NATIONAL INSTRUMENTS NI-9201 Voltage Data Acquisition Module User Guide

Contents

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Product Information

The NI-9927 is a product that requires connection to the NI 9201 with screw terminal, NI 9201 with spring terminal, or NI 9201 with DSUB. It is important to complete the software and hardware installation procedures in your chassis documentation before beginning use. The guidelines in the user manual are specific to the NI 9201 and may not apply to other components in the system. Safety and EMC ratings for the entire system should be determined by referring to the documentation for each component.

Safety Guidelines

It is important to operate the NI 9201 only as described in the user manual to avoid hazards. Do not operate the product in a manner not specified in this document as product misuse can result in a hazard. If the product is damaged, it should be returned to NI for repair. Hazardous voltage warnings are denoted by an icon in the manual.

NI 9201 with Screw Terminal and NI 9201 with Spring Terminal Safety Voltages

Only connect voltages within the following limits: Channel-to-COM

- Continuous: 250 Vrms, Withstand: 2,300 Vrms verified by a 5 s dielectric withstand test. Channel-to-channel
- Continuous: 250 Vrms, Withstand: 2,300 Vrms verified by a 5 s dielectric withstand test. Channel-to-earth ground
- Continuous: 250 Vrms, Withstand: 2,300 Vrms verified by a 5 s dielectric withstand test.
  Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. Do not connect the NI 9201 with screw terminal or NI 9201 with spring terminal to signals or use for measurements within Measurement Categories III or IV.

NI 9201 with DSUB Safety Voltages

- Only connect voltages within the following limits: Channel-to-COM – Continuous: 60 VDC, Withstand: 1,000 Vrms verified by a 5 s dielectric withstand test. Channel-to-channel
- Continuous: 60 VDC, Withstand: 1,000 Vrms verified by a 5 s dielectric withstand test. Channel-to-earth

- Continuous: 60 VDC, Withstand: 1,000 Vrms verified by a 5 s dielectric withstand test.
  Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. Do not connect the NI 9201 with DSUB to signals or use for measurements within Measurement Categories III or IV. Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Safety Guidelines for Hazardous Voltages

Hazardous voltages can only be connected to the NI 9201 with screw terminal and the NI 9201 with spring terminal. Do not connect hazardous voltages to the NI 9201 with DSUB.

Product Usage Instructions

Before using the product, it is important to complete the software and hardware installation procedures in your chassis documentation. Only connect voltages within the limits outlined in the user manual. The NI 9201 with screw terminal and the NI 9201 with spring terminal can be used for hazardous voltages while the NI 9201 with DSUB should not be used for hazardous voltages. When connecting voltages, ensure they are within the specified limits for Channel-to-COM, Channel-to-channel, and Channel-to-earth ground. Do not connect the NI 9201 with screw terminal or NI 9201 with spring terminal to signals or use for measurements within Measurement Categories III or IV. The same applies to the NI 9201 with DSUB. Measurement Categories CAT I and CAT O are equivalent and not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV. It is important to operate the product only as described in the user manual to avoid hazards. If the product is damaged, it should be returned to NI for repair.

This document explains how to connect to the NI 9201. In this document, the NI 9201 with screw terminal, NI 9201 with spring terminal, and NI 9201 with DSUB are referred to inclusively as the NI 9201.

Note Before you begin, complete the software and hardware installation procedures in your chassis documentation.

Note The guidelines in this document are specific to the NI 9201. The other components in the system might not meet the same safety ratings. Refer to the documentation for each component in the system to

determine the safety and EMC ratings for the entire system.

Safety Guidelines
Operate the NI 9201 only as described in this document.

 **Caution** Do not operate the NI 9201 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

 **Hazardous Voltage:** This icon denotes a warning advising you to take precautions to avoid electrical shock.

NI 9201 with Screw Terminal and NI 9201 with Spring Terminal Safety Voltages
Connect only voltages that are within the following limits.

- **Channel-to-COM:** ±60 VDC maximum
- **Channel-to-channel:** None
- **Channel-to-earth ground:**
- **Continuous:** 250 Vrms, Measurement Category II
- **Withstand:** 2,300 Vrms, verified by a 5 s dielectric withstand test

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, for example, 115 V for U.S. or 230 V for Europe.

 **Caution** Do not connect the NI 9201 with screw terminal or NI 9201 with spring terminal to signals or use for measurements within Measurement Categories III or IV.

NI 9201 with DSUB Safety Voltages
Connect only voltages that are within the following limits.

- **Channel-to-COM:** ±60 VDC maximum
- **Channel-to-channel:** None
- **Channel-to-earth:**
- **Continuous:** 60 VDC, Measurement Category I
- **Withstand:** 1,000 Vrms, verified by a 5 s dielectric withstand test

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 NI 9201 with DSUB to signals or use for measurements within

Measurement Categories III or IV.

- **Note** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Safety Guidelines for Hazardous Voltages

You can connect hazardous voltages only to the NI 9201 with screw terminal and the NI 9201 with spring terminal. Do not connect hazardous voltages to the NI 9201 with DSUB. If hazardous voltages are connected to the device, take the following precautions. A hazardous voltage is a voltage greater than 42.4 Vpk voltage or 60 VDC to earth ground.

-  **Caution** Ensure that hazardous voltage wiring is performed only by qualified personnel adhering to local electrical standards.
-  **Caution** Do not mix hazardous voltage circuits and human-accessible circuits on the same module.
-  **Caution** Ensure that devices and circuits connected to the module are properly insulated from human contact.
-  **Caution** When module terminals are hazardous voltage LIVE (>42.4 Vpk/60 VDC), you must ensure that devices and circuits connected to the module are properly insulated from human contact. You must use the NI 9927 connector backshell kit with the NI 9201 with screw terminal and the NI 9981 connector backshell kit with the NI 9201 with spring terminal to ensure that the terminals are not accessible.

Safety Guidelines for Hazardous Locations

The NI 9201 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 and Ex nA IIC T4 hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the NI 9201 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.
-  **Caution** For Division 2 and Zone 2 applications, install the system in an enclosure rated to at least IP54 as defined by IEC/EN 60079-15.
-  **Caution** For Zone 2 applications, install a protection device between the input signal and the NI 9201

input terminal. The device must prevent the channel-to-COM voltage from exceeding 85 V if there is a transient overvoltage condition.

Special Conditions for Hazardous Locations Use in Europe and Internationally
The NI 9201 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO Certificate No. 03 ATEX 0324020X and is IECEx UL 14.0089X certified. Each NI 9201 is marked  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 9201 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** You must make sure that transient disturbances do not exceed 140% of the rated voltage.
-  **Caution** The system shall only be used in an area of not more than Pollution Degree 2, as defined in IEC 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.

Special Conditions for Marine Applications
Some products are Lloyd's Register (LR) Type Approved for marine (shipboard) applications. To verify Lloyd's Register certification for a product, visit **ni.com/certification** and search for the LR certificate, or look for the Lloyd's Register mark on the product.

Caution 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 9201 meets the following specifications.

- **Operating temperature (IEC 60068-2-1, IEC 60068-2-2)**: 40 °C to 70 °C
- **Operating humidity (IEC 60068-2-78):** 10% RH to 90% RH, noncondensing
- **Pollution Degree**: 2
- **Maximum altitude:** 2,000 m
- **Indoor use only.**

  Note Refer to the device datasheet on ni.com/manuals for complete specifications.

NI 9201 Pinout

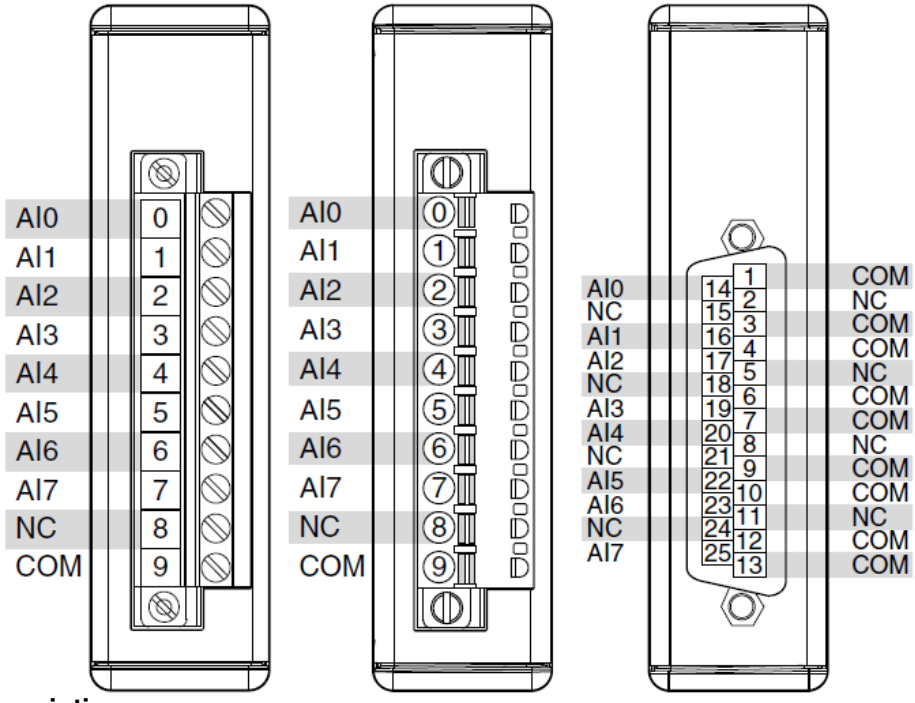
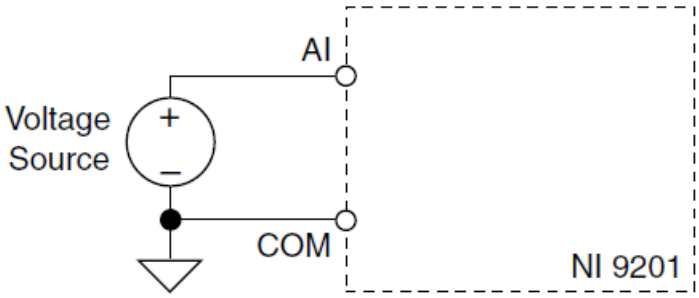


Table 1. Signal Descriptions

Signal	Description
AI	Analog input signal connection
COM	Common reference connection
NC	No connection

Single-Ended Connections



NI 9201 Connection Guidelines

- Make sure that devices you connect to the NI 9201 are compatible with the module specifications.

- You must use 2-wire ferrules to create a secure connection when connecting more than one wire to a single terminal on the NI 9201 with screw terminal or NI 9201 with spring terminal.

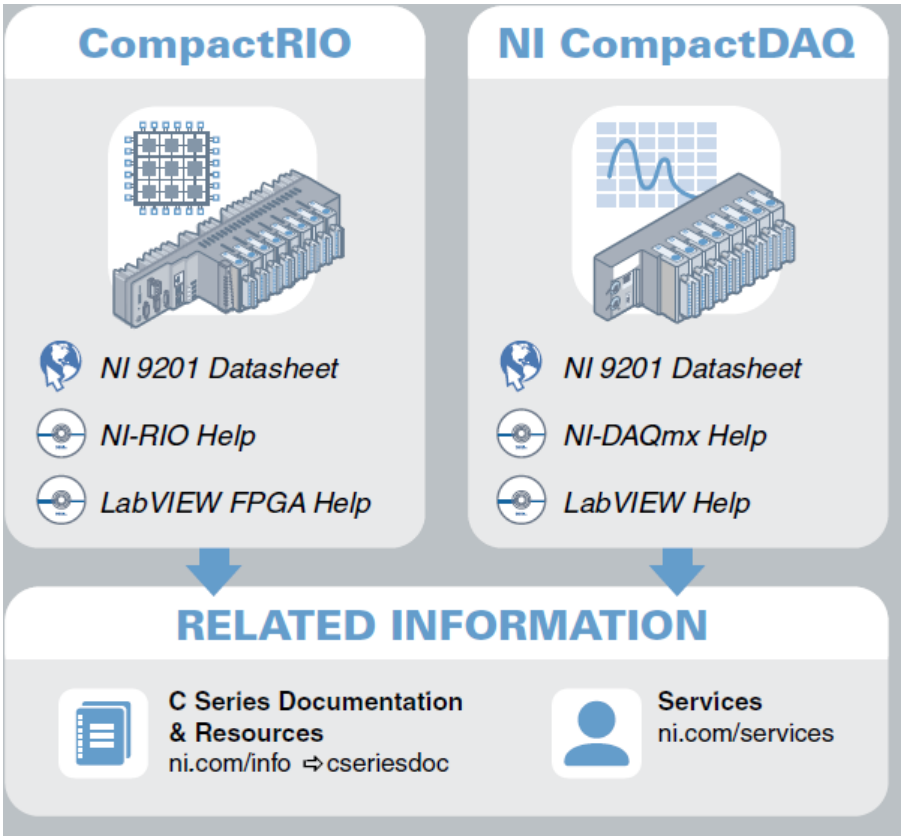
High-Vibration Application Connections
If your application is subject to high vibration, NI recommends that you follow these guidelines to protect connections to the NI 9201 with screw terminal or the NI 9201 with spring terminal:

- Use ferrules to terminate wires to the detachable connector.
- Use the NI 9927 backshell kit with the NI 9201 with screw terminal or the NI 9981 backshell kit with the NI 9201 with spring terminal.

Overvoltage Protection
The NI 9201 provides overvoltage protection for each channel.

Note: Refer to the device datasheet on ni.com/manuals for more information about overvoltage protection.

Where to Go Next



Located at ni.com/manuals

Installs with the software

Worldwide Support and Services

- The NI website 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.
- Visit ni.com/services for NI Factory Installation Services, repairs, extended warranty, and other services.
- Visit ni.com/register to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.
- A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting ni.com/certification. If your product supports calibration, you can obtain the calibration certificate for your product at ni.com/calibration.
- NI corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. NI also has offices located around the world. For telephone support in the United States, create your service request at ni.com/support or dial 1 866 ASK MYNI (275 6964). For telephone support outside the United States, visit the Worldwide Offices section of ni.com/niglobal to access the branch office websites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

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52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.

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Documents / Resources

	NATIONAL INSTRUMENTS NI-9201 Voltage Data Acquisition Module [pdf] User Guide NI-9201 Voltage Data Acquisition Module, NI-9201, Voltage Data Acquisition Module, Data Acquisition Module, Module

References

- Engineer Ambitiously - NI

- Calibration Services - NI
- Product Certifications - NI
- Using Info Codes - NI
- Trade Compliance - NI
- Product Documentation - NI
- Contact Us - NI
- National Instruments Patents - NI
- Log In - National Instruments
- NI Services - NI
- Support - NI
- NI Trademarks and Logo Guidelines - NI
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