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Find the *National Instruments NI 9239* at our website: ***Click HERE***

Technical Sales

(866) 531-6285
orders@ni.com

Ordering Information | Detailed Specifications | Pinouts/Front Panel Connections
For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

Last Revised: 2014-11-06 07:14:18.0

NI 9229, NI 9239

±10 V or ±60 V, Simultaneous Analog Input, 50 kS/s, 4 Ch Modules





- 4 differential channels, 50 kS/s per channel sample rate
- ±10 V (NI 9239) or ±60 V (NI 9229) measurement range, 24-bit resolution
- Antialias filter
- 250 Vrms ch-ch, CAT II (screw terminal), or 60 VDC ch-ch, CAT I (BNC) isolation
- Screw-terminal or BNC connectivity
- -40 °C to 70 °C operating, 5 g vibration, 50 g shock

Overview

The NI 9229 is a 4-channel, 24-bit C Series analog input module for use in any NI CompactDAQ or CompactRIO chassis. The NI 9239 is similar to the NI 9229 in functionality except for the input range. You can find detailed specifications for the NI 9229 and NI 9239 in the same manual for comparison.

With channel-to-channel isolation, your entire system, including the device under test, is protected from harmful voltage spikes up to the isolation rating. In addition to safety, isolation eliminates measurement errors caused by ground loops because the front end of the module is floating.
EMC Performance To ensure EMC compliance for BNC, you must use a ferrite bead, such as NI part number 782801-01.

Recommended Accessories
-NI 9971 strain relief and operator protection (for screw-terminal variant)
-EMI suppression ferrite for NI 9229/9239 BNC (for BNC variant)

Box Contents
-1 NI 9229 or NI 9239 C Series module
-1 NI 9229/9239 Operating Instructions and Specifications manual
-4 NI 9976 two-position screw-terminal connectors (for screw-terminal variant)

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Comparison Tables

Product Name	Signal Ranges	Channels	Sample Rate	Simultaneous	Resolution	Isolation	Connectivity
NI 9201	±10 V	8 Single-Ended	500 kS/s/ch	No	12-Bit	250 Vrms Ch-Earth (Screw Terminal), 60 VDC Ch-Earth (D-SUB)	Screw Terminal, 25-Pin D-SUB
NI 9205	±200 mV, ±1 V, ±5 V, ±10 V	32 Single-Ended, 16 Differential	250 kS/s	No	16-Bit	250 Vrms Ch-Earth (Spring Terminal), 60 VDC Ch-Earth (D-SUB))	Spring Terminal, 37-Pin D-SUB
NI 9206	±200 mV, ±1 V, ±5 V, ±10 V	32 Single-Ended, 16 Differential	250 kS/s	No	16-Bit	600 VDC Ch-Earth	Spring Terminal
NI 9215	±10 V	4 Differential	100 kS/s/ch	Yes	16-Bit	250 Vrms Ch-Earth (Screw Terminal), 60 VDC Ch-Earth (BNC)	Screw Terminal, BNC
NI 9220	±10 V	16 Differential	100 kS/s/ch	Yes	16-Bit	250 Vrms Ch-Earth (Spring Terminal), 60 VDC Ch-Earth (D-SUB)	Spring Terminal, 37-Pin D-SUB
NI 9221	±60 V	8 Single-Ended	800 kS/s	No	12-Bit	250 Vrms Ch-Earth (Screw Terminal), 60 VDC Ch-Earth (D-SUB)	Screw Terminal, 25-Pin D-SUB

Product Name	Signal Ranges	Channels	Sample Rate	Simultaneous	Resolution	Isolation	Connectivity
NI 9222	±10 V	4 Differential	500 kS/s/ch	Yes	16-Bit	60 VDC Ch-Ch	Screw Terminal
NI 9223	±10 V	4 Differential	1 MS/s/ch	Yes	16-Bit	60 VDC Ch-Ch	Screw Terminal
NI 9229	±60 V	4 Differential	50 kS/s/ch	Yes	24-Bit	250 Vrms Ch-Ch (Screw Terminal), 60 VDC Ch-Ch (BNC)	Screw Terminal, BNC
NI 9239	±10 V	4 Differential	50 kS/s/ch	Yes	24-Bit	250 Vrms Ch-Ch (Screw Terminal), 60 VDC Ch-Ch (BNC)	Screw Terminal, BNC

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Application and Technology

NI C Series Overview



NI C Series modules are engineered to provide high-accuracy measurements to meet the demands of advanced DAQ and control applications. Each module contains measurement-specific signal conditioning to connect to an array of sensors and signals, bank and channel-to-channel isolation options, and support for wide temperature ranges to meet a variety of application and environmental needs all in a single rugged package. You can choose from more than 100 C Series modules for measurement, control, and communication to connect your applications to any sensor on any bus.

Most C Series I/O modules work with both the NI CompactDAQ and NI CompactRIO platforms. The modules are identical, and you can move them from one platform to the other with no modification.

NI CompactRIO Platform



Powered by the NI LabVIEW reconfigurable I/O (RIO) architecture, NI CompactRIO combines an open embedded architecture with small size, extreme ruggedness, and hot-swappable industrial I/O modules. Each system contains an FPGA for custom timing, triggering, and processing with a wide array of modular I/O to meet any embedded application requirement.

Configure Your Complete NI CompactRIO System

NI CompactDAQ Platform



NI CompactDAQ is a portable, rugged data acquisition platform that integrates connectivity and signal conditioning into modular I/O to directly interface with any sensor or signal. Using NI CompactDAQ with LabVIEW, you can easily customize how you acquire, analyze, present, and manage your measurement data. From research to development to validation, NI provides programmable software, high-accuracy measurements, and local technical support to help ensure you meet your exact measurement application requirements.

Configure Your Complete NI CompactDAQ System

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Ordering Information

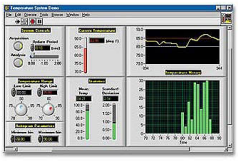
For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
		No accessories required.	
		No accessories required.	

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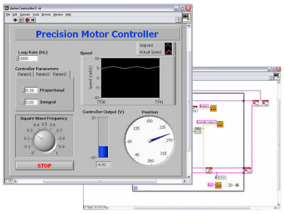
Software Recommendations

LabVIEW Professional Development System for Windows



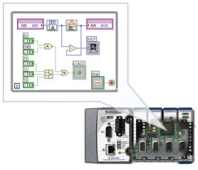
- Advanced software tools for large project development
- Automatic code generation using DAQ Assistant and Instrument I/O Assistant
- Tight integration with a wide range of hardware
- Advanced measurement analysis and digital signal processing
- Open connectivity with DLLs, ActiveX, and .NET objects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

NI LabVIEW 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

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

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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 range –40 to 70 °C unless otherwise noted. All voltages are relative to the AI– signal on each channel unless otherwise noted. The specifications are the same for the NI 9229 and the NI 9239 unless otherwise noted.

Input Characteristics	
Number of channels	4 analog input channels
ADC resolution	24 bits
Type of ADC	Delta-Sigma (with analog prefiltering)
Sampling mode	Simultaneous
Internal master timebase (f_M)	
Frequency	12.8 MHz

Accuracy	±100 ppm max
Data rate range (f_s) using internal master timebase	
Minimum	1.613 kS/s
Maximum	50 kS/s
Data rate range (f_s) using external master timebase	
Minimum	390.625 S/s
Maximum	51.2 kS/s
Data rates [1]	$\frac{f_M \div 256}{n}, n = 1, 2, \ldots, 31$

Input voltage ranges (AI+ to AI–) [2]			
Module	**Nominal (V)**	**Typical (V)**	**Minimum (V)**
NI 9229	±60	±62.64	±61.5
NI 9239	±10	±10.52	±10.3

Overvoltage protection	±100 V
Input coupling	DC
Input impedance (AI+ to AI–)	1 MΩ

Accuracy, NI 9229		
Measurement Conditions	**Percent of Reading (Gain Error)**	**Percent of Range [3] (Offset Error)**
Calibrated max (–40 to 70 °C)	±0.13%	±0.05%
Calibrated typ (25 °C, ±5 °C)	±0.03%	±0.008%
Uncalibrated max (–40 to 70 °C)	±1.2%	±0.55%
Uncalibrated typ (25 °C, ±5 °C)	±0.3%	±0.11%

Accuracy, NI 9239		
Measurement Conditions	**Percent of Reading (Gain Error)**	**Percent of Range [4] (Offset Error)**
Calibrated max (–40 to 70 °C)	±0.13%	±0.06%
Calibrated typ (25 °C, ±5 °C)	±0.03%	±0.008%
Uncalibrated max (–40 to 70 °C)	±1.4	±0.70%
Uncalibrated typ (25 °C, ±5 °C)	±0.3%	±0.11%

Input noise	
NI 9229	320 μV_{rms}
NI 9239	70 μV_{rms}
Stability	
Gain drift	±5 ppm/°C
Offset drift	
NI 9229	±150 µV/°C
NI 9239	±26 µV/°C
Post calibration gain match (ch-to-ch, 20 kHz)	0.22 dB max
Crosstalk (1 kHz)	–130 dB
Phase mismatch (ch-to-ch)	
NI 9229	0.045°/kHz max
NI 9239	0.075°/kHz max
Phase mismatch (module-to-module, max)	

NI 9229	0.045°/kHz max +360° · f_{in}/f_M
NI 9239	0.075°/kHz max +360° · f_{in}/f_M
Phase nonlinearity (f_s = 50 kS/s)	0.11° max
Input delay	
NI 9229	38.4/f_s + 2.6 µs
NI 9239	38.4/f_s + 3 µs
Passband	
Frequency	0.453 · f_s
Flatness (f_s = 50 kS/s)	±100 mdB max
Stopband	
Frequency	0.547 · f_s
Rejection	100 dB
Alias-free bandwidth	0.453 · f_s
–3 dB prefilter bandwidth (f_s = 50 kS/s)	24.56 kHz
CMRR (f_{in} = 60 Hz)	
NI 9229	116 dB
NI 9239	126 dB
SFDR (1 kHz, –60 dBFS)	–128 dBFS
Total Harmonic Distortion (THD)	
1 kHz, –1 dBFS	–99 dB
1 kHz, –20 dBFS	–105 dB
MTBF	662,484 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

Note Contact NI for Bellcore MTBF specifications at other temperatures or for MIL-HDBK-217F specifications.

Power Requirements

Power consumption from chassis	
Active mode	740 mW max
Sleep mode	25 µW max
Thermal dissipation (at 70 °C)	
Active mode	760 mW max
Sleep mode	16 mW max

Physical Characteristics

Screw-terminal wiring	16 to 28 AWG copper conductor wire with 7 mm (0.28 in.) of insulation stripped from the end
Torque for screw terminals	0.22 to 0.25 N · m (1.95 to 2.21 lb · in.)
Ferrules	0.25 mm^2 to 0.5 mm^2
Weight	147 g (5.2 oz)

Safety

If you need to clean the module, wipe it with a dry towel.

Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-earth ground isolation	
Continuous	250 V_{rms}, Measurement Category II
Withstand	2,300 V_{rms}, verified by a 5 s dielectric withstand test
Channel-to-channel isolation	
Continuous	250 V_{rms}, Measurement Category II
Withstand	1,390 V_{rms}, verified by a 5 s dielectric withstand test

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Zone 2 hazardous locations applications in Europe	
Maximum voltage (channel-to-earth ground and channel-to-channel)	60 VDC, Measurement Category I

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS [5] voltage. 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.

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet (e.g., 115 V for U.S. or 230 V for Europe). Examples of Measurement Category II are measurements performed on household appliances, portable tools, and similar products.

Caution Do *not* connect to signals or use for measurements within Measurement Categories 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 the *Online Product Certification* section.

Hazardous Locations

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

Environmental

National Instruments C Series modules are intended for indoor use only but may be used outdoors if installed in a suitable enclosure. Refer to the manual for the chassis you are using for more information about meeting these specifications.

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

Shock and Vibration

To meet these specifications, you must panel mount the system and either affix ferrules to the ends of the terminal wires or use the NI 9971 backshell kit to protect the connections.

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

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 with shielded cables.

CE Compliance

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

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

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

Online Product Certification

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

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Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also 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 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.

电子信息产品污染控制管理办法 （中国 RoHS）



中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。
关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。
(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

Calibration

You can obtain the calibration certificate for this device at ni.com/calibration.

Calibration interval	1 year

[1] The data rate must remain within the appropriate data rate range. Refer to the *Understanding NI 9229/9239 Data Rates* section of the *NI 9229/9239 Operating Instructions and Specifications* for more information.

[2] Refer to the *Safety Guidelines* section for more information about safe operating voltages.

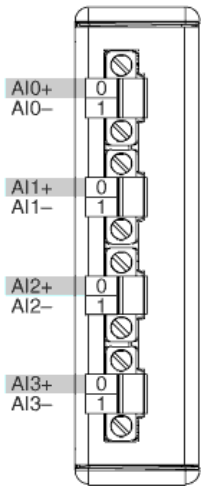
[3] Range equals 62.64 V

[4] Range equals 10.52 V

[5] MAINS is defined as the (hazardous live) electrical supply system to which equipment is designed to be connected for the purpose of powering the equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

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Pinouts/Front Panel Connections



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