



- Embedded controller runs LabVIEW Real-Time for deterministic control, data logging, and analysis
- 800 MHz processor, 4 GB nonvolatile storage, 512 MB DDR2 memory
- Dual Ethernet ports with embedded Web and file servers for remote user interfacing
- Hi-Speed USB host port for connection to USB flash and memory devices
- RS232 serial port for connection to peripherals; dual 9 to 35 VDC supply inputs
- -20 to 55 °C operating temperature range

## cRIO-9024

Real-Time Controller with 800 MHz,  
512 MB DRAM, 4 GB Storage

### Overview

The NI cRIO-9024 embedded real-time controller is part of the high-performance NI CompactRIO programmable automation controller (PAC) platform. It features an industrial 800 MHz real-time Freescale processor for deterministic, reliable real-time applications and contains 512 MB of DDR2 RAM and 4 GB of nonvolatile storage for holding programs and logging data.

### Requirements and Compatibility

OS Information	Driver Information	Software Compatibility
<ul style="list-style-type: none"><li>• VxWorks</li></ul>	<ul style="list-style-type: none"><li>• NI-RIO</li></ul>	<ul style="list-style-type: none"><li>• LabVIEW</li><li>• LabVIEW Real-Time Module</li><li>• LabVIEW Professional Development System</li><li>• LabVIEW FPGA Module</li></ul>

## Application and Technology

### System Configuration

The NI cRIO-9024 rugged, reliable controller is designed for low-power consumption with dual 9 to 35 VDC supply inputs that deliver isolated power to the CompactRIO chassis/modules and a -20 to 55 °C operating temperature range. The cRIO-9024 accepts 9 to 35 VDC power supply inputs on power up and 6 to 35 VDC power supply inputs during operation, so it can function for long periods of time in remote applications using a battery or solar power.

The controller provides two Ethernet ports - 10/100 and 10/100/1000 - that you can use to conduct programmatic communication over the network and built-in Web (HTTP) and file (FTP) servers. The ports also are compatible with the NI 9144 C Series expansion chassis, so you can connect more deterministic I/O for your application.

To create additional storage capability for your embedded logging applications, the cRIO-9024 has a Hi-Speed USB host port to which you can connect external USB-based storage media (flash drives and hard drives). In addition, the controller features a fault-tolerant file system that provides increased reliability for data-logging applications.

The CompactRIO real-time controller connects to any four- or eight-slot CompactRIO reconfigurable chassis. The user-defined FPGA circuitry in the chassis controls each I/O module and passes data to the controller through a local PCI bus using built-in communication functions.

### Embedded Software

The cRIO-9024 runs NI LabVIEW Real-Time Module software on the Wind River VxWorks real-time operating system (RTOS) for extreme reliability and determinism. You can now use leading VxWorks RTOS technology and LabVIEW graphical programming tools to quickly design, prototype, and deploy a customizable, commercial off-the-shelf embedded system.

You can synchronize embedded code execution to an FPGA-generated interrupt request (IRQ) or an internal millisecond real-time clock source. The LabVIEW Real-Time ETS OS provides reliability and simplifies the development of complete embedded applications that include time-critical control and acquisition loops in addition to lower-priority loops for postprocessing, data logging, and Ethernet/serial communication. Built-in elemental I/O functions such as the FPGA Read/Write function provide a communication interface to the highly optimized reconfigurable FPGA circuitry. Data values are read from the FPGA in integer format and then converted to scaled engineering units in the controller.

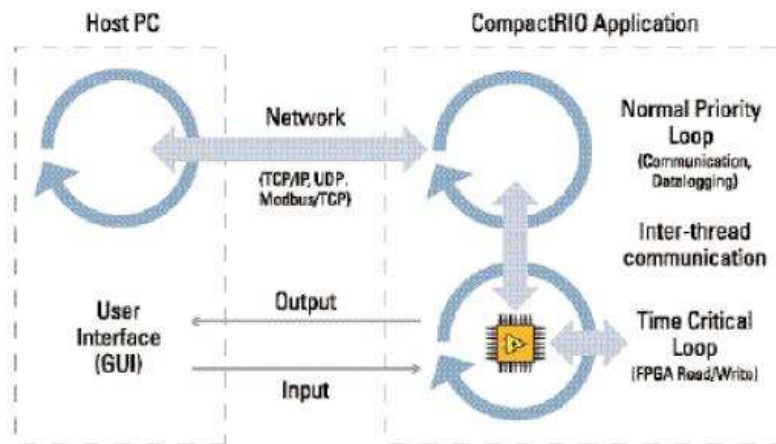


Figure 1. CompactRIO Software Architecture

## Built-In Servers

In addition to programmatic communication via TCP/IP, UDP, Modbus/TCP, IrDA, and serial protocols, the CompactRIO controllers include built-in servers for Virtual Instrument Software Architecture (VISA), HTTP, and FTP. The VISA server provides remote download and communication access to the reconfigurable I/O (RIO) FPGA over Ethernet. The HTTP server provides a Web browser user interface to HTML pages, files, and the user interface of embedded LabVIEW applications through a Web browser plug-in. The FTP server provides access to logged data or configuration files.