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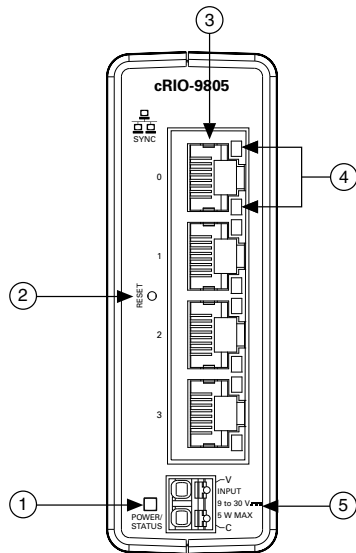
***cRIO-9805***

# cRIO-9805

## 4-Port 802.1AS Ethernet Switch Expansion Module for CompactRIO

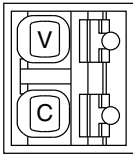
This document provides information to help you get started with the cRIO-9805, connecting the module to power, connecting to Ethernet, and configuring the device and the network.

**Figure 1.** cRIO-9805 Front Panel



- |                          |                                  |
|--------------------------|----------------------------------|
| 1. Power/Status LED      | 4. Ethernet LEDs                 |
| 2. Reset button          | 5. Power connector (9 V to 30 V) |
| 3. Ethernet ports 0 to 3 |                                  |

**Table 1.** Power Connector Pinout

Pinout	Pin	Description
	V	Power input
	C	Common

**Table 2. Power/Status LED Indicators**

LED Color	LED Pattern	Indication
Blue	Solid	The cRIO-9805 is powered on.
Yellow	Solid	The cRIO-9805 is booting.
	Blinking	The cRIO-9805 is in recovery mode.
Blue and Yellow	Solid	The cRIO-9805 is resetting.
—	Off	The cRIO-9805 is powered off.

**Table 3. Ethernet Port Pinout**

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

**Table 4. Ethernet LED Indicators**

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

# Unpacking the Kit

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**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.

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

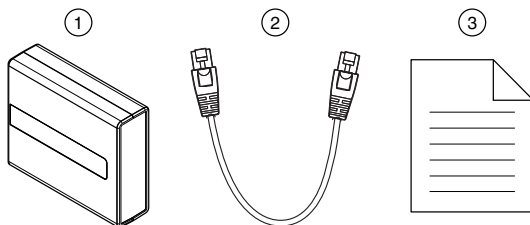
## What You Need to Get Started

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### Kit Contents

Verify that the following items are included in the cRIO-9805 kit.

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1. cRIO-9805
  2. Ethernet cable
  3. Safety, Environmental, and Regulatory Information document
- 

### Required Components

- CompactRIO controller or host computer
- Power supply, 9 V to 30 V, 5 W maximum

### Recommended Components

- Internet access
- Additional, required-length Ethernet cable(s), user provided

# Mounting the cRIO-9805

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You can mount the cRIO-9805 with a CompactRIO chassis. For instructions and guidelines about the various chassis mounting configurations, refer to the *Expansion Module for CompactRIO User Manual* on [ni.com/manuals](http://ni.com/manuals).

You can also use the cRIO-9805 with a variety of hardware systems and configurations. For more information about using the module with non-CompactRIO systems, contact NI.

## Grounding the cRIO-9805

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For information about grounding the cRIO-9805, refer to the *Expansion Module for CompactRIO User Manual* on [ni.com/manuals](http://ni.com/manuals).

## Connecting the cRIO-9805

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### Connecting the cRIO-9805 to an External Power Supply

The cRIO-9805 requires a 9 V to 30 V power supply.

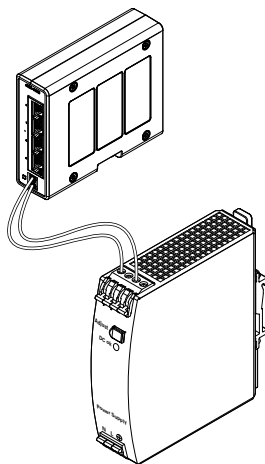
#### What to Use

- Power supply, 9 V to 30 V, 5 W maximum
- Wire, 1.3 mm<sup>2</sup> to 0.2 mm<sup>2</sup> (16 AWG to 24 AWG)
- Ferrules (recommended)
- Screwdriver, 2.54 mm (0.10 in.) flathead

#### What to Do

Complete the following steps to connect the cRIO-9805 to an external power supply.

**Figure 2.** Connecting the cRIO-9805 to an External Power Supply



1. Power off the power supply.
2. Connect a ferrule to the end of the power wires.
3. Push the ferruled wires directly into the power connector terminals on the cRIO-9805.
4. Power on the power supply.
5. Verify the Power/Status LED is on.

## Connecting the cRIO-9805 to the Controller Power Connector

The cRIO-9805 requires a 9 V to 30 V power supply. You can power both the module and a CompactRIO or CompactDAQ controller from the same power supply.

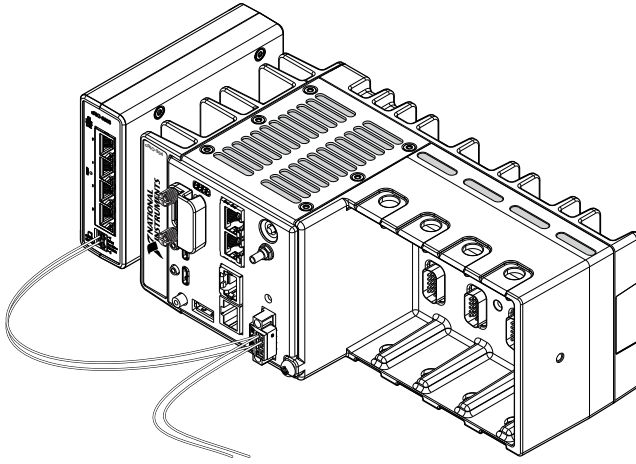
### What to Use

- Power supply, 9 V to 30 V, 5 W maximum (sufficient power for the cRIO-9805 and the controller)
- Wire, 1.3 mm<sup>2</sup> to 0.2 mm<sup>2</sup> (16 AWG to 24 AWG)
- Ferrules (recommended)
- Screwdriver, 2.54 mm (0.10 in.) flathead

### What to Do

Complete the following steps to connect the cRIO-9805 to a controller power connector.

**Figure 3.** Connecting the cRIO-9805 to a Controller Power Connector



1. Power off the power supply connected to the CompactRIO controller.
2. Remove the power connector from the CompactRIO controller.
3. Use a two-wire ferrule to insert the power supply wires and module power wires into the CompactRIO controller power connector terminals.
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 CompactRIO controller.
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. Connect a ferrule to the other end of the power wires.
8. Push the ferruled wires directly into the power connector terminals on the cRIO-9805.
9. Power on the power supply.
10. Verify the cRIO-9805 Power/Status LED is on.

## Disconnecting Power from the cRIO-9805

1. Power off the power supply connected to the cRIO-9805.
2. Use a small flathead screwdriver or similar tool to press the white release button on the power connector.
3. Remove the ferruled wire from the power connector.
4. Repeat steps 2 and 3 to remove the second ferruled wire from the power connector.

# Connecting the cRIO-9805 to a Network

## What to Use

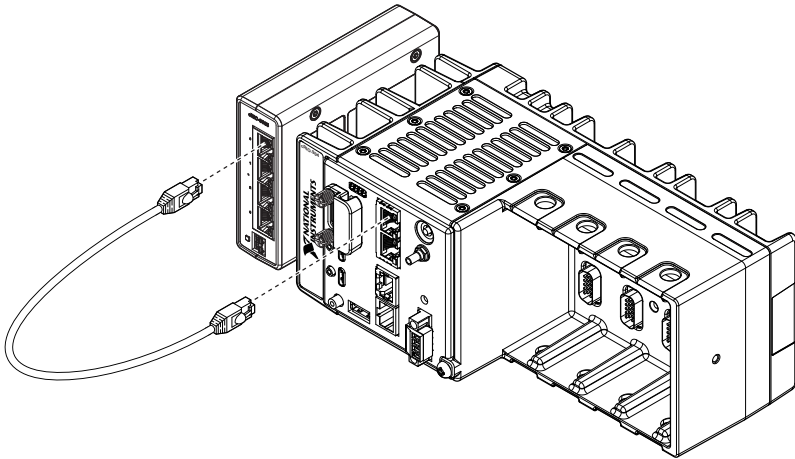
- cRIO-9805
- Ethernet cable, included in shipping kit

## What to Do

Complete the following steps to connect the cRIO-9805 to a network.

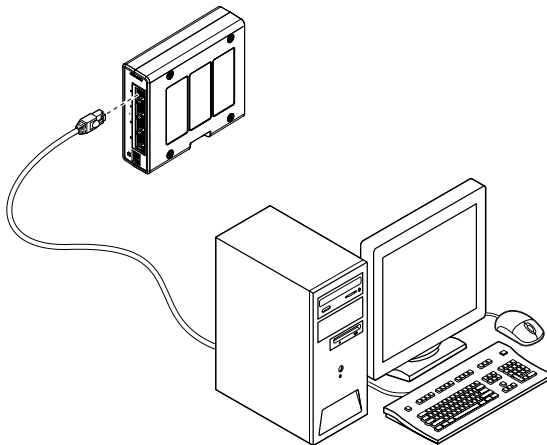
**Figure 4.** Connecting the cRIO-9805 to a Controller

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**Figure 5.** Connecting the cRIO-9805 to a Host Computer

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1. Connect the Ethernet cable to any port on the cRIO-9805.
2. Connect the other end of the cable to the Ethernet port on the CompactRIO controller or the network card on your computer.
3. Verify that the Act/Link LED on the cRIO-9805 is on.

## Configuring Your System

The cRIO-9805 functions as an Ethernet switch for an out-of-the-box NI TSN system. The following sections describe the most common topologies created with a cRIO-9805.



**Note** You can use other network devices as nodes in your Ethernet system, but the system may not provide the advantages of an NI TSN system.

**Host** Can be a Windows computer or a real-time controller with the NI Linux Real-Time operating system, such as the IC-317x, cRIO-9035/9039 Sync, cRIO-904x, cRIO-905x, or cDAQ-913x for LabVIEW Real-Time.

**Node** Can be the cDAQ-9185, cDAQ-9189, or any FieldDAQ device.

**cRIO-9805** Ethernet switch.

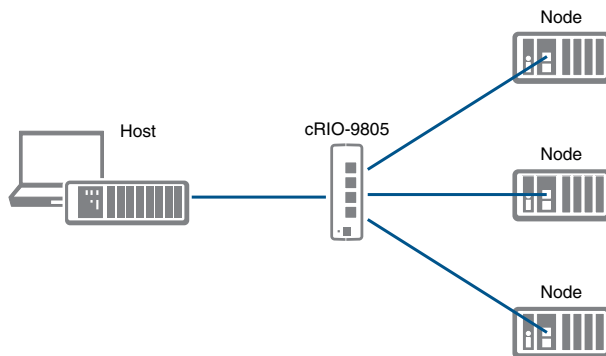


**Note** Network configuration and programming require careful consideration. Visit [ni.com/r/cdagenet](http://ni.com/r/cdagenet) for information about exploiting link redundancy and automatically improving reliability.

## Creating a Basic Topology

The cRIO-9805 is configured to work in this topology out of the box. Most systems should follow this topology. The host communicates directly with each node through the external switch.

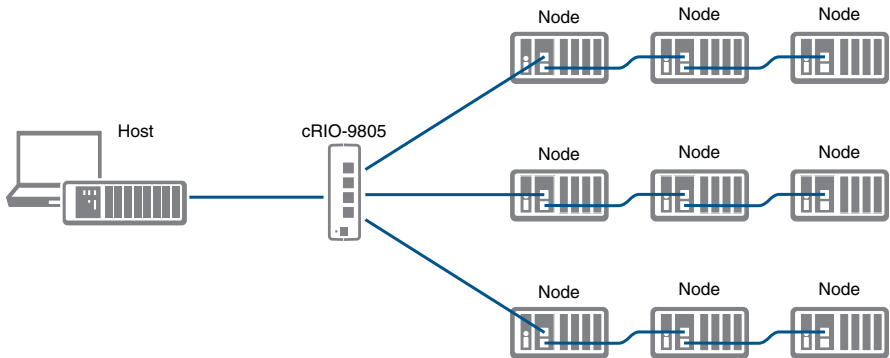
**Figure 6. Basic Topology**



# Expanding Your System

You can daisy-chain your system starting from each node connected to the switch. The host communicates directly with all the nodes in one chain through one bus line. A standard Ethernet device or switch can be added to the end of the chain if desired and used as normal. Be aware that these devices will compete for network bandwidth with the controller. Reliable system design requires awareness of the bandwidth consumed by each device during operations. This topology offers no redundant links.

**Figure 7. Expanded Topology**



## Advantages:

- Simple and inexpensive installation, expansion, and troubleshooting.
- Ideal for low number of nodes. NI recommends a maximum of 15 nodes per chain.
- No additional switch needed.
- Can cover long distances.

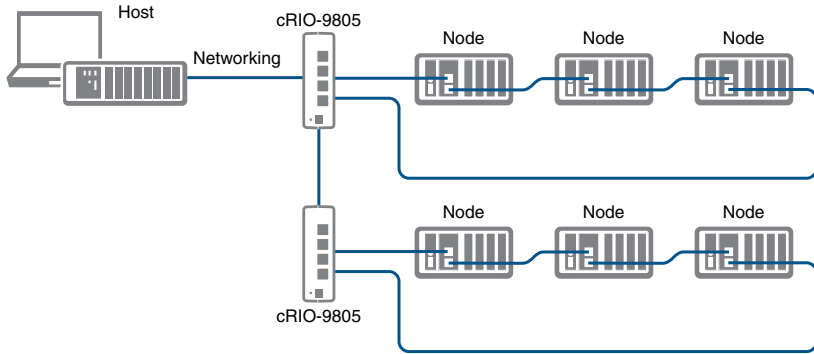
## Disadvantages:

- Any unpowered nodes and/or node failure disrupts network communication.
- Addition or removal of any node disrupts network communication.
- Failure of any Ethernet cable and/or improper cable termination disrupts network communication.
- Network performance and synchronization affected when node count exceeds 15 per chain.

# Adding Redundancy

To add redundancy, you can connect an additional Ethernet cable to the last node of a daisy chain and reconnect that cable back to the switch. In this topology, the host communicates with all nodes through the most effective path. You must configure the network properly before creating redundant links in the network.

**Figure 8. Adding Redundancy**



**Advantages:**

- Failure of any single Ethernet cable does not disrupt network communication.
- Additional nodes or heavier network traffic affects network performance less than the line topology.
- Simple installation.
- Ideal for a local networking solution.

**Disadvantages:**

- Network traffic patterns can make troubleshooting difficult.
- Only allows one chain per switch. Requires more switches to configure larger systems.

## More Options



**Note** For more information about designing Ethernet measurement systems, visit [ni.com/r/cdaqenet](https://ni.com/r/cdaqenet).



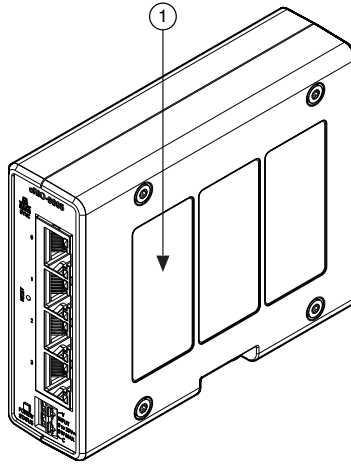
**Note** For more advanced network management needs, visit [ni.com/r/netconfig](https://ni.com/r/netconfig).

## Locating the Security Label

The security label on the cRIO-9805 contains the following information necessary for setting up and configuring your system:

- Model name
- Serial number
- Username
- Password
- MAC address

**Figure 9. Security Label Location**



1. Security label

## Resetting the Module

When you press the reset button for less than five seconds, the module reboots with the current configuration.

### What to Use

- Reset tool

### What to Do

1. Press the Reset button.
2. Hold it for one second.
3. Confirm the Status LED behavior:
  1. The LED lights both blue and yellow to indicate the module is resetting.
  2. The LED lights solid yellow to indicate the module is booting.
  3. The LED lights solid blue to indicate the module is powered on and running.

## Resetting the Module to Factory Default Configuration

If you press the reset button for five seconds or longer, the module reboots into factory default mode, which returns the module user configuration to the factory-set defaults

**Table 5. cRIO-9805 Default Settings**

Attribute	Value
Hostname	cRIO9805- <i>&lt;serial number&gt;</i>
IP	DHCP or Link Local
Default login	User name: admin Password: printed on security label

### What to Use

- Reset tool

### What to Do

Follow these steps to reset the firmware on the cRIO-9805 to default settings.

1. Press the Reset button.
2. Hold it for five seconds.
3. Confirm the Status LED behavior:
  1. The LED lights both blue and yellow to indicate the module is resetting.
  2. The LED lights solid yellow to indicate the module is booting.
  3. The LED lights solid blue to indicate the module is powered on and running.

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