CompactRIO High-Performance Real-Time Controllers

NI cRIO-9012, NI cRIO-9014 *NEW!*

- Small and rugged embedded real-time controllers
- Execution target for NI LabVIEW Real-Time applications
- Reliable and deterministic operation for stand-alone control, monitoring, and logging
- 400 MHz Freescale MPC5200 real-time processor
- -40 to 70 °C operating temperature range

Operating System

- LabVIEW Real-Time (VxWorks)

Driver Software

- NI-RIO for reconfigurable embedded systems

Product	DRAM Memory (MB)	Internal Nonvolatile Storage (MB)	10/100BaseT/TX Ethernet Port	RS232 Serial Port	USB Port	LEDs	DIP Switches	Power Supply Input Range	Power Consumption	Backup Power Input	Remote Panel Web Server	FTP Server
cRIO-9012	64	128	✓	✓	✓	4	5	9 to 35 VDC	6 W max	✓	✓	✓
cRIO-9014	128	2000	✓	✓	✓	4	5	9 to 35 VDC	6 W max	✓	✓	✓

Overview and Applications

The National Instruments cRIO-901x controllers feature an industrial 400 MHz Freescale MPC5200 real-time processor for deterministic and reliable real-time applications. Both embedded controllers are designed for extreme ruggedness, reliability, and low power consumption with dual 9 to 35 VDC supply inputs that deliver isolated power to the CompactRIO chassis/modules and a -40 to 70 °C operating temperature range. The cRIO-901x controllers accept 9 to 35 VDC power supply inputs on power-up and 6 to 35 VDC power supply inputs during operation, so they can function for long periods of time in remote applications using a battery or solar power.

With the 10/100 Mb/s Ethernet and serial ports, you can communicate via TCP/IP, UDP, Modbus/TCP, and serial protocols. The cRIO-901x controllers also feature built-in Web (HTTP) and file (FTP) servers. For additional storage capability, cRIO-901x controllers have a full-speed USB host port to which you can connect external USB-based storage media (flash drives and hard drives) for embedded logging applications requiring additional storage. Also, there is a fault-tolerant file system embedded in cRIO-901x controllers that provides increased reliability for data logging.

CompactRIO real-time controllers connect to any 4 or 8-slot cRIO-910x reconfigurable chassis. The embedded FPGA in the chassis controls each I/O module and passes data to the controller through a local PCI bus using built-in communications functions.

Embedded Software

The cRIO-901x controllers run the National Instruments LabVIEW Real-Time Module on the Wind River VxWorks real-time operating system (RTOS) for extreme reliability and determinism. You can now use the leading VxWorks RTOS technology to quickly design, prototype, and deploy a customizable COTS embedded system using NI LabVIEW graphical programming tools.

Ordering Information

NI cRIO-9012 779563-01
NI cRIO-9014 779564-01

Accessories

NI 9978 (4-pos screw-terminal power supply plugs, quantity 5).....196938-01
NI 9979 (strain relief kit for 4-pos power connector) 196939-01

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/compactrio**.

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Specifications

Minimum Software Support Information

CompactRIO Real-Time Controller	Minimum Version of LabVIEW Real-Time Module	Minimum Version of NI-RIO Driver
cRIO-9012	8.2	2.1
cRIO-9014	8.2.1	2.1.1

Specifications subject to change without notice. The following specifications are typical for the range -40 to 70 °C unless otherwise noted.

Network

Network interface ..... 10BaseT and 100BaseTX Ethernet
Compatibility ..... IEEE 802.3
Communication rates ..... 10 Mb/s, 100 Mb/s, autonegotiated
Maximum cabling distance ..... 100 m/segment

SMB Connector

Output Characteristics

Logic high ..... 3.3 V
Logic low ..... 0 V
Driver type ..... CMOS
Sink/source current ..... ±50 mA
3-state output leakage current ..... ±5 µA

Input Characteristics

Minimum input level ..... -500 mV
Maximum input low level ..... 990 mV
Minimum input high level ..... 2.31 V
Maximum input level ..... 5.5 V
Input capacitance ..... 2.5 pF
Resistive strapping ..... 1 kΩ to 3.3 V

USB Port

Maximum data rate ..... 12 Mb/s
Maximum current ..... 500 mA

Memory

CompactRIO Real-Time Controller	Nonvolatile Storage	DRAM
cRIO-9012	128 MB	64 MB
cRIO-9014	2 GB	128 MB

Use the following formula to determine the minimum life span in years of the nonvolatile storage of your cRIO-901x controller:

Minimum life span in years = 35068 / [file size (MB) x write rate (per day)]

Power Requirements

Caution: You must use a National Electric Code (NEC) UL Listed Class 2 power supply with cRIO-901x controllers.

Recommended power supply ..... 48 W secondary, 18 to 24 VDC
Power consumption
  Controller only ..... 6 W
  Controller supplying power to eight CompactRIO modules ..... 20 W
Power supply
  On power-up ..... 9 to 35 V
  After power-up ..... 6 to 35 V

Note: The cRIO-901x controllers are guaranteed to power up when 9 V is applied to V and C. After power-up, it can operate on as little as 6 V.

Physical Characteristics

If you need to clean the controller, wipe it with a dry towel.
Screw-terminal wiring ..... 12 to 24 AWG copper conductor wire with 10 mm (0.39 in.) of insulation stripped from the end
Torque for screw terminals ..... 0.5 to 0.6 N · m (4.4 to 5.3 lb · in.)
Weight ..... Approx. 488 g (17.2 oz)

Safety Voltages

Connect only voltages that are within these limits.
V-to-C ..... 35 V max, 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 to signals or use for measurements within measurement categories II, III, or IV.

Safety Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note: For UL and other safety certifications, refer to the product label or visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326 EMC requirements; Industrial Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note: For EMC compliance, operate this device according to product documentation.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 73/23/EEC; Low-Voltage Directive (safety)
- 89/336/EEC; Electromagnetic Compatibility Directive (EMC)

Note: Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers: At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit **ni.com/environment/weee.htm**.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA II T4
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA II T4
Europe (DEMKO)	EEx nA II T4

Environmental

The cRIO-901x controllers are intended for indoor use only. For outdoor use, mount the CompactRIO system in a suitably rated enclosure.

Operating temperature	-40 to 70 °C (meets IEC 60068-2-1, IEC 60068-2-2)

Note: To meet this operating temperature range, follow the guidelines in the installation instructions for your CompactRIO system.

Storage temperature	-40 to 85 °C (meets IEC 60068-2-1, IEC 60068-2-2)
Ingress protection	IP 40
Operating humidity	10 to 90% RH, noncondensing (meets IEC 60068-2-56)
Storage humidity	5 to 95% RH, noncondensing (meets IEC 60068-2-56)
Maximum altitude	2,000 m
Pollution degree	2 (meets IEC 60664)

Shock and Vibration

To meet these specifications, you must panel mount the CompactRIO system, affix ferrules to the ends of the terminal wires, and install a tie wrap on the USB cable for strain relief. You can use the tie wrap to attach the USB cable to the Ethernet cable.

Operating vibration, random	5 g_{rms}, 10 to 500 Hz (meets IEC 60068-2-64)
Operating shock	30 g, 11 ms half sine 50 g, 3 ms half sine, 18 shocks at 6 orientations (meets IEC 60068-2-27)
Operating vibration, sinusoidal	5 g, 10 to 500 Hz (meets IEC 60068-2-6)

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NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit **ni.com/training**.

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Our Professional Services Team is composed of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit **ni.com/alliance**.

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OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit **ni.com/oem**.

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We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit **ni.com/ssp**.

Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

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