Getting Started with the NI PXI-7811R

This document explains how to set up the National Instruments PXI-7811R device.

Introduction

The PXI-7811R is an R Series reconfigurable I/O (RIO) device with 160 digital I/O (DIO) lines.

Traditional digital I/O devices have a fixed functionality provided by an application-specific integrated circuit (ASIC), but the PXI-7811R has a field-programmable gate array (FPGA) that allows you to define device functionality and timing.

You can use the LabVIEW FPGA Module to graphically design the PXI-7811R timing and functionality without having to learn a low-level programming language or a hardware description language (HDL) traditionally used for FPGA design. With the LabVIEW FPGA Module, you create or download a custom virtual instrument (VI) to the FPGA. You can reconfigure the PXI-7811R device with a new VI at any time.

You can use the LabVIEW Real-Time Module to communicate and control the PXI-7811R device while performing additional tasks, such as real-time floating-point processing and data logging.

✎ **Note** If you are using LabVIEW but not the LabVIEW FPGA Module, you can create VIs that run in LabVIEW to control existing FPGA VIs, but you cannot create new FPGA VIs.

The PXI-7811R device has Flash memory that you can use to store VIs. You can configure VIs to load to the FPGA and to run when the device powers up.

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Required Items

This section provides lists of the items necessary for getting started using the PXI-7811R with Windows 2000/XP and the LabVIEW Real-Time Module.

Documentation

The *NI PXI-7811R User Manual* describes the electrical and mechanical aspects of the PXI-7811R device and contains information about device operation and programming. This document is included on the NI-RIO CD and is also available at ni.com/manuals.

LabVIEW Help is available in LabVIEW by selecting **Help»VI, Function, & How-To Help**.

Windows 2000/XP

Use the following items to set up and use the PXI-7811R with Windows 2000/XP.

❑ PXI-7811R device

❑ The following software packages:
  – LabVIEW 7.1 or later
  – LabVIEW FPGA Module 1.1 or later—required to develop custom FPGA VIs for the PXI-7811R device
  – NI-RIO 1.1 or later—included with the PXI-7811R

❑ PXI/CompactPCI chassis and a PXI/CompactPCI embedded controller running Windows 2000/XP (or any computer running Windows 2000/XP and a MXI-3 link to a PXI/CompactPCI chassis)

❑ At least one cable and device for connecting signals to the PXI-7811R

LabVIEW Real-Time Module for ETS

Use the following items to set up and use the PXI-7811R with the LabVIEW FPGA Module and the LabVIEW Real-Time Module.

❑ PXI-7811R device

❑ The following software packages:
  – LabVIEW 7.1 or later
  – LabVIEW Real-Time Module for ETS 7.1 or later

- – LabVIEW FPGA Module 1.1 or later—required to develop custom FPGA VIs for the PXI-7811R device
- – NI-RIO 1.1 or later—included with the PXI-7811R

❑ PXI/CompactPCI chassis and real-time PXI controller

❑ One of the following host computers, depending upon your application, running Windows 2000/XP:
  - – PC
  - – Laptop computer
  - – PXI/CompactPCI embedded controller

❑ At least one cable and device for connecting signals to the PXI-7811R

❑ CAT 5 Ethernet crossover cable if the real-time PXI system is not configured on a network. To connect the PXI system to a network port, use a standard CAT 5 10/100Base-T Ethernet cable.

Installing Software

The following instructions describe how to install the NI-RIO device drivers and LabVIEW.

Installing LabVIEW, the LabVIEW Real-Time Module for ETS, and the LabVIEW FPGA Module

Use the following sequence when installing LabVIEW, the LabVIEW Real-Time Module for ETS, and the LabVIEW FPGA Module. For more detailed information about software requirements, refer to the *LabVIEW FPGA Release Notes*.

If you are using NI-RIO without LabVIEW, skip these steps and complete the steps in the *Installing NI-RIO Device Drivers* section.

Note You must install LabVIEW 7.0 or later and the LabVIEW modules you will be using with the NI 7811R *before* installing the NI-RIO device drivers. For LabVIEW installation instructions, refer to the *LabVIEW Release Notes*.

1. Install LabVIEW for Windows from the LabVIEW CD.
2. Install the LabVIEW Real-Time Module for ETS from the LabVIEW Real-Time CD.
3. Install LabVIEW FPGA from the LabVIEW FPGA CD.
4. Install the NI-RIO device drivers. Refer to the *Installing NI-RIO Device Drivers* section for driver installation instructions.

Installing NI-RIO Device Drivers

Complete the following steps to install the NI-RIO device drivers that are included with the PXI-7811R device. If you are using LabVIEW, complete the installation instructions in the *Installing LabVIEW, the LabVIEW Real-Time Module for ETS, and the LabVIEW FPGA Module* section *before* installing the NI-RIO device drivers.

1. Run setup.exe from the NI-RIO CD and follow the setup instructions.

2. Follow the onscreen instructions until the Feature Tree window appears.

3. In the Feature Tree window, select the components to install. You must install NI-VISA, NI-RIO, and NI Measurement & Automation Explorer (MAX).

4. Follow the onscreen instructions to complete the driver installation.

5. Reboot your computer.

Installing Hardware

This section describes how to unpack and install the PXI-7811R device. You can install the PXI-7811R in any available peripheral slot in the PXI or CompactPCI chassis.

Note You must install the NI-RIO device drivers before installing the PXI-7811R device.

Unpacking

The PXI-7811R device ships in an antistatic package to prevent electrostatic discharge from damaging device components. To prevent such damage when handling the device, take the following precautions:

• Ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

• Touch the antistatic package to a metal part of the computer chassis before removing the devices from the package.

Caution *Never* touch the exposed pins of connectors.

Remove the devices from the package and inspect the devices for loose components or any other sign of damage. Notify NI if the devices appear damaged in any way. Do *not* install damaged devices into the computer.

Store the PXI-7811R in the antistatic envelope when not in use.

Installation

You can install the PXI-7811R in any available peripheral slot in the PXI or CompactPCI chassis. Complete the following steps to install the PXI-7811R device.

✎ **Note** You must install the software before installing the hardware. For software installation instructions, refer to the *Installing Software* section.

1. Power off and unplug the PXI or CompactPCI chassis.

2. Make sure there are no lit LEDs on the chassis. Wait for any lit LEDs to go out before continuing the installation.

3. Remove the filler panel for the peripheral slot.

4. Ground yourself using a grounding strap or by touching a grounded object, such as the PXI or CompactPCI chassis.

5. Insert the PXI-7811R into the slot. Use the injector/ejector handle to fully inject the PXI-7811R into place.

6. Screw the front panel of the PXI-7811R to the front panel mounting rails of the chassis.

7. Visually verify the installation. Make sure the PXI-7811R is not touching other devices or components and that the PXI-7811R is fully inserted into the slot.

8. Plug in and power on the PXI or CompactPCI chassis.

Connecting Signals

The PXI-7811R has four DIO connectors with 40 DIO lines per DIO connector.

Figure 1 shows the I/O connector locations for the PXI-7811R. The I/O connectors are numbered starting at zero.
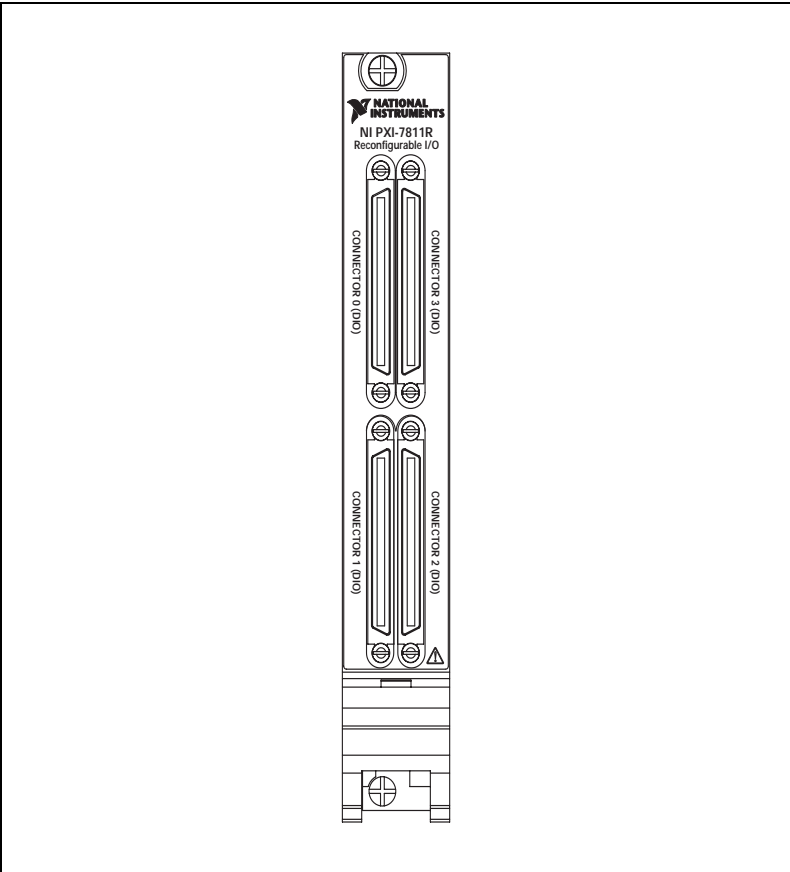
Figure 1. PXI-7811R Connector Locations

Figure 2 shows the pin assignments for all I/O connectors on the PXI-7811R.

DIO38	34	68	DIO39
DIO36	33	67	DIO37
DIO34	32	66	DIO35
DIO32	31	65	DIO33
DIO30	30	64	DIO31
DIO28	29	63	DIO29
+5V	28	62	DIO27
+5V	27	61	DIO26
DGND	26	60	DIO25
DGND	25	59	DIO24
DGND	24	58	DIO23
DGND	23	57	DIO22
DGND	22	56	DIO21
DGND	21	55	DIO20
DGND	20	54	DIO19
DGND	19	53	DIO18
DGND	18	52	DIO17
DGND	17	51	DIO16
DGND	16	50	DIO15
DGND	15	49	DIO14
DGND	14	48	DIO13
DGND	13	47	DIO12
DGND	12	46	DIO11
DGND	11	45	DIO10
DGND	10	44	DIO9
DGND	9	43	DIO8
DGND	8	42	DIO7
DGND	7	41	DIO6
DGND	6	40	DIO5
DGND	5	39	DIO4
DGND	4	38	DIO3
DGND	3	37	DIO2
DGND	2	36	DIO1
DGND	1	35	DIO0

Figure 2. PXI-7811R I/O Connector Pin Assignments

⚠ **Caution** Connections that exceed any of the maximum ratings of input or output signals on the PXI-7811R can damage the PXI-7811R and the computer. NI is *not* liable for any damage resulting from such signal connections. Refer to the *PXI-7811R User Manual* for the maximum input ratings for each signal.

For detailed information about connecting I/O signals, refer to the *NI 7811R User Manual*.

Cabling Options

Accessing the signals on the I/O connectors requires at least one cable and one signal accessory. Table 1 summarizes the National Instruments cables available for use with the NI 7811R device.

Table 1. Cabling Options

Cable	Description
SH68-C68-S	For connecting signals from the DIO connector to the NI SCB-68 terminal block.
NSC68-5050	For direct connection of the NI 7811R and SSR backplanes. Routes signals to connectors that attach directly to SSR backplanes.

Documentation Resources

Refer to the following documentation for information about the LabVIEW FPGA Module, R Series hardware, and VIs necessary for your application.

- *LabVIEW FPGA Module Release Notes*—describes the software installation and other known software issues

- *LabVIEW FPGA Module User Manual*—describes the LabVIEW FPGA Module software and techniques for building applications in LabVIEW with the LabVIEW FPGA Module

- *PXI-7811R User Manual*—describes the electrical and mechanical aspects of the PXI-7811R device and contains information concerning its operation and programming

- *LabVIEW Help*—describes the VIs and function reference information

- *CompactRIO R Series Expansion System Installation Instructions*—describes how to install the CompactRIO R Series Expansion chassis and CompactRIO I/O modules

Where to Go from Here

Refer to the *LabVIEW FPGA Module Release Notes* for information about getting started with LabVIEW FPGA VIs and host VIs. This document also provides examples for verifying that your software and hardware are properly installed. To access this document, select **Start»Programs» National Instruments»LabVIEW»Module Documents**.