cRIO-906x Getting Started

Contents

cRIO-906x Overview

This document describes the features of the cRIO-906x, and how to install, mount, and operate the controller.

In this document, the cRIO-9063, cRIO-9064, cRIO-9065, cRIO-9066, cRIO-9067, and cRIO-9068 are referred to collectively as cRIO-906x.

> **Note** Refer to the device Safety, Environmental, and Regulatory Information document, shipped with your cRIO-906x controller, for important safety and environmental specifications necessary when setting up your device.

Unpacking the Kit

> **⊘ Notice** 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.

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.

   > **⊘ Notice** 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.

> **✎ Note** Store the device in the antistatic package when the device is not in use.

Kit Contents

Verify that the following items are included in the cRIO-906x kit.

Figure 1. cRIO-9063/9064/9065 Kit Contents
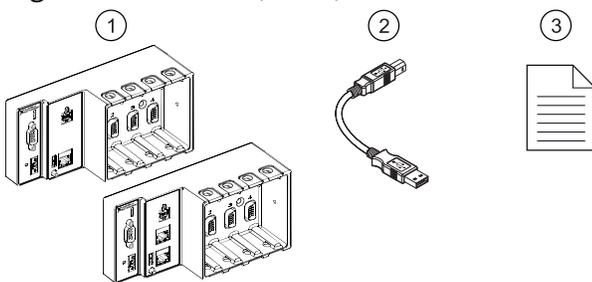
1. cRIO Controller
2. USB A-to-B Cable
3. Safety, Environmental, and Regulatory Information Document

Figure 2. cRIO-9066/9067 Kit Contents
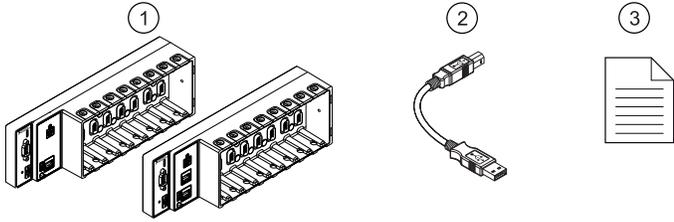
1. cRIO Controller
2. USB A-to-B Cable
3. Safety, Environmental, and Regulatory Information Document

Figure 3. cRIO-9068 Kit Contents
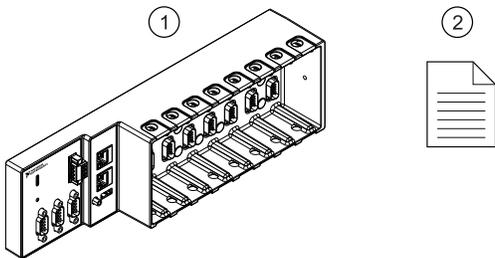
1. cRIO Controller with Power Connector
2. Safety, Environmental, and Regulatory Information Document

Ports and Connectors

The cRIO-906x provides the following ports and connectors.

Figure 4. cRIO-9063/9064/9065/9066/9067 Ports and Connectors
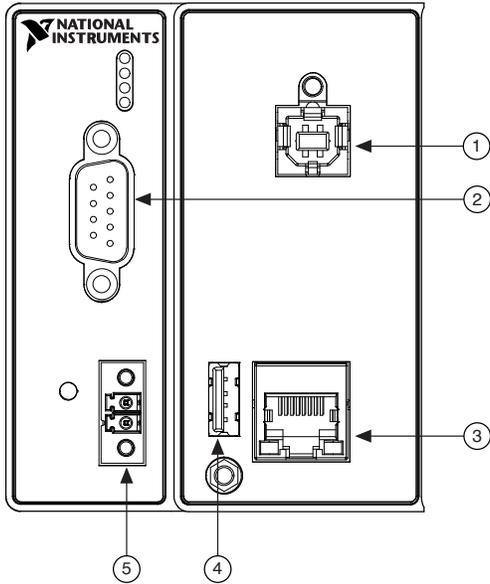
1. USB Device Port
2. RS-232 Serial Port
3. RJ-45 Gigabit Ethernet Ports (one or two, depending on model)
4. USB Host Port
5. Power Connector

Figure 5. cRIO-9068 Ports and Connectors
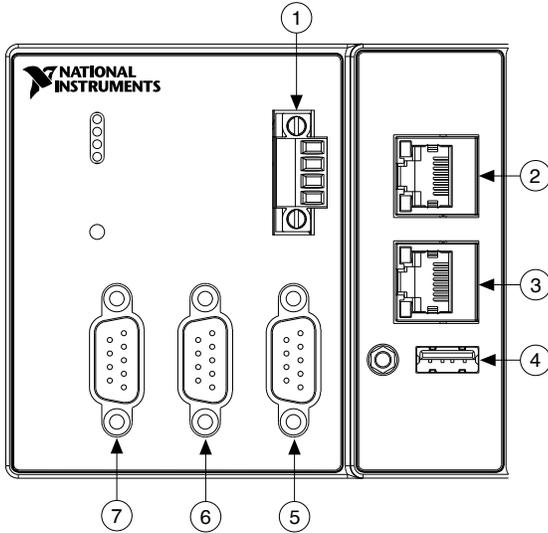
1. Power Connector
2. RJ-45 Gigabit Ethernet Port 2
3. RJ-45 Gigabit Ethernet Port 1
4. USB Host Port
5. RS-485 Serial Port
6. RS-232 Serial Port
7. RS-232 Serial Port

RJ-45 Gigabit Ethernet Port

The cRIO-906x will have one or two tri-speed RJ-45 Gigabit Ethernet ports. By default, the Ethernet port is enabled and configured to obtain an IP address automatically. The Ethernet port can be configured in MAX.

Figure 6. RJ-45 Gigabit Ethernet Port, Typical
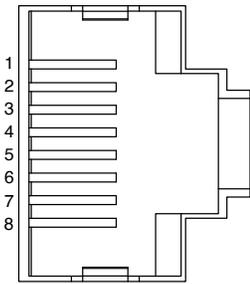
Table 1. RJ-45 Gigabit Ethernet Port Pinout, Typical

Pin	Fast Ethernet Signal	Gigabit Ethernet Signal
1	TX+	TX_A+
2	TX-	TX_A-
3	RX+	RX_B+
4	No Connect	TX_C+
5	No Connect	TX_C-
6	RX-	RX_B-
7	No Connect	RX_D+
8	No Connect	RX_D-

Note The Ethernet port performs automatic crossover configuration so you do not need to use a crossover cable to connect to a host computer.

The following NI Ethernet cables are available for use with the cRIO-906x.

Table 2. RJ-45 Gigabit Ethernet Cables

Cables	Length	Part Number
CAT-5E Ethernet Cable, shielded	2 m	151733-02
	5 m	151733-05
	10 m	151733-10

Power Connector

cRIO-9063/64/65/66/67

The cRIO-9063/64/65/66/67 have a power connector to which you can connect a power supply.
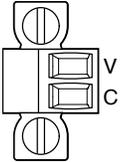
Table 3. Power Connector Pinout

Pin	Description
V	Power input
C	Common

The cRIO-9063/64/65/66/67 have reverse-voltage protection.

The following NI power supplies and accessories are supported.

Table 4. Power Accessories

Accessory	Part Number
NI PS-10 Desktop Power Supply, 24 VDC, 5 A, 100-120/200-240 VAC Input	782698-01
NI PS-14 Industrial Power Supply, 24 to 28 VDC, 3.3 A, 100-240 VAC Input	783167-01
NI PS-15 Industrial Power Supply, 24 to 28 VDC, 5 A, 100/230 VAC Input	781093-01
NI PS-16 Industrial Power Supply, 24 to 28 VDC, 10 A, 115/230 VAC Input	781094-01
NI PS-17 Industrial Power Supply, 24 to 28 VDC, 20 A, 85-276 VAC Input	781095-01

cRIO-9068

The cRIO-9068 has a power connector to which you can connect a primary and secondary power supply. The following table shows the pinout for the power connector.
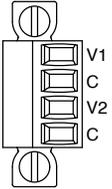
Table 5. cRIO-9068 Power Connector Pinout

Pin	Description
V1	Primary power input
C	Common
V2	Secondary power input
C	Common

If you apply power to both the V1 and V2 inputs, the cRIO-9068 operates from the V1 input. If the input voltage to V1 is insufficient, the cRIO-9068 operates from the V2 input.

The cRIO-9068 has reverse-voltage protection.

The following NI power supplies and accessories are supported.

Table 6. Power Accessories

Accessory	Part Number
NI PS-15 Power Supply, 24 VDC, 5 A, 100-120/200-240 VAC Input	781093-01
NI PS-10 Desktop Power Supply, 24 VDC, 5 A, 100-120/200-240 VAC Input	782698-01
4-Position Gold Power Supply Plugs (Quantity 5)	783529-01

Accessory	Part Number
NI 9979 Strain Relief for 4-Position Power Connector	196939-01

RS-232 Serial Port

The cRIO-906x will have one or two RS-232 serial ports 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. Refer to the **LabVIEW Help** for information about the Serial VIs.

Find examples on how to use NI-Serial or NI-VISA to perform serial communication in the NI Example Finder. The NI Example Finder is located on the Help menu in the **LabVIEW Help**.

> ✏️ **Note** The RS-232 serial port cannot be accessed by the user application when the Console Out startup option is enabled.

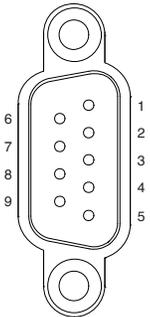The following table shows the pinout for an RS-232 serial port.

Table 7. RS-232 Serial Port Pinout

Pin	Signal
1	DCD
2	RxD
3	TxD

Pin	Signal
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Table 8. RS-232 Serial Port Accessories

Accessory	Length	Part Number
RS-232, Null-Modem Serial Cable, 9-Pin DSUB (Female) to 9-Pin DSUB (Female)	1 m	182238-01
	2 m	182238-02
	4 m	182238-04

RS-485 Serial Port

The cRIO-906x has an 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 the serial ports. Refer to the *LabVIEW Help* for information about the Serial VIs.

Find examples on how to use NI-Serial or NI-VISA to perform serial communication in the NI Example Finder. The NI Example Finder is located on the Help menu in the *LabVIEW Help*. For information about available transceiver modes for serial communication, visit ni.com/r/serialtransceiver.

The following table shows the pinout for the RS-485 serial port.

Table 9. RS-485 Serial Port Pinout

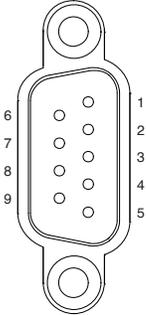| Pinout	Pin	Signal
	1	Ground
	2	No Connect
	3	No Connect
	4	RXD+
	5	RXD-
	6	No Connect
	7	No Connect
	8	TXD+
	9	TXD-

Table 10. RS-485 Serial Port Accessories

Accessory	Length	Part Number
RS-485/RS-422, Null-Modem Serial Cable, 9-Pin DSUB (Female) to 9-Pin DSUB (Female)	1 m	183283-01
	2 m	183283-02
	4 m	183283-04

USB Host Ports

The USB host ports on the cRIO-906x support common USB mass-storage devices such as USB Flash drives, USB-to-IDE adapters, keyboards, mice, and USB cameras.

⚠️ **Caution** Do not hot-swap USB devices while the cRIO-906x is in a hazardous location or connected to high voltages. If the cRIO-906x is not in a hazardous location, you can connect and disconnect USB devices without affecting operation.

The following table shows the pinout for the USB host ports.

Table 11. USB Host Port Pinout for cRIO-906x

Pin	Signal	Description
1	VCC	Cable power (5 V)
2	D-	USB data-
3	D+	USB data+
4	GND	Ground

The following NI cable is available for the cRIO-906x.

Table 12. USB Host Port Cable

Cable	Length	Part Number
USB Extension with Retention, Type A Connectors	0.5 m	152166-0R5
	2 m	152166-02

USB Device Port

The cRIO-9063, cRIO-9064, cRIO-9065, cRIO-9066, and cRIO-9067 have a USB device port you can use for device configuration, application deployment, debugging, and maintenance. For example, you can use the USB device port to install software or driver updates during field maintenance instead of interrupting communication on the RJ-45 Ethernet ports.
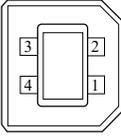
Note There is no USB device port on the cRIO-9068.

Caution Do not hot-swap USB devices while the device is in a hazardous location or connected to high voltages. If the device is not in a hazardous location, you can connect and disconnect USB devices without affecting operation.

The following table shows the pinout for the USB device port.

Description	Signal	Pin	Pinout	Pin	Signal	Description
USB data+	D+	3		2	D-	USB data-
Ground	GND	4		1	VCC	Cable power (5 V)

The following NI cable is available for the cRIO-906x.

Table 13. USB Device Port Cable

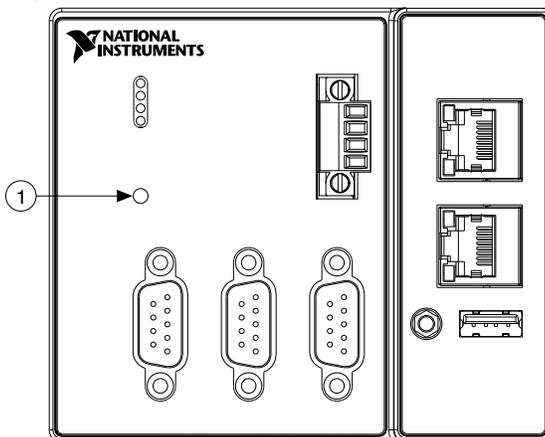| Cable	Length	Part Number
USB Cable	1 m	157788-01

Buttons

The cRIO-906x provides a RESET button to reset the processor in the same manner as cycling power.

Figure 7. RESET Button Location on the cRIO-9063/9064/9065/9066/9067
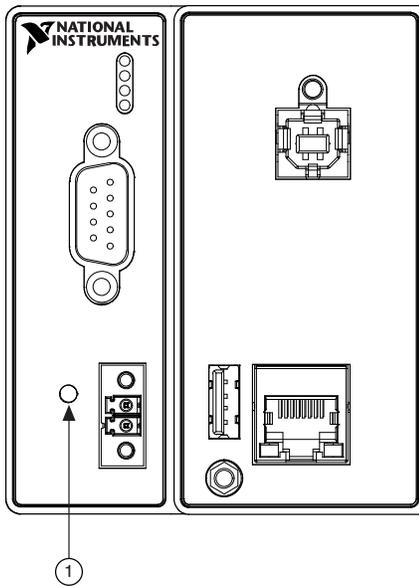
1. RESET button

Figure 8. RESET Button Location on the cRIO-9068

1. RESET button

Troubleshooting Network Connectivity with the RESET Button

You can use the RESET button to troubleshoot network connectivity.

Complete the following steps to reset the network adapters to default settings.

1. Hold the RESET button for 5 seconds, and then release it to boot the controller in safe mode and enable Console Out.
2. Hold the RESET button again for 5 seconds to boot the controller into safe mode, enable Console Out, and reset network adapters to default settings.

System Reset

The following figure shows the reset behavior of the cRIO-906x.

Figure 9. Reset Button Behavior
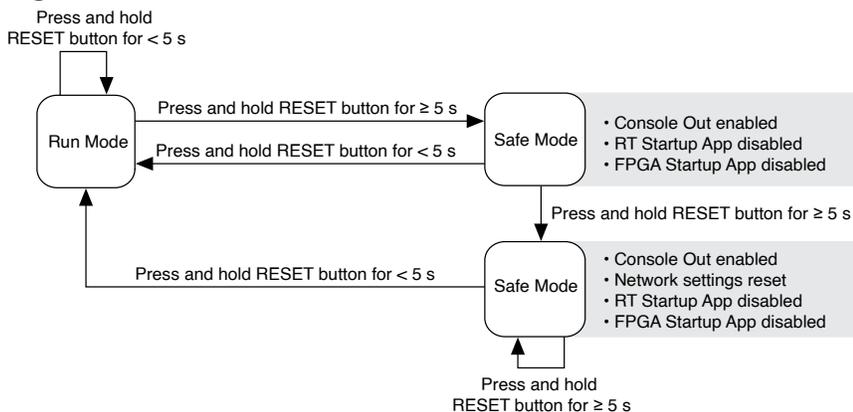
LEDs

cRIO-9063/9064/9065/9066/9067

The cRIO-9063, cRIO-9064, cRIO-9065, cRIO-9066, cRIO-9067 provide the following LEDs.

1. POWER LED
2. STATUS LED
3. USER1 LED
4. USER FPGA1 LED
5. RJ-45 Ethernet LEDs, typical

cRIO-9068

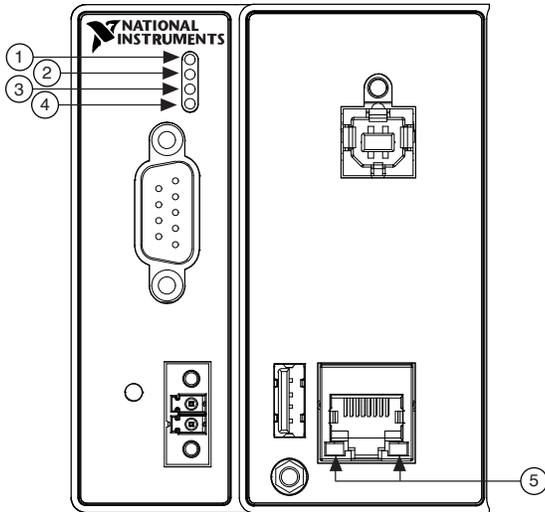The cRIO-9068 provides the following LEDs.
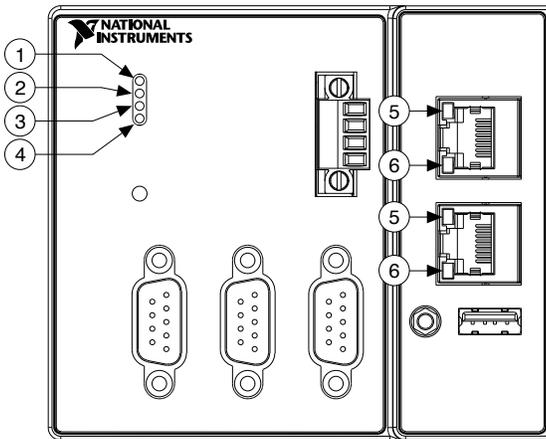
1. Power
2. Status
3. User1
4. User FPGA1
5. ACT/LINK
6. 10/100/1000

POWER LED Indicators

cRIO-9063, cRIO-9064, cRIO-9065, cRIO-9066, cRIO-9067 Power LEDs

LED Color	LED Pattern	Indication
Green	Solid	The device is powered on.
—	Off	The device is powered off.

cRIO-9068 Power LEDs

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

STATUS LED Indicators

LED Pattern	Indication
Blinks twice and pauses	The cRIO-906x is in safe mode. Software is not installed, which is the factory default state, or software has been improperly installed on the device. An error can occur when an attempt to upgrade the software is interrupted. Reinstall software on the device. Refer to the **Measurement & Automation Explorer (MAX) Help** for information about installing software on the cRIO-906x.
Blinks three times and pauses	The cRIO-906x is in user-directed safe mode, or the device is in install mode to indicate that software is currently being installed. This pattern may also indicate that the user has forced the cRIO-906x 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-906x is in safe mode. The software has crashed twice without rebooting or cycling power between crashes.
Continuously blinks	The cRIO-906x has not booted into NI Linux Real-Time. The device either booted into an unsupported operating system, was interrupted during the boot process, or detected an unrecoverable software error.
On momentarily	The cRIO-906x is booting. No action required.
Off	The cRIO-906x is in run mode. Software is

LED Pattern	Indication
	installed and the operating system is running.

User LEDs

You can define the USER1 and USER FPGA1 LEDs to meet the needs of your application.

LED	LED Color	Description
USER1	Green (cRIO-906x)	Use LabVIEW Real-Time to define the USER1 LED with the RT LEDs VI. For more information about the RT LEDs VI, refer to the *LabVIEW Help*.
	Yellow (cRIO-9068 only)	
USER FPGA1	Green (cRIO-906x)	Use the LabVIEW FPGA Module and NI-RIO Device Drivers software to define the USER FPGA1 LED. Use the USER FPGA1 LED to help debug your application or retrieve application status. Refer to the *LabVIEW Help* for information about programming this LED.
	Yellow (cRIO-9068 only)	

Ethernet LED Indicators

LED	LED Color	LED Pattern	Indication
ACT/LINK	—	Off	LAN link not established
	Green	Solid	LAN link established
		Flashing	Activity on LAN
10/100/1000	Yellow	Solid	1,000 Mb/s data rate selected
	Green	Solid	100 Mb/s data rate selected

LED	LED Color	LED Pattern	Indication
	—	Off	10 Mb/s data rate selected

Chassis Grounding Screw

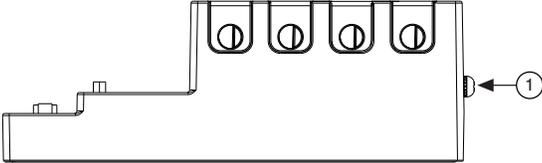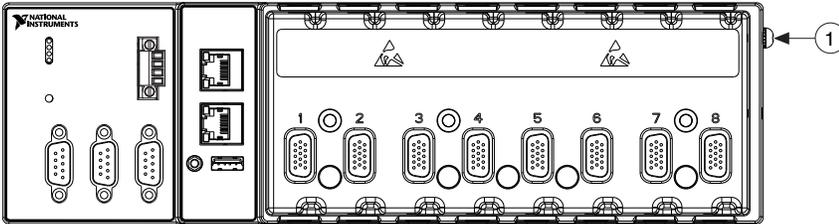Figure 10. cRIO-9063/9064/9065/9066/9067 Chassis Grounding Screw

Figure 11. cRIO-9068 Chassis Grounding Screw

> **Note** For more information about ground connections, refer to the ***Grounding Guide for Test and Measurement Devices*** link below.

Related information:

- [Grounding Guide for Test and Measurement Devices](#)

Internal Real-Time Clock

The cRIO-906x contains an internal real-time clock that maintains system time when the cRIO-906x is powered off. The system clock of the cRIO-906x is synchronized with the internal real-time clock at startup. You can set the real-time clock using MAX, or you can set the clock programmatically using LabVIEW.

Refer to the specifications for your controller for the real-time clock accuracy specifications.

Battery

The cRIO-906x contains a lithium cell battery that stores the system clock information when the cRIO-906x is powered off. There is only a slight drain on the battery when power is applied to the cRIO-906x 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-906x at a cooler temperature and apply power to the power connector. Refer to the specifications for your controller for the expected battery lifetime.

The battery is not user-replaceable. If you need to replace the battery, contact NI. Refer to the Safety, Environmental, and Regulatory Information document for your controller for information about battery disposal.

File System

LabVIEW mounts USB devices and SD cards to the `media/sdx1` directory and creates symbolic links `/u`, `/v`, `/w`, or `/x` to the media mount point, starting with `/u` if it is available. To prevent any file corruption to external storage devices, verify that any file IO operations with the specific drive finish before removing the device. Refer to the **LabVIEW Help** for more information.

The file system of the cRIO-906x follows conventions established for UNIX-style operating systems. Other LabVIEW Real-Time 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 Real-Time system files which would be accessible from `C:` (or `/C`) on other LabVIEW Real-Time 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 Real-Time targets, to `/usr/local/lib`, where they are stored on the cRIO-906x, if the application requires this.

> ✎ **Note** For more information, refer to the **Working with File Paths on Real-Time Targets** link below.

Related information:

- [Working with File Paths on Real-Time Targets](#)

Installing Software on the Host Computer

If you do not currently have any NI software installed on your host computer, refer to the **Install Software** section for details on required software and in which order to install it. If you have some NI software already installed, refer to the **Software Compatibility Resources** section for resources to check the compatibility of your software with your controller.

Install Software

Before using the cRIO-906x, you must install the following application software and device drivers on the host computer in the order shown. Visit ni.com/downloads to download the required software and drivers.

Sequence	Software	Corresponding Programming Mode
1	LabVIEW	
2	LabVIEW Real-Time Module	
3	LabVIEW FPGA Module	LabVIEW FPGA Mode
4	NI CompactRIO Drivers	Scan Interface Mode

> **Note** LabVIEW FPGA Module is not required when using Scan Interface mode. To program the user-accessible FPGA on the cRIO-906x LabVIEW FPGA Module is required.

After installing the software, you must activate it using NI License Manager.

> **Note** If you try to install software that already exists on your host computer, the installer will show nothing installed.

Software Compatibility Resources

For more information about software compatibility, visit the links below.

Related information:

- [Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT](#)
- [Preventing Software Compatibility Issues for CompactRIO Systems](#)

Installing the C Series Modules

Complete the following steps to install a C Series module. Your controller may look different, depending on the module.

Figure 12. Installing a C Series Module, Typical
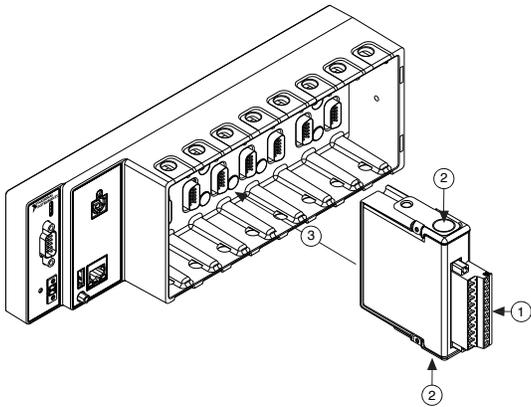
1. Verify that power is not connected to the I/O connector(s) on the C Series module and the cRIO-906x.

   > **Note** If the system is in a nonhazardous location, the cRIO-906x 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-906x. If the system is in a nonhazardous location, the cRIO-906x can be powered on when you remove modules.

Connecting the cRIO-906x to Ground

You must connect the cRIO-906x grounding terminal to the grounding electrode system of the facility.

What to Use

- Ring lug
- Wire, 1.31 mm^2 (16 AWG) or larger
- Screwdriver, Phillips #2

What to Do

Complete the following steps to ground the cRIO-906x.

1. Attach the ring lug to the wire.
2. Remove the grounding screw from the grounding terminal on the cRIO-906x.
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.

> ⊘ **Notice** 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 1.31 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, refer to the ***Grounding Guide for Test and Measurement Devices*** link below.

Related information:

- Grounding Guide for Test and Measurement Devices

Connecting the cRIO-906x to Power

The cRIO-906x requires a 9 V to 30 V external power supply. The cRIO-906x filters and regulates the supplied power and provides power for the C Series modules.

The cRIO-9063/9064/9065/9067 has one layer of reverse-voltage protection.

The cRIO-9068 has a primary power input, V1, and a secondary power input, V2. The POWER LED indicates which power input is in use.

Refer to **Power LED Indicators** for more information about the POWER LED states.

> **(!) Notice** Do not connect the cRIO-9068 secondary power input 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:
    - **(cRIO-9030/9031/9032/9033/9034)**9 V to 30 V, 40 W minimum
    - **(cRIO-9035/9036/9037/9038/9039)**9 V to 30 V, 46 W minimum
- (Optional) Secondary power supply:
    - **(cRIO-9068)**9 V to 30 V, 25 W minimum

NI recommends the power supplies listed in the following table for the cRIO-906x.

Table 14. NI Power Supplies

Power Supply	Part Number
cRIO-906x: NI PS-15 Industrial Power Supply (24 V DC, 5 A, 100 V AC to 120 V AC/200 V AC to 240 V AC input)	781093-01
cRIO-9068 only: NI PS-10 Desktop Power Supply (24 V DC, 5 A, 100 V AC to 120 V AC/200 V AC to	782698-01

Power Supply	Part Number
240 V AC input)	

What to Do

Complete the following steps to connect a power supply to the cRIO-906x.

1. Ensure that your power supply is powered off.
2. Remove the power connector from the cRIO-906x.

   ⚠ **Caution** Do not tighten or loosen the terminal screws on the power connector while the cRIO-906x is powered on.

   ⚠ **Attention** Ne pas serrer ou desserrer les vis des bornes sur le connecteur d'alimentation pendant que le cRIO-906x est sous tension.

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

   Figure 13. cRIO-9063, cRIO-9064, cRIO-9065, cRIO-9066, cRIO-9067 Power Connections
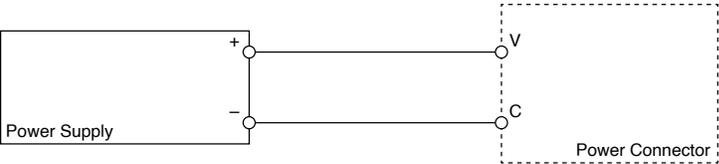
   Figure 14. cRIO-9068 Power Connections
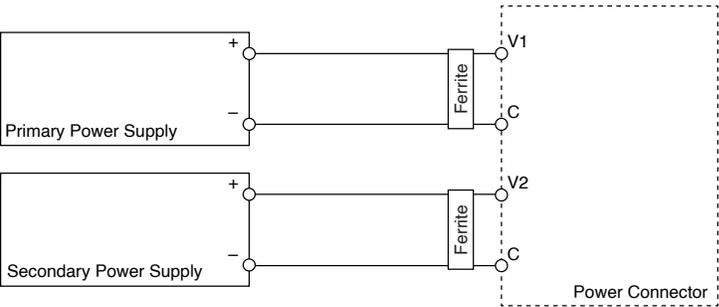
   ✎ **Note** The C terminals are internally connected to each other.

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-906x.

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 power supply. cRIO-9068: Power on the primary power supply (cRIO-906x) and optional secondary power supply.
    When you power on the cRIO-906x for the first time, the device boots into safe mode. The POWER LED illuminates, the STATUS LED illuminates briefly, and then the STATUS LED blinks twice every few seconds, indicating the controller does not yet have software installed.

Related concepts:

- POWER LED Indicators

Connecting the cRIO-906x to the Host Computer or Network

You can connect the cRIO-906x to the host computer and/or network in the following ways:

- USB 2.0 Type-C Device Port with Console Out
- RJ-45 Gigabit Ethernet Port

> **Tip** NI recommends using the USB 2.0 Type-C Device Port for configuration, debug, and maintenance.

Connecting the cRIO-906x to the Host Computer Using USB

Complete the following steps to connect the cRIO-906x to the host computer using the USB device port.

1. Power on the host computer.
2. Connect the cRIO-906x to the host computer using the USB A-to-B cable.

   > **Caution** NI requires the use of a locking USB cable (157788-01) to meet the shock and vibration specifications. Refer to the specifications on ni.com/manuals for shock and vibration specifications.

The device driver software automatically detects the cRIO-906x. If the device driver software does not detect the cRIO-906x, verify that you installed the appropriate NI software in the correct order on the host computer.

Connecting the cRIO-906x to the Host Computer or Network Using Ethernet

Complete the following steps to connect the cRIO-906x to a host computer or Ethernet network using the RJ-45 Gigabit Ethernet port 1. NI recommends using the RJ-45 Gigabit Ethernet port 1 for communication with deployed systems.

> **Note** If your controller has the RJ-45 Gigabit Ethernet port 1, you can configure that port 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-906x to the host computer or Ethernet hub using a standard Category 5 (CAT-5) or better shielded, twisted-pair Ethernet cable.

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

The cRIO-906x attempts to initiate a DHCP network connection the first time you connect using Ethernet. The cRIO-906x 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.

Finding the cRIO-906x on the Network (DHCP)

Complete the following steps to find the cRIO-906x on a network using DHCP.

1. Disable secondary network interfaces on the host computer, such as a wireless access card on a laptop.
2. Ensure that any anti-virus and firewall software running on the host computer allows connections to the host computer.

> **Note** MAX uses UDP 44525. Refer to the documentation of your firewall software for information about configuring the firewall to allow communication through the UDP 44525.

3. Launch MAX on the host computer.
4. Expand **Remote Systems** in the configuration tree and locate your system.

> **Tip** MAX lists the system under the model number followed by the serial number, such as NI-cRIO-906x-1856AAA.

What to Do When the cRIO-906x is Not Communicating with the Network

Use this topic to troubleshoot possible reasons your cRIO-906x is not communicating with the network.

- Ensure that the USB Device connection between the cRIO-906x and the host computer and the Ethernet connections between the host computer and the router are secure.
- Configure the IP and other network settings by completing the following steps.
  1. Use a USB-Type-C-to-USB-Type-A cable (included in the kit) to connect the cRIO-906x USB Type-C Device Port with Console Out to a host computer. The USB driver creates a virtual network interface card and assigns an IP address to the cRIO-906x in the format of 172.22.11.x.
  2. In MAX, expand your system under **Remote Systems**.

     Tip If you do not see the cRIO-906x under **Remote Systems**, use the **Troubleshoot Remote System Discovery** utility to walk through troubleshooting steps.

  3. Select the **Network Settings** tab to configure the IP and other network settings.
  4. (Optional) Use the RJ-45 Ethernet port 1 to reconnect the cRIO-906x to the host computer. The cRIO-906x attempts to initiate a DHCP network connection at power up.

     Note If the cRIO-906x cannot obtain an IP address, it connects to the network with a link-local IP address with the form 169.254.x.x. The host computer communicates with the cRIO-906x over a standard Ethernet connection.

- Ensure that you have the correct version of NI CompactRIO Device Drivers installed on the host computer.

  Note Refer to the *Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT* link

> under **Related Information** below for the minimum supported versions of LabVIEW and NI CompactRIO Device Drivers.

> 🔅 **Tip** If you have recently upgraded LabVIEW, you must reinstall NI CompactRIO Device Drivers.

- Ensure that the NI USBLAN adapter is recognized in the Device Manager. Select **Start** » **Control Panel** » **Device Manager** » **Network adapters** » **National Instruments** » **USBLAN adapter**. If the USBLAN adapter is not recognized, you must reinstall NI CompactRIO Device Drivers.

> ✏️ **Note** For Windows 10, you may need to search for the Control Panel as it not always available from the Start Menu.

- Temporarily disable any network firewalls or other security software.

Related information:

- [Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT](#)

Verifying the System IP Configuration

Complete the following steps to verify the system IP configuration of your cRIO-906x

1. Put the cRIO-906x in safe mode and enable the RS-232 serial port by holding the RESET button down for 5 seconds.
   The STATUS LED starts blinking three times every few seconds.
2. Use the RS-232 serial port terminal to read the IP address, or connect a monitor to the mini DisplayPort to read the IP address.

> ✏️ **Note** Refer to **cRIO-906x Startup Options** for more information about port configuration.

3. Set a new DHCP connection by holding the RESET button down for 5 seconds. The STATUS LED repeats the same behavior from Step 1.
   If the cRIO-906x fails to set a new DHCP address, it assigns itself a link-local IP

address. If the DHCP connection is successful and appropriate for your application, skip to Step 6.

4. In MAX, expand your system under Remote Systems.
5. Select the **Network Settings** tab to configure the IP and other network settings.
6. Reboot the cRIO-906x by pressing the RESET button.

Related reference:

- [cRIO-906x Startup Options](#)

Troubleshooting Network Connectivity with the RESET Button

You can use the RESET button to troubleshoot network connectivity.

Complete the following steps to reset the network adapters to default settings.

1. Hold the RESET button for 5 seconds, and then release it to boot the controller in safe mode and enable Console Out.
2. Hold the RESET button again for 5 seconds to boot the controller into safe mode, enable Console Out, and reset network adapters to default settings.

Configure the Windows Firewall

Use this topic to configure the firewall in Windows to ensure you cRIO-906x can communicate with the network.

- Use the **Troubleshoot Remote System Discovery** tool to configure the firewall.
  1. In MAX, right click **Remote Systems** and select **Troubleshoot Remote System Discovery**.
  2. Follow the steps in the tool.
- Add an exception for MAX to your network firewall or other security software by completing the following steps:
  1. Select **Start » Control Panel » Windows Firewall » Allow a program through Windows Firewall**.

     > ✎ **Note** For Windows 10, you may need to search for the Control Panel as it not always available from the Start Menu.

2. Click **Allow another program**.

3. Select **Measurement & Automation**.

4. Click **Add**.

5. Click **OK**.

- Ensure that UDP port 44525 is open to communication on the host computer. If you are using an intelligent switch on the network, ensure that it is not disabling UDP port 44525.

Discovering the Controller in MAX

Complete the following steps to find the cRIO-906x controller 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 by default.

Setting a System Password

Complete the following steps to set a system password.

1. In MAX, click the **Log In** button on the toolbar.
2. Enter `admin` in the **User name** field.
3. Leave the **Password** field blank.

> **Note** There is no default password for the cRIO-906x, so you must leave the password field blank when logging in until you set a system password.

4. Click the **OK** button.
5. Click the **Set Permissions** button in the toolbar.
   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.
6. Click the **Login** button and enter `admin` in the **User name** field.
7. Leave the **Password** field blank if you have not changed the default password, or enter the current password.
8. Double-click **admin** in the list of users under the **Users** tab.
9. Click **Change Password**.
10. Enter and re-enter a new password.
11. Click **OK**.
12. Click **Save**.

13. Click **OK** to confirm you are changing the password.

> ⊘ **Notice** NI cannot recover lost system passwords. If you forget the password, you must contact NI and reformat the controller.

14. Close the NI Web-Based Configuration and Monitoring utility.

Installing Software on the Controller

Complete the following steps to install software on the cRIO-906x.

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 to install software on the cRIO-906x. The default username for the cRIO-906x is admin. There is no default password for the cRIO-906x. To set a password for your system, refer to ***Setting a System Password***.

4. Select the recommended software set for your LabVIEW and NI-RIO Device Drivers versions.
5. Click **Next**.
6. Select any additional software from the list of software add-ons, if needed.

> 🔆 **Tip** You can use this wizard at any time to install additional software.

> ✐ **Note** LabVIEW FPGA Module is required to run your modules in the LabVIEW FPGA programming mode. NI Scan Engine is required to run your modules in the Real-Time Scan (IO Variables) programming mode.

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.

Related tasks:

- Setting a System Password

Configuring Startup Options

You can configure the startup options using the USB device port or RJ-45 Gigabit Ethernet port.

Complete the following steps to configure the cRIO-906x startup options in MAX.

1. In MAX, expand your system under Remote Systems.
2. Select the **Startup Settings** tab to configure the startup settings.

cRIO-906x Startup Options

You can configure the following cRIO-906x startup options.

Table 15. cRIO-906x Startup Options

Startup Option	Description
Force Safe Mode	Rebooting the cRIO-906x with this setting on starts the cRIO-906x without launching LabVIEW Real-Time or any startup applications. In safe mode, the cRIO-906x launches only the services necessary for updating configuration and installing software.
Enable Console Out	Rebooting the cRIO-906x with this setting on redirects the console output to the USB 2.0 Type-C Device Port with Console Out. You can use a serial-port terminal program to read the IP address and firmware version of the cRIO-906x. 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 cRIO-906x with this setting on prevents any LabVIEW startup applications from running.
Disable	Rebooting the cRIO-906x with this setting on prevents autoloading of any FPGA

Startup Option	Description
FPGA Startup App	application.
Enable Secure Shell (SSH) Logins	Rebooting the cRIO-906x with this setting on starts sshd on the cRIO-906x. Starting sshd enables logins over SSH, an encrypted communication protocol. **Note** Refer to the *Accessing the Shell on NI Linux Real-Time Devices* link under *Related Information* below for more information about SSH.
LabVIEW Project Access	Rebooting the cRIO-906x with this setting on enables you to add the target to a LabVIEW project.

Related information:

- [Accessing the Shell on NI Linux Real-Time Devices](#)

Mounting the Controller

To obtain the maximum ambient temperature for your controller (55 °C for the cRIO-9063/9064/9066/9067, and 70 °C for the cRIO-9065/9068), you must mount the cRIO-906x horizontally on a flat, metallic, vertical surface such as a panel or wall. You can mount the cRIO-906x directly to the surface or use the NI Panel Mounting Kit. The following figure shows the cRIO-906x mounted horizontally.

Figure 15. cRIO-906x Horizontal Mounting, Typical
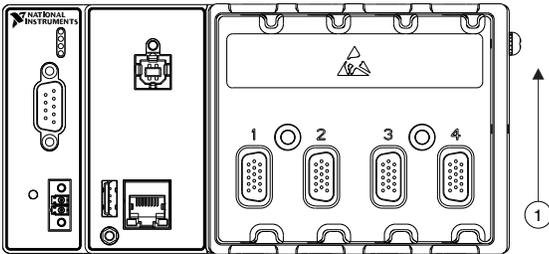
1. Up

You can also mount the cRIO-906x in other orientations, on a nonmetallic surface, on a 35-mm DIN rail, on a desktop, or in a rack. Mounting the cRIO-906x in these or other configurations can reduce the maximum allowable ambient temperature and can affect the typical accuracy of modules in the cRIO-906x.

⚠️ **Caution** Make sure that no C Series modules are in the cRIO-906x before mounting it.

💡 **Tip** Before using any of these mounting methods, record the serial number from the back of the cRIO-906x so that you can identify the cRIO-906x in MAX. You will be unable to read the serial number after you mount the cRIO-906x.

Dimensions

The following figures show the front and side dimensions of the cRIO controller.

✏️ **Note** For detailed dimensional drawings and 3D models, visit ni.com/

dimensions and search for the module number.

Figure 16. cRIO-9063/9064/9065 Front Dimensions, Typical

87.3 mm
(3.44 in.)

178.1 mm
(7.01 in.)

4.1 mm
(0.16 in.)
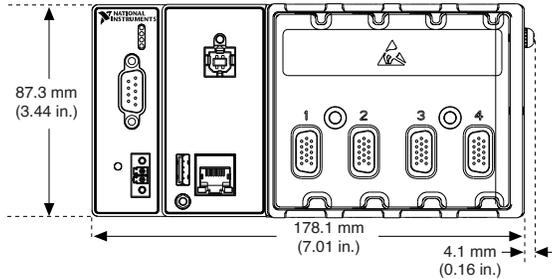
Figure 17. cRIO-9066/9067 Front Dimensions, Typical

88.1 mm
(3.47 in.)

272.8 mm
(10.74 in.)

4.1 mm
(0.16 in.)
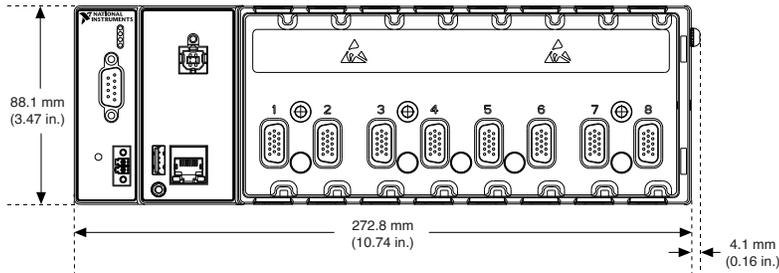
Figure 18. cRIO-9068 Front Dimensions

88.1 mm
(3.47 in.)

302.8 mm
(11.92 in.)

4.0 mm
(0.16 in.)
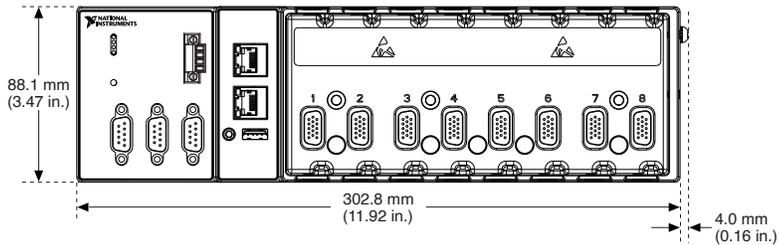
Figure 19. cRIO-9064/9065/9066 Side Dimensions, Typical

44.1 mm
(1.74 in.)

29.1 mm
(1.15 in.)

14.1 mm
(0.55 in.)

44.1 mm
(1.73 in.)
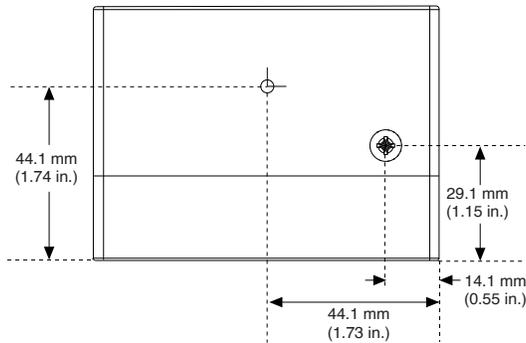
Figure 20. cRIO-9066/9067/9068 Side Dimensions, Typical

44.1 mm
(1.74 in.)

29.3 mm
(1.15 in.)

14.1 mm
(0.55 in.)

44.1 mm
(1.73 in.)
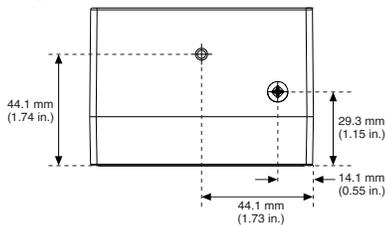
Mounting Requirements

Your installation must meet the following requirements for cooling and cabling clearance.

Allow 25.4 mm (1.00 in.) on the top and the bottom of the cRIO-906x for air circulation, as shown in the following figure.

Figure 21. cRIO-906x Cooling Dimensions, Typical
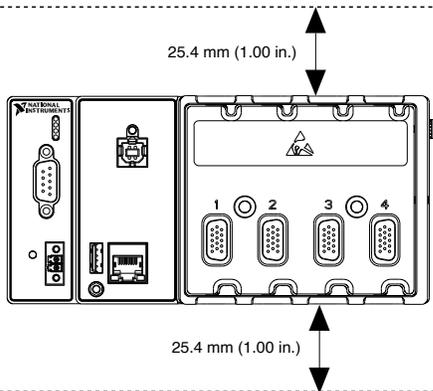
Allow the appropriate space in front of C Series modules for cabling clearance, as shown in the following figure. The different connector types on C Series modules require different cabling clearances.

> **Note** For a complete list of cabling clearances for C Series modules, refer to the ***Cabling Clearances for C Series Modules*** link below.

Figure 22. cRIO-9063/9064/9065/9066/9067 Cabling Clearance, Typical
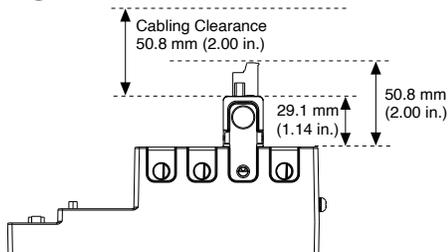
Figure 23. cRIO-908 Cabling Clearance
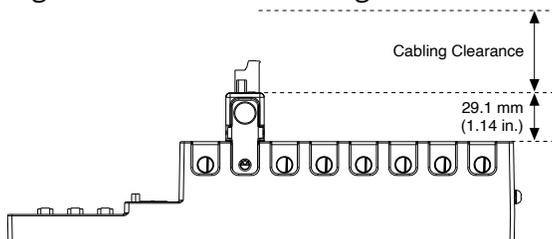
Related information:

- [Cabling Clearances for C Series Modules](#)

Ambient Temperature

Measure the ambient temperature at each side of the cRIO-906x, 63.5 mm (2.50 in.) from the side and 25.4 mm (1.00 in.) forward from the rear of the device, as shown in the following figure.

Figure 24. Ambient Temperature Location, Typical
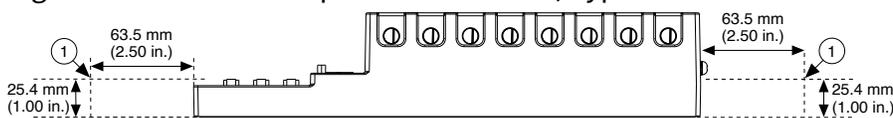
1. Location for measuring the ambient temperature

Mounting the Device Directly on a Flat Surface

For environments with high shock and vibration, NI recommends mounting the cRIO-906x directly on a flat, rigid surface using the mounting holes in the device.

What to Use

- cRIO-906x
- Screwdriver, Phillips #2
- M4 or number 8 screw (x2), user-provided, longer than 19.00 mm (0.75 in.) to pass all the way through the cRIO-906x

Note The cRIO-9063/64/65 have two mounting screws. The cRIO-9066/67/68 have three mounting screws.

What to Do

Complete the following steps to mount the cRIO-906x directly on a flat surface.

Figure 25. cRIO-9063/9064/9065 Mounting Hole Locations, Typical
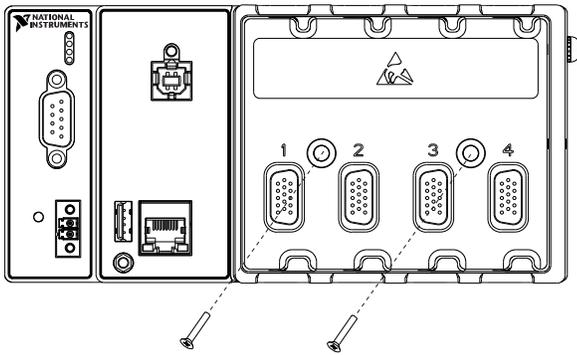
Figure 26. cRIO-9066/9067/9068 Mounting Hole Locations, Typical
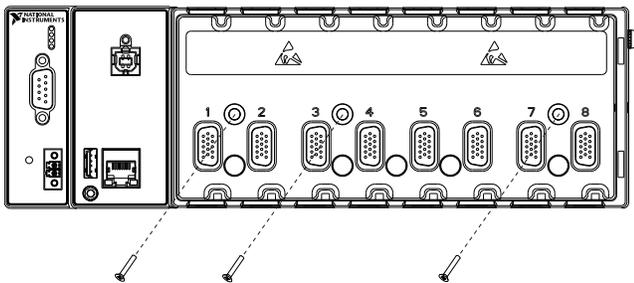
1. Prepare the surface for mounting the cRIO-906x using the **_Surface Mounting Dimensions_**.
2. Align the cRIO-906x on the surface.
3. Fasten the cRIO-906x to the surface using the M4 or number 8 screws appropriate for the surface. Tighten the screws to a maximum torque of 1.3 N · m(11.5 lb · in.).

Related reference:

- Surface Mounting Dimensions

Surface Mounting Dimensions

The following figure shows the surface mounting dimensions for the cRIO-906x.

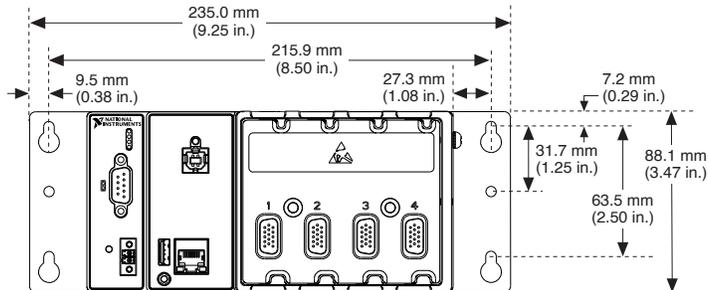Figure 27. cRIO-9063/9064/9065 Surface Mounting Dimensions, Typical
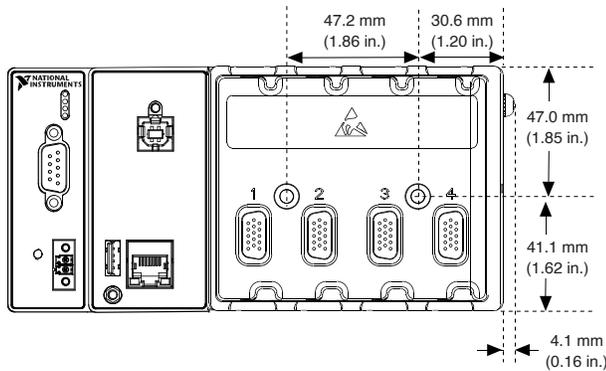
Figure 28. cRIO-9066/9067/9068 Surface Mounting Dimensions, Typical
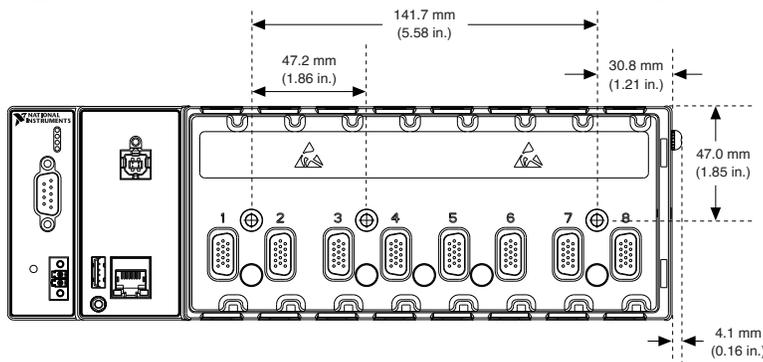
Mounting the Controller on a Panel

You can use the NI panel mounting kit to mount the cRIO-906x on a panel.

What to Use

- cRIO-906x
- Screwdriver, Phillips #2
- **(cRIO-9063/9064/9065)** NI panel mounting kit, 779097-01:
    - Panel mounting plate
    - M4 x 10 screws (x4)
- **(cRIO-9066/9067/9068)** NI panel mounting kit, 782863-01:
    - Panel mounting plate
    - M4 x 10 screws (x4)

What to Do

Complete the following steps to mount the cRIO-906x on a panel.

Figure 29. cRIO-9063/9064/9032/965 Panel Mounting, Typical
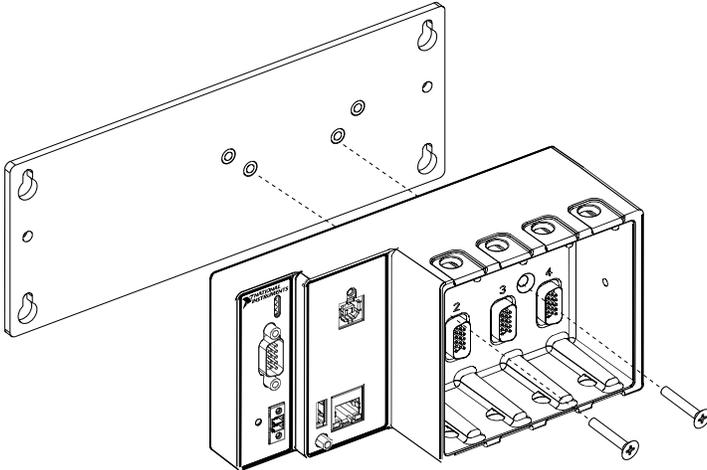
Figure 30. cRIO-9066/9067/9068 Panel Mounting, Typical
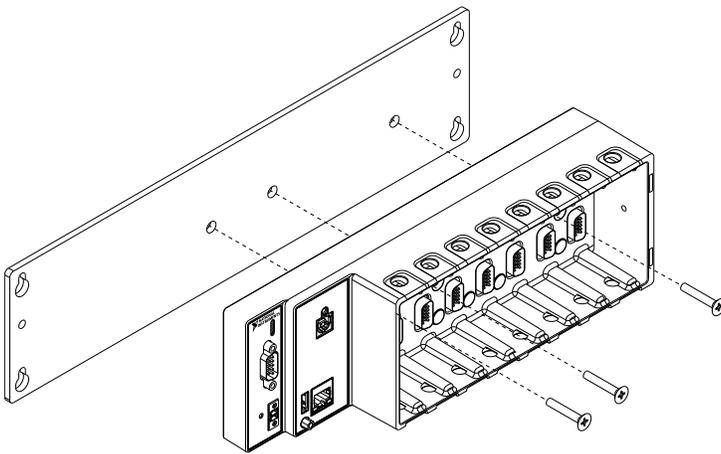
1. Align the cRIO-906x and the panel mounting plate.
2. Fasten the panel mounting plate to the cRIO-906x using the screwdriver and M4 x 10 screws. NI provides these screws with the panel mounting kit. Tighten the screws to a maximum torque of 1.3 N · m(11.5 lb · in.).

> **Note** You must use the screws provided with the NI panel mounting kit because they are the correct depth and thread for the panel mounting plate.

3. 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.

Panel Mounting Dimensions

The following figure shows the panel mounting dimensions for the cRIO-906x.

Figure 31. cRIO-9063/9064/9065 Panel Mounting Dimensions, Typical

Figure 32. cRIO-9066/9067/9068 Panel Mounting Dimensions, Typical
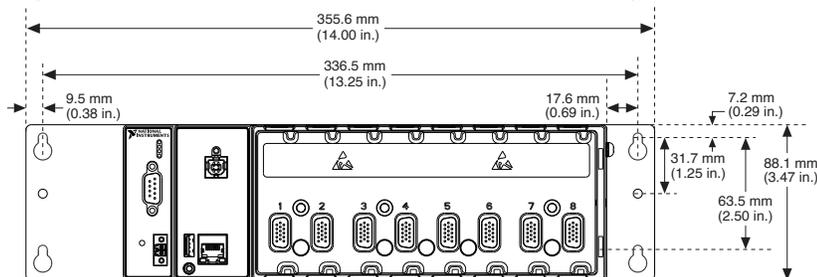
Mounting the Controller on a DIN Rail

You can use the NI DIN rail mounting kit to mount the cRIO-906x on a standard 35-mm DIN rail.

What to Use

- cRIO-906x
- Screwdriver, Phillips #2
- **(cRIO-9063/9064/9065)** NI DIN rail mounting kit, 779097-01:
    - DIN rail clip
    - M4 x 25 flathead screw (x2)
- **(cRIO-9066/9067/9068)** NI DIN rail mounting kit, 779018-01:
    - DIN rail clip
    - M4 x 25 flathead screw (x2)

What to Do

Complete the following steps to mount the cRIO-906x on a DIN rail.

Figure 33. cRIO-9063/9064/9065 Rail Mounting, Typical
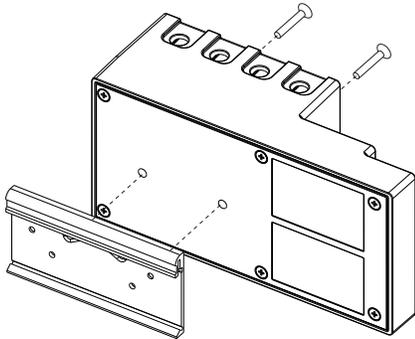
Figure 34. cRIO-9035/9036/9037/9038/9039 DIN Rail Mounting
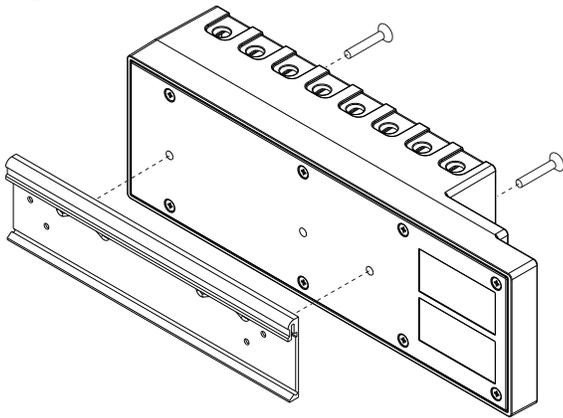
1. Align the cRIO-906x and the DIN rail clip.
2. Fasten the DIN rail kit to the cRIO-906x using the screwdriver and M4 x 25 screws. NI provides these screws with the DIN rail mounting kit. Tighten the screws to a maximum torque of 1.3 N · m(11.5 lb · in.).

> ✎ **Note** You must use the screws provided with the NI DIN rail mounting kit because they are the correct depth and thread for the DIN rail clip.

Clipping the Device on a DIN Rail

Complete the following steps to clip the cRIO-906x on a DIN rail.
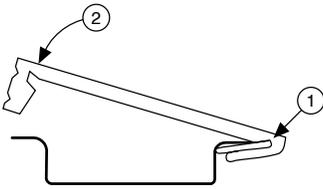
1. Insert one edge of the DIN rail into the deeper opening of the DIN rail clip.
2. Press down firmly to compress the spring until the clip locks in place on the DIN rail.

> ⊘ **Notice** Ensure that no C Series modules are in the cRIO-906x before removing it from the DIN rail.

Mounting the Controller on a Rack

You can use the following rack mount kits to mount the cRIO-906x and other DIN rail-mountable equipment on a standard 482.6 mm (19 in.) rack.

- NI Sliding Rack-Mounting Kit, 779102-01
- NI Rack-Mounting Kit, 781989-01

> ✎ **Note** You must use the NI DIN rail mounting kit (779019-01 for the cRIO-9063/9064/909065 or 779018-01 for the cRIO-9066/9067/9068), in addition to a rack-mounting kit.

Mounting the Controller on a Desktop

You can use the NI desktop mounting kit to mount the cRIO-906x on a desktop.

What to Use

- cRIO-906x
- Screwdriver, Phillips #2
- NI desktop mounting kit, 779473-01, containing desktop mounting brackets (x2)

Figure 35. Components of the NI Desktop Mount Kit
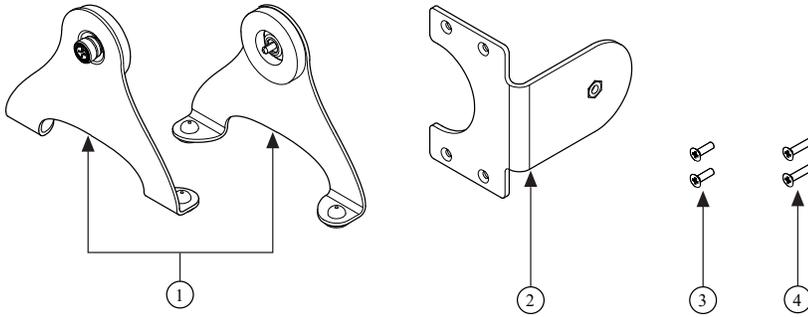
1. Desktop mounting brackets (x2)
2. Adapter bracket
3. M3x14 screws (x2)
4. M3x20 screws (x2)

What to Do

Complete the following steps to mount the cRIO-906x on a desktop.

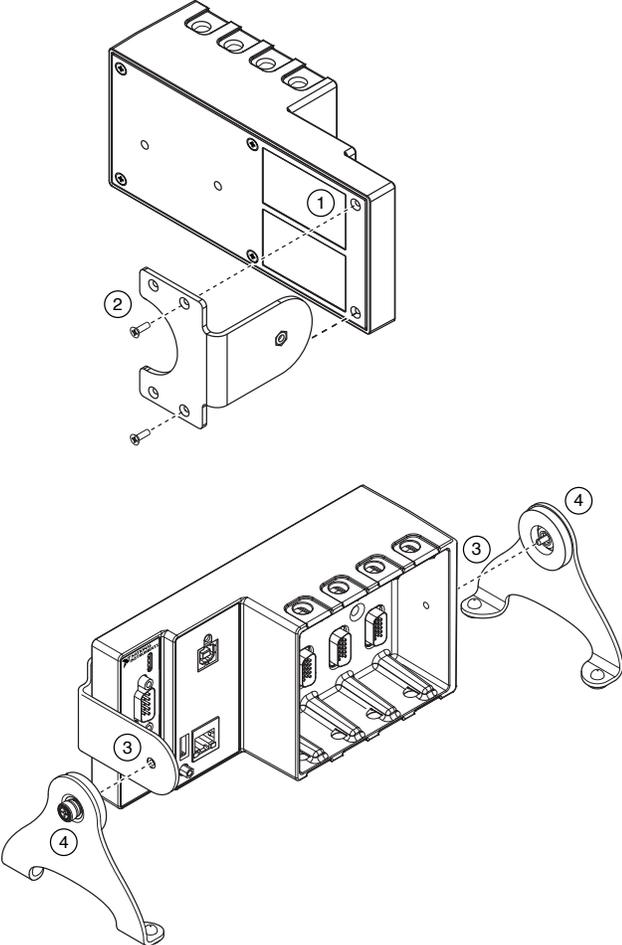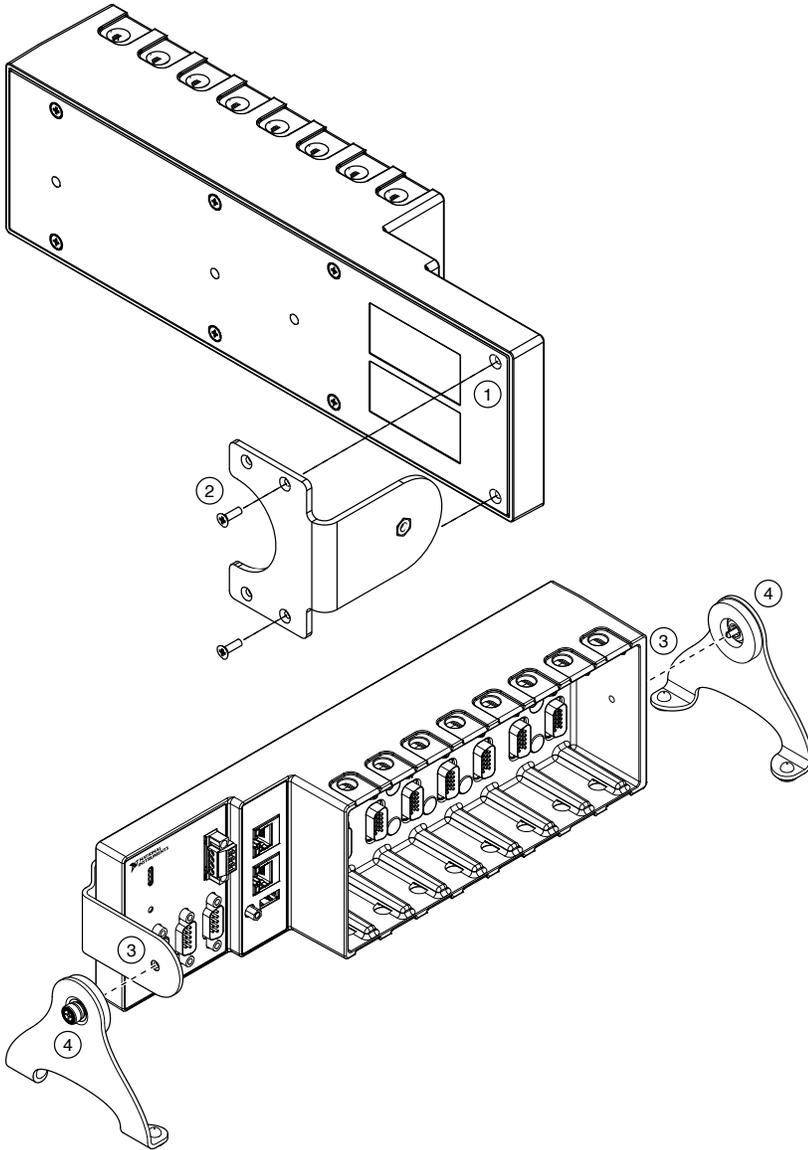Figure 36. cRIO-9063/9064/9065 Desktop Mounting, Typical

Figure 37. cRIO-9066/9067/9068 Desktop Mounting, Typical

1. Use a #1 Phillips screwdriver to remove the two screws from the back of the chassis on the front-panel side.
2. Use the screwdriver and the two M3x20 screws to attach the adapter bracket to the chassis.
3. Align one of the end brackets with the mounting hole at one of the ends of the chassis.
4. Use a #2 Phillips screwdriver to tighten the captive screw on the end bracket.
5. Repeat steps 2 and 3 to attach the other end bracket to the other end of the chassis.

Desktop Mounting Dimensions

The following figures show the desktop mounting dimensions for the cRIO-906x.

Figure 38. cRIO-9063/9064/9065 Desktop Mounting Front Dimensions, Typical
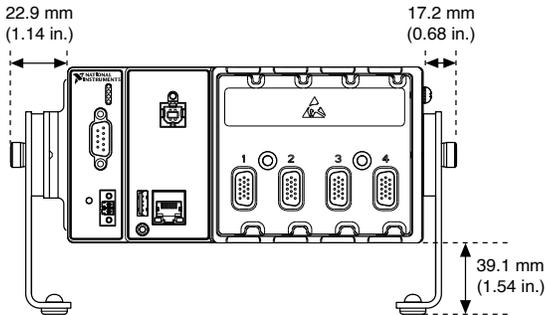
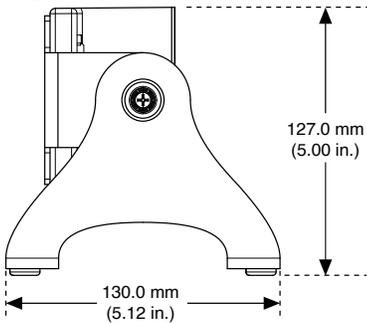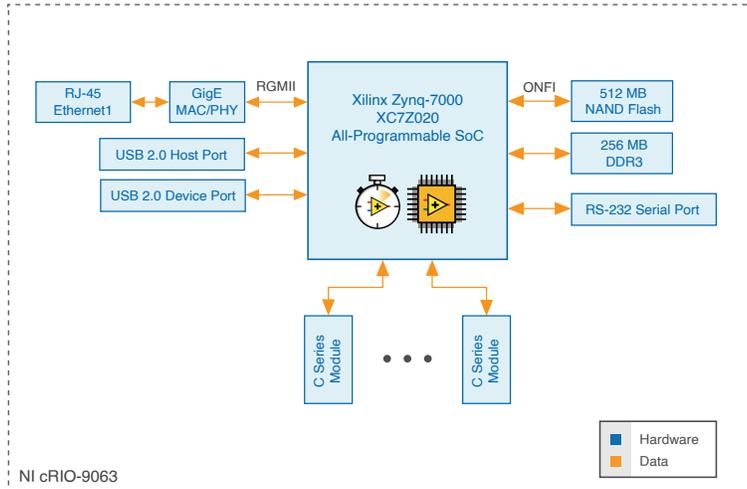Figure 39. cRIO-9066/9067/9068 Desktop Mounting Front Dimensions, Typical
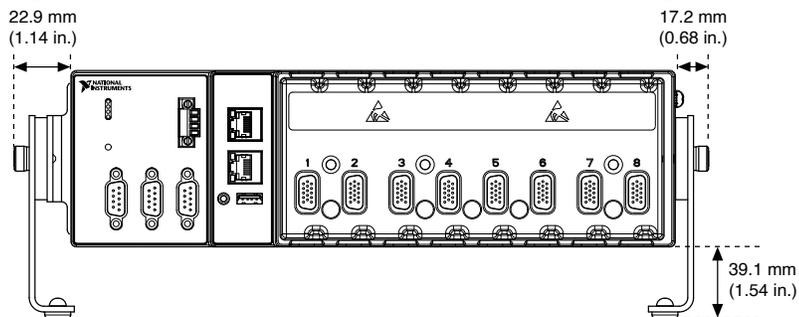
Figure 40. cRIO-906x Desktop Mounting Side Dimensions, Typical
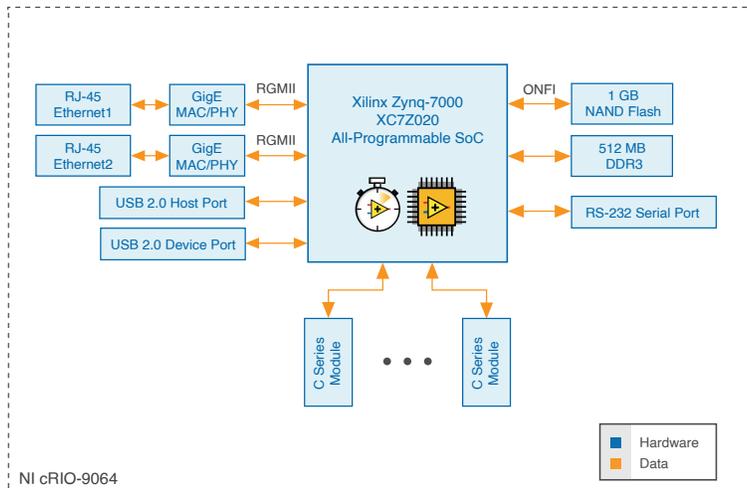
Block Diagram

cRIO-9063 Block Diagram

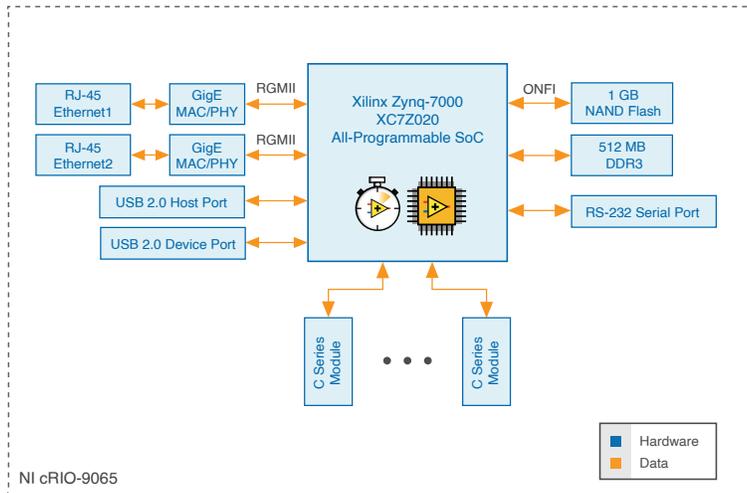Figure 41. cRIO-9063 Block Diagram

cRIO-9064 Block Diagram

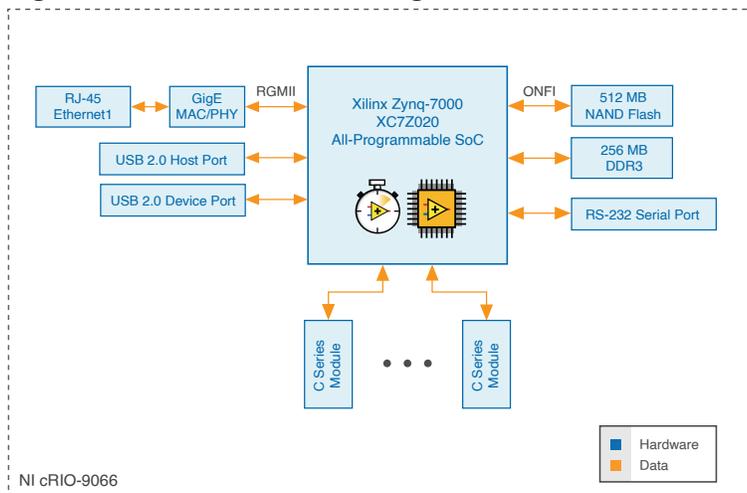Figure 42. cRIO-9064 Block Diagram

cRIO-9065 Block Diagram
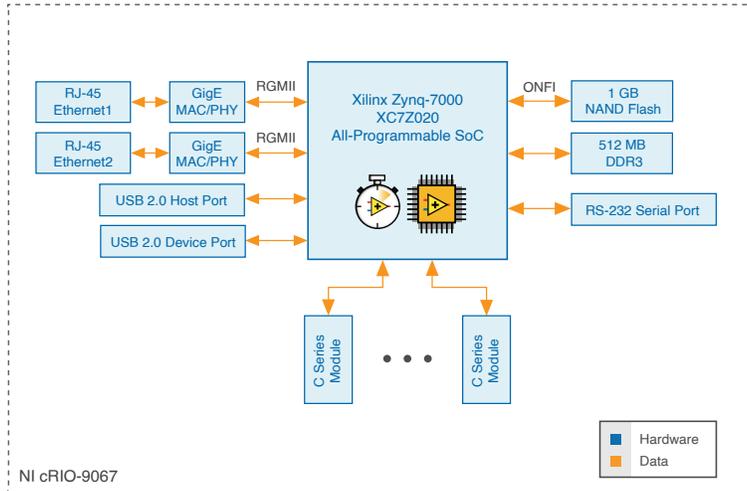
Figure 43. cRIO-9065 Block Diagram

cRIO-9066 Block Diagram
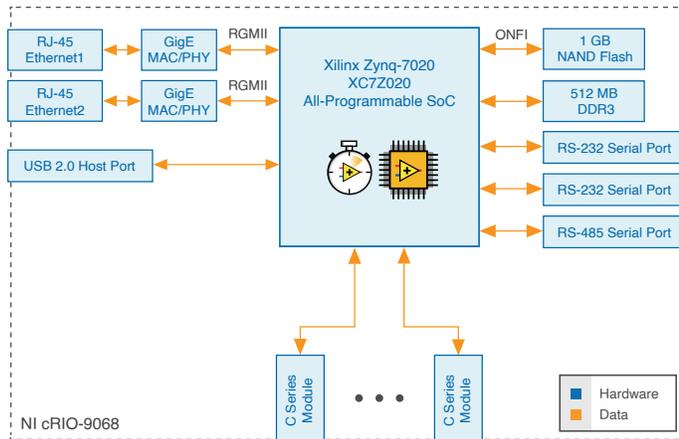
Figure 44. cRIO-9066 Block Diagram

cRIO-9067 Block Diagram

Figure 45. cRIO-9067 Block Diagram

cRIO-9068 Block Diagram

Figure 46. cRIO-9068 Block Diagram

Conformal Coating

The cRIO-9065 and cRIO-9068 are available with conformal coating for additional protection in corrosive and condensing environments, including environments with molds and dust.

In addition to the environmental specifications listed in the product **Safety, Environmental, and Regulatory Information**, the cRIO-9065 and cRIO-9068 with conformal coating meet the following specification for the device temperature range. To meet this specification, you must follow the appropriate setup requirements for condensing environments. Refer to **Conformal Coating and NI RIO Products** for more information about conformal coating and the setup requirements for condensing environments.

Operating humidity (IEC 60068-2-30 Test Db)	80 to 100% RH, condensing

Related information:

- Conformal Coating and NI RIO Products

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