NI-9232 Getting Started

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Contents

Before You Begin

Read the **NI-9232 Safety, Environmental, and Regulatory Information** and complete the software and hardware installation procedures in your chassis documentation.

Safety Guidelines

Caution Observe all instructions and cautions in the user documentation. Using the product in a manner not specified can damage the product and compromise the built-in safety protection.

Attention Suivez toutes les instructions et respectez toutes les mises en garde de la documentation d'utilisation. L'utilisation du produit de toute autre façon que celle spécifiée risque de l'endommager et de compromettre la protection de sécurité intégrée.

Safety Voltages

Connect only voltages that are within the following limits.

Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	60 V DC, Measurement Category I
Withstand	1,000 V RMS, verified by a 5 s dielectric withstand test

Safety Guidelines for Hazardous Locations

The NI-9232 is suitable for use in Class I, Division 2, Groups A, B, C, D, T4 hazardous locations; Class I, Zone 2, AEx nA IIC T4 Gc and Ex nA IIC T4 Gc hazardous locations;

and nonhazardous locations only. Follow these guidelines if you are installing the NI-9232 in a potentially explosive environment. Not following these guidelines may result in serious injury or death.

Caution Do not disconnect I/O-side wires or connectors unless power has been switched off or the area is known to be nonhazardous.

Caution Do not remove modules unless power has been switched off or the area is known to be nonhazardous.

Caution Substitution of components may impair suitability for Class I, Division 2, or Zone 2.

Caution The system must be installed in an enclosure certified for the intended hazardous (classified) location, having a tool secured cover/door, where a minimum protection of at least IP54 is provided.

Caution For Division 2 and Zone 2 applications, connected signals must be within the following limits.

Capacitance	0.2 µF maximum

Special Conditions for Hazardous Locations Use in Europe and Internationally

The NI-9232 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO 12ATEX 1202658X and is IECEx UL 14.0089X certified. Each NI-9232 is marked Ⓔx II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of -40 °C ≤ Ta ≤ 70 °C. If you are using the NI-9232 in Gas Group IIC hazardous locations, you must use the device in an NI chassis that has been evaluated as Ex nC IIC T4, Ex IIC T4, Ex nA IIC T4, or Ex nL IIC T4 equipment.

Caution Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value of 85 V at the supply terminals to the equipment.

Caution The system shall only be used in an area of not more than Pollution Degree 2, as defined in IEC/EN 60664-1.

Caution The system shall be mounted in an ATEX/IECEx-certified enclosure with a minimum ingress protection rating of at least IP54 as defined in IEC/EN 60079-15.

Caution The enclosure must have a door or cover accessible only by the use of a tool.

Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

Notice To ensure the specified EMC performance, operate this product only with shielded cables and accessories. Do not use unshielded cables or

accessories unless they are installed in a shielded enclosure with properly designed and shielded input/output ports and connected to the product using a shielded cable. If unshielded cables or accessories are not properly installed and shielded, the EMC specifications for the product are no longer guaranteed.

Caution Electrostatic Discharge (ESD) can damage the NI-9232. To prevent damage, use industry-standard ESD prevention measures during installation, maintenance, and operation.

Caution To ensure the specified EMC performance for the NI-9232 with screw terminal, you must install clamp-on ferrite beads (part number 782802-01) in accordance with the product installation instructions. Refer to the NI-9232 product page on ni.com for purchasing information about clamp-on ferrite beads.

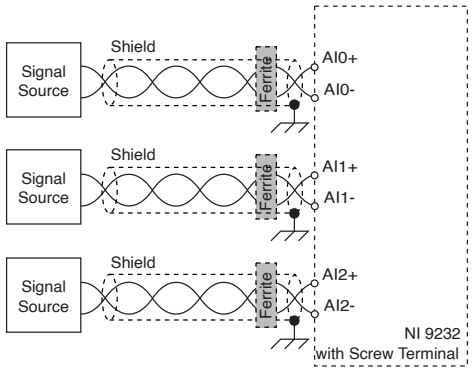
Notice To ensure the specified EMC performance, the length of all I/O cables must be no longer than 3 m (10 ft).

Cable Requirements for EMC Compliance

Select and install cables for the NI-9232 in accordance with the following requirements:

- Connect the cable shield to the chassis ground (grounding screw of the chassis).
- For the NI-9232 with screw terminal, install a clamp-on ferrite bead (part number 782802-01) on the input cable for each channel that you are connecting to on the NI-9232.
- For the NI-9232 with screw terminal, clamp-on ferrite beads must be installed on the cable as close to the module as possible. Placing the ferrite elsewhere on the cable noticeably impairs its effectiveness.

Figure 1. Cable Connections for EMC Compliance



Special Conditions for Marine Applications

Some products are approved for marine (shipboard) applications. To verify marine approval certification for a product, visit ni.com/product-certifications, search by model number, and click the appropriate link.

Notice In order to meet the EMC requirements for marine applications, install the product in a shielded enclosure with shielded and/or filtered power and input/output ports. In addition, take precautions when designing, selecting, and installing measurement probes and cables to ensure that the desired EMC performance is attained.

Preparing the Environment

Ensure that the environment in which you are using the NI-9232 meets the following specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Operating humidity (IEC 60068-2-30)	10% RH to 90% RH, noncondensing
Pollution Degree	2
Maximum altitude	5,000 m

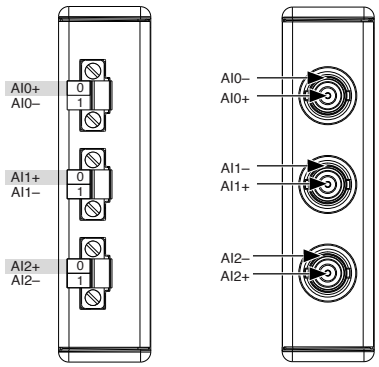
Indoor use only.

Note Refer to the **NI-9232 Specifications** on ni.com/manuals for complete specifications.

Connecting the NI-9232

The NI-9232 provides connections to three simultaneously sampled analog input channels.

Figure 2. NI-9232 Pinout



Note You must use 2-wire ferrules to create a secure connection when connecting more than one wire to a single terminal on the NI-9232 with screw terminal.

Each channel has a terminal to which you can connect a signal source. The AI+ terminal of the connector provides the DC excitation, when enabled, and the positive input signal connection. The AI- terminal provides the excitation return path and the signal ground reference.

Signal	Description
AI+	Positive analog input signal connection
AI-	Negative analog input signal connection

Table 1. Signal Descriptions

Connecting Signal Sources

You can connect ground-referenced or floating signal sources to the NI-9232.

If you make a ground-referenced connection between the signal source and the NI-9232, make sure the voltage on the AI+ and the AI- connections are in the channel-to-earth safety voltage range to ensure proper operation of the NI-9232. Refer to the device datasheet on ni.com/manuals for more information about operating voltages and overvoltage protection.

Figure 3. Connecting a Grounded Signal Source

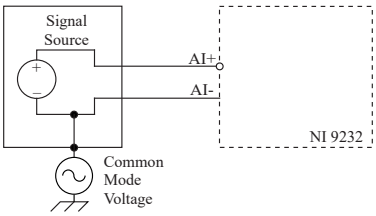
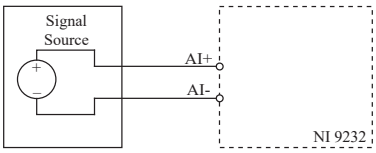


Figure 4. Connecting a Floating Signal Source



Integrated Electronic Piezoelectric (IEPE) Sensors

The NI-9232 provides an IEPE excitation current for each channel to measure the IEPE sensors. Typical IEPE sensors have a case that is electrically isolated from the IEPE electronics. As a result, connecting the sensor to the NI-9232 results in a floating connection even though the case of the sensor is grounded.

Wiring for High-Vibration Applications

If your application is subject to high vibration, NI recommends that you follow these guidelines to protect connections to the NI-9232 with screw terminal:

- Use ferrules to terminate wires to the detachable connector.
- Use the NI 9971 backshell kit.

Where to Go Next

NI Services

Visit ni.com/support to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

Visit ni.com/services to learn about NI service offerings such as calibration options, repair, and replacement.

Visit ni.com/register to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

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