
NI-9421 Getting Started

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Contents

Before You Begin.....	3
Safety Guidelines.....	3
Safety Guidelines for Hazardous Voltages.....	3
NI-9421 with Screw Terminal and NI-9421 with Spring Terminal Safety Voltages	4
NI-9421 with DSUB Safety Voltages.....	5
Safety Guidelines for Hazardous Locations.....	5
Electromagnetic Compatibility Guidelines.....	7
Special Conditions for Marine Applications.....	7
Preparing the Environment.....	7
Connecting the NI-9421.....	8
NI-9421 Signals.....	8
Connecting Sourcing-Output Devices.....	8
LED Indications.....	9
High-Vibration Application Connections.....	9
Where to Go Next.....	9
NI Services.....	9

Before You Begin

Read the **NI-9421 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 Guidelines for Hazardous Voltages

If hazardous voltages are connected to the product, take the following precautions. A hazardous voltage is a voltage greater than:

- 30 V RMS, 42.4 V peak, or 60 V DC in DRY LOCATIONS
- 16 V RMS, 22.6 V peak, or 35 V DC in WET LOCATIONS



Caution Ensure that hazardous voltage wiring is performed only by qualified personnel adhering to local electrical standards.



Attention S'assurer que le câblage à tension dangereuse est effectué par du personnel qualifié respectant les normes électriques locales.



Caution Do not mix hazardous voltage circuits and human-accessible circuits on the same product.



Attention Ne pas combiner des circuits avec des tensions dangereuses et des circuits accessibles aux personnes sur le même produit.



Caution When product terminals are hazardous voltage LIVE, you must ensure that devices and circuits connected to the product are properly insulated from human contact.



Attention Lorsqu'une haute tension dangereuse est appliquée aux bornes du produit, vous devez vous assurer que les appareils et les circuits auxquels il est connecté sont correctement isolés de tout contact humain.



Caution You must use the connector backshell kit to ensure that the terminals are not accessible.

NI-9421 with Screw Terminal and NI-9421 with Spring Terminal Safety Voltages

Connect only voltages that are within the following limits:

Channel-to-COM	30 V maximum
Overvoltage protection	40 V maximum
Reverse-biased voltage	-30 V maximum
Isolation	
Channel-to-channel	None
Channel-to-earth ground	

Continuous	250 V RMS, Measurement Category II
Withstand	2,300 V RMS, verified by a 5 s dielectric withstand test

NI-9421 with DSUB Safety Voltages

Connect only voltages that are within the following limits:

Channel-to-COM	30 V maximum
Overvoltage protection	40 V maximum
Reverse-biased voltage	-30 V maximum
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-9421 is suitable for use in hazardous locations; , and hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the NI-9421 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 μ F maximum
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Special Conditions for Hazardous Locations Use in Europe and Internationally

The NI-9421 has been evaluated as equipment under DEMKO ATEX and is IECEx certified. Each NI-9421 is marked and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of $-40\text{ }^{\circ}\text{C} \leq T_a \leq 70\text{ }^{\circ}\text{C}$. If you are using the NI-9421 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.

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-9421 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.

Connecting the NI-9421

The NI-9421 provides connections for eight digital input channels.

Figure 1. NI-9421 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-9421 with screw terminal or NI-9421 with spring terminal.

NI-9421 Signals

Each channel of the NI-9421 has a DI terminal or pin to which you can connect voltage or current signals. The NI-9421 also has COM, a common terminal or pin that is internally connected to the isolated ground reference of the module.

The NI-9421 has sinking inputs, meaning that when the external device drives current or applies voltage to the DI terminal or pin, DI provides a path to COM for the current or voltage. The NI-9421 internally limits current signals connected to DI.

Connecting Sourcing-Output Devices

You can connect 2-, 3-, and 4-wire sourcing-output devices to the NI-9421. A sourcing-output device drives current or applies voltage to DI. An example of a sourcing-output device is an open collector PNP.

Connect the output of the sourcing-output device to DI on the NI-9421. Connect the common of the external device to the COM terminal or pin.

Figure 2. Connecting a Device to the NI-9421 (3-Wire Device Shown)

The NI-9421 channel registers as ON when the sourcing-output device applies a voltage or drives a current that is in the input ON range to DI. The channel registers as OFF when the device applies a voltage or drives a current that is in the input OFF range to DI. If no device is connected to DI, the channel registers as OFF.

LED Indications

Each channel has an LED that indicates the state of the channel, as the following table describes. The LEDs are disabled when the chassis is in sleep mode.

LED State	Indication
Illuminated	Channel is on
Not illuminated	Channel is off

Table 1. LED Indications

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-9421:

- Use ferrules to terminate wires to the detachable connector.
- Use the backshell kit with the NI-9421 with screw terminal or the backshell kit with the NI-9421 with spring terminal.

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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