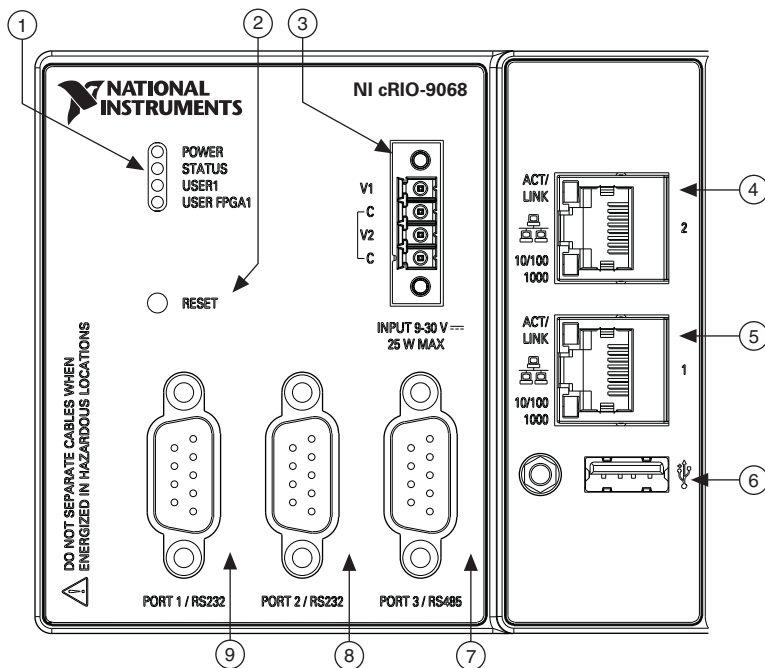# OPERATING INSTRUCTIONS AND SPECIFICATIONS

CompactRIO™ cRIO-9068

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

Figure 1. CompactRIO cRIO-9068 Front Panel

1	LEDs	4	RJ-45 Ethernet Port 2	7	RS-485 Serial port
2	Reset Button	5	RJ-45 Ethernet Port 1	8	RS-232 Serial Port
3	Power Connector	6	USB Port	9	RS-232 Serial Port

This document describes how to connect the cRIO-9068 to a network and how to use the features of the cRIO-9068. This document also contains specifications for the cRIO-9068.

Safety Guidelines

⚠️ **Caution** Do *not* operate the NI cRIO-9068 in a manner not specified in these operating instructions. 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 National Instruments for repair.

Safety Guidelines for Hazardous Locations

The cRIO-9068 is suitable for use in Class I, Division 2, Groups A, B, C, D, T4 hazardous locations; Class 1, Zone 2, AEx nC IIC T4 and Ex nL IIC T4 hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the cRIO-9068 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** Substitution of components may impair suitability for Class I, Division 2.

⚠️ **Caution** For Zone 2 applications, install the CompactRIO system in an enclosure rated to at least IP 54 as defined by IEC 60529 and EN 60529.

⚠️ **Caution** The USB port requires the NI Industrial USB Extender Cable, NI part number 152166-xx. The cable must pass through conduit or cable gland to a nonhazardous location. Do not disconnect the cable unless the cRIO-9068 is powered off or the area is known to be nonhazardous.

Special Conditions for Hazardous Locations Use in Europe

Some chassis have been evaluated as Ex nA IIC T4 Gc equipment under DEMKO Certificate No. 12 ATEX 1202658X. Each such chassis is marked ⟨Ex⟩ II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of $-40 \leq Ta \leq 70$ °C.

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

⚠️ **Caution** The system shall be mounted in an ATEX certified enclosure with a minimum ingress protection rating of at least IP 54 as defined in IEC/EN 60529 and used in an environment of not more than Pollution Degree 2.

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

What You Need to Install CompactRIO Reconfigurable Embedded Hardware

☐ CompactRIO reconfigurable embedded chassis with integrated intelligent real-time controller

☐ C Series I/O modules

☐ Panel mounting kit (for panel mounting only)

☐ DIN rail mounting kit (for DIN rail mounting only)

☐ Desktop mounting kit (for desktop mounting only)

☐ Three M4 or number 8 flathead screws (for mounting the chassis without one of the listed mounting kits)

☐ A number 2 Phillips screwdriver

☐ Power supply

☐ Ethernet cable

Note Visit ni.com/info and enter the Info Code rdsoftwareversion to determine which software you need to use the cRIO-9068.

Mounting the Chassis

In order to obtain the maximum allowable ambient temperature of 70 °C, you must mount the chassis horizontally on a flat, vertical, metallic surface such as a panel or wall. You can mount the chassis directly to the surface or you can use the NI Panel Mounting Kit. You can also mount the chassis in other orientations, on a nonmetallic surface, on a 35 mm DIN rail, on a desktop, or in a rack. Mounting the chassis in these or other configurations can reduce the maximum allowable ambient temperature and can affect the typical accuracy of modules in the chassis. Figure 2 shows the chassis mounted horizontally.

Figure 2. NI cRIO-9068 Mounted Horizontally
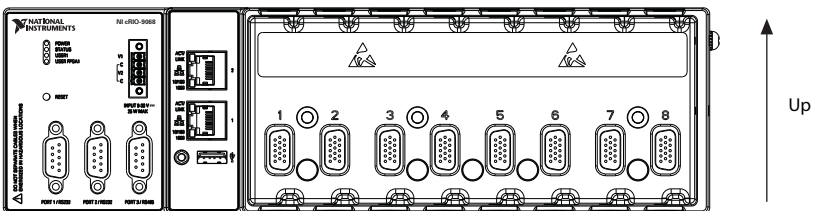
Note For more information about how different mounting configurations can cause temperature derating, go to ni.com/info and enter the Info Code `criomounting`.

Note For more information about typical accuracy specifications for modules, go to ni.com/info and enter the Info Code `criotypical`.

Note Measure the ambient temperature at each side of the chassis, 63.5 mm (2.5 in.) from the side and 25.4 mm (1 in.) forward from the rear of the chassis, as shown in Figure 3.

Caution 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, as shown in Figure 4.
- 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, as shown in Figure 3.

Note For information about the minimum cabling clearance for C Series modules with other connector types, go to ni.com/info and enter the Info Code `rdcrioconn`.

Figure 3. cRIO-9068, Bottom View with Dimensions
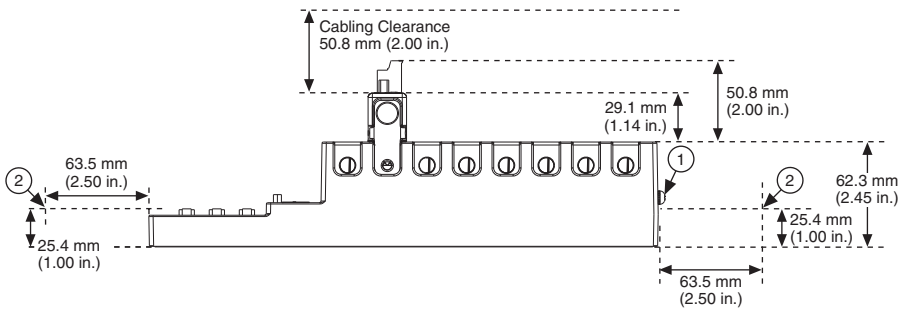
| 1 | Chassis Grounding Screw | 2 | Measure ambient temperature here. |

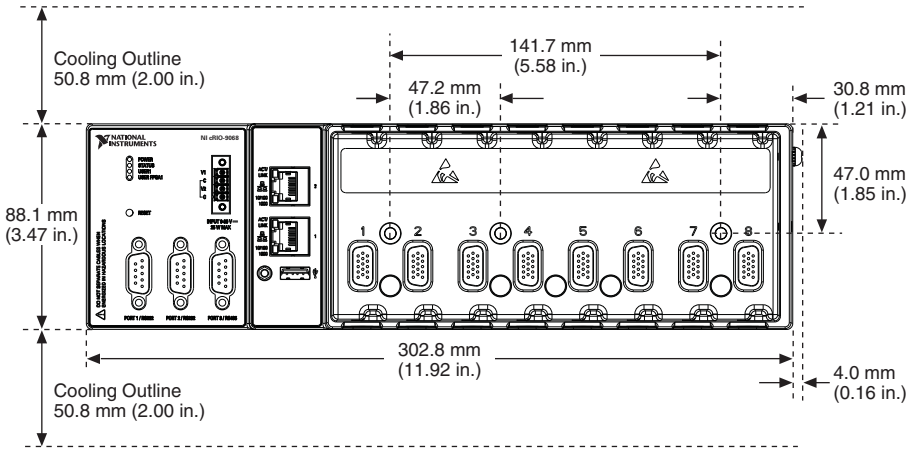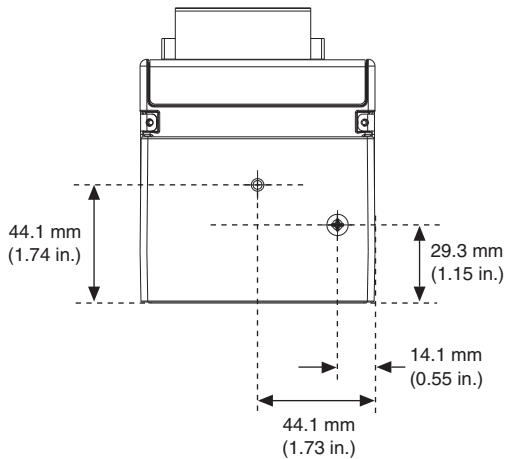**Figure 4.** cRIO-9068, Front View with Dimensions

Figure 5. cRIO-9068, Side View with Dimensions

Note For more information about the dimensions of the system, including detailed dimensional drawings, go to `ni.com/dimensions`.

Note For more information about mounting the chassis in environments with high shock and vibration, go to `ni.com/info` and enter the Info Code `criomounting`.

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 Directly on a Flat Surface Using the Mounting Holes

For environments with high shock and vibration, National Instruments recommends mounting the chassis directly on a flat, rigid surface using the mounting holes in the chassis. Complete the following steps to mount the chassis:

1. Use the dimensions shown in Figure 4 to prepare the surface for mounting the chassis.

2. Align the chassis on the surface.

3. Fasten the chassis to the surface using three M4 or number 8 screws appropriate for the surface, as shown in Figure 6. Screws must be longer than 19 mm (0.75 in.) to pass all the way through the chassis. National Instruments does not provide these screws with the chassis.

Figure 6. Mounting the cRIO-9068 Directly on a Flat Surface
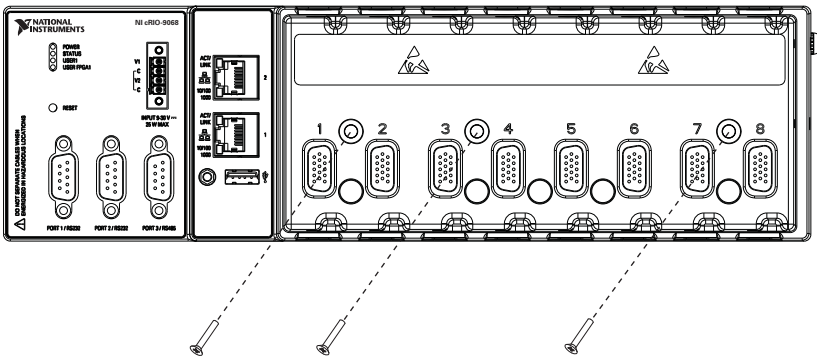
Mounting the Chassis Using the NI Panel Mounting Kit

You can use the NI panel mounting kit, part number 782863-01, to mount the chassis on a flat surface. Complete the following steps.

1. Fasten the panel mounting plate to the chassis using a number 2 Phillips screwdriver and three M4 × 23 screws. National Instruments provides these screws with the panel mounting kit. You *must* use these screws because they are the correct depth and thread for the panel mounting plate. Tighten the screws to a maximum torque of 1.3 N · m (11.5 lb · in.).

Figure 7. Installing the Panel Mounting Plate on the cRIO-9068
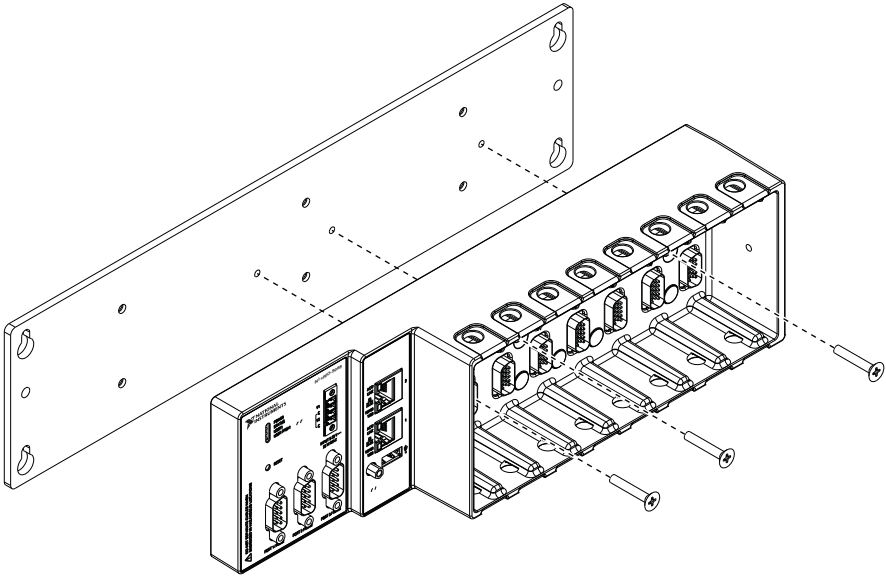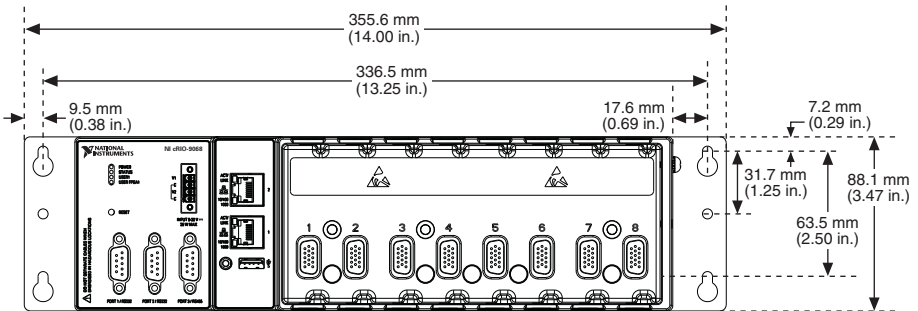

Figure 8. Dimensions of cRIO-9068 with Panel Mounting Plate Installed

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 M5 or number 10.

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

Mounting the Chassis on a DIN Rail

You can use the NI 9915 DIN rail mounting kit, part number 779018-01, to mount 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 × 25 flathead screws. National Instruments provides these screws with the DIN rail mounting kit. Tighten the screws to a maximum torque of 1.3 N · m (11.5 lb · in.).

Figure 9. Installing the DIN Rail Clip on the cRIO-9068

2. Insert one edge of the DIN rail into the deeper opening of the DIN rail clip, as shown in Figure 10.

Figure 10. One Edge of the DIN Rail Inserted in a Clip
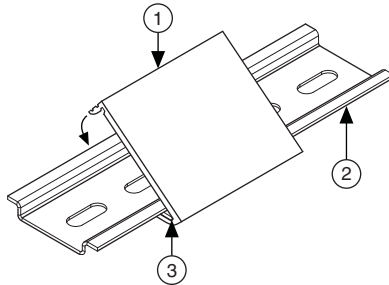
1	DIN Rail Clip	2	DIN Rail	3	DIN Rail Spring

3. Press down firmly on the chassis to compress the spring until the clip locks in place on the DIN rail.
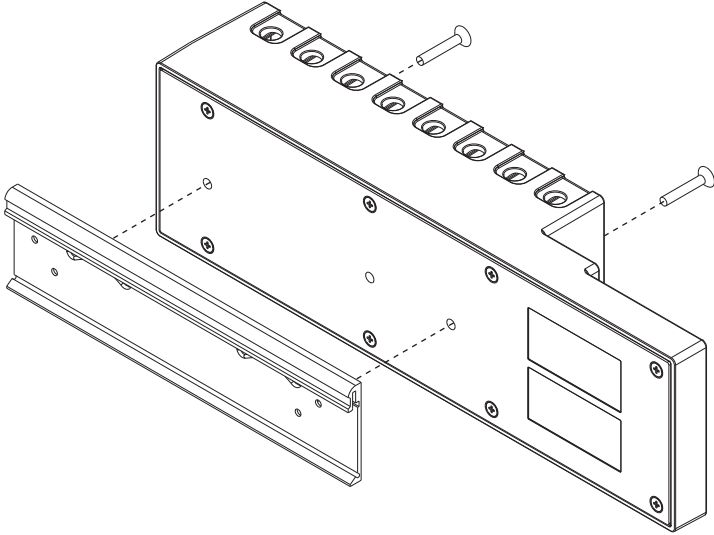
⚠ **Caution** Make sure that no I/O modules are in the chassis before removing it from the DIN rail.

Mounting the Chassis on a Desktop

You can use the NI 9901 desktop mounting kit to mount the chassis on a desktop. You must install the adapter bracket using two M3 × 20 screws. The adapter bracket and the screws are included in the kit. Refer to the NI 9901 documentation for information about mounting the chassis on a desktop.

Installing C Series I/O Modules in the Chassis

Figure 11 shows the mechanical dimensions of C Series I/O modules.

Figure 11. C Series I/O Module, Front and Side View with Dimensions
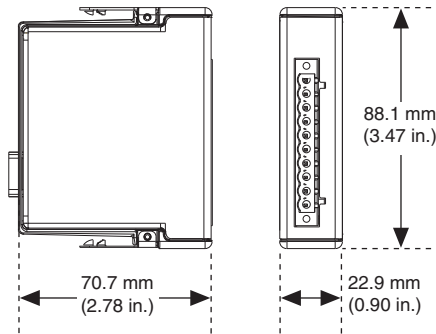
Complete the following steps to install a C Series I/O module in the chassis.

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 as shown in Figure 12. The module slots are labeled 1 to 8, left to right.

Figure 12. 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

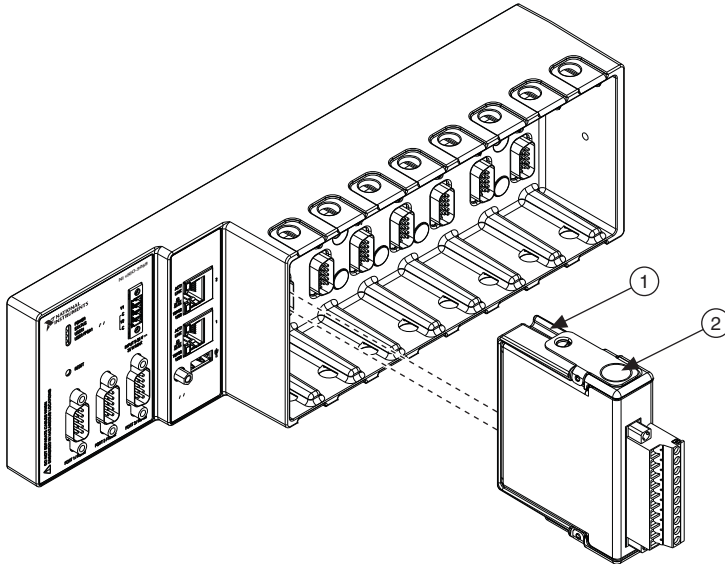Complete the following steps to remove a C Series I/O module from the chassis.

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 RJ-45 Ethernet port 1 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 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.

The first time you power up the chassis, it attempts to initiate a DHCP network connection. 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`. After powerup, you must install software on the chassis and configure the network settings in Measurement & Automation Explorer (MAX) as described in the *Configuring the System in MAX* section of this document.

📝 **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` and enter the Info Code `ipconfigcrio`.

Grounding the Chassis

You must connect the chassis grounding terminal to the grounding electrode system of your facility. Complete the following steps to ground the chassis:

1. Attach a ring lug to a 2.0 mm^2 (14 AWG) or larger wire.
2. Remove the grounding screw from the grounding terminal on the right side of the chassis. Refer to Figure 3 for the location of the grounding screw.
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^2 (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` and enter the Info Code `emcground`.

Wiring Power to the Chassis

The cRIO-9068 requires an external power supply that meets the specifications in the *Power Requirements* section. The cRIO-9068 filters and regulates the supplied power and provides power for all of the I/O modules. The cRIO-9068 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 COMBICON power connector shipped with the cRIO-9068, and tighten the terminal screw. Figure 13 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 13. COMBICON Power Connector
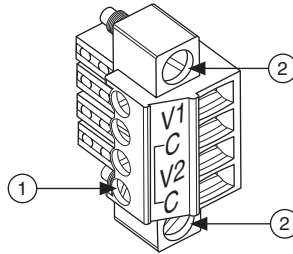
1	Terminal Screws	2	Connector Screws

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-9068 and tighten the connector screws.

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

Powering On the cRIO-9068

When you apply power to the cRIO-9068, the controller starts up. The Power and Status LEDs turn on briefly, andthen the Status LED turns off. 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-9068 to launch an embedded stand-alone LabVIEW RT application each time you boot the controller. Refer to the *Running a Stand-Alone Real-Time Application (RT Module)* topic of the *LabVIEW Help* for more information.

If you have downloaded a bitfile to the cRIO-9068, it will be autoloaded by default at startup. If you want to disable bitfile autoloading, either use the **Disable FPGA Startup App** setting in MAX, or click the **Erase Bitfile on Flash** button in the RIO Device Setup Utility. Access the

RIO Device Setup utility by selecting **Start»All Programs»National Instruments»NI-RIO» RIO Device Setup**.

Controller Startup Options

You can configure controller startup options in MAX. Select the controller under **Remote Systems** in the MAX configuration tree, then select the **System Settings** tab. You can configure the following options under **Startup Settings**.

Safe Mode

When you reboot the controller with this setting on, the controller starts without launching LabVIEW RT or any startup applications. In safe mode the controller launches only the services necessary for updating configuration and installing software.

Console Out

When you reboot the controller with this setting on, the controller redirects output to Port 1, one of the RS-232 serial ports. You can use a serial-port terminal program to read the IP address and firmware version of the controller. Use a null-modem cable to connect Port 1 to a computer. Make sure that the serial-port terminal program is configured to the following settings:

- 115,200 bits per second
- Eight data bits
- No parity
- One stop bit
- No flow control

Disable RT Startup App

Rebooting the controller with this setting on prevents any LabVIEW startup applications from running.

Enable Secure Shell (SSH) Logins

Rebooting the controller with this setting on starts sshd on the controller. Starting sshd enables logins over SSH, an encrypted communication protocol. For information about SSH, go to ni.com/info and enter the Info Code openssh.

Disable FPGA Startup App

Rebooting the controller with this setting on prevents any FPGA application from being autoloaded.

⚠️ **Caution** When you reset the cRIO-9068 controller either programmatically or by using the Reset button, you also reset the FPGA. All FPGA I/O lines are tri-stated after a reset.

Battery

The cRIO-9068 contains a lithium cell battery that stores the system clock information when the system is powered off. There is only a slight drain on the battery when power is applied to the cRIO-9068 power connector. The rate at which the battery drains when power is disconnected depends on the ambient storage temperature. For longer battery life, store the cRIO-9068 at a cooler temperature. Refer to the *Battery* section of the specifications for the expected battery lifetime.

If the battery is dead, the system still starts, but the system clock is reset to the date and time of the BIOS release. The battery is not user replaceable. If you need to replace the battery, please contact National Instruments.

Configuring the System in MAX

Complete the following steps to configure the system for the first time in MAX:

1. Launch MAX on the host computer.
2. Expand **Remote Systems** in the MAX configuration tree and find the system. MAX lists the system as the model name followed by the serial number, for example, **NI-cRIO-9068-1856XXX**. If you cannot find the system, refer to the *Troubleshooting Network Communication* section of this document.
3. Right-click the system and select **Web Configuration**. The **Web Configuration** window appears.
4. Click the **Security Configuration** icon on the left. The **Security Configuration** window appears.

5. Click **Login** at the top right.
6. Enter **admin** for the user name, leave the password blank, and click **OK**.
7. Click **Change Password**.
8. Enter and re-enter the new password, click **OK**, then click **Save**. A message appears warning that the password is changing and you must log in again. Click **OK**.

Connecting Serial Devices to the cRIO-9068

The cRIO-9068 has two RS-232 serial ports and one RS-485 serial port to which you can connect devices such as displays or input devices. Use the Serial VIs to read from and write to a serial port from a LabVIEW RT application. For more information about the Serial VIs, refer to the *LabVIEW Help*. For information about available transceiver modes for serial communication, go to ni.com/info and enter the Info Code serialtransceiver.

Figure 14. Controller Serial Port Pin Locations
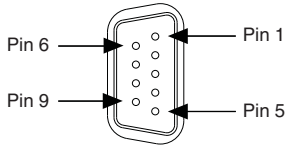
Table 1. RS-232 Pin Descriptions

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

Table 2. RS-485 Pin Descriptions

Pin	Signal
1	GND
2	NC
3	NC
4	RXP
5	RXN
6	NC
7	NC
8	TXP
9	TXN

Connecting USB Mass-Storage Devices to the Controller

The cRIO-9068 supports common USB mass-storage devices such as USB Flash drives and USB-to-IDE adapters formatted with FAT16 and FAT32 file systems. LabVIEW maps USB devices to the `U:`, `V:`, `W:`, or `X:` drive, starting with the `U:` drive if it is available. You can connect multiple USB mass-storage devices to the cRIO-9068 if you use a USB hub. Refer to the *LabVIEW Help* for more information.

Note If the cRIO-9068 is not in a hazardous location, you can connect and disconnect USB devices without affecting operation.

Using the cRIO-9068 File System

The file system of the cRIO-9068 follows conventions established for UNIX-style operating systems. Other LabVIEW RT targets follow Microsoft Windows-style conventions. In order to facilitate the porting of applications from those targets, this target supports the Windows-style `/C` home directory. This path is bound to the UNIX-style directory `/home/lvuser`.

Various LabVIEW RT system files which would be accessible from `C:` (or `/C`) on other LabVIEW RT targets are found in different locations on this target.

UNIX-style file systems support the concept of a symbolic link, which allows access to a file using an alternative file path. For example, it is possible to link `/C/ni-rt/system`, where dynamic libraries are deployed on other LabVIEW RT targets, to `/usr/local/lib`, where they are stored on the cRIO-9068, if the application requires this.

For more information, go to `ni.com/info` and enter the Info Code `RT_Paths`.

Using the Internal Real-Time Clock

The system clock of the cRIO-9068 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* specification in the *Specifications* section for the accuracy specifications of the real-time clock.

Understanding LED Indications

Figure 15. cRIO-9068 LEDs

POWER
STATUS
USER1
USER FPGA1
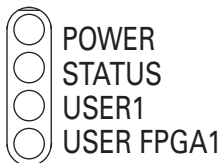
POWER LED

The POWER LED is lit while the cRIO-9068 is powered on. This LED indicates that the power supply connected to the chassis is adequate.

STATUS LED

The STATUS LED is off during normal operation. The cRIO-9068 indicates specific error conditions by flashing the STATUS LED a certain number of times every few seconds, as shown in Table 3.

Table 3. Status LED Indications

Number of Flashes Every Few Seconds	Indication
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 *Measurement & Automation Explorer Help* for information about installing software on the chassis.
3	The chassis is in safe mode. Refer to the *Measurement & Automation Explorer Help* for information about safe mode.
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 flashing or solid	The chassis has detected an unrecoverable error. 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*.

USER FPGA1 LED

You can use the USER FPGA1 LED to help debug your application or easily retrieve application status. Use the LabVIEW FPGA Module and NI-RIO software to define the USER FPGA1 LED to meet the needs of your application. Refer to *LabVIEW Help* for information about programming this LED.

Troubleshooting Network Communication

If the cRIO-9068 cannot communicate with the network, you can perform the following troubleshooting steps.

1. Hold the Reset button down for 5 s, then release it. The Status LED turns on, then starts blinking three times every few seconds. The chassis is now in safe mode with output from the serial port enabled. You can use a serial port terminal to read the IP address of the controller. If you want the controller to attempt a new DHCP connection, proceed to step 2.

2. Hold the Reset button down for 5 s, then release it. The Status LED repeats the same behavior. The cRIO-9068 attempts to establish a new DHCP connection. If it fails, it assigns itself a link-local IP address. If the DHCP connection is successful and appropriate for your application, skip to step 4.

3. Configure the IP and other network settings in MAX.

4. Press and release the Reset button to reboot the chassis.

Where to Go from Here

Now that you have set up the cRIO-9068 and configured it on your network, you can start using it in your applications. The following figure shows the main components of the CompactRIO documentation that you may find helpful as you program and use the cRIO-9068.

Figure 16. CompactRIO Documentation
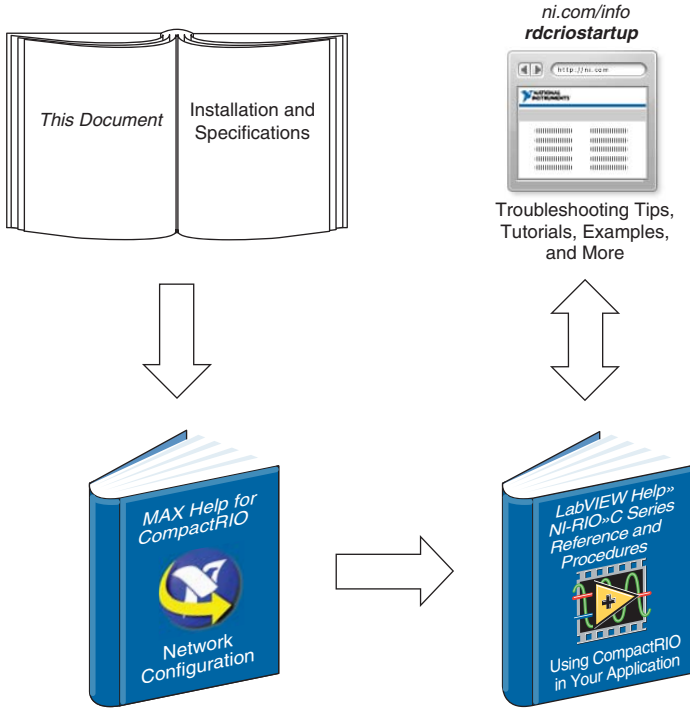
Specifications

The following specifications are typical for the -40 to 70 °C operating temperature range unless otherwise noted.

Network

Network interface .... 10/100/1,000 Ethernet

Compatibility .... IEEE 802.3

Communication rates.. 10 Mbps, 100 Mbps, 1,000 Mbps auto-negotiated

Maximum cabling distance................................ 100 m/segment

RS-232 Serial Ports

Maximum baud rate ....230,400 bps

Data bits 5, 6, 7, 8

Stop bits 1, 2

Parity ....Odd, Even, Mark, Space

Flow control ....RTS/CTS, XON/XOFF, DTR/DSR

RS-485 Serial Port

Maximum baud rate ....230,400 bps

Data bits 5, 6, 7, 8

Stop bits 1, 2

Parity ....Odd, Even, Mark, Space

Flow control ....XON/XOFF

Transmission modes...2-wire, 2-wire auto, 4-wire

Isolation voltage..60 VDC continuous[1]

Memory

Nonvolatile..1 GB

DRAM ....512 MB

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

Reconfigurable FPGA

FPGA type ....Xilinx Zynq 7020

Number of flip-flops...106,400

Number of 6-input LUTs 53,200

Number of DSP slices
(18 x 25 multipliers) 220

Available block RAM ....4,480 kbits

Number of DMA channels................................32

Internal Real-Time Clock

Accuracy ....5 ppm

---

[1] Refer to the *Safety Voltages* section for more information about the RS-485 serial port isolation voltage.

Battery

Typical battery life with power
applied to power connector .... 10 years

Typical battery life
in storage at 55 °C .... 5.7 years

Minimum battery life
in storage at 85 °C .... 5.3 years

Power Requirements

Voltage input range .... 9 to 30 V

Maximum power input .... 25 W

Maximum power consumption .... 25 W

Physical Characteristics

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

Screw-terminal wiring .... 0.2 mm^2 (24 AWG) to 2.1 mm^2 (14 AWG)
copper conductor wire with 10 mm (0.39 in.) of
insulation stripped from the end

Torque for screw terminals .... 0.5 to 0.6 N · m
(4.4 to 5.3 lb · in.)

Weight .... 1,164 g (41.1 oz)

Safety Voltages

Connect only voltages that are within these limits.

V terminal to C terminal .... 30 V max,
Measurement Category I

Isolation voltage, RS-485 serial port to earth ground
Continuous .... 60 VDC,
Measurement Category I
Withstand .... 1,000 V_{rms}, verified by a 5 s
dielectric withstand test

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 system to signals or use for measurements within Measurement Categories II, III, or IV.

Safety Standards

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

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

📝 **Note** For UL and other safety certifications, refer to the product label or 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 the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

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

CE Compliance $C\,\epsilon$

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

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EEC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the Declaration of Conformity (DoC) for this product for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

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`. 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 products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

Battery Replacement

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 sevice representative.

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`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

For additional information, visit `ni.com/environment`.

Hazardous Locations

U.S. (UL) .... Class I, Division 2, Groups A, B, C, D, T4;
Class I, Zone 2,
AEx nC IIC T4

Canada (C-UL) .... Class I, Division 2, Groups A, B, C, D, T4;
Class I, Zone 2,
Ex nL IIC T4

Europe (DEMKO) .... Ex nA IIC T4 Gc

Environmental

Operating temperature
(IEC 60068-2-1, IEC 60068-2-2) .... -40 to 70 °C

Note   Failure to follow the mounting instructions in the *Mounting the Chassis* section of this document can cause temperature derating. For more information about mounting configurations and temperature derating, go to `ni.com/info` and enter the Info Code `criomounting`.

Storage temperature
(IEC 60068-2-1, IEC 60068-2-2)......................-40 to 85 °C

Ingress protection...IP 40

Operating humidity (IEC 60068-2-56) ....10 to 90% RH, noncondensing

Storage humidity (IEC 60068-2-56) ....5 to 95% RH, noncondensing

Maximum altitude..2,000 m

Pollution Degree (IEC 60664) 2

Indoor use only

Shock and Vibration

To meet these specifications, you must mount the chassis directly on a flat, rigid surface as described in the *Mounting the Chassis Directly on a Flat Surface Using the Mounting Holes* section, affix ferrules to the ends of the terminal lines, and provide strain relief for all cables.

Operating shock (IEC 60068-2-27) ....30 g, 11 ms half sine
50 g, 3 ms half sine,
18 shocks at 6 orientations

Operating vibration, random
(IEC 60068-2-64)...5 g_{rms}, 10 to 500 Hz

Operating vibration, sinusoidal
(IEC 60068-2-6)...5 g, 10 to 500 Hz

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At 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.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, visit the Worldwide Offices section of ni.com/niglobal to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.