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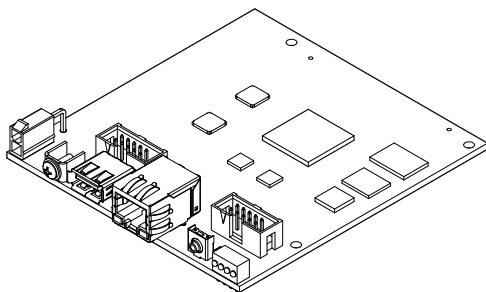# sbRIO-9607

NI sbRIO-9607

Single-Board RIO OEM Devices

This document describes how to begin using the NI sbRIO-9607.

Safety Guidelines

Operate the sbRIO-9607 only as described in the user documentation.

Caution The sbRIO-9607 must be installed in a suitable enclosure prior to use.

Caution NI makes no product safety, electromagnetic compatibility (EMC), or CE marking compliance claims for the sbRIO-9607. The end-product supplier is responsible for conformity to any and all compliance requirements.

Caution Exercise caution when designing an enclosure for the sbRIO-9607. Auxiliary cooling may be necessary to keep the sbRIO-9607 within the specified operating temperature range. Refer to the *NI sbRIO-9607 Specifications* on *ni.com/manuals* for more information about the maximum operating temperature rating. For information and examples regarding factors that can affect thermal performance, visit *ni.com/info* and enter the Info Code sbriocooling.

Caution Do not operate the sbRIO-9607 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.

NATIONAL INSTRUMENTS™

Safety Voltages

Connect only voltages that are below these limits.

V terminal to C terminal	30 VDC maximum, Measurement Category I

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 sbRIO-9607 to signals or use for measurements within Measurement Categories II, III, or IV.

Preparing the Environment

Ensure that the environment in which you are using the sbRIO-9607 meets the following specifications.

Local ambient operating temperature near device (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Maximum reported onboard sensor temperature	
CPU/FPGA temperature	98 °C
Primary System temperature	85 °C
Secondary System temperature	85 °C

📝 **Note** Ensure that the local ambient, reported CPU/FPGA, and reported Primary System temperatures do not exceed any of the maximum temperatures listed in this document. For more information about how to access the onboard sensors, visit *ni.com/info* and enter the Info Code sbriosensors.

Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Pollution Degree (IEC 60664)	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.

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.
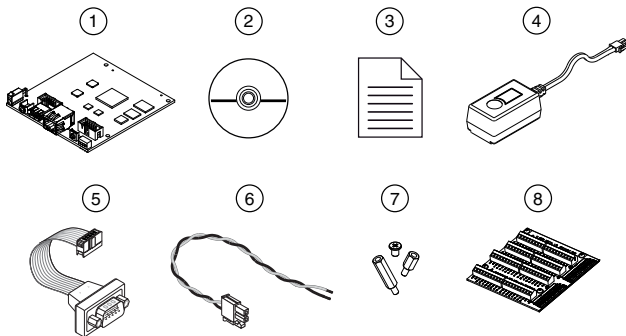
Verifying the Kit Contents

Verify that the following items are included in the sbRIO-9607 kit.

Figure 1. sbRIO-9607 Kit Contents

1. sbRIO Device
2. NI CompactRIO Device Drivers Media
3. Getting Started Guide
4. Power Supply
5. 10-pin IDC to 9-pin DSUB Cable
6. Power Cable Assembly
7. Standoffs and Screws
8. NI 9694 Digital I/O Breakout RMC Board

📝 **Note** The provided power supply is only intended for the getting started experience. NI recommends the use of a power supply that meets the specifications listed in the *NI sbRIO-9607 Specifications* for system deployment.

Installing Software on the Host Computer

Before using the sbRIO-9607, you must install the following application software and device drivers on the host computer.
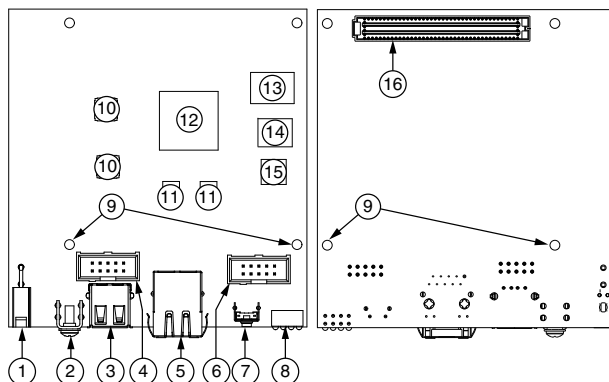
1. LabVIEW 2015 or later
2. LabVIEW Real-Time Module 2015 or later
3. LabVIEW FPGA Module 2015 or later
4. NI CompactRIO Device Drivers August 2015 or later

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

Connecting the sbRIO-9607

The sbRIO-9607 has the following components.

Figure 2. sbRIO-9607 Components

1. J9, Power Connector
2. Chassis Ground Bracket
3. J10, USB Host Port
4. W1, CAN (CAN0)
5. J7, RJ-45 Ethernet Port
6. W2, RS-232 (COM1)
7. Reset Switch
8. LEDs
9. Mounting Holes Connected to Chassis Ground
10. Ethernet RGMII Transceiver
11. ULPI USB Transceiver
12. FPGA Processor
13. DDR Memory
14. NAND Flash
15. CPLD
16. J1, RIO Mezzanine Card Connector

Connecting the sbRIO-9607 to Power

The NI sbRIO device requires a 9 VDC to 30 VDC external power supply. The NI sbRIO device filters and regulates the supplied power and provides power for RMCs.

> **Note** Refer to the *Power Requirements* section of the *NI sbRIO-9607 Specifications* for the complete power requirement specifications.

> **Note** Refer to the *Power Requirements* section of the *NI sbRIO-9607 User Manual* for formulas and examples for calculating power requirements for different configurations and application types.

> **Note** Refer to the *Power Requirements* section of the *NI sbRIO-9607 User Manual* for proper wiring of the power cable assembly.

Complete the following steps to connect a power supply to the device.

> **Caution** Do not mate or unmate the power supply connectors while power is applied.

1. Ensure that your power supply is powered off.
2. Insert the power connector plug into the power connector receptacle of the NI sbRIO device until the connector latches into place.
3. Turn on the power supply.

Powering On the NI sbRIO Device

The NI sbRIO device runs a power-on self test (POST) when you apply power to the device. During the POST, the Power and Status LEDs turn on. When the Status LED turns off, the POST is complete. If the LEDs do not behave in this way when the system powers on, refer to the *STATUS LED Indicators* section.

Connecting the sbRIO-9607 to the Host Computer

Complete the following steps to connect the sbRIO-9607 to the host computer using the RJ-45 Ethernet port.

1. Power on the host computer.
2. Connect the sbRIO-9607 to the host computer 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.

The first time you power up the device, it attempts to initiate a DHCP network connection. If the device 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 the device has

powered up, you must install software on the device and configure the network settings in MAX.

> **Note** Installing software may change the network behavior of the device. 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-sbRIO-9607-########.

Setting a System Password

Complete the following steps to set a system password.

> **Note** The default username for the sbRIO-9607 is `admin`. There is no default password for the sbRIO-9607, 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.

Installing Software on the sbRIO-9607

Complete the following steps to install software on the sbRIO-9607.

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 CompactRIO 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 sbRIO-9607 with the LabVIEW FPGA Module, you can click **Next**.

> **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 sbRIO-9607

The sbRIO-9607 is Not Communicating with the Network

- Ensure that the Ethernet connections between the sbRIO-9607 and the host computer and the Ethernet connections between the host computer and the router are secure.
- Ensure that you have the correct version of NI CompactRIO Device Drivers installed on the host computer. Visit *ni.com/info* and enter the Info Code softwareversion 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.

- Temporarily disable any network firewalls or other security software.

Configure the IP and other network settings by completing the following steps.

1. Use a standard Category 5 (CAT-5) or better shielded, twisted-pair Ethernet cable to connect the sbRIO-9607 Ethernet port to a host computer. The sbRIO-9607 attempts to initiate a DHCP network connection at powerup.
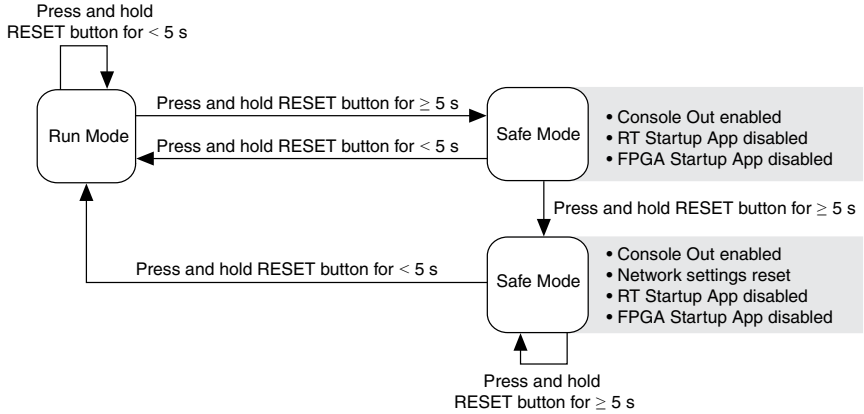
2. In MAX, expand your system under Remote Systems and select **Troubleshoot Remote System Discovery**.

System Reset

The following figure shows the reset behavior of the sbRIO-9607.

Figure 3. Reset Button Behavior
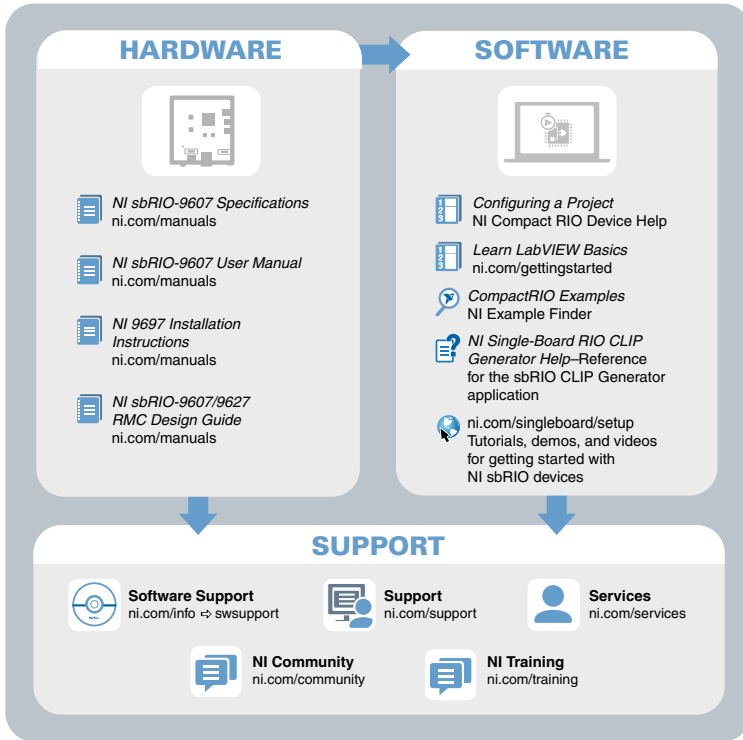

STATUS LED Indicators

The following table lists the STATUS LED indicators.

Table 1. STATUS LED Indicators

LED Pattern	Indication
Blinks twice and pauses	The sbRIO-9607 is in safe mode. Software is not installed, which is the factory default state, or software has been improperly installed on the sbRIO-9607. An error can occur when an attempt to upgrade the software is interrupted. Reinstall software on the sbRIO-9607. Refer to the *Measurement & Automation Explorer (MAX) Help* for information about installing software on the sbRIO-9607.
Blinks three times and pauses	The sbRIO-9607 is in user-directed safe mode, or the sbRIO-9607 is in install mode to indicate that software is currently being installed. This pattern may also indicate that the user has forced the sbRIO-9607 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 sbRIO-9607 is in safe mode. The software has crashed twice without rebooting or cycling power between crashes. This usually indicates that the sbRIO-9607 has run out of memory. Review your LabVIEW Real-Time application to resolve any memory leaks.
Continuously blinks	The sbRIO-9607 has not booted into NI Linux Real-Time. The sbRIO-9607 either booted into an unsupported operating system, was interrupted during the boot process, or detected an unrecoverable software error.
On momentarily	The sbRIO-9607 is booting. No action required.
Off	The sbRIO-9607 is in run mode. Software is installed and the operating system is running.

Where to Go Next

HARDWARE

NI sbRIO-9607 Specifications
ni.com/manuals

NI sbRIO-9607 User Manual
ni.com/manuals

NI 9697 Installation Instructions
ni.com/manuals

NI sbRIO-9607/9627 RMC Design Guide
ni.com/manuals

SOFTWARE

Configuring a Project
NI Compact RIO Device Help

Learn LabVIEW Basics
ni.com/gettingstarted

CompactRIO Examples
NI Example Finder

NI Single-Board RIO CLIP Generator Help–Reference for the sbRIO CLIP Generator application

ni.com/singleboard/setup
Tutorials, demos, and videos for getting started with NI sbRIO devices

SUPPORT

Software Support
ni.com/info ⇨ swsupport

Support
ni.com/support

Services
ni.com/services

NI Community
ni.com/community

NI Training
ni.com/training

Worldwide Support and Services

The National Instruments 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.

Visit *ni.com/services* for NI Factory Installation Services, repairs, extended warranty, and other services.

Visit *ni.com/register* to register your National Instruments product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

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