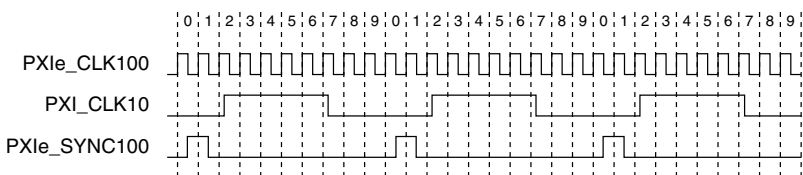
Installation and Configuration

The following section describes how to prepare and operate the PXIe-1090 chassis.

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

Safety Information

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

⚠ **Caution** Protection may be impaired if equipment is not used in the manner specified.

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

- Protective Earth—The facility installation must provide a means for connection to protective earth.
- 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 the 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 NI 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-1090 chassis is designed to operate on a bench or in an instrument rack. You must adhere to the cooling clearances as outlined in the following section.

Providing Adequate Clearance

As shown below, the PXIe-1090 module and power supply intake vents are on the right side of the chassis. The module and power supply exhaust vents are on the left side of the chassis.

Figure 6. PXIe-1090 Cooling Air Flow
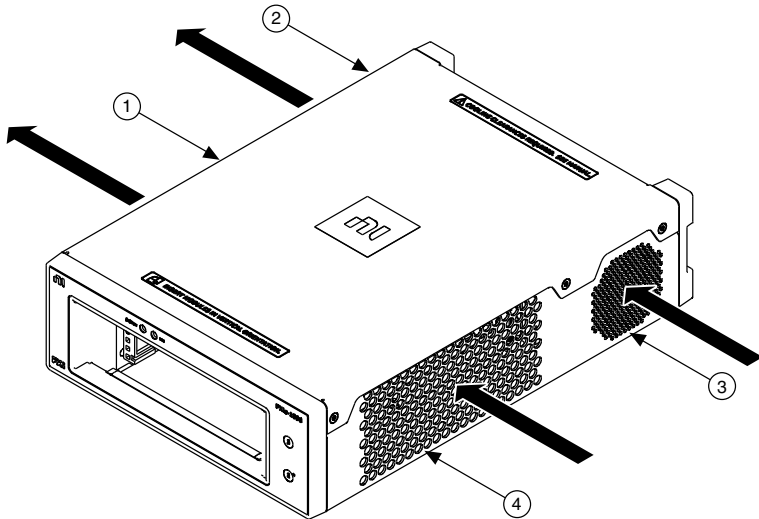
1.	Module Exhaust	3.	Power Supply Intake
2.	Power Supply Exhaust	4.	Module Intake

You must maintain adequate clearance between the chassis and surrounding equipment, heat generating devices, and air flow blockages to ensure proper cooling. Minimum cooling clearances are shown in the following figure. For rack mount applications, adequate forced air ventilation is required. For benchtop or rack mount applications, additional cooling clearances may be required for optimal air flow and reduced hot air recirculation to the air inlet fans.

Figure 7. PXIe-1090 Cooling Clearances
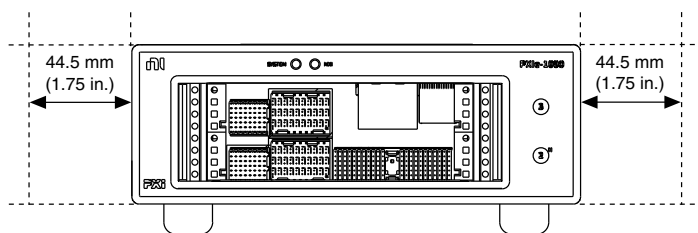
Note Failure to provide these clearances may result in undesired thermal-related issues with the chassis or modules.

To aid in thermal health monitoring for either rack or benchtop use, you can monitor the chassis intake temperatures in Measurement & Automation Explorer (MAX) to ensure the temperatures do not exceed the ratings in the *Operating Environment* section of the *PXIe-1090 Specifications*.

Additionally, many PXI modules provide temperature values you can monitor to ensure critical temperatures are not exceeded. Increasing chassis clearances, ventilation, reducing external ambient temperatures, and removing nearby heat sources are all options for improving overall chassis thermal performance.

Chassis Ambient Temperature Definition

The chassis fan control system uses ambient intake air temperatures for controlling fan speeds when in Auto mode. These temperatures may be higher than ambient room temperature depending on surrounding equipment and/or airflow blockages. Ensure ambient intake temperatures do not exceed the ratings in the *Operating Environment* section of the *PXIe-1090 Specifications*. You can monitor the module ambient intake temperatures in NI Measurement & Automation Explorer (MAX).

Setting Fan Speed

The PXIe-1090 chassis supports multiple fan operating modes. Refer to the *Fan Mode* section for more information.

Installing Filler Panels

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

Installing Slot Blockers

You can improve the cooling performance of the chassis by installing optional slot blockers. Refer to the NI website at *ni.com/info* and enter the Info Code `slotblocker` for more information about slot blockers.

Connecting the Safety Ground

⚠ **Caution** The PXIe-1090 chassis is designed with a three-position IEC 60320 C14 inlet for the U.S. that connects the ground line to the chassis ground. For proper grounding, you must use a suitable cordset to connect this inlet to an appropriate earth safety ground.

If your power outlet does not have an appropriate ground connection, you must connect the premise safety ground to the chassis grounding screw located on the rear panel. To connect the safety ground, complete the following steps:

1. Connect a 16 AWG (1.3 mm) wire to the chassis grounding screw (M4 SEMS) using a grounding lug. The wire must have green insulation with a yellow stripe or must be noninsulated (bare).
2. Attach the opposite end of the wire to permanent earth ground using toothed washers or a toothed lug.

Connecting to a Power Source

⚠ **Caution** Do not install modules prior to performing the following power-on test. To completely remove power, you must disconnect the AC power cable.

Attach input power through the rear AC inlet using the appropriate AC power cable supplied.

The Power Inhibit switch allows you to power on the chassis or place it in standby mode. With an empty chassis in Default Mode, press down the Power Inhibit switch and hold it down for one second. Observe that all fans become operational, the System LED is green, and the MXI LED is solid amber (without a host PC). Pressing and holding the Power Inhibit switch again for one second will return the chassis to standby.

Cabling

The following table shows the various MXI-Express Thunderbolt cables available from NI.

Table 2. NI MXI-Express Thunderbolt Cables

Description	Cable Length (Meters)	Part Number
MXI-Express Thunderbolt active cable	2 m	785607-02
MXI-Express Thunderbolt passive cable	2 m	785608-02
MXI-Express Thunderbolt passive cable	0.8 m	787580-0R8

Connect the MXI-Express Thunderbolt cable to the host PC Thunderbolt port and PXIe-1090. The cables have no polarity, so you can connect either end to either Thunderbolt port. The

cable plugs are reversible, and there is no defined upstream or downstream port on the PXIe-1090.

> **Note** Although Thunderbolt is a hotpluggable technology, avoid removing the cable after the system is powered on. Doing so can hang or cause errors in applications communicating with devices behind MXI-Express Thunderbolt. If a cable becomes unplugged, plug it back into the system.

For more information about MXI-Express Thunderbolt cabling, go to *ni.com/thunderbolt*.

Powering On/Off the MXI-Express Thunderbolt System

This chassis includes a feature to follow host power based on the Thunderbolt connection. Refer to the table below to determine how to power on or off the chassis based on the connection to the host.

Table 3. Chassis Inhibit Mode: Default (Refer to *Inhibit Mode* for More Information)

PXIe-1090 Power	Thunderbolt Connection to Host	Actions Required
To power on the PXIe-1090	Not present	Press the power button
		Hot plug a Thunderbolt cable with a powered on host on the other end
	Present	Power on the host
To power off the PXIe-1090	Not present	Press the power button
	Present	Hot unplug the Thunderbolt cable
		Power off the host
		Press the power button > 4 s (this causes a forced shutdown)

Table 4. Chassis Inhibit Mode: Manual (Refer to *Inhibit Mode* for More Information)

PXIe-1090 Power	Actions Required
To power on the PXIe-1090	AC on
To power off the PXIe-1090	AC off

Observe the PXIe-1090 LED status where applicable. A properly connected and powered up system should report a valid link and power status once the host PC is powered on. Refer to *LED Indicators* for more information.

Installing Peripheral Modules

This section contains general installation instructions for installing a peripheral module in a PXIe-1090 chassis. Refer to your peripheral module user manual for specific instructions and warnings. To install a module, complete the following steps:

Note To avoid possible damage to a peripheral module when you install it in the PXIe-1090 chassis, the chassis *must* be in a vertical orientation, as shown in the following figure. *Do not* install a peripheral module with the chassis in a horizontal orientation.

Note The PXIe-1090 chassis also *must* be in a vertical orientation when you remove a peripheral module from the chassis. *Do not* remove a peripheral module with the chassis in a horizontal orientation.

1. 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.

2. Ensure that the chassis is powered off.

3. 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 the following figure. Slide the module to the rear of the chassis, making sure that the injector/ejector handle is pushed down, as shown in the following figure.

4. 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.
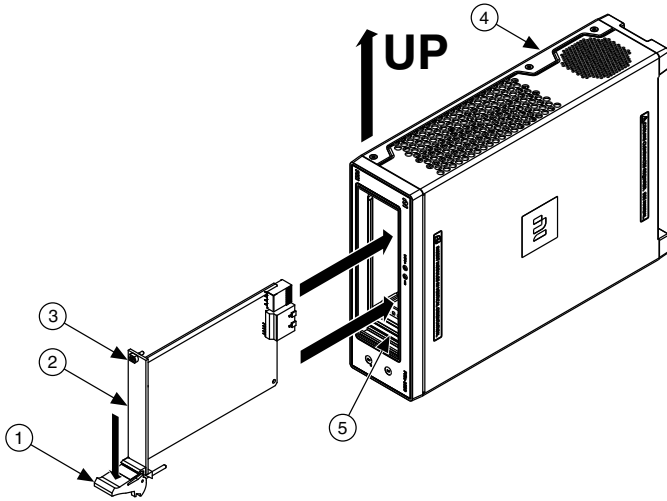
1. Injector/Ejector Handle
2. PXI Express Peripheral Module
3. Peripheral Module Front Panel Mounting Screws (2x)
4. PXIe-1090 Chassis (in a Vertical Orientation)
5. Injector/Ejector Rail

LED Indicators

MXI LED

The tri-color MXI LED on the PXIe-1090 front panel gives status information about the power supply and link state, as the following table describes.

Table 5. MXI LED Colors

LED	Color	Meaning
MXI	Off	Power is off.
	Blinking red	Power is out of spec.
	Solid amber	Power is within spec; no link to chassis.
	Solid green	Power is within spec; link established.

System LED

The following figure shows the rear panel System LED. The following table describes the System LED states.

**Figure 9.** PXIe-1090 System LED

Table 6. Front Panel System LED States

LED	State	Description
System	Off	Chassis is powered off.
	Steady green	Chassis is powered on and operating normally.
	Steady red	Indicates temperature is out of range, or an internal chassis fault has occurred.

DIP Switches

Use the DIP switches to control chassis behavior. Refer to the following figure for the DIP switches location.

**Figure 10.** PXIe-1090 Dip Switches Location
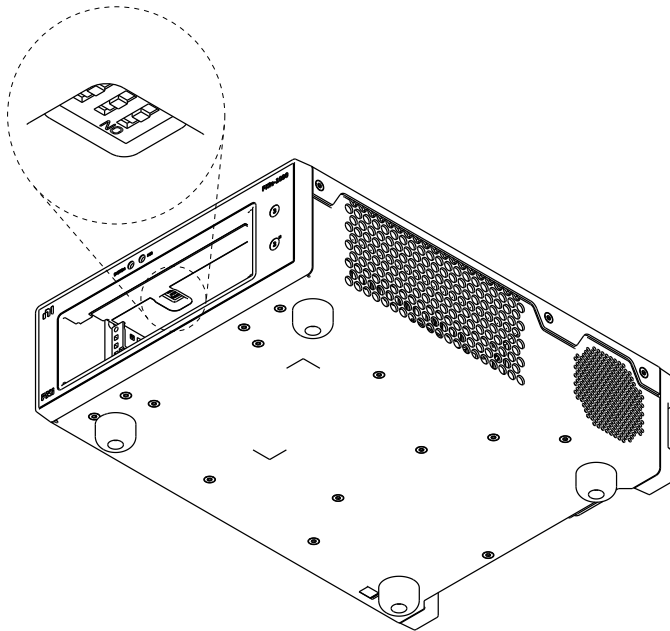
DIP switch #1 (on the left) controls the chassis fan mode. Set this switch in the off position (down in the following figure) to select Auto mode. Set this switch in the on position (up in the following figure) to select High mode.

DIP switch #2 (in the center) controls the chassis Inhibit Mode. Set this switch in the off position (down in the following figure) to select Default mode. Set this switch in the on position (up in the following figure) to select Manual mode.

DIP switch #3 (on the right) controls the host power up mode. Set this switch in the off position (down in the following figure) to select Default mode. Set this switch in the on position (up in the following figure) to select Manual mode.

Figure 11. PXIe-1090 DIP Switches
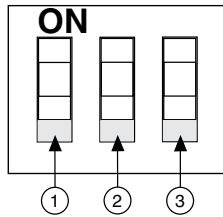
1. Switch #1 (Fan)
2. Switch #2 (Inhibit)
3. Switch #3 (Host Power)

Table 7. DIP Switch States

Location	Switch	State	Description
1	Fan	Off (Down)	Set chassis fan mode to Auto. Refer to the *Fan Mode* section for information.
		On (Up)	Set chassis fan mode to High.
2	Inhibit	Off (Down)	Set chassis inhibit mode to Default. Refer to the *Inhibit Mode* section for information.
		On (Up)	Set chassis inhibit mode to Manual.
3	Host Power	Off (Down)	Set host power up mode to Default. Refer to the *Default Host Power Up Mode* section for information.
		On (Up)	Set host power up mode to Manual.

Inhibit Mode

The PXIe-1090 chassis supports operation in two inhibit modes. Use Default mode when you desire normal Power Inhibit switch functionality. In Default mode, when no host is connected

to the chassis Thunderbolt port, you can press the Power Inhibit switch to power on the chassis. When the host is connected to the chassis via a Thunderbolt cable, the chassis follows the host's power states.

In Manual mode, the chassis powers up when you apply AC power and shuts down when you remove AC power.

Inhibit Mode Selection

You can select the PXIe-1090 chassis Inhibit Mode using a DIP switch on the top of the card cage. Refer to the *DIP Switches* section for the DIP switch location and more information about DIP switch settings.

Default Host Power Up Mode

The PXIe-1090 supports two host power up modes. Use default mode to have the chassis turn on when the Thunderbolt cable is plugged into a PC or the Power Inhibit switch is pressed. Unplug the cable to turn off the chassis. You also can turn off the chassis by pressing the Power Inhibit switch for 4 seconds. Use manual mode to have the chassis power on or off with only the Power Inhibit switch.

Fan Mode

The PXIe-1090 chassis operates in two main fan modes.

In Auto mode, the chassis intake air temperature determines the chassis fans' speed. Select Auto mode for improved acoustic performance.

In High mode, the chassis fans' speed is fixed at high speed regardless of chassis intake air temperature. Select High mode for maximum cooling performance.

Cooling Profiles

Both fan modes are available within the 38 W and 58 W cooling profiles.

- 38 W cooling profile supports NI modules up to 38 W max power dissipation
- 58 W cooling profile supports NI modules up to 58 W max power dissipation

Note Refer to *Operating Environment* requirements in the *PXIe-1090 Specifications* for more information about chassis ambient temperature range and cooling capacity.

Fan Mode Selection

You can select the chassis fan mode using Measurement & Automation Explorer (MAX). Refer to the *Fan Configuration in MAX* section for more information.

You also can select the PXIe-1090 chassis fan mode using a DIP switch. Refer to the *DIP Switches* section for more information.

> **Note** The DIP switch must be in the Auto position for software configuration in MAX to work. If the DIP switch is in the High position, the chassis fan mode will be High regardless of the software setting.

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. PXI Platform Services creates the `pxiesys.ini` and `pxisys.ini` file, which define your PXI system parameters.
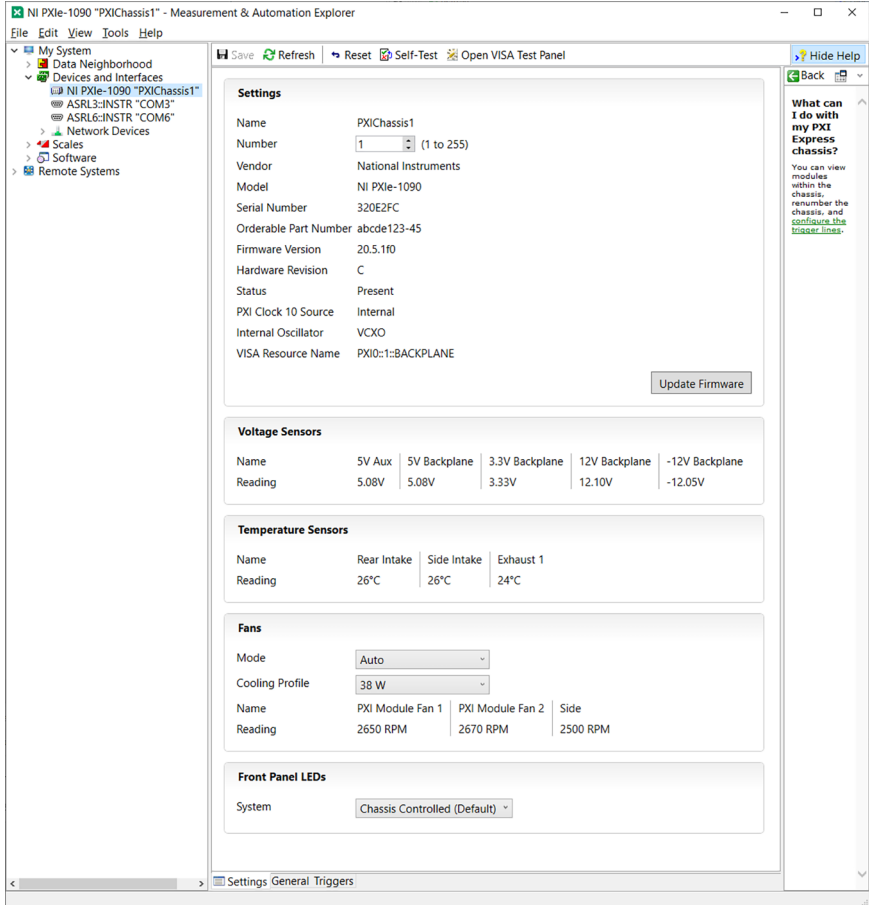
> **Note** The configuration steps for single or multiple-chassis systems are the same.

MAX provides the following chassis information:

- Asset information, such as serial number or part number
- Chassis number
- Voltages, temperatures, and fan speed
- Fan and cooling settings
- Slot details
- Chassis self-test
- Firmware update

Figure 12. Chassis Settings in MAX

Note Information available through MAX may vary based on your chassis variant or firmware and platform services version.

Trigger Configuration in MAX

PXI Platform Services provides an interface to route and reserve triggers so dynamic routing, through drivers such as DAQmx, avoids double-driving and potentially damaging trigger lines.

The PXIe-1090 has a trigger bus 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 *on the fly* within a user program based on NI APIs such as NI-DAQmx. NI recommends dynamic

reservations and routing are used whenever possible. If static reservations are required, static reservation of trigger lines can be implemented by the user in MAX through the **Triggers** tab.

Fan Configuration in MAX

You can configure fan behavior using software settings in MAX.

The PXIe-1090 supports both Auto and High fan modes for both the 38 W and 58 W cooling profiles. Refer to the *Fan Mode* section for more information about these modes.

You may also select a Manual fan mode. In this mode, you may manually set the fan speeds to achieve the desired performance.

Note You may not set the fan speeds or power settings lower than the minimum level required to maintain required cooling levels.

Complete the following steps to change the fan settings in MAX .
1. In the Configuration tree, click on the PXI chassis you want to configure.
2. In the right-hand pane, click on the **Settings** tab.
3. In the **Fans** group, select the desired Mode and Cooling Profile using the drop-down menus.
4. Click the **Save** button. Shortly after clicking the **Save** button, you should see the fan speeds change.

Using System Configuration and Initialization Files

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-1090 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-1090 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* 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.

Maintenance

This section describes basic maintenance procedures you can perform on the PXIe-1090 chassis.

⚠ **Caution** Disconnect the power cable prior to servicing your PXIe-1090 chassis.

Service Interval

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

Preparation

The information in this section 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 section.

📝 **Note** 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

Cleaning procedures consist of exterior and interior cleaning of the chassis and cleaning the nonremoveable mesh fan grates. Refer to your module's user documentation for information about cleaning individual CompactPCI or PXI Express modules.

⚠ **Caution** Always disconnect the power cable prior to servicing the chassis.

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

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.

⚠ **Caution** Avoid getting moisture inside the chassis during exterior cleaning. 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.

NI Services

Visit *ni.com/support* to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

Visit *ni.com/services* to learn about NI service offerings such as calibration options, repair, and replacement.

Visit *ni.com/register* to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

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