

## COMPREHENSIVE SERVICES

We offer competitive repair and calibration services, as well as easily accessible documentation and free downloadable resources.

## SELL YOUR SURPLUS

We buy new, used, decommissioned, and surplus parts from every NI series. We work out the best solution to suit your individual needs.

 Sell For Cash    Get Credit    Receive a Trade-In Deal

## OBSOLETE NI HARDWARE IN STOCK & READY TO SHIP

We stock **New**, **New Surplus**, **Refurbished**, and **Reconditioned** NI Hardware.



*Bridging the gap between the manufacturer and your legacy test system.*

 1-800-915-6216

 [www.apexwaves.com](http://www.apexwaves.com)

 [sales@apexwaves.com](mailto:sales@apexwaves.com)

All trademarks, brands, and brand names are the property of their respective owners.

**Request a Quote**

 **CLICK HERE**

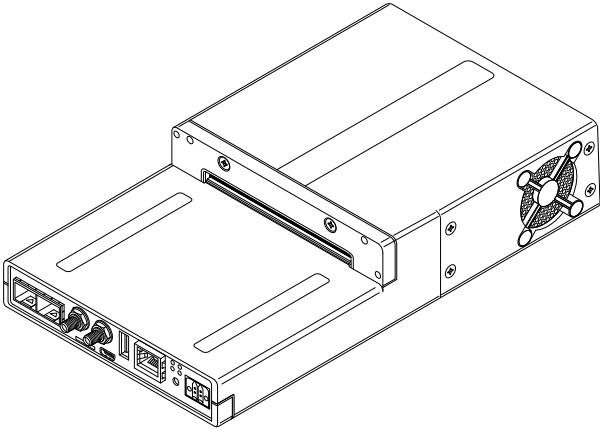
**NI-7932**

# NI-7932R

Controller for FlexRIO™

This document describes how to begin using the NI-7932R.

**Figure 1.** NI-7932R



## Related Information

*For information about the device specifications, refer to the [NI-7932R Specifications at ni.com/manuals](http://ni.com/manuals).*

## Contents

|   |   |
|---|---|
| FlexRIO Documentation.....                        | 2 |
| Safety Guidelines.....                            | 3 |
| Electromagnetic Compatibility Guidelines.....     | 4 |
| Verifying the System Requirements.....            | 4 |
| What You Need to Get Started.....                 | 5 |
| Unpacking the Kit.....                            | 5 |
| Preparing the Environment.....                    | 6 |
| Wiring Power to the NI-7932R.....                 | 6 |
| Powering on the NI-7932R.....                     | 7 |
| STATUS LED.....                                   | 7 |
| Connecting the NI-7932R to the Host Computer..... | 8 |
| Installing the FlexRIO Adapter Module.....        | 8 |

|  |    |
|--|----|
| Configuring the System in Measurement & Automation Explorer (MAX)..... | 9  |
| Setting a System Password.....   | 10 |
| Installing Software on the NI-7932R.....                               | 10 |
| Adding the NI-7932R to a LabVIEW Project.....                          | 11 |
| Adding a FlexRIO Adapter Module to the Target.....                     | 11 |
| Programming Options.....   | 12 |
| Programming with LabVIEW.....  | 12 |
| Text-based Programming.....  | 12 |
| Removing the Adapter Module.....                                       | 12 |
| Troubleshooting the NI-7932R.....                                      | 12 |
| Why Can't the NI-7932R Communicate with the Network?.....              | 13 |
| Why Doesn't the Device Appear in MAX?.....                             | 13 |
| Appendix: Front Panel.....   | 14 |
| NI-7932R Front Panel.....  | 14 |
| Worldwide Support and Services.....                                    | 16 |
| Where to Go Next.....  | 17 |

## FlexRIO Documentation

**Table 1.** FlexRIO Documentation Locations and Descriptions

| Document  | Location  | Description  |
|---|---|--|
| Getting started guide for your controller for FlexRIO   | Available from the Start menu and at <a href="http://ni.com/manuals">ni.com/manuals</a> .   | Contains installation instructions for your FlexRIO system.                      |
| Specifications document for your controller for FlexRIO | Available from the Start menu and at <a href="http://ni.com/manuals">ni.com/manuals</a> .   | Contains specifications for your controller for FlexRIO.                         |
| Getting started guide for your adapter module           | Available from the Start menu and at <a href="http://ni.com/manuals">ni.com/manuals</a> .   | Contains signal information, examples, and CLIP details for your adapter module. |
| Specifications document for your adapter module         | Available from the Start menu and at <a href="http://ni.com/manuals">ni.com/manuals</a> .   | Contains specifications for your adapter module.                                 |
| <i>LabVIEW FPGA Module Help</i>                         | Embedded in <i>LabVIEW Help</i> and at <a href="http://ni.com/manuals">ni.com/manuals</a> . | Contains information about the basic functionality of the LabVIEW FPGA Module.   |

**Table 1.** FlexRIO Documentation Locations and Descriptions (Continued)

| Document  | Location   | Description  |
|---|--|--|
| <i>Real-Time Module Help</i>                              | Embedded in <i>LabVIEW Help</i> and at <a href="http://ni.com/manuals">ni.com/manuals</a> .  | Contains information about real-time programming concepts, step-by-step instructions for using LabVIEW with the Real-Time Module, reference information about Real-Time Module VIs and functions, and information about LabVIEW features on real-time operating systems. |
| <i>FlexRIO Help</i>                                       | Available from the Start menu and at <a href="http://ni.com/manuals">ni.com/manuals</a> .  | Contains information about the FPGA module front panel connectors and I/O, controller for FlexRIO front panel connectors and I/O, programming instructions, and adapter module component-level IP (CLIP).  |
| <i>FlexRIO Adapter Module Development Kit User Manual</i> | Available from the Start menu at <b>Start»All Programs»National Instruments»NI FlexRIO»NI FlexRIO Adapter Module Development Kit»Documentation</b> . | Contains information about how to create custom adapter modules for use with FlexRIO FPGA modules.   |
| LabVIEW Examples  | Available in NI Example Finder. In LabVIEW, click <b>Help»Find Examples»Hardware Input and Output»FlexRIO</b> .                                      | Contains examples of how to run FPGA VIs and Host VIs on your device.  |
| IPNet   | Located at <a href="http://ni.com/ipnet">ni.com/ipnet</a> .  | Contains LabVIEW FPGA functions and intellectual property to share.  |
| FlexRIO product page                                      | Located at <a href="http://ni.com/flexrio">ni.com/flexrio</a> .  | Contains product information and data sheets for FlexRIO devices.  |

## Safety Guidelines



**Caution** You can impair the protection provided by the NI-7932R if you use it in a manner not described in this document.

# 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 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.



**Caution** To ensure the specified EMC performance, operate this product only with shielded cables and accessories. The DC power input cables and optical SFP+ cables may be unshielded.



**Caution** To ensure the specified EMC performance, you must use an isolated cable with the SFP+ ports.



**Caution** To ensure the specified EMC performance, the length of any cable connected to the TRIG ports and REF CLK ports must be no longer than 3 m (10 ft). The length of copper cables connected to the SFP+ ports must be no longer than 3 m (10 ft). The length of cables connected to the USB device ports or host ports must be no longer than 30 m (100 ft). The lengths of Ethernet cables and optical SFP+ cables are not limited.



**Caution** The USB device port is intended only for use in device configuration, application deployment, debug, and maintenance.

## Verifying the System Requirements

---

To use the NI-7932R, your system must meet certain requirements. For more information about minimum system requirements, recommended system, and supported application development environments (ADEs), refer to the readme, which is available on the software media or online at [ni.com/updates](https://ni.com/updates).

# What You Need to Get Started

---

- The NI-7932R shipping kit, which includes the following components:
  - The NI-7932R device
  - FlexRIO Support DVD



**Note** FlexRIO Support 15.1 is the earliest supported driver for the NI-7932R.

- *NI-7932R Getting Started Guide* (this document)
  - Power screw terminal connector plug
  - A to Mini-B device port USB cable
- A host computer running Windows, with NI software installed in the following order:



**Note** Visit [ni.com/info](http://ni.com/info) and enter the Info Code `rdsoftwareversion` to determine which software versions you need to use the NI-7932R and supported FlexRIO adapter modules.

- LabVIEW
  - LabVIEW Real-Time
  - LabVIEW FPGA
  - FlexRIO Support<sup>1</sup>
- A DC power supply as described in the *NI-7932R Specifications*
- A FlexRIO adapter module or custom adapter module (optional)
- A number 2 Phillips screwdriver
- A number 1 Phillips screwdriver
- A small flat-blade screwdriver
- Straight through shielded Ethernet cable (if connecting to a network) or crossover shielded Ethernet cable (if connecting directly to a PC)

## 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.

---

<sup>1</sup> LabVIEW 2015, FlexRIO Support 2015, LabVIEW Real-Time 2015, and LabVIEW FPGA 2015 are the earliest versions of software that support the NI-7932R.



**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.

## Preparing the Environment

Ensure that the environment you are using the NI-7932R in meets the following specifications.

|  |                                      |
|--|--------------------------------------|
| Operating temperature (IEC 60068-2-1, IEC 60068-2-2) | 0 °C to 55 °C                        |
| Operating humidity (IEC 60068-2-56)                  | 10% to 90% RH, noncondensing         |
| Pollution Degree                                     | 2                                    |
| Maximum altitude                                     | 2,000 m at 25 °C ambient temperature |

Indoor use only.



**Note** Refer to the *NI-7932R Specifications* at [ni.com/manuals](https://ni.com/manuals) for complete specifications.



**Caution** Clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

## Wiring Power to the NI-7932R

The NI-7932R requires a 9 V to 30 V external power supply that meets the specifications in the *NI-7932R Specifications*. The NI-7932R filters and regulates the supplied power and provides power for the I/O modules.



**Note** You can latch the power plug to the NI-7932R using two screws tightened to 0.20 to 0.25 N · m (1.8 to 2.2 lb · in.) of torque.

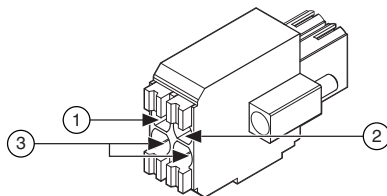
The maximum wire gage accepted by the power connector plug is 16 AWG. You must use a stripped wire length of 10 mm (.394 in).

When the POWER LED on the front panel is lit green, the device is powered.

The NI-7932R has reverse-voltage protection.

Complete the following steps to connect a power supply to the NI-7932R.

1. Ensure the power source is turned off.
2. Connect a positive wire to the positive terminal of the power connector plug, and connect a negative wire to the negative terminal of the power connector plug.



1. Positive terminal
2. Negative terminal
3. No connect

3. Install the power connector on the front panel of the NI-7932R.
4. Turn on the external power source(s).

## Powering on the NI-7932R

When you apply power for the first time to the NI-7932R, the controller boots into safe mode. The POWER LED illuminates, the STATUS LED illuminates briefly, and then the STATUS LED blinks twice every few seconds.

After you install software on the controller, subsequent reboots will boot the controller into the NI Linux Real-Time operating system.

You can optionally configure the NI-7932R to launch an embedded stand-alone LabVIEW Real-Time application each time you boot the controller.

## STATUS LED

The STATUS LED is off during normal operation. The NI-7932R indicates specific error conditions by flashing the STATUS LED a certain number of times every few seconds, as shown in the following table.

| LED State                   | Indication   |
|-----------------------------|--|
| 2 flashes every few seconds | <p>There is no software installed, which is the out-of-box state, or the controller has detected an error in its software.</p> <p>An error can occur when an attempt to upgrade the software is interrupted. Refer to the <i>MAX Help</i> for information about reinstalling software on the controller.</p> |
| 3 flashes every few seconds | <p>The controller is in safe mode. Refer to the <i>MAX Help</i> for information about safe mode.</p>   |



| LED State                   | Indication  |
|-----------------------------|---|
| 4 flashes every few seconds | The software has crashed twice without rebooting or cycling power between crashes. This usually occurs when the controller runs out of memory. Review your Real-Time VI and check the memory usage. Modify the VI as necessary to solve the memory usage issue. |
| Continuously flashing       | The controller has not booted into NI Linux Real-Time. The controller either booted into an unsupported operating system, was interrupted during the boot process, or detected an unrecoverable software error.   |
| Solid                       | The controller is booting up.   |
| Continuously flashing       | This indicates a hardware error. An internal power supply has failed. Check front-panel I/O and adapter module connections for shorts. Remove any shorts and power cycle the controller. If the problem persists, contact National Instruments.                 |
| Off                         | Normal operation.   |

## Connecting the NI-7932R to the Host Computer

Complete the following steps to connect the NI-7932R to the host computer using the USB device port.

1. Power on the host computer.
2. Connect the NI-7932R to the host computer using the USB A-to-B cable.



**Note** Alternatively, you can use the RJ-45 Ethernet port to connect the NI-7932R to the host computer.

The device driver software automatically detects the NI-7932R. If the device driver software does not detect the NI-7932R, verify that you installed the appropriate NI software in the correct order on the host computer.



**Tip** You can also use the Ethernet port to connect directly to the host computer or network. Refer to the user manual on [ni.com/manuals](https://ni.com/manuals) for more information about Ethernet connections.

### Related Information

[Troubleshooting the NI-7932R](#) on page 12

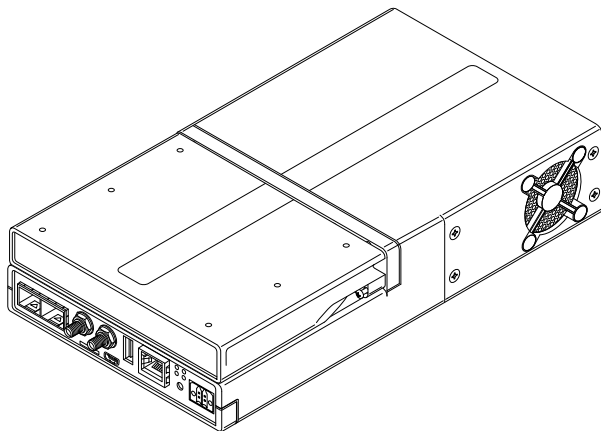
## Installing the FlexRIO Adapter Module

Skip this section if you are not using a FlexRIO adapter module.

1. Gently insert the guide pins and the high-density card edge of the FlexRIO adapter module into the corresponding connectors of the NI-7932R.  
The connection may be tight, but do not force the adapter module into place.
2. Tighten the captive screws on the FlexRIO adapter module to secure it to the NI-7932R.

The following figure shows the NI-7932R with the FlexRIO adapter module connected.

**Figure 2. NI-7932R with FlexRIO Adapter Module**



Refer to the getting started guide for your adapter module for more information about your adapter module, including programming information.

## Configuring the System in Measurement & Automation Explorer (MAX)

After connecting the NI-7932R to the host computer, complete the following steps to configure the system for the first time in MAX.

1. Launch MAX on the host computer.
2. Expand **Remote Systems** in the MAX configuration tree and select the system. MAX lists the system as the model name followed by the serial number, such as NI-7932R-030521C9.

### Related Information

[Why Doesn't the Device Appear in MAX?](#) on page 13

# Setting a System Password

Complete the following steps to set a system password.



**Note** Setting a system password is optional.



**Note** The default username for the NI-7932R is `admin`. There is no default password for the NI-7932R, 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 NI-7932R

1. Open Measurement & Automation Explorer (MAX).
2. Expand the system under **Remote Systems** by clicking the arrow beside it.
3. Select **Software**.
4. Click **Add/Remove Software** at the top of the **Software** tab to launch the LabVIEW Real-Time Software Wizard.



**Note** A login window appears if you set a system password.

5. Select a recommended software set to install.
6. Click **Next**.

7. The recommended software set is preselected from the list of software add-ons. Check any additional software add-ons you want. The System State Publisher, for example, makes monitoring system performance simple.



**Note** You can use the LabVIEW Real-Time Software Wizard to install more software add-ons later. The FlexRIO 15.0 Recommended Software Set is enough to get started.

8. Click **Next**.
9. Review the summary of software to install. Click **Next** to begin the update.
10. Wait for the installation to finish, and then click **Finish**.

## Adding the NI-7932R to a LabVIEW Project

---

1. Launch LabVIEW. The LabVIEW **Getting Started** window appears.
2. Click **Create Project** or open an existing project.
3. Right-click the project root in the **Project Explorer** window and select **New»Targets and Devices** from the shortcut menu to display the **Add Targets and Devices** dialog box.
  - a) If the hardware is connected to the host, select **Existing target or device**. Select the NI-7932R under **Real-Time FlexRIO** and click **OK**.
  - b) If the hardware is not connected to the host, select **New target or device**. Select the NI-7932R under **Real-Time FlexRIO** and click **OK**.
4. Right-click the target and select **New»FPGA Target**.

The FPGA target appears in the project under the Real-Time target.

## Adding a FlexRIO Adapter Module to the Target

Skip this section if you are not using an adapter module.

1. Expand the FPGA target by clicking the + button, then right-click **IO Module** and select **Properties**.
2. Select the **General** category and check the **Enable IO Module** box.
3. Select your I/O module from the **IO Modules** list, and select the CLIP you want to use from the **Component Level IP** box.
4. Click **OK**.

# Programming Options

Refer to the following table for information about how to program the NI-7932R.

| Component            | Programming Option(s)   |
|----------------------|---|
| Real-Time controller | LabVIEW Real-Time or C/C++ Development Tools for NI Linux Real-Time, Eclipse Edition. |
| FPGA                 | LabVIEW FPGA  |

## Related Information

*For more information about programming with LabVIEW Real-Time, refer to the [NI-7931R/7932R/7935R User Manual](#).*

*For more information about programming with C/C++ development tools, refer to the [Getting Started with C/C++ Development Tools for NI Linux Real-Time, Eclipse Edition tutorial](#).*

## Programming with LabVIEW

The Controller for FlexRIO examples provide a starting point for programming with LabVIEW. To access these examples, open LabVIEW and select **Help»Find Examples»**

**Hardware Input and Output»Controller for FlexRIO**.

For more detailed instructions about programming the NI-7932R with LabVIEW, refer to the *NI-7931R/7932R/7935R User Manual*.

## Text-based Programming

You can target the NI-7932R Linux Real-Time operating system from text-based development environments such as C and C++.

## Removing the Adapter Module

Complete the following steps to remove an adapter module from the NI-7932R.

1. Disconnect all cables to the adapter module.
2. Power off the NI-7932R.<sup>2</sup>
3. Unscrew the adapter module.
4. Remove the adapter module.

## Troubleshooting the NI-7932R

### Related Information

[Connecting the NI-7932R to the Host Computer](#) on page 8

<sup>2</sup> If you cannot power down the NI-7932R, use the System Configuration application programming interface (API) to disable power to the adapter module.

# Why Can't the NI-7932R Communicate with the Network?

1. Connect cables from your device to the host computer.
  - a) If you are using the USB port, use a USB cable to connect the NI-7932R USB device port to a host computer.

The USB driver creates a virtual network interface and assigns an IP address to the NI-7932R in the format of 172.22.11.x.
  - b) If you are using the ethernet port, use an ethernet to connect the ethernet port to the host computer.
2. In MAX, expand your system under Remote Systems.
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 NI-7932R to the host computer. The NI-7932R attempts to initiate a DHCP network connection at powerup.

If the NI-7932R cannot contain 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 NI-7932R over a standard Ethernet connection.

## Why Doesn't the Device Appear in MAX?

If you cannot find the NI-7932R in MAX, complete the following steps.

- Ensure you have the correct version of FlexRIO Support installed on the host computer.
- Check the USB cable connections at the NI-7932R and host computer. Check the Ethernet cable connections at the host computer and router.
- If you have network firewalls or other security software enabled, try temporarily turning them off. You may also need to add an exception for MAX. In Windows 7, select **Start»Control Panel»System and Security»Windows Firewall»Allow a program through Windows Firewall**. Click **Allow another program**, select **Measurement & Automation**, click **Add**, then 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.
- Hold down the RESET button for 5 seconds to reboot the target into safe mode. This prevents a real-time app from running. Sometimes a malfunctioning real-time app prevents network communication.
- Check the Device Manager to ensure the National Instruments USBLAN adapter is recognized. In Windows 7, select **Start»Control Panel»Device Manager»Network adapters»National Instruments»USBLAN adapter**. If the USBLAN adapter is not recognized, you must reinstall FlexRIO Support.
- Ensure that the Ethernet cable is connected correctly.

### Related Information

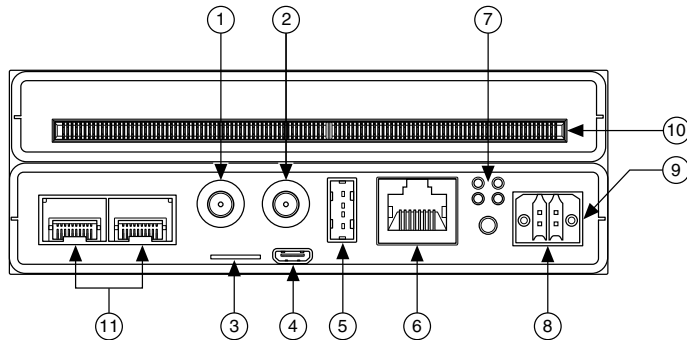
[Configuring the System in Measurement & Automation Explorer \(MAX\)](#) on page 9

# Appendix: Front Panel

## NI-7932R Front Panel

The following figure shows the NI-7932R front panel connectors, buttons, and LEDs.

**Figure 3.** NI-7932R



- |                       |                                      |
|-----------------------|--------------------------------------|
| 1. TRIG               | 7. LED indicators                    |
| 2. REF CLK            | 8. Reset                             |
| 3. Storage (μSD card) | 9. DC power source                   |
| 4. USB device port    | 10. FlexRIO adapter module connector |
| 5. USB host           | 11. Port 0/Port 1 (SFP+ connectors)  |
| 6. 1 Gigabit Ethernet |                                      |

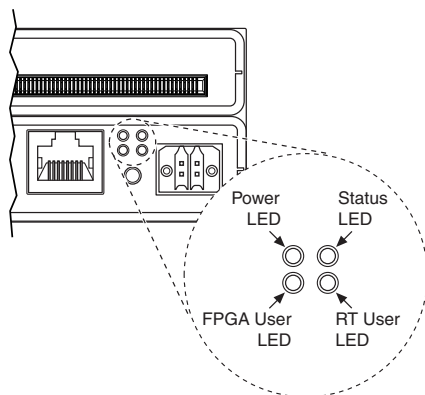
### Related Information

*For more information about the NI-7932R front panel connectors, buttons, and LEDs, refer to the [FlexRIO Help](#).*

## LED Indicators

The following figure shows the NI-7932R LEDs in more detail.

**Figure 4. NI-7932R LEDs**



## NI-7932R Module Signals

The following figure shows the available signals on the NI-7932R.



| PCB Secondary Side |     |      | PCB Primary Side |     |  | PCB Secondary Side |     |      | PCB Primary Side |  |  |
|--------------------|-----|------|------------------|-----|--|--------------------|-----|------|------------------|--|--|
| +3.3V              | P1  | P1   | +3.3V            | SCL |  | GND                | G21 | G21  | GND              |  |  |
| SDA                | S74 | S148 | SCL              |     |  | GPIO_CC_38_n       | S40 | S114 | GPIO_CC_14_n     |  |  |
| TB_Power_Good      | S73 | S147 | TB_Present       |     |  | GPIO_CC_38         | S39 | S113 | GPIO_CC_14       |  |  |
| +12V               | P2  | P2   | +12V             |     |  | GND                | G20 | G20  | GND              |  |  |
| Vcco               | S72 | S146 | Vcco             |     |  | GPIO_39_n          | S38 | S112 | GPIO_15_n        |  |  |
| Veeprom            | S71 | S145 | RSVD             |     |  | GPIO_39            | S37 | S111 | GPIO_15          |  |  |
| GND                | G37 | G37  | GND              |     |  | GND                | G19 | G19  | GND              |  |  |
| TDC_Assert_CLK     | S70 | S144 | IOModSyncClk_n   |     |  | GPIO_40_n          | S36 | S110 | GPIO_16_n        |  |  |
| TDC_Assert_CLK     | S69 | S143 | IOModSyncClk     |     |  | GPIO_40            | S35 | S109 | GPIO_16          |  |  |
| GND                | G36 | G36  | GND              |     |  | GND                | G18 | G18  | GND              |  |  |
| GPIO_24_n          | S68 | S142 | GPIO_0_n         |     |  | GPIO_41_n          | S34 | S108 | GPIO_17_n        |  |  |
| GPIO_24            | S67 | S141 | GPIO_0           |     |  | GPIO_41            | S33 | S107 | GPIO_17          |  |  |
| GND                | G35 | G35  | GND              |     |  | GND                | G17 | G17  | GND              |  |  |
| GPIO_25_n          | S66 | S140 | GPIO_1_n         |     |  | GPIO_42_n          | S32 | S106 | GPIO_18_n        |  |  |
| GPIO_25            | S65 | S139 | GPIO_1           |     |  | GPIO_42            | S31 | S105 | GPIO_18          |  |  |
| GND                | G34 | G34  | GND              |     |  | GND                | G16 | G16  | GND              |  |  |
| GPIO_CC_26_n       | S64 | S138 | GPIO_CC_2_n      |     |  | GPIO_43_n          | S30 | S104 | GPIO_19_n        |  |  |
| GPIO_CC_26         | S63 | S137 | GPIO_CC_2        |     |  | GPIO_43            | S29 | S103 | GPIO_19          |  |  |
| GND                | G33 | G33  | GND              |     |  | GND                | G15 | G15  | GND              |  |  |
| GPIO_27_n          | S62 | S136 | GPIO_3_n         |     |  | GPIO_44_n          | S28 | S102 | GPIO_20_n        |  |  |
| GPIO_27            | S61 | S135 | GPIO_3           |     |  | GPIO_44            | S27 | S101 | GPIO_20          |  |  |
| GND                | G32 | G32  | GND              |     |  | GND                | G14 | G14  | GND              |  |  |
| GPIO_28_n          | S60 | S134 | GPIO_4_n         |     |  | GPIO_45_n          | S26 | S100 | GPIO_21_n        |  |  |
| GPIO_28            | S59 | S133 | GPIO_4           |     |  | GPIO_45            | S25 | S99  | GPIO_21          |  |  |
| GND                | G31 | G31  | GND              |     |  | GND                | G13 | G13  | GND              |  |  |
| GPIO_29_n          | S58 | S132 | GPIO_5_n         |     |  | GPIO_46_n          | S24 | S98  | GPIO_22_n        |  |  |
| GPIO_29            | S57 | S131 | GPIO_5           |     |  | GPIO_46            | S23 | S97  | GPIO_22          |  |  |
| GND                | G30 | G30  | GND              |     |  | GND                | G12 | G12  | GND              |  |  |
| GPIO_30_n          | S56 | S130 | GPIO_6_n         |     |  | GPIO_47_n          | S22 | S96  | GPIO_23_n        |  |  |
| GPIO_30            | S55 | S129 | GPIO_6           |     |  | GPIO_47            | S21 | S95  | GPIO_23          |  |  |
| GND                | G29 | G29  | GND              |     |  | GND                | G11 | G11  | GND              |  |  |
| GPIO_31_n          | S54 | S128 | GPIO_7_n         |     |  | GPIO_48_n          | S20 | S94  | GPIO_58_n        |  |  |
| GPIO_31            | S53 | S127 | GPIO_7           |     |  | GPIO_48            | S19 | S93  | GPIO_58          |  |  |
| GND                | G28 | G28  | GND              |     |  | GND                | G10 | G10  | GND              |  |  |
| GPIO_32_n          | S52 | S126 | GPIO_8_n         |     |  | GPIO_49_n          | S18 | S92  | GPIO_59_n        |  |  |
| GPIO_32            | S51 | S125 | GPIO_8           |     |  | GPIO_49            | S17 | S91  | GPIO_59          |  |  |
| GND                | G27 | G27  | GND              |     |  | GND                | G9  | G9   | GND              |  |  |
| GPIO_33_n          | S50 | S124 | GPIO_9_n         |     |  | GPIO_CC_50_n       | S16 | S90  | GPIO_CC_60_n     |  |  |
| GPIO_33            | S49 | S123 | GPIO_9           |     |  | GPIO_CC_50         | S15 | S89  | GPIO_CC_60       |  |  |
| GND                | G26 | G26  | GND              |     |  | GND                | G8  | G8   | GND              |  |  |
| GPIO_34_n          | S48 | S122 | GPIO_10_n        |     |  | GPIO_51_n          | S14 | S88  | GPIO_61_n        |  |  |
| GPIO_34            | S47 | S121 | GPIO_10          |     |  | GPIO_51            | S13 | S87  | GPIO_61          |  |  |
| GND                | G25 | G25  | GND              |     |  | GND                | G7  | G7   | GND              |  |  |
| GPIO_35_n          | S46 | S120 | GPIO_11_n        |     |  | GPIO_52_n          | S12 | S86  | GPIO_62_n        |  |  |
| GPIO_35            | S45 | S119 | GPIO_11          |     |  | GPIO_52            | S11 | S85  | GPIO_62          |  |  |
| GND                | G24 | G24  | GND              |     |  | GND                | G6  | G6   | GND              |  |  |
| GPIO_36_n          | S44 | S118 | GPIO_12_n        |     |  | GPIO_53_n          | S10 | S84  | GPIO_63_n        |  |  |
| GPIO_36            | S43 | S117 | GPIO_12          |     |  | GPIO_53            | S9  | S83  | GPIO_63          |  |  |
| GND                | G23 | G23  | GND              |     |  | GND                | G5  | G5   | GND              |  |  |
| GPIO_37_n          | S42 | S116 | GPIO_13_n        |     |  | GPIO_54_n          | S8  | S82  | GPIO_64_n        |  |  |
| GPIO_37            | S41 | S115 | GPIO_13          |     |  | GPIO_54            | S7  | S81  | GPIO_64          |  |  |
| GND                | G22 | G22  | GND              |     |  | GND                | G4  | G4   | GND              |  |  |
|                    |     |      |                  |     |  | GPIO_55_n          | S6  | S80  | GPIO_65_n        |  |  |
|                    |     |      |                  |     |  | GPIO_55            | S5  | S79  | GPIO_65          |  |  |
|                    |     |      |                  |     |  | GND                | G3  | G3   | GND              |  |  |
|                    |     |      |                  |     |  | GPIO_56_n          | S4  | S78  | GPIO_66_n        |  |  |
|                    |     |      |                  |     |  | GPIO_56            | S3  | S77  | GPIO_66          |  |  |
|                    |     |      |                  |     |  | GND                | G2  | G2   | GND              |  |  |
|                    |     |      |                  |     |  | GPIO_57_n          | S2  | S76  | GPIO_67_n        |  |  |
|                    |     |      |                  |     |  | GPIO_57            | S1  | S75  | GPIO_67          |  |  |
|                    |     |      |                  |     |  | GND                | G1  | G1   | GND              |  |  |

# Worldwide Support and Services

The National Instruments website is your complete resource for technical support. At [ni.com/support](https://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](https://ni.com/services) for NI Factory Installation Services, repairs, extended warranty, and other services.

Visit [ni.com/register](https://ni.com/register) to register your National Instruments product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

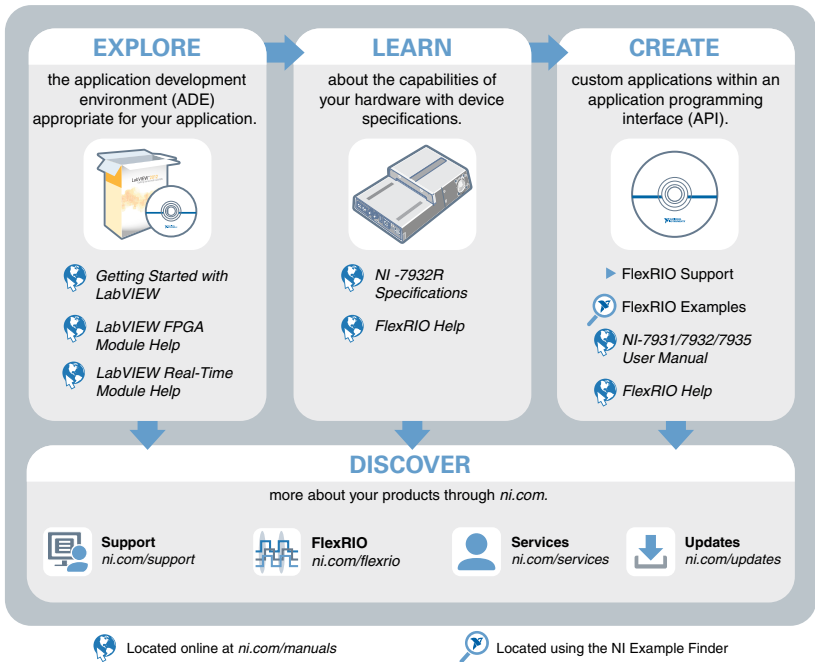
A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer’s declaration of conformity. This system

affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting [ni.com/certification](http://ni.com/certification). If your product supports calibration, you can obtain the calibration certificate for your product at [ni.com/calibration](http://ni.com/calibration).

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world. For telephone support in the United States, create your service request at [ni.com/support](http://ni.com/support) or dial 1 866 ASK MYNI (275 6964). For telephone support outside the United States, visit the *Worldwide Offices* section of [ni.com/niglobal](http://ni.com/niglobal) to access the branch office websites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

## Where to Go Next

Refer to the following figure for information about other product tasks and associated resources for those tasks.



Refer to the *NI Trademarks and Logo Guidelines* at [ni.com/trademarks](http://ni.com/trademarks) for information on NI trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering NI products/technology, refer to the appropriate location: **Help»Patents** in your software, the `patents.txt` file on your media, or the *National Instruments Patent Notice* at [ni.com/patents](http://ni.com/patents). You can find information about end-user license agreements (EULAs) and third-party legal notices in the readme file for your NI product. Refer to the *Export Compliance Information* at [ni.com/legal/export-compliance](http://ni.com/legal/export-compliance) for the NI global trade compliance policy and how to obtain relevant HTS codes, ECCNs, and other import/export data. NI MAKES NO EXPRESS OR IMPLIED WARRANTIES AS TO THE ACCURACY OF THE INFORMATION CONTAINED HEREIN AND SHALL NOT BE LIABLE FOR ANY ERRORS. U.S. Government Customers: The data contained in this manual was developed at private expense and is subject to the applicable limited rights and restricted data rights as set forth in FAR 52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.

© 2015 National Instruments. All rights reserved.