NI-9157/9159 Getting Started

2025-03-21

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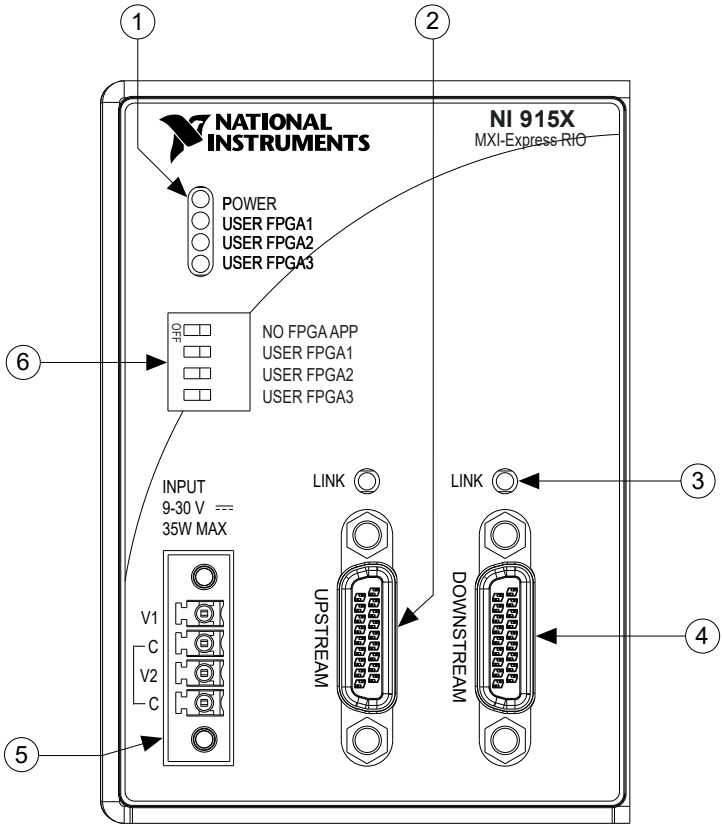
NI-9157/9159 Front Panel

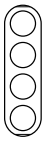
Figure 1. NI-9157/9159 Front Panel



1. LEDs
2. Upstream Port
3. MXI-Express LINK LEDs
4. Downstream Port
5. Power Connector
6. DIP Switches

Understanding LED Indications

Figure 2. NI-9157/9159 LEDs



POWER LED

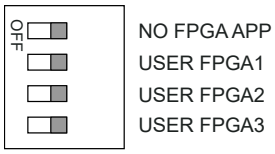
The POWER LED is lit while the NI-9157/9159 is powered on. This LED is a bi-color LED. When the chassis is powered from V1, the POWER LED is lit green. When the chassis is powered from V2, the POWER LED is lit yellow.

USER FPGA LEDs

You can use the bi-color, yellow and green USER FPGA LEDs to help debug your application or easily retrieve application status. Use the LabVIEW FPGA Module and NI-RIO software to define the USER FPGA LEDs to meet the needs of your application. Refer to ***LabVIEW Help*** for information about programming these LEDs.

Configuring DIP Switches

Figure 3. DIP Switches



All of the DIP switches are in the OFF position when the chassis is shipped from National Instruments.

NO FPGA APP Switch	Push the NO FPGA APP switch to the ON position to prevent a LabVIEW FPGA application from loading at startup. The NO FPGA APP switch overrides the chassis powerup options described in ***Configuring the NI-9157/9159***. After startup you can download to the FPGA from software regardless of switch position.
USER FPGA Switches	You can define the USER FPGA switches for your application. Use the LabVIEW FPGA Module and NI-RIO software to define the USER FPGA switches to meet the needs of your application. Refer to ***LabVIEW Fundamentals*** for information about programming these switches.

NO FPGA APP Switch

Push the NO FPGA APP switch to the ON position to prevent a LabVIEW FPGA application from loading at startup. The NO FPGA APP switch overrides the chassis powerup options described in the section on chassis powerup options. After startup

you can download to the FPGA from software regardless of switch position.

USER FPGA Switches

You can define the USER FPGA switches for your application. Use the LabVIEW FPGA Module and NI-RIO software to define the USER FPGA switches to meet the needs of your application. Refer to the ***LabVIEW Help*** for information about programming these switches.

What You Need to Install the NI-9157/9159

- NI-9157/9159 reconfigurable embedded chassis with integrated MXI-Express (x1)
- One of the following MXI-Express (x1) host systems:
  - PXI system with MXI-Express device installed
  - PC with MXI-Express PCI or PCIe device installed
  - NI Industrial Controller

> **Note**
>
> The NI-9157/9159 requires a host system with a PCI Express clock that complies with the ***PCI Express Specification***. The NI-9157/9159 may not be compatible with systems using noncompliant clocks, particularly clocks with peak frequencies higher than 100 MHz. For more information about PCI Express clock compatibility with the NI-9157/9159, refer to ***PCI Express Clock Specifications and Effect on NI MXI-Express RIO Interoperability***.

- C Series I/O modules
- MXI-Express (x1) cable(s) up to 7 m long
- DIN rail mount kit (for DIN rail mounting only)
- Panel mount kit (for panel mounting only)
- Three M4 or number 8 panhead screws (for mounting the chassis without one of the listed mounting kits)
- Number 2 Phillips screwdriver
- Power supply
- ***MXI-Express (x1) Series User Manual***

Refer to ***Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT*** to confirm software support compatibility for the NI-9157/9159.

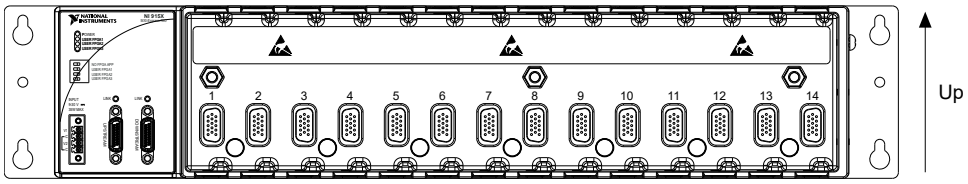
Related information:

- Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT
- PCI Express Clock Specifications and Effect on NI MXI-Express RIO Interoperability

Mounting the NI-9157/9159

You can mount the chassis horizontally on a 35 mm DIN rail or on a flat, vertical, metallic surface such as a panel or wall. The maximum allowable ambient temperature for operation is 55 °C. Mounting the chassis in a different orientation or on a nonmetallic surface can reduce the maximum allowable ambient temperature and can affect the typical accuracy of modules in the chassis. The following figure shows the chassis mounted horizontally.

Figure 4. NI-9157/9159 Mounted Horizontally

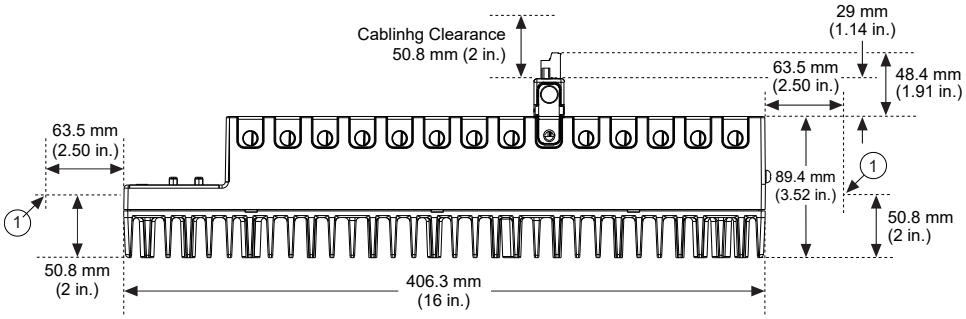


Measure the ambient temperature at each side of the chassis, 63.5 mm (2.5 in.) from the side and 50.8 mm (2 in.) forward from the rear of the chassis.

Notice Your installation must meet the following requirements for space and cabling clearance:

- Allow 50.8 mm (2 in.) on the top and the bottom of the chassis for air circulation.
- Allow 50.8 mm (2 in.) in front of modules for cabling clearance for common connectors, such as the 10-terminal, detachable screw terminal connector.

Figure 5. NI-9157/9159, Bottom View with Dimensions



1. Measure ambient temperature here.

Figure 6. NI-9157/9159, Front View with Dimensions

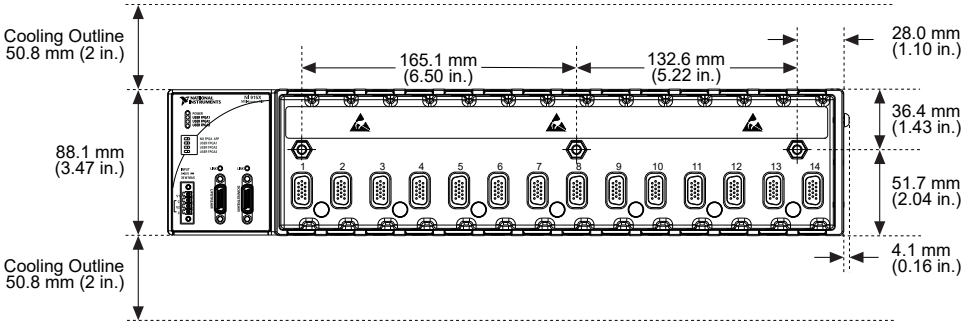
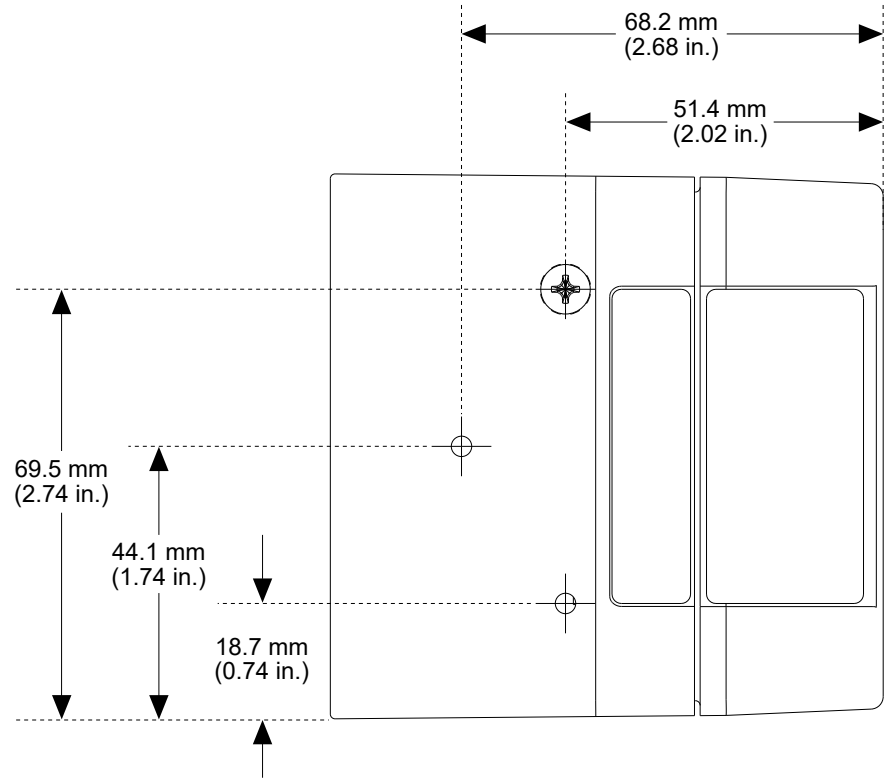


Figure 7. NI-9157/9159, Side View with Dimensions



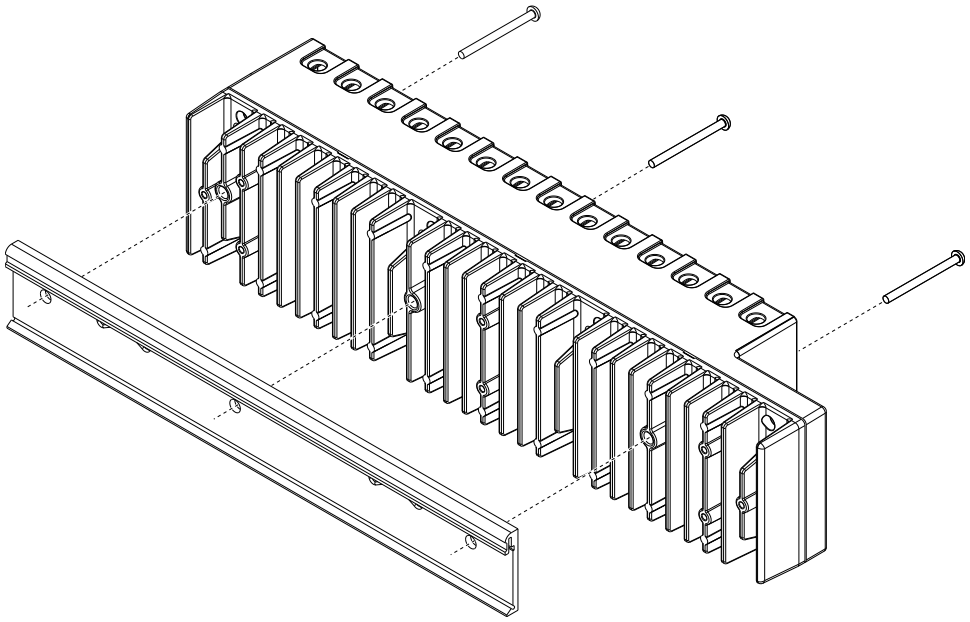
The following sections contain instructions for the mounting methods. Before using any of these mounting methods, record the serial number from the back of the chassis. You will be unable to read the serial number after you have mounted the chassis.

Caution Make sure that no I/O modules are in the chassis before mounting it.

Mounting the Chassis on a DIN Rail

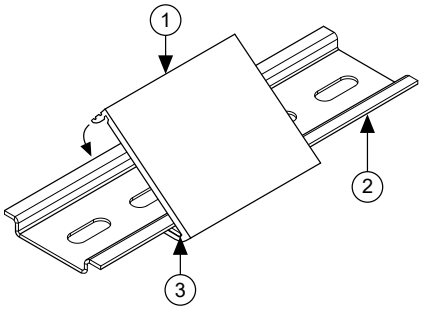
Use the DIN rail mounting method if you already have a DIN rail configuration or if you need to be able to remove the chassis quickly. You can order the NI-9916 DIN rail mount kit if you want to mount the chassis on a DIN rail. You need one clip for mounting the chassis on a standard 35 mm DIN rail. Complete the following steps to mount the chassis on a DIN rail.

1. Fasten the DIN rail clip to the chassis using a number 2 Phillips screwdriver and three M4 x 50 screws. NI provides these screws with the DIN rail mount kit. Tighten the screws to a maximum torque of 1.3 N · m(11.5 lb · in.).
   Figure 8. Installing the DIN Rail Clip on the NI-9157/9159



2. Insert one edge of the DIN rail into the deeper opening of the DIN rail clip.

Figure 9. One Edge of the DIN Rail Inserted in a Clip



1. DIN Rail Clip
2. DIN Rail
3. DIN Rail Spring

3. Press down firmly on the chassis to compress the spring until the clip locks in place on the DIN rail.

> **Caution** Make sure that no I/O modules are in the chassis before removing it from the DIN rail.

Mounting the Chassis on a Flat Surface Using the NI-9907 Panel Mount Kit

Panel or wall mounting is the best method for applications that are subject to high shock and vibration. You can use the NI-9907 panel mount kit to mount the NI-9157/9159 on a flat surface. Complete the following steps.

1. Fasten the chassis to the panel mount kit using a number 2 Phillips screwdriver and six M4 x 50 screws. NI provides these screws with the panel mount kit. Tighten the screws to a maximum torque of 1.3 N · m (11.5 lb · in.).

Figure 10. Installing the Panel Mount Plate on the NI-9157/9159

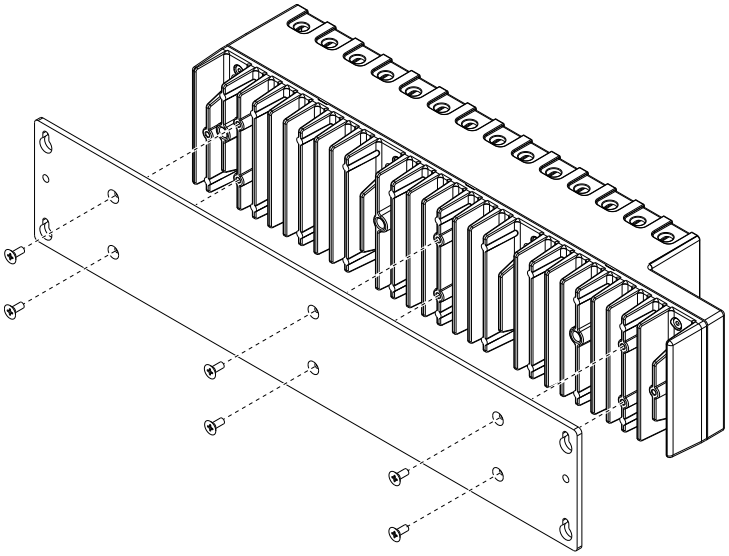
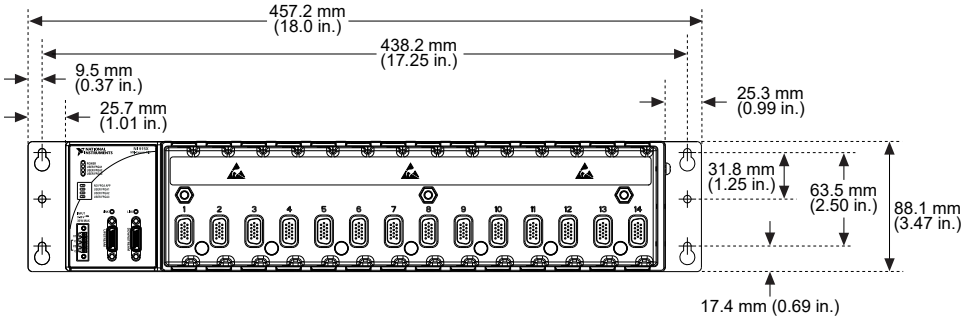


Figure 11. Dimensions of NI-9157/9159 with Panel Mounting Plate Installed



2. Fasten the panel mounting plate to the surface using the screwdriver and screws that are appropriate for the surface. The maximum screw size is M4 or number 8.

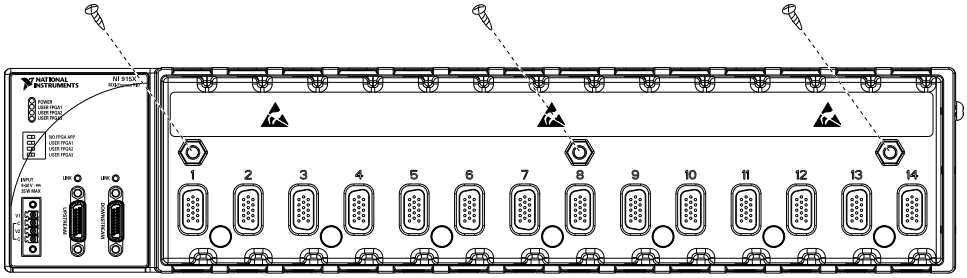
Caution Make sure that no I/O modules are in the chassis before removing it from the panel.

Mounting the Chassis Directly on a Flat Surface Using the Mounting Holes

Panel or wall mounting is the best method for high shock and vibration applications. If you do not have the NI-9907 panel mount kit and do not require the portability that the NI-9907 affords, you can mount the NI-9157/9159 directly on a flat surface using the three mounting holes. Complete the following steps.

1. Align the chassis on the surface.
2. Fasten the chassis to the surface using three M4 or number 8 screws. NI does not provide these screws with the chassis.

Figure 12. Mounting the NI-9157/9159 Directly on a Flat Surface

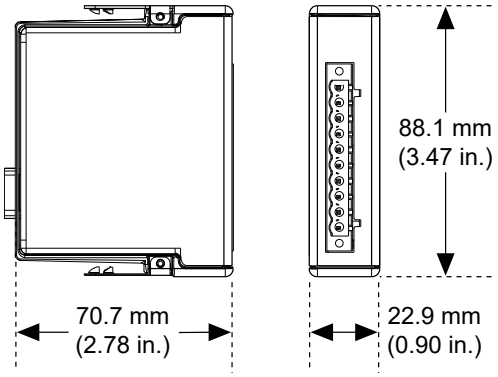


Caution Make sure that no I/O modules are in the chassis before removing it from the panel.

Installing C Series Modules

The following figure shows the mechanical dimensions of C Series I/O modules.

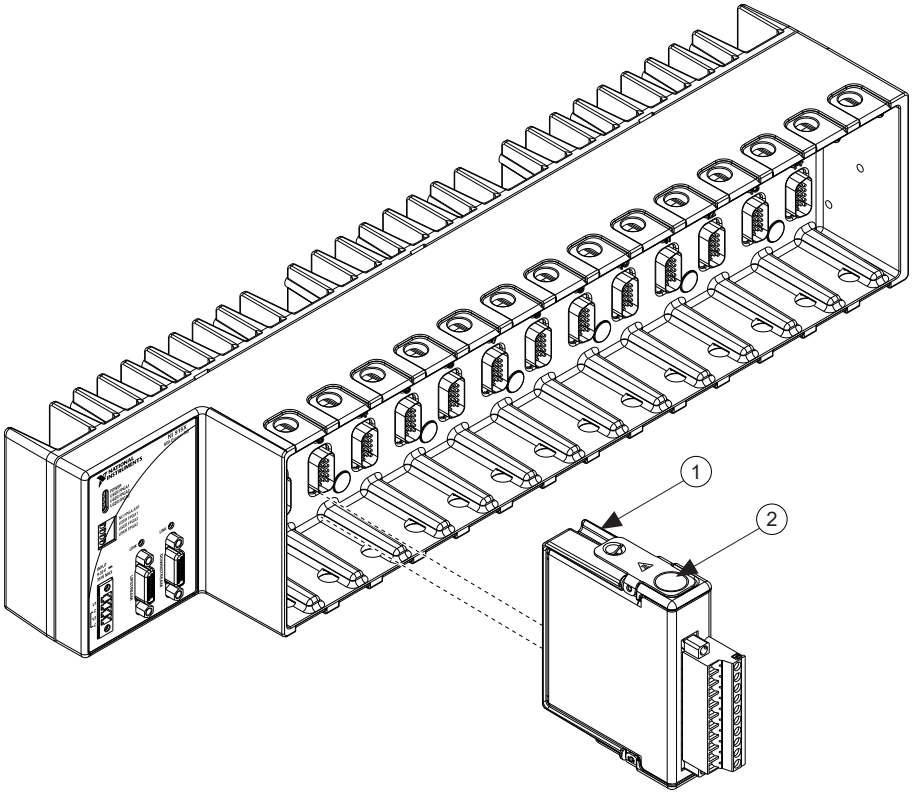
Figure 13. C Series I/O Module, Front and Side View with Dimensions



Complete the following steps to install a C Series I/O module in the chassis.

1. Make sure that no I/O-side power is connected to the I/O module. If the system is in a nonhazardous location, the chassis power can be on when you install I/O modules.
2. Align the I/O module with an I/O module slot in the chassis. The module slots are labeled 1 to 14, left to right.

Figure 14. Installing an I/O Module in the Chassis



1. Insertion Groove
2. Latch

3. Squeeze the latches and insert the I/O module into the module slot.
4. Press firmly on the connector side of the I/O module until the latches lock the I/O module into place.
5. Repeat these steps to install additional I/O modules.

Removing C Series Modules

Complete the following steps to remove a C Series I/O module from the chassis.

1. Make sure that no I/O-side power is connected to the I/O module. If the system is in a nonhazardous location, the chassis power can be on when you remove I/O modules.
2. Squeeze the latches on both sides of the module and pull the module out of the chassis.

Wiring Power to the Chassis

The NI-9157/9159 requires an external power supply that meets the specifications. The NI-9157/9159 filters and regulates the supplied power and provides power for all of the I/O modules. You must connect a power supply to at least one pair of V and C terminals. Optionally, you can connect a second power supply to the other pair of V and C terminals. The chassis draws power from the power supply with the higher voltage. The NI-9157/9159 has one layer of reverse-voltage protection. Complete the following steps to connect a power supply to the chassis.

Note The chassis draws power from either V1 or V2 depending on which terminal has a higher voltage. It does not draw power from both terminals. The chassis switches between V1 and V2 without affecting operation.

Note If you prefer for the chassis to draw power from one power supply, you must ensure that the voltage of that power supply, measured at the chassis power connector, is at least 500 mV higher than the voltage of the other power supply.

Caution The C terminals are internally connected to each other. If you use two power supplies, make sure that they share a common ground.

Caution The C terminals are internally connected to the body of the chassis to prevent a faulty ground connection from causing the chassis ground to float. If you reverse the input voltage, the positive input voltage is connected directly to the chassis. The chassis has built-in reversed-voltage protection, but reversed voltage can damage connected peripherals if the chassis ground is not reliably connected to earth ground.

Caution Do not tighten or loosen the terminal screws on the power connector while the power connector is plugged into the chassis or while the power supply is on.

1. Connect the positive lead of the power supply to the V1 or V2 terminal of the COMBICON connector shipped with the NI-9157/9159.
2. Connect the negative lead of the power supply to one of the C terminals of the COMBICON connector.
3. Optionally you can connect the positive lead of another power supply to the other V terminal and the negative lead to one of the C terminals.
4. Install the COMBICON connector on the front panel of the NI-9157/9159.

Connecting One or More NI-9157/9159 Chassis to the MXI-Express Host System or a Target

Complete the following steps to connect one or more NI-9157/9159 chassis to a MXI-Express host system or a target.

1. Make sure the MXI-Express host system is set up and configured as described in the ***MXI-Express (x1) Series User Manual***.
2. If the MXI-Express host system is powered up, power it down.
3. If the NI-9157/9159 is powered up, power it down.
4. Use a MXI-Express (x1) cable to connect the MXI-Express host system to the Upstream port of the first NI-9157/9159 in the chain.
5. Use a MXI-Express (x1) cable to connect the Downstream port of the first NI-9157/9159 to the Upstream port of the next NI-9157/9159 in the chain.

> **Note** The maximum number of NI-9157/9159 chassis in a chain depends on the system configuration. For example, a PXI system with an NI PXI-8196 controller can support four chassis per chain. Different types of systems may support more or fewer chassis per chain. For more information about how different system configurations can affect the maximum number of chassis in a chain, go to ni.com/info and enter the Info Code `915xchain`.

6. Power up all of the connected NI-9157/9159 chassis.
7. Power up the MXI-Express host system.

> **Note** Refer to the ***MXI-Express (x1) Series User Manual*** for connectivity options and supported host devices.

> **Caution** All connected NI-9157/9159 chassis must have power connected before the host system is powered up. The BIOS and OS of the host system must detect all bus segments on the chassis side in order to configure the PCI hierarchy. Powering connected chassis up or down

while the host system is running can cause system hangs and data corruption.

Caution Do not remove MXI-Express (x1) cables while power is connected. Doing so can cause hangs or application errors. If a cable becomes unplugged, plug it back in and reboot.

Chassis Powerup Options

The following table lists the reset options available for the NI-9157/9159. These options determine how the chassis behaves when it is powered on in various conditions. Use the RIO Device Setup utility to select reset options. Access the RIO Device Setup utility by selecting **Start»All Programs»National Instruments»NI-RIO»RIO Device Setup**.

Table 1. Chassis Powerup Options

Powerup Option	Behavior
Do Not Autoload VI	Does not load the FPGA bit stream from flash memory.
Autoload VI on device powerup	Loads the FPGA bit stream from flash memory to the FPGA when the chassis powers on.

If you want the NI-9157/9159 to autoload and run a VI at powerup, you must also configure the VI to autoload before you compile it. For more information about autoloading VIs, refer to the ***LabVIEW FPGA Module Help***.

Checking MXI-Express LINK LEDs for Status

After powering on the chassis and host system, check the MXI-Express LINK LEDs to ensure that all connected systems are linked and communicating properly. The MXI-Express LINK LEDs of the NI-9157/9159 indicate the following:

Table 2. NI-9157/9159 MXI-Express LINK LED Indications

LINK LED Appearance	Meaning
Off	Chassis power is off.
Solid yellow	Link is not established.
Solid green	Link is established.
Blinking yellow	PCI Express clock is incompatible with NI-9157/9159

Note For information about PCI Express clock compatibility with the NI-9157/9159, go to ni.com/info and enter the Info Code `915xclock`.

Powering Down the MXI-Express System

Always power down the host system before powering down any connected NI-9157/9159 chassis. When the host system is powered down, the order in which the NI-9157/9159 chassis are powered down is not important.

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