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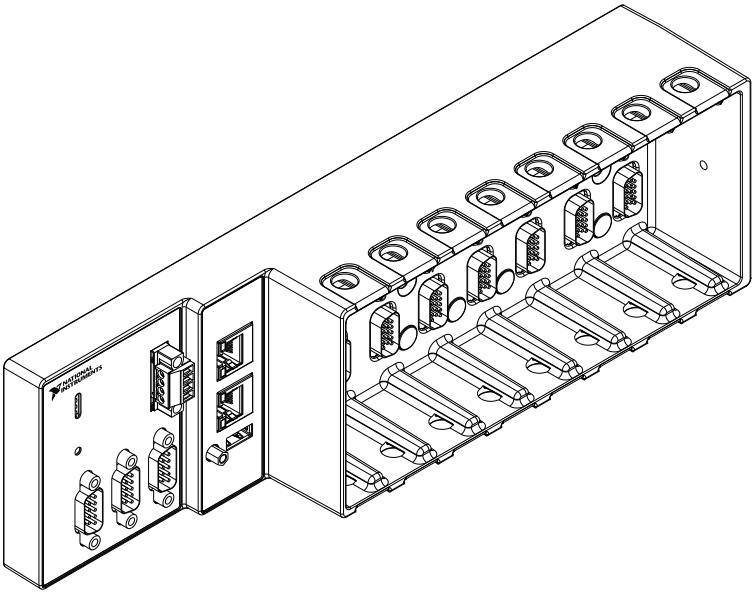
Find the *National Instruments cRIO-9068* at our website: ***Click HERE***

GETTING STARTED GUIDE

NI cRIO-9068

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

This document describes how to begin using the NI cRIO-9068.



Safety Guidelines

Caution Do not operate the cRIO-9068 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-9068 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-9068 in a

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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.

Caution The USB port requires NI Industrial USB Extender Cable (152166-*xx*) for hazardous locations. All cables must be used in a conduit or cable gland to wire to a nonhazardous location. Do not disconnect a cable unless the cRIO-9068 is powered off or the area is known to be nonhazardous.

Special Conditions for Hazardous Locations Use in Europe and Internationally

The cRIO-9068 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO 12 ATEX 1202658X and is IECEx UL 14.0089X certified. Each device is marked Ⓔx II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of -40 °C ≤ Ta ≤ 70 °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/EN 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

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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* 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.

Preparing the Environment

Ensure that the environment in which you are using the cRIO-9068 meets the following specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Operating humidity (IEC 60068-2-56)	10% RH to 90% RH, noncondensing
Pollution Degree	2
Maximum altitude	5,000 m

Indoor use only.

Note Refer to the device specifications on *ni.com/manuals* for complete specifications.

Unpacking the Kit

Caution To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

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1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.

Caution Never touch the exposed pins of connectors.

Note Do not install a device if it appears damaged in any way.

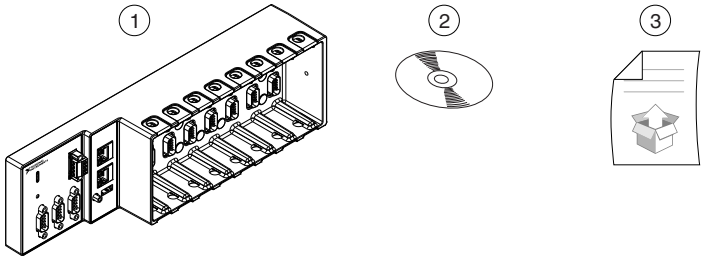
3. Unpack any other items and documentation from the kit.

Store the device in the antistatic package when the device is not in use.

Verifying the Kit Contents

Verify that the following items are included in the cRIO-9068 kit.

Figure 1. Kit Contents



1. cRIO-9068 with power connector
2. NI Driver Media
3. Getting Started Guide

Installing Software on the Host Computer

Before using the cRIO-9068, you must install the following application software and device drivers on the host computer in this order:

1. LabVIEW 2013 or later
2. LabVIEW Real-Time Module 2013 or later
3. LabVIEW FPGA Module 2013 or later[1]
4. NI CompactRIO Device Drivers 13.0 or later

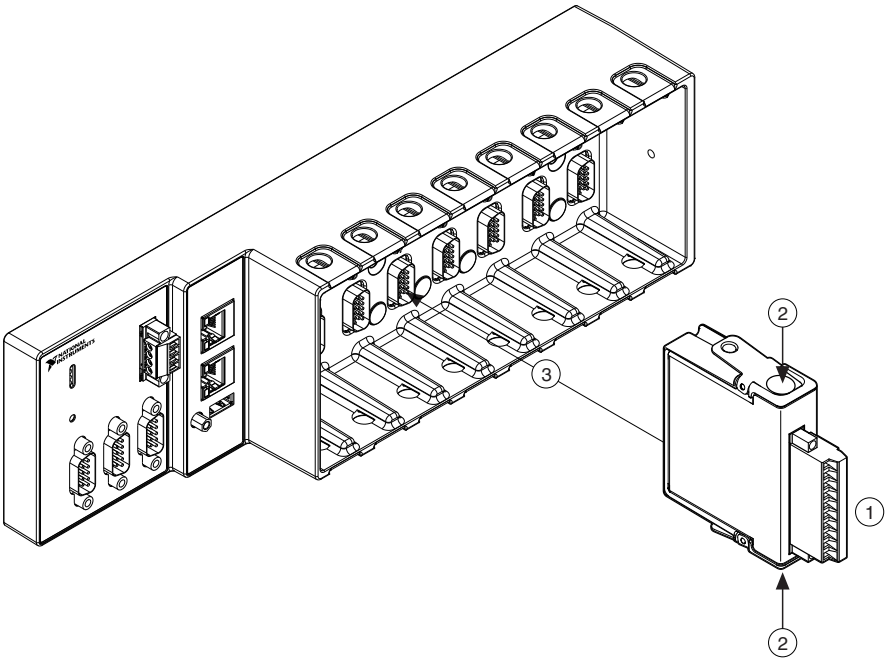
For minimum software support information, visit *ni.com/info* and enter the Info Code `swsupport`.

[1] LabVIEW FPGA Module is not required when using Scan Interface mode. To program the user-accessible FPGA on the cRIO-9068, LabVIEW FPGA Module is required.

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Installing C Series Modules

Complete the following steps to install a C Series module.



1. Verify that power is not connected to the I/O connector(s) on the C Series module. If the system is in a nonhazardous location, the cRIO-9068 can be powered on when you install modules.
2. Press the latches on the C Series module.
3. Align the C Series module with a slot and seat it in the slot until the latches lock in place.

Removing C Series Modules

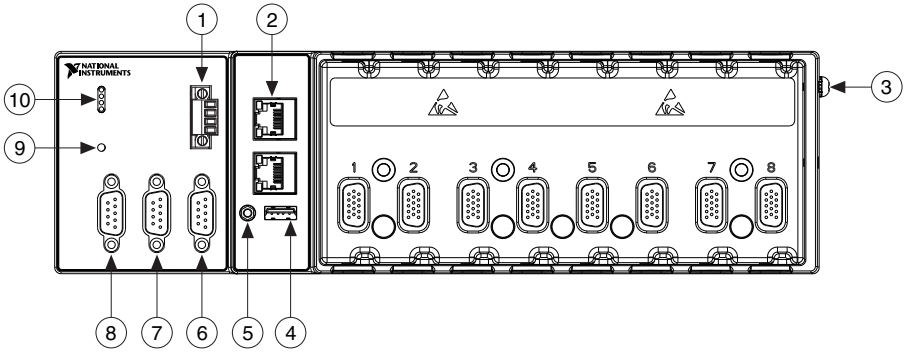
Verify that power is not connected to the I/O connector(s) on the C Series module before you remove a module from the cRIO-9068. If the system is in a nonhazardous location, the cRIO-9068 can be powered on when you remove modules.

Connecting the cRIO-9068

The cRIO-9068 has the following connectors, LEDs, and buttons.

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Figure 2. cRIO-9068 Part Locator Diagram



1. Power Connector
2. Ethernet Ports
3. Chassis Ground Terminal
4. USB Host Port
5. USB Cable Retention Mount
6. RS-485 Serial Port
7. RS-232 Serial Port
8. RS-232 Serial Port
9. Reset Buttom
10. LEDs

Connecting the cRIO-9068 to Ground

You must connect the cRIO-9068 grounding terminal to the grounding electrode system of the facility.

What to Use

- Ring lug
- Wire, 2.0 mm^2 (14 AWG) or larger
- Screwdriver, Phillips #2

What to Do

Complete the following steps to ground the cRIO-9068.

1. Attach the ring lug to the wire.
2. Remove the grounding screw from the grounding terminal on the cRIO-9068.
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 that is appropriate for your application.

Caution If you use shielded cabling to connect to a C Series module with a plastic connector, you must attach the cable shield to the chassis grounding terminal using 2.0 mm^2 (14 AWG) or larger wire. Attach a ring lug to the wire and attach the wire

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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, visit *ni.com/info* and enter the Info Code `emcground`.

Connecting the cRIO-9068 to Power

The cRIO-9068 requires a 9 V to 30 V external power supply. The cRIO-9068 filters and regulates the supplied power and provides power for the C Series modules. The cRIO-9068 has a primary power input, V1, and a secondary power input, V2.

The POWER LED on the cRIO-9068 indicates which power input is in use, as shown in the following table.

Table 1. POWER LED Indicators

LED Color	LED Pattern	Indication
Green	Solid	The cRIO-9068 is powered from the V1 input.
Yellow	Solid	The cRIO-9068 is powered from the V2 input.
—	Off	The cRIO-9068 is powered off.

Caution Do not connect V2 to a DC mains supply or to any supply that requires a connecting cable longer than 3 m (10 ft). A DC mains supply is a local DC electricity supply network in the infrastructure of a site or building.

What to Use

- Screwdriver, 2.54 mm (0.10 in.) flathead
- Primary power supply, 9 V to 30 V, 25 W minimum
- (Optional) Secondary power supply, 9 V to 30 V, 25 W minimum

NI recommends the power supplies listed in the following table for the cRIO-9068.

Table 2. NI Power Supplies

Power Supply	Part Number
NI PS-15 Industrial Power Supply (24 VDC, 5 A, 100 VAC to 120 VAC/200 VAC to 240 VAC input)	781093-01
NI PS-10 Desktop Power Supply (24 VDC, 5 A, 100 VAC to 120 VAC/200 VAC to 240 VAC input)	782698-01

What to Do

Complete the following steps to connect a power supply to the cRIO-9068.

1. Ensure that your power supply is powered off.

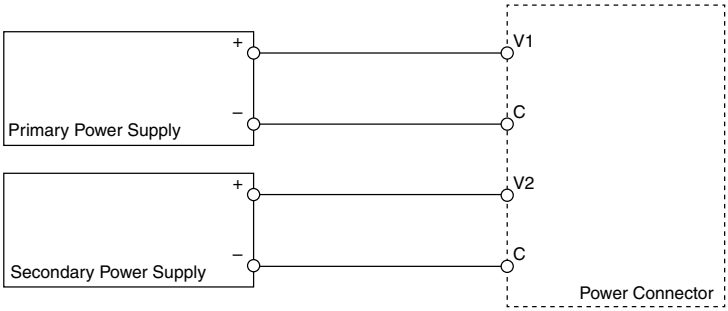
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2. Remove the power connector from the cRIO-9068.

Caution Do not tighten or loosen the terminal screws on the power connector while the cRIO-9068 is powered on.

3. Connect the primary power supply and optional secondary power supply to the power connector, as shown in the following figure.

Figure 3. cRIO-9068 Power Connections



Note The C terminals are internally connected to each other.

4. Tighten the terminal screws on the power connector to 0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.) of torque.
5. Install the power connector on the front panel of the cRIO-9068.
6. Tighten the power connector screw flanges to 0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.) of torque.
7. Power on the primary power supply and optional secondary power supply.

Connecting the cRIO-9068 to the Host Computer or Network

Complete the following steps to connect the cRIO-9068 to a host computer or Ethernet network using the RJ-45 Ethernet port 1. NI recommends using the RJ-45 Ethernet port 1 for communication with deployed systems.

Note You can configure the RJ-45 Ethernet port 2 in Measurement & Automation Explorer (MAX) under the **Network Settings** tab.

1. Power on the host computer or Ethernet hub.
2. Connect the RJ-45 Gigabit Ethernet port 1 on the cRIO-9068 to the host computer or Ethernet hub using a standard Category 5 (CAT-5) or better shielded, twisted-pair Ethernet cable.

Caution To prevent data loss and to maintain the integrity of your Ethernet installation, do not use a cable longer than 100 m (328 ft).

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The cRIO-9068 attempts to initiate a DHCP network connection the first time you connect using Ethernet. The cRIO-9068 connects to the network with a link-local IP address with the form 169.254.*x.x* if it is unable to initiate a DHCP connection.

Tip Installing software may change the network behavior of the cRIO-9068. For information about network behavior by installed software version, visit *ni.com/info* and enter the Info Code `ipconfigcrio`.

Configuring the System in Measurement & Automation Explorer (MAX)

Complete the following steps to find the system in MAX.

1. Launch MAX on the host computer.
2. Expand **Remote Systems** in the configuration tree and locate your system.
3. Select your target.

Tip MAX lists the system under the model number followed by the serial number, such as NI-cRIO-9068-1856AAA.

Setting a System Password

Complete the following steps to set a system password.

Note The default username for the cRIO-9068 is `admin`. There is no default password for the cRIO-9068, so you must leave the password field blank when logging in until you set a system password.

1. Right-click your system and select **Web Configuration**.

   The NI Web-Based Configuration and Monitoring utility opens in your default browser and is where you set the password. If you have not installed Microsoft Silverlight, NI Web-based Configuration & Monitoring prompts you to do so.
2. Enter a unique name for your system in the **Hostname** field.
3. Click the **Security Configuration** icon.
4. Click **Login**.
5. In the **Login** dialog box, enter the username `admin` and leave the password field blank.
6. Click **OK**.
7. Click **Change Password**.
8. Enter and re-enter a new password.
9. Click **OK**.
10. Click **Save**.
11. Click **OK** to confirm you are changing the password.

Caution NI cannot recover lost system passwords. If you forget the password, you must contact NI and reformat the controller.

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Installing Software on the cRIO-9068

Complete the following steps to install software on the cRIO-9068.

1. In MAX, expand your system under Remote Systems.
2. Right-click **Software**.
3. Select **Add/Remove Software** to launch the LabVIEW Real-Time Software Wizard.

   Tip You must log in if you set a system password.

4. Select the recommended software set for your LabVIEW and NI-RIO Device Drivers versions.
5. Click **Next**.
6. Select **NI Scan Engine** from the software add-ons.

   Select any additional software to install. If you plan on using the cRIO-9068 with the LabVIEW FPGA Module, you can click **Next**. Click **NI Scan Engine** if you plan on using the cRIO-9068 without the LabVIEW FPGA Module.

   Tip You can use this wizard at anytime to install additional software.

7. Click **Next**.
8. Verify that the summary of software to install is correct.
9. Click **Next** to start the installation.
10. Click **Finish** when the installation is complete.

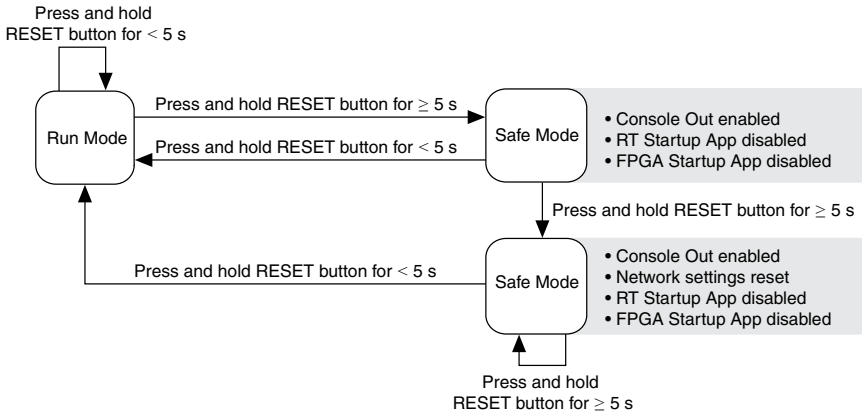
Troubleshooting the cRIO-9068

System Reset

The following figure shows the reset behavior of the cRIO-9068.

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Figure 4. Reset Button Behavior



STATUS LED Indicators

The following table describes the STATUS LED indicators.

Table 3. STATUS LED Indicators

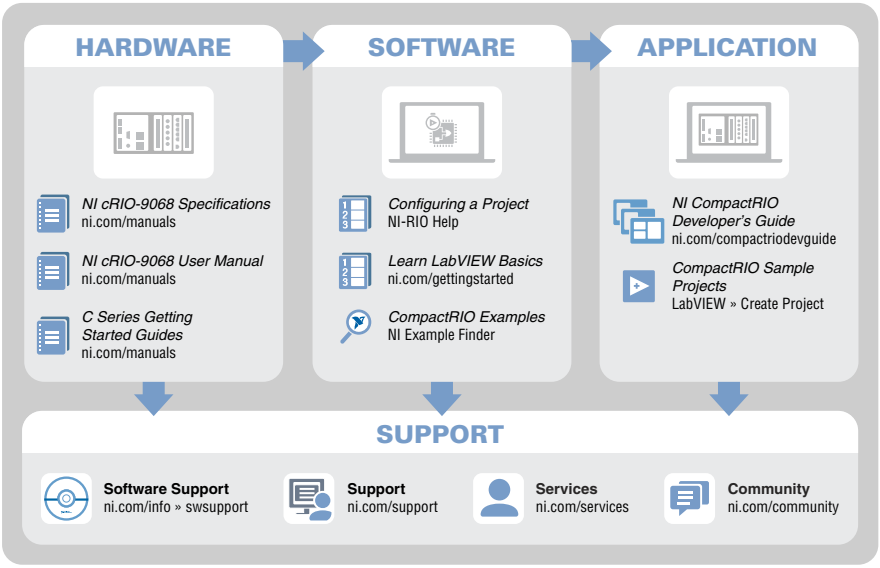
LED Pattern	Indication
Blinks twice and pauses	The cRIO-9068 is in safe mode. Software is not installed, which is the factory default state, or software has been improperly installed on the cRIO-9068. An error can occur when an attempt to upgrade the software is interrupted. Reinstall software on the cRIO-9068. Refer to the *Measurement & Automation Explorer (MAX) Help* for information about installing software on the cRIO-9068.
Blinks three times and pauses	The cRIO-9068 is in user-directed safe mode, or the cRIO-9068 is in install mode to indicate that software is currently being installed. This pattern may also indicate that the user has forced the cRIO-9068 to boot into safe mode by pressing the reset button for longer than five seconds or by enabling safe mode in MAX. Refer to the *Measurement & Automation Explorer (MAX) Help* for information about safe mode.
Blinks four times and pauses	The cRIO-9068 is in safe mode. The software has crashed twice without rebooting or cycling power between crashes.

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Table 3. STATUS LED Indicators (Continued)

LED Pattern	Indication
Continuously blinks	The cRIO-9068 has not booted into NI Linux Real-Time. The cRIO-9068 either booted into an unsupported operating system, was interrupted during the boot process, or detected an unrecoverable software error.
On momentarily	The cRIO-9068 is booting. No action required.
Off	The cRIO-9068 is in run mode. Software is installed and the operating system is running.

Where to Go Next



Worldwide Support and Services

The NI website 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.

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