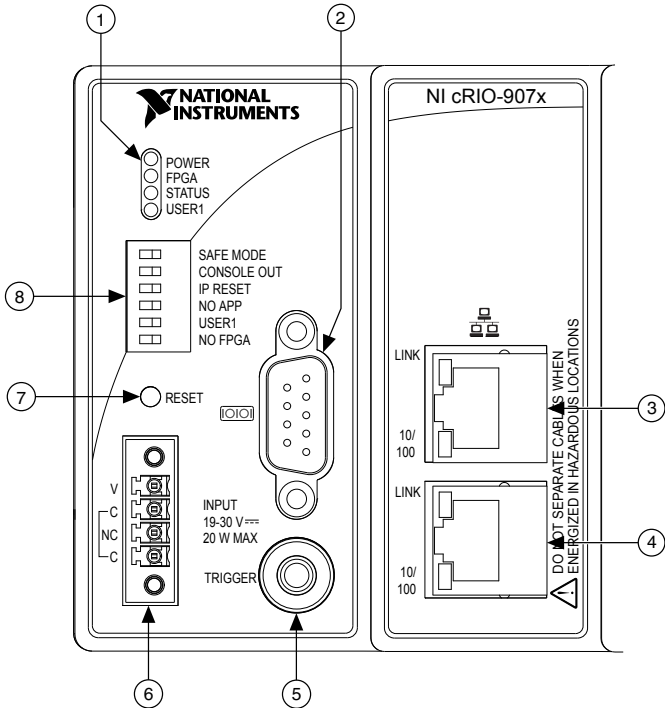


# NI cRIO-9072/9073/9074

Reconfigurable Embedded Chassis with Integrated Intelligent Real-Time Controller for CompactRIO

Figure 1. CompactRIO cRIO-9072/9073/9074



- |   |                                   |
|---|-----------------------------------|
| 1. LEDs                                   | 5. SMB Connector (cRIO-9074 Only) |
| 2. RS-232 Serial Port                     | 6. Power Connector                |
| 3. RJ-45 Ethernet Port 2 (cRIO-9074 Only) | 7. Reset Button                   |
| 4. RJ-45 Ethernet Port 1                  | 8. DIP Switches                   |

This document describes how to connect the cRIO-9072/9073/9074 to a network and how to use the features of the cRIO-9072/9073/9074.

# Safety Guidelines

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Operate the cRIO-9072/9073/9074 only as described in this document.



**Caution** Do not operate the cRIO-9072/9073/9074 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

## Safety Guidelines for Hazardous Locations

The cRIO-9072/9073/9074 is suitable for use in Class I, Division 2, Groups A, B, C, D, T4 hazardous locations; Class I, Zone 2, AEx nA IIC T4 and Ex nA IIC T4 hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the cRIO-9072/9073/9074 in a potentially explosive environment. Not following these guidelines may result in serious injury or death.



**Caution** Do not disconnect the power supply wires and connectors from the controller unless power has been switched off.



**Caution** Do not disconnect I/O-side wires or connectors unless power has been switched off or the area is known to be nonhazardous.



**Caution** Do not remove modules unless power has been switched off or the area is known to be nonhazardous.



**Caution** Substitution of components may impair suitability for Class I, Division 2.



**Caution** For Division 2 and Zone 2 applications, install the system in an enclosure rated to at least IP54 as defined by IEC/EN 60079-15.

## Special Conditions for Hazardous Locations Use in Europe and Internationally

The cRIO-9072/9073/9074 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO Certificate No. 07 ATEX 0626664X and is IECEx UL 14.0089X certified. Each device is marked Ⓢ II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of  $-20\text{ °C} \leq T_a \leq 55\text{ °C}$ .



**Caution** You must make sure that transient disturbances do not exceed 140% of the rated voltage.



**Caution** The system shall only be used in an area of not more than Pollution Degree 2, as defined in IEC 60664-1.



**Caution** The system shall be mounted in an ATEX/IECEx-certified enclosure with a minimum ingress protection rating of at least IP54 as defined in IEC/EN 60079-15.



**Caution** The enclosure must have a door or cover accessible only by the use of a tool.

## Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

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

## Special Conditions for Marine Applications

Some products are Lloyd's Register (LR) Type Approved for marine (shipboard) applications. To verify Lloyd's Register certification for a product, visit [ni.com/certification](https://www.lloydregister.com/certification) and search for the LR certificate, or look for the Lloyd's Register mark on the product.



**Caution** In order to meet the EMC requirements for marine applications, install the product in a shielded enclosure with shielded and/or filtered power and input/output ports. In addition, take precautions when designing, selecting, and installing measurement probes and cables to ensure that the desired EMC performance is attained.

## What You Need to Install CompactRIO Reconfigurable Embedded Hardware

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- CompactRIO reconfigurable embedded chassis with integrated intelligent real-time controller
- C Series I/O modules
- DIN rail mount kit (for DIN rail mounting only)
- Two M4 or number 10 panhead screws (for panel mounting only)
- A number 2 Phillips screwdriver
- Power supply



**Note** Visit [ni.com/info](https://www.ni.com/info) and enter the Info Code `rdsoftwareversion` to determine which software you need to use the cRIO-9072/9073/9074.



**Note** The cRIO-9072/9073/9074 may be shipped with a clear protective film cover on the front panel. You can remove the film cover before installing the cRIO-9072/9073/9074.

## Mounting the CompactRIO Reconfigurable Embedded Chassis

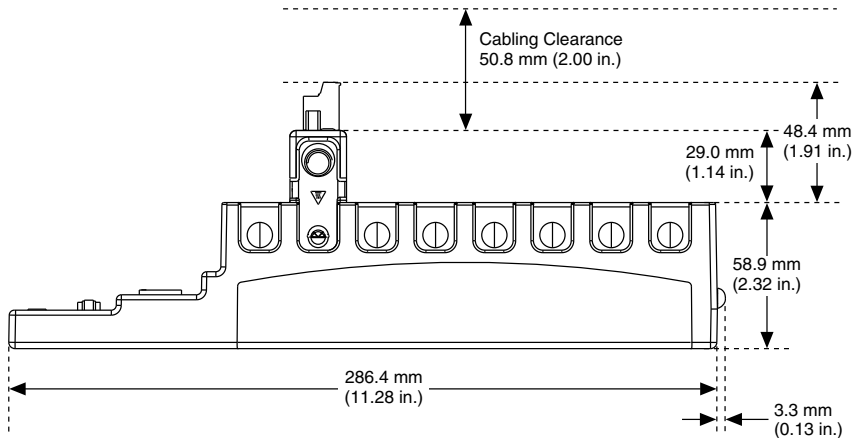
You can mount the chassis in any orientation on a 35 mm DIN rail or on a panel. Use the DIN rail mounting method if you already have a DIN rail configuration or if you need to be able to quickly remove the CompactRIO chassis. Use the panel mount method for high shock and vibration applications.



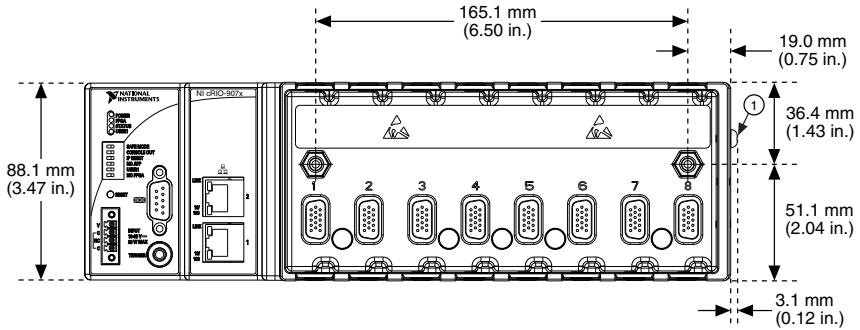
**Caution** Your installation must meet the following requirements for space and cabling clearance:

- Allow 25.4 mm (1 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 2.** cRIO-9072/9073/9074 Bottom View with Dimensions

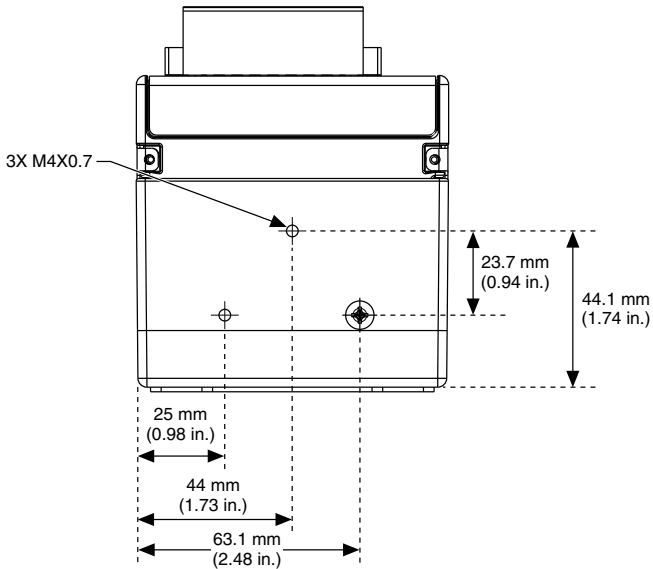


**Figure 3. cRIO-9072/9073/9074 Front View with Dimensions**



1. Chassis grounding terminal

**Figure 4. cRIO-9072/9073/9074 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.



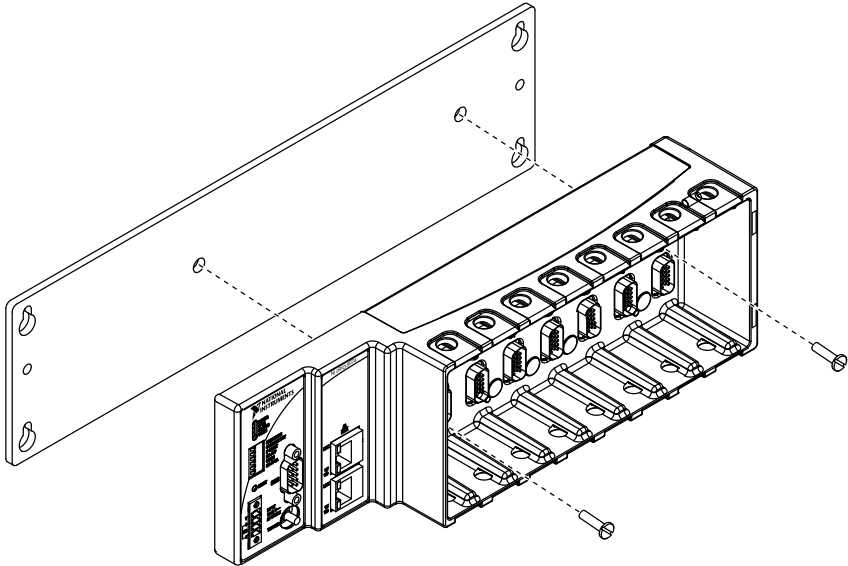
**Caution** Make sure that no I/O modules are in the chassis before mounting it.

# Mounting the Chassis on a Panel

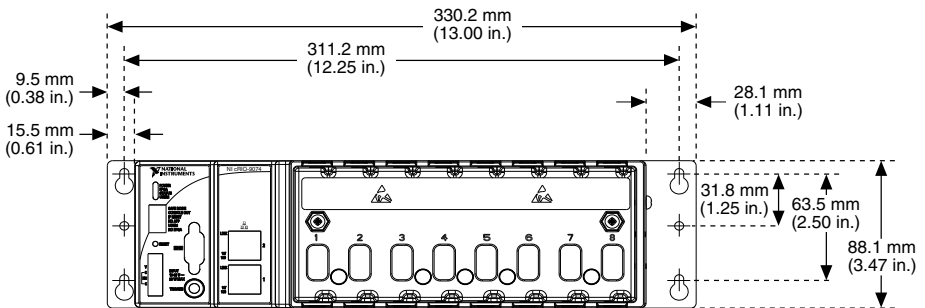
Panel or wall mounting is the best method for applications that are subject to high shock and vibration. You can use the NI 9905 panel mount kit to mount the cRIO-9072/9073/9074 on a flat surface. Complete the following steps.

1. Fasten the chassis to the panel mount kit using a number 2 Phillips screwdriver and two M4 × 16 screws. NI provides these screws with the panel mount kit. You must use these screws because they are the correct depth and thread for the panel. Tighten the screws to a maximum torque of 1.3 N · m (11.5 lb · in.).

**Figure 5.** Installing the Panel Mount Accessory on the cRIO-9072/9073/9074



**Figure 6.** Dimensions of cRIO-9072/9073/9074 with Panel Mount Accessory Installed



2. Fasten the NI 9905 panel to the wall using the screwdriver and screws that are appropriate for the wall surface. The maximum screw size is M4 or number 8.



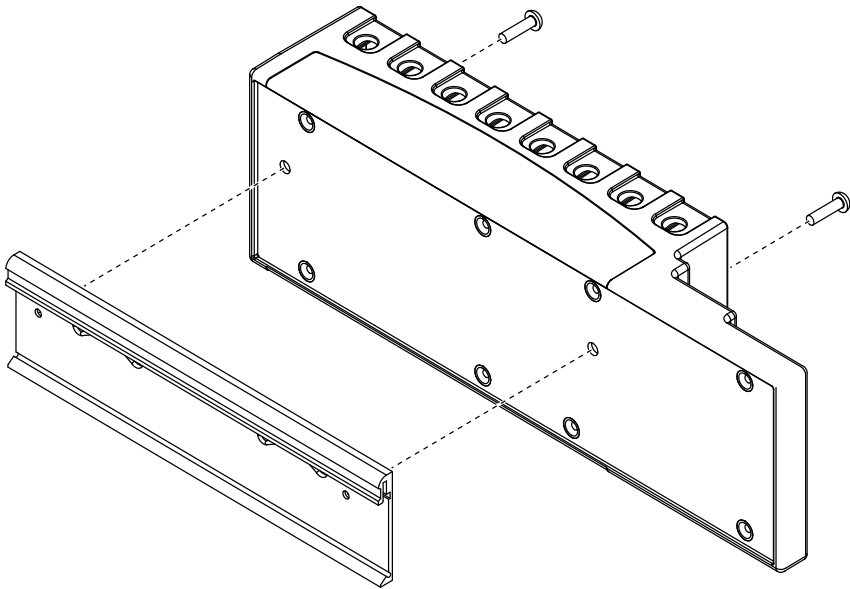
**Caution** Make sure that no I/O modules are in the chassis before removing it from the panel.

## Mounting the Chassis on a DIN Rail

You can order the NI 9915 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.

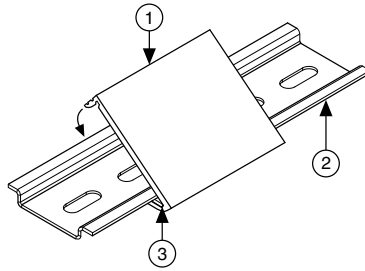
1. Fasten the DIN rail clip to the chassis using a number 2 Phillips screwdriver and two  $M4 \times 16$  screws. NI provides these screws with the DIN rail mount kit. Tighten the screws to a maximum torque of  $1.3 \text{ N} \cdot \text{m}$  ( $11.5 \text{ lb} \cdot \text{in.}$ ).

**Figure 7.** Installing the DIN Rail Clip on the cRIO-9072/9073/9074



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

**Figure 8.** 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.

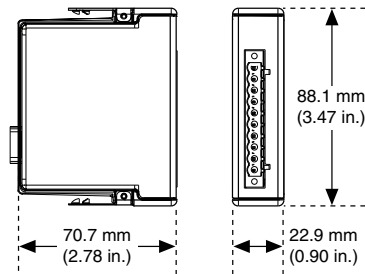


**Caution** Make sure that no I/O modules are in the chassis before removing it from the DIN rail.

## Installing C Series I/O Modules in the Chassis

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

**Figure 9.** C Series I/O Module, Front and Side View with Dimensions

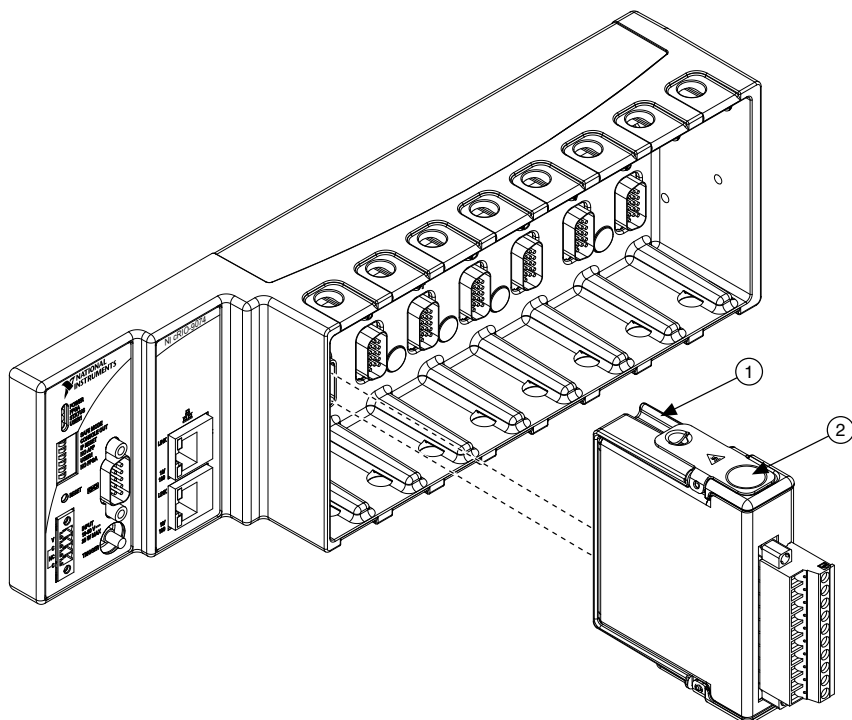


Complete the following steps to install a C Series I/O module in the chassis.

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 8, left to right.



**Figure 10.** 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 I/O Modules from the Chassis

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.

## Connecting the Chassis to a Network

Connect the chassis to an Ethernet network using the RJ-45 Ethernet port on the controller front panel. Use a standard Category 5 (CAT-5) or better shielded, twisted-pair Ethernet cable to connect the chassis to an Ethernet hub, or use an Ethernet crossover cable to connect the chassis directly to a computer.



**Caution** To prevent data loss and to maintain the integrity of your Ethernet installation, do not use a cable longer than 100 m.

If you need to build your own cable, refer to the *Cabling* section for more information about Ethernet cable wiring connections.

The first time you power up the chassis, the BIOS network settings determine the initial IP settings and other network behavior. After powerup, you must install software on the chassis and configure the network settings in NI Measurement & Automation Explorer (MAX).



**Note** Installing software may change the network behavior of the chassis. For information about network behavior by installed software version, go to [ni.com/info](http://ni.com/info) and enter the Info Code `ipconfigrio`.

The BIOS network settings of the cRIO-9072/9073/9074 depend on the part number of the chassis. The part number is located on the bottom of the chassis.

## BIOS Network Settings of cRIO-9072/9073/9074 with Part Number Beginning 192172

If the part number of the cRIO-9072/9073/9074 begins with 192172, the IP address, subnet mask, DNS address, gateway, and Time Server IP are all set to 0.0.0.0 at powerup.

The host computer communicates with the chassis over a standard Ethernet connection. If the host computer is on a network, you must configure the chassis on the same subnet as the host computer. If neither the host computer nor the chassis is connected to a network, you can connect the two directly using a crossover cable.

If you want to use the chassis on a subnet other than the one the host computer is on, first connect the chassis on the same subnet as the host computer. Use DHCP to assign an IP address or reassign a static IP address for the subnet where you want it to be and physically move it to the other subnet.

## BIOS Network Settings of cRIO-9072/9073/9074 with Part Number Beginning 198944

If the part number of the cRIO-9072/9073/9074 begins with 198944, the chassis attempts to initiate a DHCP network connection at powerup. If the chassis is unable to initiate a DHCP connection, it connects to the network with a link-local IP address with the form 169.254.x.x.

The host computer communicates with the chassis over a standard Ethernet connection. If neither the host computer nor the chassis is connected to a network, you can connect the two directly using a crossover cable.

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## Connecting the Chassis to Earth Ground

You must connect the chassis grounding screw to earth ground. Complete the following steps to connect to earth ground.

1. Attach a ring lug to a 1.6 mm<sup>2</sup> (14 AWG) or larger wire.

2. Remove the grounding screw from the grounding terminal on the right side of the chassis.
3. Attach the ring lug to the grounding terminal.
4. Tighten the grounding screw to 0.5 N · m (4.4 lb · in.) of torque.
5. Attach the other end of the wire to the grounding electrode system of your facility using a method appropriate for the application.



**Caution** If you use shielded cabling to connect to a C Series I/O module with a plastic connector, you must attach the cable shield to the chassis grounding terminal using 1.3 mm<sup>2</sup> (16 AWG) or larger wire. Attach a ring lug to the wire and attach the wire to the chassis grounding terminal. Solder the other end of the wire to the cable shield. Use shorter wire for better EMC performance.

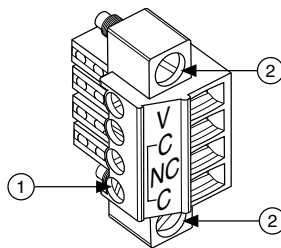
For more information about ground connections, go to [ni.com/info](http://ni.com/info) and enter the Info Code `emcground`.

## Wiring Power to the Chassis

The cRIO-9072/9073/9074 requires an external power supply that meets the specifications in the [Power Requirements](#) section. The cRIO-9072/9073/9074 filters and regulates the supplied power and provides power for all of the I/O modules. The cRIO-9072/9073/9074 has one layer of reverse-voltage protection. Complete the following steps to connect a power supply to the chassis.

1. Connect the positive lead of the power supply to the V terminal of the power connector shipped with the cRIO-9072/9073/9074, and tighten the terminal screw. The following figure shows the terminal screws, which secure the wires in the screw terminals, and the connector screws, which secure the power connector on the front panel.

**Figure 11. Power Connector**



1. Terminal Screws
2. Connector Screws

2. Connect the negative lead of the power supply to one of the C terminals of the power connector and tighten the terminal screw.
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 power connector on the front panel of the cRIO-9072/9073/9074 and tighten the connector screws.



**Caution** The C terminals are internally connected to each other.

## Powering On the cRIO-9072/9073/9074

When you apply power to the cRIO-9072/9073/9074, the controller runs a power-on self test (POST). During the POST, the Power and Status LEDs turn on. The Status LED turns off, indicating that the POST is complete. If the LEDs do not behave in this way when the system powers on, refer to the [Understanding LED Indications](#) section.

You can configure the cRIO-9072/9073/9074 to launch an embedded stand-alone LabVIEW RT application each time you boot the controller. Refer to the *LabVIEW Help* for more information.

## Chassis Reset Options

The following table lists the reset options available on CompactRIO systems such as the cRIO-9072/9073/9074. These options determine how the chassis behaves when the controller is reset 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.** CompactRIO Reset Options

Chassis Reset 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 controller powers on.
Autoload VI on device reboot	Loads the FPGA bit stream from flash memory to the FPGA when you reboot the controller either with or without cycling power.

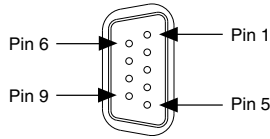
## Chassis Sleep Mode

The cRIO-9072/9073/9074 supports a low-power sleep mode. Refer to the software documentation for information about enabling sleep mode.

## Connecting Serial Devices to the cRIO-9072/9073/9074

The cRIO-9072/9073/9074 has an RS-232 serial port to which you can connect devices such as displays or input devices. Use the Serial VIs to read from and write to the serial port from a LabVIEW RT application. For more information about the Serial VIs, refer to the *LabVIEW Help*.

**Figure 12.** Controller Serial Port



**Table 2.** DB-9 Pin Descriptions

Pin	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

## Using the Internal Real-Time Clock

The system clock of the cRIO-9072/9073/9074 is synchronized with the internal high-precision real-time clock at startup. This synchronization provides timestamp data to the controller. You can also use the internal real-time clock to correct drift of the system clock. Refer to the [Internal Real-Time Clock Specifications](#) for the accuracy specifications of the real-time clock.

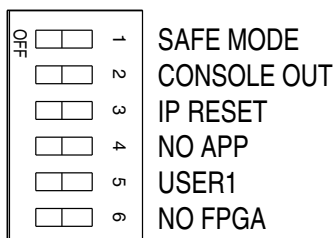
## Using the SMB Connector for Digital I/O (cRIO-9074 only)

You can use the SMB connector of the cRIO-9072/9073/9074 to connect digital devices to the controller. For example, if you connect the pulse-per-second output of a GPS device to the SMB connector of the cRIO-9072/9073/9074, you can use the GPS device to correct for drift of the system clock.

For software that supports GPS drift-correction and other digital I/O through the SMB connector, go to [ni.com/info](http://ni.com/info) and enter the Info Code `criosmb`.

# Configuring DIP Switches

**Figure 13.** DIP Switches



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

## SAFE MODE Switch

The position of the SAFE MODE switch determines whether the embedded LabVIEW Real-Time engine launches at startup. If the switch is in the OFF position, the LabVIEW Real-Time engine launches. Keep this switch in the OFF position during normal operation. If the switch is in the ON position at startup, the cRIO-9072/9073/9074 launches only the essential services required for updating its configuration and installing software. The LabVIEW Real-Time engine does not launch.

If the software on the controller is corrupted, you must put the controller into safe mode and reformat the controller drive. You can put the controller into safe mode by powering it up either with the SAFE MODE switch in the ON position or with no software installed on the drive. Refer to the *Measurement & Automation Explorer Help* for more information about installing software on a controller and reformatting the drive on the controller.

## CONSOLE OUT Switch

With a serial-port terminal program, you can use the CONSOLE OUT switch to read the IP address and firmware version of the controller. Use a null-modem cable to connect the serial port on the chassis to a computer. Push the switch to the ON position. Make sure that the serial-port terminal program is configured to the following settings:

- 9,600 bits per second
- Eight data bits
- No parity
- One stop bit
- No flow control

The serial-port terminal program displays the IP address and firmware version of the chassis. Keep this switch in the OFF position during normal operation.

## IP RESET Switch

Push the IP RESET switch to the ON position and reboot the controller to reset the IP address and other TCP/IP settings of the controller to the factory defaults. Refer to the [Troubleshooting Network Communication](#) section for more information about resetting the IP address. You also can push this switch to the ON position to unlock a chassis that was previously locked in MAX.

## NO APP Switch

Push the NO APP switch to the ON position to prevent a LabVIEW RT startup application from running at startup. If you want to permanently disable a LabVIEW RT application from running at startup, you must disable it in LabVIEW. To run an application at startup, push the NO APP switch to the OFF position, create an application using the LabVIEW Application Builder, and configure the application in LabVIEW to launch at startup. If you already have an application configured to launch at startup and you push the NO APP switch from ON to OFF, the startup application is automatically enabled. For more information about automatically launching VIs at startup and disabling VIs from launching at startup, refer to the *LabVIEW Help*.

## USER1 Switch

You can define the USER1 switch for your application. To define the purpose of this switch in your embedded application, use the RT Read Switch VI in your LabVIEW RT embedded VI. For more information about the RT Read Switch VI, refer to the *LabVIEW Help*.

## NO FPGA Switch

Push the NO FPGA switch to the ON position to prevent a LabVIEW FPGA application from loading at startup. The NO FPGA switch overrides the CompactRIO reset options described in the [Chassis Reset Options](#) section. After startup you can download to the FPGA from software regardless of switch position.

## Using the RESET Button

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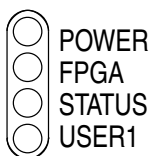
Pressing the RESET button resets the processor in the same manner as cycling power.



**Note** The FPGA continues to run unless you select the **Autoload on Any Device Reset** boot option. Refer to the [Chassis Reset Options](#) section for more information.

# Understanding LED Indications

**Figure 14.** cRIO-9072/9073/9074 LEDs



## POWER LED

The POWER LED is lit while the cRIO-9072/9073/9074 is powered on. This LED indicates that the power supply connected to the chassis is adequate.

## FPGA LED

You can use the FPGA LED to help debug your application or easily retrieve application status. Use the LabVIEW FPGA Module and NI-RIO software to define the FPGA LED to meet the needs of your application. Refer to *LabVIEW Help* for information about programming this LED.

## STATUS LED

The STATUS LED is off during normal operation. The cRIO-9072/9073/9074 indicates specific error conditions by flashing the STATUS LED a certain number of times every few seconds, as shown in the following table

Number of Flashes Every Few Seconds	Indication
1	The chassis is unconfigured. Use MAX to configure the chassis. Refer to the <i>Measurement &amp; Automation Explorer Help</i> for information about configuring the chassis.
2	The chassis has detected an error in its software. This usually occurs when an attempt to upgrade the software is interrupted. Reinstall software on the chassis. Refer to the <i>Measurement &amp; Automation Explorer Help</i> for information about installing software on the chassis.
3	The chassis is in safe mode because the SAFE MODE DIP switch is in the ON position or there is no software installed on the chassis. Refer to the <i>Configuring DIP Switches</i> section for information about the SAFE MODE DIP switch.



Number of Flashes Every Few Seconds	Indication
4	The software has crashed twice without rebooting or cycling power between crashes. This usually occurs when the chassis runs out of memory. Review your RT VI and check the memory usage. Modify the VI as necessary to solve the memory usage issue.
Continuously blinking	The chassis has detected an unrecoverable error. Contact National Instruments.
Continuously blinking or solid	The device may be configured for DHCP but unable to get an IP address because of a problem with the DHCP server. Check the network connection and try again. If the problem persists, contact National Instruments.

## USER1 LED

You can define the USER1 LED to meet the needs of your application. To define the LED, use the RT LEDs VI in LabVIEW. For more information about the RT LEDs VI, refer to the *LabVIEW Help*.

## Troubleshooting Network Communication

If the cRIO-9072/9073/9074 cannot communicate with the network, you can perform the following troubleshooting steps.

1. Move the IP RESET switch to the ON position.
2. Push the RESET button to cycle power to the chassis.
3. Configure the IP and other network settings in MAX.
4. Move the IP RESET switch to the OFF position.



**Note** The network behavior of the chassis after powering up with the IP RESET switch on depends on the version of LabVIEW RT installed. Visit [ni.com/info](http://ni.com/info) and enter the Info Code `ipconfigcrio` for information about the different network behaviors with different software versions.

## Restoring the BIOS Network Settings

If you are unable to fix network communication with the LabVIEW RT network settings restored, you can restore the BIOS network settings of the chassis. Refer to the *Connecting the Chassis to a Network* section of this document for information about the BIOS network settings for different chassis revisions. Complete the following steps to restore the BIOS network settings of the chassis.

1. Move the IP RESET and SAFE MODE switches to the ON position.

2. Push the RESET button to cycle power to the chassis.
3. Configure the IP and other network settings in MAX.
4. Move the IP RESET and SAFE MODE switches to the OFF position.



**Note** If the chassis is restored to the BIOS network settings, the LabVIEW run-time engine does not load. You must reconfigure the network settings and restart the chassis for the LabVIEW run-time engine to load.

## cRIO-9072/9073/9074 Specifications

The following specifications are typical for the range -20 °C to 55 °C unless otherwise noted.



**Caution** Do not operate the cRIO-9072/9073/9074 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

### Network

Network interface	10Base-T and 100Base-TX Ethernet
Compatibility	IEEE 802.3
Communication rates	10 Mbps, 100 Mbps, auto-negotiated
Maximum cabling distance	100 m/segment

### RS-232 Serial Port

Maximum baud rate	115,200 bps
Data bits	5, 6, 7, 8
Stop bits	1, 2
Parity	Odd, Even, Mark, Space
Flow control	RTS/CTS, XON/XOFF, DTR/DSR

### SMB Connector (cRIO-9074 only)

#### Output Characteristics

Minimum high-level output voltage	
With -100 $\mu$ A output current	2.9 V
With -16 mA output current	2.4 V
With -24 mA output current	2.3 V

Maximum low-level output voltage	
With 100 $\mu$ A output current	0.10 V
With 16 mA output current	0.40 V
With 24 mA output current	0.55 V
Driver type	CMOS
Maximum sink/source current	$\pm$ 24 mA
Maximum 3-state output leakage current	$\pm$ 5 $\mu$ A
Input Characteristics	
Minimum input voltage	0 V
Minimum low-level input voltage	0.94 V
Maximum high-level input voltage	2.43 V
Maximum input voltage	5.5 V
Typical input capacitance	2.5 pF
Typical resistive strapping	1 k $\Omega$ to 3.3 V

## Memory

### cRIO-9072, cRIO-9073

Nonvolatile	128 MB minimum
DRAM	64 MB

### cRIO-9074

Nonvolatile	256 MB minimum
DRAM	128 MB

For information about the life span of the nonvolatile memory and about best practices for using nonvolatile memory, go to [ni.com/info](http://ni.com/info) and enter the Info Code SSDBP.

## Reconfigurable FPGA

### cRIO-9072

FPGA type	Xilinx Spartan-3 1M
Number of flip-flops	15,360
Number of 4-input LUTs	15,360
Number of multipliers	24
Available block RAM	432 kbits
Number of DMA channels	3

## cRIO-9073, cRIO-9074

FPGA type	Xilinx Spartan-3 2M
Number of flip-flops	40,960
Number of 4-input LUTs	40,960
Number of multipliers	40
Available block RAM	720 kbits
Number of DMA channels	3

For information about the life span of the nonvolatile memory and about best practices for using nonvolatile memory, go to [ni.com/info](http://ni.com/info) and enter the Info Code `SSDBP`.

## Internal Real-Time Clock

Accuracy 200 ppm; 35 ppm at 25 °C

## Power Requirements



**Caution** You must use a UL Listed ITE power supply marked **LPS** with the cRIO-9072/9073/9074.

Recommended power supply	48 W, 24 VDC
Power consumption	20 W maximum
Power supply input range	19 V to 30 V

## Physical Characteristics

If you need to clean the module, wipe it with a dry towel.



**Tip** For two-dimensional drawings and three-dimensional models of the C Series module and connectors, visit [ni.com/dimensions](http://ni.com/dimensions) and search by module number.

### Screw-terminal wiring

Gauge	0.13 mm <sup>2</sup> to 2.1 mm <sup>2</sup> (26 AWG to 14 AWG) copper conductor wire
Wire strip length	6 mm (0.24 in.) of insulation stripped from the end
Temperature rating	85 °C
Torque for screw terminals	0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.)
Wires per screw terminal	One wire per screw terminal
Ferrules	0.25 mm <sup>2</sup> to 1.5 mm <sup>2</sup>

## Connector securement

Securement type	Screw flanges provided
Torque for screw flanges	0.3 N · m to 0.4 N · m (2.7 lb · in. to 3.5 lb · in.)
Dimensions (unloaded)	286.4 mm × 87.3 mm × 58.9 mm (11.3 in. × 3.4 in. × 2.3 in.)
Weight	929 g (32.7 oz)

## Safety Voltages

Connect only voltages that are within the following limits:

V terminal to C terminal	35 VDC maximum, Measurement Category I
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Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as *MAINS* voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.



**Caution** Do not connect the cRIO-9072/9073/9074 to signals or use for measurements within Measurement Categories II, III, or IV.



**Note** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

## Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
Europe (ATEX) and International (IECEX)	Ex nA IIC T4 Gc

## Safety and Hazardous Locations Standards

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

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1
- EN 60079-0:2012, EN 60079-15:2010
- IEC 60079-0: Ed 6, IEC 60079-15; Ed 4

- UL 60079-0; Ed 5, UL 60079-15; Ed 3
- CSA 60079-0:2011, CSA 60079-15:2012



**Note** For UL and other safety certifications, refer to the product label or the [Online Product Certification](#) section.

## Electromagnetic Compatibility

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

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



**Note** For EMC declarations and certifications, and additional information, refer to the [Online Product Certification](#) section.



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

## CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 94/9/EC; Potentially Explosive Atmospheres (ATEX)

## Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and 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.

## Shock and Vibration

To meet these specifications, you must panel mount the system.

### Operating vibration

Random (IEC 60068-2-64)	5 g <sub>rms</sub> , 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz to 500 Hz
Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

## Environmental

Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-20 °C to 55 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection	IP40
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-78)	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.

## Environmental Management

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

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

## Waste Electrical and Electronic Equipment (WEEE)




**EU Customers** At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit [ni.com/environment/weee](https://ni.com/environment/weee).

## Battery Replacement and Disposal



**Battery Directive** This device contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized National Instruments service representative. For more information about compliance with the EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit [ni.com/environment/batterydirective](https://ni.com/environment/batterydirective).

# 电子信息产品污染控制管理办法（中国 RoHS）

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

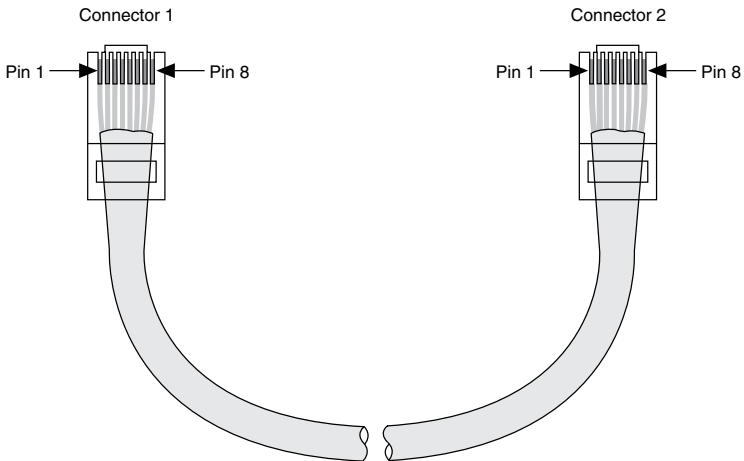
## Cabling

The following table shows the standard Ethernet cable wiring connections for both normal and crossover cables.

**Table 3. Ethernet Cable Wiring Connections**

Pin	Connector 1	Connector 2 (Normal)	Connector 2 (Crossover)
1	white/orange	white/orange	white/green
2	orange	orange	green
3	white/green	white/green	white/orange
4	blue	blue	blue
5	white/blue	white/blue	white/blue
6	green	green	orange
7	white/brown	white/brown	white/brown
8	brown	brown	brown

**Figure 15. Ethernet Connector Pinout**





# Worldwide Support and Services

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The NI website is your complete resource for technical support. At [ni.com/support](https://ni.com/support), you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

Visit [ni.com/services](https://ni.com/services) for NI Factory Installation Services, repairs, extended warranty, and other services.

Visit [ni.com/register](https://ni.com/register) to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting [ni.com/certification](https://ni.com/certification). If your product supports calibration, you can obtain the calibration certificate for your product at [ni.com/calibration](https://ni.com/calibration).

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