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Find the *National Instruments cRIO-9148* at our website: ***Click HERE***

Technical Sales

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Requirements and Compatibility | Ordering Information | Detailed Specifications
For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

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NI 9148



- 8-slot Ethernet expansion chassis for NI C Series modules
- Easily add distributed monitoring and control to any Ethernet network
- Directly access C Series I/O from your Windows PC or LabVIEW Real-Time controller
- Integrated 2M gate FPGA for custom timing, onboard processing, and control
- Network fail-safe for increased reliability
- Industrial ratings: -40 to 70 °C operating temperature, 50 g shock, 5 g vibration

Overview

The NI 9148 is a rugged, 8-slot Ethernet reconfigurable I/O (RIO) expansion chassis for adding distributed industrial I/O to your Ethernet network. Offering an easy-to-use software experience, this chassis helps you access your I/O using the NI RIO Scan Interface or the user-programmable FPGA from any Windows-based or LabVIEW Real-Time system.

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Requirements and Compatibility

OS Information

- Real-Time OS
- Windows

Driver Information

- NI-RIO

Software Compatibility

- LabVIEW
- LabVIEW FPGA Module
- LabVIEW Professional Development System
- LabVIEW Real-Time Module

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Comparison Tables

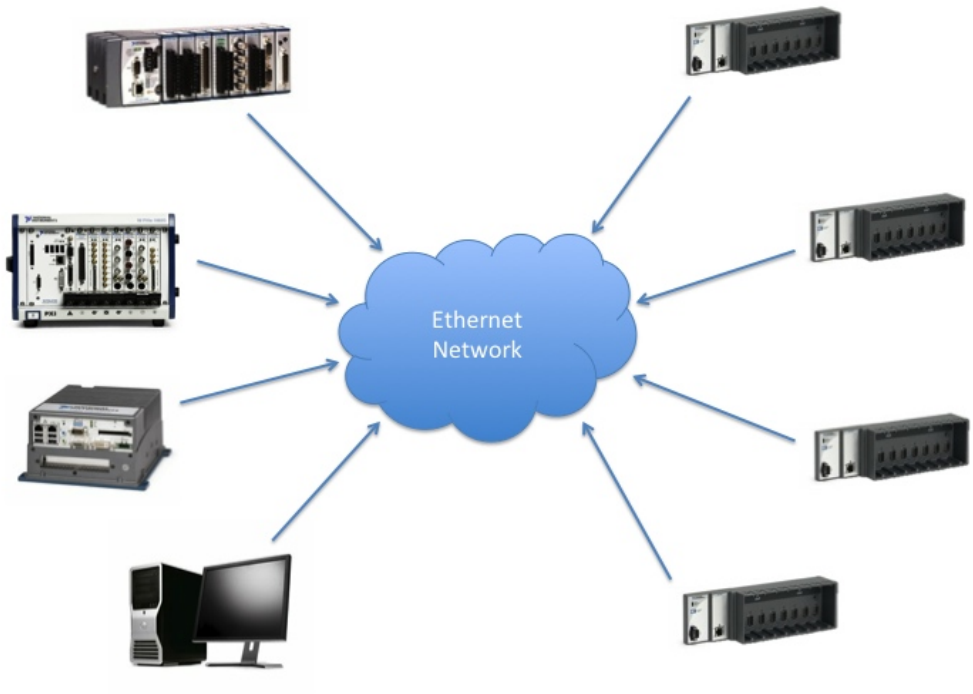
Chassis	Number of Slots	FPGA
NI 9146	4	Spartan-6 LX45
NI 9148	8	Spartan-3 2M

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Application and Technology

The NI 9148 is a rugged, 8-slot expansion chassis for easily adding C Series I/O to any standard 10/100 Ethernet network. You can add this Ethernet RIO chassis to an NI LabVIEW for Windows application or use it as remote expansion I/O on LabVIEW Real-Time systems such as NI CompactRIO or PXI. Just connect it over Ethernet and instantly obtain access to C Series I/O in your LabVIEW host program.

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Connect your Ethernet RIO chassis to your Ethernet network to access I/O from any Windows-based or LabVIEW Real-Time system on the network.

The NI 9148 does not require the LabVIEW Real-Time Module for access to C Series I/O in Windows-based systems.

For low-level access to I/O timing, triggering, and onboard processing, you can use the LabVIEW FPGA Module to program the Spartan-3 2M gate field-programmable gate array (FPGA) without having any prior experience in FPGA digital design. This FPGA provides reliable high-speed I/O, highly customizable timing, and advanced processing algorithms for your high-speed control applications. If you want to access your I/O only through the RIO Scan Interface, you do not need to use the LabVIEW FPGA Module.

The NI 9148 offers diagnostic and autoconfiguration features to simplify installation, use, and maintenance. For increased reliability, the chassis also has a network fail-safe that verifies network connectivity and communication with the remote host system and drives I/O to safe states should connectivity be interrupted. The NI 9148 features low-power consumption, quick startup times, a wide temperature range (-40 to 70 °C), and rugged industrial specs (50 g shock, 5 g vibration).

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Ordering Information

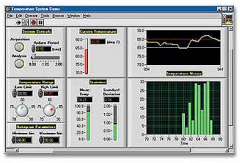
For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
Ethernet RIO Expansion Chassis (8-Slot)			
NI 9148 Ethernet RIO	781502-01	No accessories required.	
Ethernet RIO Expansion Chassis (4-Slot)			
NI 9146 Ethernet RIO	782445-01	No accessories required.	

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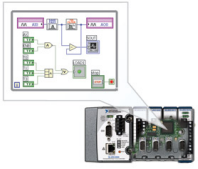
Software Recommendations

LabVIEW Professional Development System for Windows



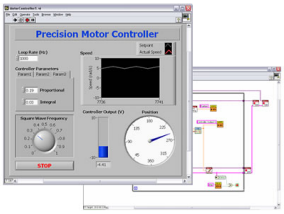
- Advanced software tools for large project development
- Automatic code generation using DAQ Assistant and Instrument I/O Assistant
- Tight integration with a wide range of hardware
- Advanced measurement analysis and digital signal processing
- Open connectivity with DLLs, ActiveX, and .NET objects
- Capability to build DLLs, executables, and MSI installers

NI LabVIEW FPGA Module



- Design FPGA applications for NI reconfigurable I/O (RIO) hardware targets
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx CORE Generator functions
- Included in the LabVIEW Embedded Control and Monitoring Suite

NI LabVIEW Real-Time Module



- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Includes real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

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Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

Calibration

NI measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of your measurement hardware, NI offers basic or detailed recalibration service that provides ongoing ISO 9001 audit compliance and confidence in your measurements. To learn more about NI calibration services or to locate a qualified service center near you, contact your local sales office or visit ni.com/calibration.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

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Detailed Specifications

The following specifications are typical for the –40 to 70 °C operating temperature range unless otherwise noted.

Network	
Network interface	10BaseT and 100BaseTX Ethernet
Compatibility	IEEE 802.3
Communication rates	10 Mbps, 100 Mbps, auto-negotiated
Maximum cabling distance	100 m/segment
Reconfigurable FPGA	
Number of logic cells	46,080
Available embedded RAM	720 kbits
Power Requirements	

Caution You must use a UL Listed ITE power supply marked LPS with the NI 9148.

Recommended power supply	48 W, 24 VDC
Power consumption	20 W maximum
Power supply input range	19 to 30 V
Physical Characteristics	
If you need to clean the chassis, wipe it with a dry towel.	
Screw-terminal wiring	0.5 to 2.5 mm2 (24 to 12 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	929 g (32.7 oz)
Safety Voltages	
Connect only voltages that are within these limits.	
V terminal to C terminal	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 the system to signals or use for measurements within Measurement Categories II, III, or IV.

Safety Standards

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- EN 61010-1

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Industrial immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note For the standards applied to assess the EMC of this product, refer to the Online Product Certification section.

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

CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EEC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the Declaration of Conformity (DoC) for this product for additional regulatory compliance information. To obtain product certifications and 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.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the NI and the Environment Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of the product life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit ni.com/environment/weee.

Battery Replacement and Disposal



Battery Directive This device contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized National Instruments service representative. For more information about compliance with the
EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit ni.com/environment/batterydirective.

Environmental

The NI 9148 is intended for indoor use only, but it may be used outdoors if mounted in a suitably rated enclosure.

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

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

Storage temperature

(IEC 60068-2-1, IEC 60068-2-2) .....–40 to 85 °C

Ingress protection .....IP 40

Operating humidity
(IEC 60068-2-56) .....10 to 90% RH, noncondensing

Storage humidity
(IEC 60068-2-56) .....5 to 95% RH, noncondensing

Maximum altitude.....2,000 m

Pollution Degree (IEC 60664) 2

Indoor use only

Shock and Vibration

To meet these specifications, you must panel mount the chassis and affix ferrules to the ends of the power terminal wires.

Operating shock
(IEC 60068-2-27) .....30 g, 11 ms half sine 50 g, 3 ms half sine, 18 shocks at 6 orientations

Operating vibration, random
(IEC 60068-2-64) .....5 grms, 10 to 500 Hz

Operating vibration, sinusoidal
(IEC 60068-2-6) .....5 g, 10 to 500 Hz

Cabling

Table 3 shows the standard Ethernet cable wiring connections for both normal and crossover cables.

Table 3. Ethernet Cable Wiring Connections

Pin	Connector 1	Connector 2 (Normal)	Connector 2 (Crossover)
1	white/orange	white/orange	white/green
2	orange	orange	green
3	white/green	white/green	white/orange
4	blue	blue	blue
5	white/blue	white/blue	white/blue
6	green	green	orange
7	white/brown	white/brown	white/brown
8	brown	brown	brown

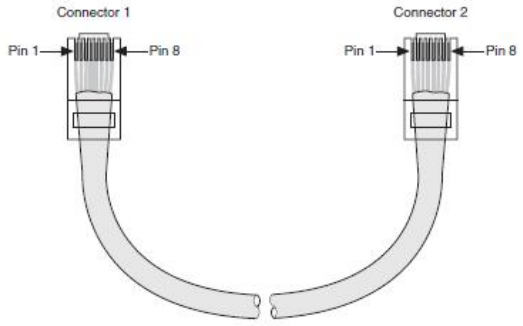


Figure 14. Ethernet Connector Pinout

Where to Go for Support

The National Instruments Web site 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.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 662 457990-0, Belgium 32 (0) 2 757 0020, Brazil 55 11 3262 3599, Canada 800 433 3488, China 86 21 5050 9800, Czech Republic 420 224 235 774, Denmark 45 45 76 26 00, Finland 358 (0) 9 725 72511, France 01 57 66 24 24, Germany 49 89 7413130, India 91 80 41190000, Israel 972 3 6393737, Italy 39 02 41309277, Japan 0120-527196, Korea 82 02 3451 3400, Lebanon 961 (0) 1 33 28 28, Malaysia 1800 887710, Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466, New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60, Poland 48 22 328 90 10, Portugal 351 210 311 210, Russia 7 495 783 6851, Singapore 1800 226 5886, Slovenia 386 3 425 42 00, South Africa 27 0 11 805 8197, Spain 34 91 640 0085, Sweden 46 (0) 8 587 895 00, Switzerland 41 56 2005151, Taiwan 886 02 2377 2222, Thailand 662 278 6777, Turkey 90 212 279 3031, United Kingdom 44 (0) 1635 523545

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