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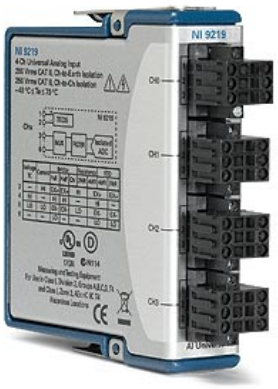
Find the *National Instruments NI 9219* at our website: ***Click HERE***

Technical Sales
United States
(866) 531-6285
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24-Bit Universal Analog Input

NI 9219



- 250 Vrms channel-to-channel isolation
- Built-in quarter-, half-, and full-bridge support
- Built-in voltage and current excitation
- Thermocouple, RTD, resistance, voltage, and current measurements
- CJC per channel for accurate thermocouple measurement
- 100 S/s/ch simultaneous inputs (50 S/s/ch for thermocouple)

Overview

The NI 9219 is a four-channel universal C Series module designed for multipurpose testing in any NI CompactDAQ or CompactRIO chassis. With the NI 9219, you can measure several signals from sensors such as strain gages, RTDs, thermocouples, load cells, and other powered sensors. The channels are individually selectable, so you can perform a different measurement type on each of the four channels. Measurement ranges differ for each type of measurement and include up to ±60 V for voltage and ±25 mA for current. Please see the manual for detailed specifications and ranges.

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Requirements and Compatibility

OS Information

Real-Time OS
Windows

Driver Information

NI-DAQmx
NI-RIO

Software Compatibility

LabVIEW
LabWindows/CVI
Measurement Studio
SignalExpress
Visual Basic
Visual C#
Visual C++
Visual Studio
Visual Studio .NET

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Comparison Tables

Thermocouple Module	Channels	Sample Rate	Resolution	Feature
NI 9213	16	1,200 S/s	24-bit	Lowest cost/channel
NI 9219	4	50 S/s/ch	24-bit	Channel-to-channel isolation
NI 9211	4	14 S/s	24-bit	Low-channel count

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Application and Technology

Because of the driver design, the NI 9219 does not limit the overall speed of an NI CompactDAQ system when used with faster sampling modules. With 250 Vrms of channel-to-channel isolation, the NI 9219 protects not only the surrounding modules, chassis, and connected computer system but also the other channels within the same module. In addition to increased safety, channel-to-channel isolation eliminates problems associated with ground loops.

Connectivity Accessories

The NI 9219 uses six-position spring terminal connectors in each channel for direct signal connectivity. You can purchase additional connectors to reduce signal connection time for multiple test units. In addition to extra connectors, a strain relief kit is available to secure the signal wires. NI recommends:

NI 9972 - strain relief backshells for signal wire security and high-voltage protection (qty 4)
NI 9973 - extra connectors for six-position connector modules (qty 10)

NI C Series Compatibility

The NI C Series hardware family features more than 50 measurement modules and several chassis and carriers for deployment. With this variety of modules, you can mix and match measurements such as temperature, acceleration, flow, pressure, strain, acoustic, voltage, current, digital, and more to create a custom system. Install the modules in one of several carriers to create a single module USB, Ethernet, or Wi-Fi system, or combine them in chassis such as NI CompactDAQ and CompactRIO to create a mixed-measurement system with synchronized measurements. You can install up to eight modules in a simple, complete NI CompactDAQ USB data acquisition system to synchronize all of the analog output, analog input, and digital I/O from the modules. For a system without a PC, CompactRIO holds up to eight modules and features a built-in processor, RAM, and storage for an embedded data logger or control unit. For higher-speed control, CompactRIO chassis incorporate a field-programmable gate array (FPGA) that you can program with NI LabVIEW software to achieve silicon-speed processing on I/O data from C Series modules.

Advanced Features

When used with CompactRIO, NI C Series analog input modules connect directly to reconfigurable I/O (RIO) FPGA hardware to create high-performance embedded systems. The reconfigurable FPGA hardware within CompactRIO provides a variety of options for custom timing, triggering, synchronization, filtering, signal processing, and high-speed decision making for all C Series analog modules. For instance, with CompactRIO, you can implement custom triggering for any analog sensor type on a per-channel basis using the flexibility and performance of the FPGA and the numerous arithmetic and comparison function blocks built into the LabVIEW FPGA Module.

Key Features

High-accuracy, high-performance analog measurements for any CompactRIO embedded system, R Series expansion chassis, or NI CompactDAQ chassis
Screw terminals, BNC, D-Sub, spring terminals, strain relief, high voltage, cable, solder cup backshell, and other connectivity options
Available channel-to-earth ground double-isolation barrier for safety, noise immunity, and high common-mode voltage range
CompactRIO Extreme Industrial Certifications and Ratings
Built-in signal conditioning for direct connection to sensors and industrial devices

Visit ni.com/compactrio or ni.com/compactdaq for up-to-date information on module availability, example programs, application notes, and other developer tools.

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Ordering Information

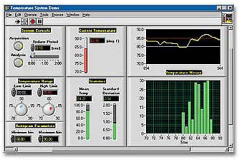
For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
NI 9219 Voltage Input Module			
NI 9219 Requires: 1 Connectivity Accessories ;	779781-01	**Connectivity Accessories:** screwTerminal - NI 9972 Strain relief, operator protection (qty 4)	196720-01

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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

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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.

Input Characteristics	
Number of channels	4 analog input channels
ADC resolution	24 bits
Type of ADC	Delta-sigma (with analog prefiltering)
Sampling mode	Simultaneous
Type of TEDS supported	IEEE 1451.4 TEDS Class II (Interface)

Mode input ranges		
Mode	**Nominal Range(s)**	**Actual Range(s)**
Voltage	±60 V, ±15 V, ±4 V, ±1 V, ±125 mV	±60 V, ±15 V, ±4 V, ±1 V, ±125 mV

Mode input ranges		
Mode	**Nominal Range(s)**	**Actual Range(s)**
Current	±25 mA	±25 mA
4-Wire and 2-Wire Resistance	10 kΩ, 1 kΩ	10.5 kΩ, 1.05 kΩ
Thermocouple	±125 mV	±125 mV
4-Wire and 3-Wire RTD	Pt 1000, Pt 100	5.05 kΩ, 505 Ω
Quarter-Bridge	350 Ω, 120 Ω	390 Ω, 150 Ω
Half-Bridge	±500 mV/V	±500 mV/V
Full-Bridge	±62.5 mV/V, ±7.8 mV/V	±62.5 mV/V, ±7.8125 mV/V
Digital In	—	0–60 V
Open Contact	—	1.05 kΩ

Conversion time, no channels in TC mode	
High speed	10 ms for all channels
Best 60 Hz rejection	110 ms for all channels
Best 50 Hz rejection	130 ms for all channels
High resolution	500 ms for all channels
Conversion time, one or more channels in TC mode	
High speed	20 ms for all channels
Best 60 Hz rejection	120 ms for all channels
Best 50 Hz rejection	140 ms for all channels
High resolution	510 ms for all channels
Overvoltage protection	
Terminals 1 and 2	±30 V
Terminals 3 through 6, across any combination	±60 V
Input impedance	
Voltage and Digital In modes (±60 V, ±15 V, ±4 V)	1 MΩ
Current mode	<40 Ω
All other modes	>1 GΩ

Accuracy		
Mode, Range	**Gain Error (Percent of Reading)**	**Offset Error (ppm of Range)**
	Typ (25 °C, ±5 °C), Max (–40 to 70 °C)	
Voltage, ±60 V	±0.3, ±0.4	±20, ±50
Voltage, ±15 V	±0.3, ±0.4	±60, ±180
Voltage, ±4 V	±0.3, ±0.4	±240, ±720
Voltage, ±1 V	±0.1, ±0.18	±15, ±45
Voltage/Thermocouple, ±125 mV	±0.1, ±0.18	±120, ±360
Current, ±25 mA	±0.1, ±0.6	±30, ±100
4-Wire and 2-Wire [1] Resistance, 10 kΩ	±0.1, ±0.5	±120, ±320
4-Wire and 2-Wire [1] Resistance, 1 kΩ	±0.1, ±0.5	±1200, ±3200
4-Wire and 3-Wire RTD, Pt 1000	±0.1, ±0.5	±240, ±640
4-Wire and 3-Wire RTD, Pt 100	±0.1, ±0.5	±2400, ±6400
Quarter-Bridge, 350 Ω	±0.1, ±0.5	±2400, ±6400
Quarter-Bridge, 120 Ω	±0.1, ±0.5	±2400, ±6400
Half-Bridge, ±500 mV/V	±0.03, ±0.07	±300, ±450
Full-Bridge, ±62.5 mV/V	±0.03, ±0.08	±300, ±1000
Full-Bridge, ±7.8 mV/V	±0.03, ±0.08	±2200, ±8000

Cold-junction compensation sensor accuracy	±1°C typ

Stability		
Mode, Range	**Gain Drift (ppm of Read-ing/°C)**	**Offset Drift (ppm of Range/°C)**
Voltage, ±60 V	±20	±0.2
Voltage, ±15 V	±20	±0.8
Voltage, ±4 V	±20	±3.2
Voltage, ±1 V	±10	±0.2
Voltage/Thermocouple, ±125 mV	±10	±1.6
Current, ±25 mA	±15	±0.4
4-Wire and 2-Wire Resistance, 10 kΩ	±15	±3
4-Wire and 2-Wire Resistance, 1 kΩ	±15	±30
4-Wire and 3-Wire RTD, Pt 1000	±15	±6
4-Wire and 3-Wire RTD, Pt 100	±15	±60
Quarter-Bridge, 350 Ω	±15	±120
Quarter-Bridge, 120 Ω	±15	±240
Half-Bridge, ±500 mV/V	±3	±20
Full-Bridge, ±62.5 mV/V	±3	±20
Full-Bridge, ±7.8 mV/V	±3	±20

Input noise in ppm of $Range_{rms}$				
Mode, Range	**Conversion Time**			
	High speed	**Best 60 Hz re-jection**	**Best 50 Hz re-jection**	**High resolution**
Voltage, ±60 V	7.6	1.3	1.3	0.5
Voltage, ±15 V	10.8	1.9	1.9	0.7
Voltage, ±4 V	10.8	2.7	2.7	1.3
Voltage, ±1 V	7.6	1.3	1.3	0.5
Voltage/Thermocouple, ±125 mV	10.8	1.9	1.9	1.0
Current, ±25 mA	10.8	1.9	1.9	1.0
4-Wire and 2-Wire Resistance, 10 kΩ	4.1	1.3	0.8	0.3
4-Wire and 2-Wire Resistance, 1 kΩ	7.1	1.8	1.2	0.7
4-Wire and 3-Wire RTD, Pt 1000	7.6	1.7	1.1	0.4
4-Wire and 3-Wire RTD, Pt 100	10.8	1.9	1.9	0.9
Quarter-Bridge, 350 Ω	5.4	1.0	1.0	0.7
Quarter-Bridge, 120 Ω	5.4	1.0	1.0	0.7
Half-Bridge, ±500 mV/V	3.8	0.5	0.5	0.2
Full-Bridge, ±62.5 mV/V	5.4	1.0	1.0	0.8
Full-Bridge, ±7.8 mV/V	30	4.7	4.7	2.3

Input bias current	<1 nA
INL	±15 ppm
CMRR (f_{in} = 60 Hz)	>100 dB
NMRR	
Best 60 Hz rejection	90 dB at 60 Hz
Best 50 Hz rejection	80 dB at 50 Hz
High resolution	65 dB at 50 Hz and 60 Hz

Excitation level for Half-Bridge and Full-Bridge modes		
Mode	**Load Resistance (Ω)**	**Excitation (V)**
Half-Bridge	700	2.5

Excitation level for Half-Bridge and Full-Bridge modes		
Mode	**Load Resistance (Ω)**	**Excitation (V)**
	240	2.0
Full-Bridge	350	2.7
	120	2.2

Excitation level for Resistance, RTD, and Quarter-Bridge modes	
Load Resistance (Ω)	**Excitation (mV)**
120	50
350	150
1 k	430
10 k	2200

MTBF	384,716 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	750 mW max
Sleep mode	25 µW max
Thermal dissipation (at 70 °C)	
Active mode	625 mW max
Sleep mode	25 µW max

Physical Characteristics

Note For two-dimensional drawings and three-dimensional models of the C Series module and connectors, visit ni.com/dimensions and search by module number.

Spring-terminal wiring	18 to 28 AWG copper conductor wire with 7 mm (0.28 in.) of insulation stripped from the end
Weight	156 g (5.5 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-channel	
Continuous	250 VAC, Measurement Category II
Withstand	1,390 VAC, verified by a 5 s dielectric withstand test
Channel-to-earth ground	
Continuous	250 VAC, Measurement Category II
Withstand	2,300 VAC, verified by a 5 s dielectric withstand test
Zone 2 hazardous locations applications in Europe channel-to-channel and channel-to-earth ground	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 [2] 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.

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

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Europe (DEMKO)	Ex nA IIC T4

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.

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 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.

Shock and Vibration

To meet these specifications, you must panel mount the system.

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

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

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.

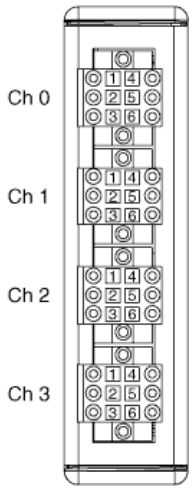
Calibration interval	1 year

[1] 2-Wire Resistance mode accuracy depends on the lead wire resistance. This table assumes 0 Ω of lead wire resistance.

[2] 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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