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# NI-9237 Getting Started

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2022-07-06



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## Overview

This document explains how to connect to the NI-9237. In this document, the NI-9237 with RJ-50 and the NI-9237 with DSUB are referred to inclusively as the NI-9237.



**Note** Before you begin, read the **NI-9237 Safety, Environmental, and Regulatory Information** document on [ni.com/manuals](https://ni.com/manuals) and complete the software and hardware installation procedures in your chassis documentation.



**Note** The guidelines in this document are specific to the NI-9237. 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



**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.

Between any two pins	±30 V maximum
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Isolation, channel-to-channel	None
<b>Isolation, channel-to-earth ground</b>	
<b>Up to 3,000 m</b>	
Continuous	60 VDC, Measurement Category I
Withstand	1,000 Vrms, verified by a 5 s dielectric withstand test
<b>Up to 5,000 m</b>	
Continuous	60 VDC, Measurement Category I
Withstand	860 Vrms, verified by a 5 s dielectric withstand test

## Safety Guidelines for Hazardous Locations

The NI-9237 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-9237 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 $\mu$ F maximum
Inductance	80 mH maximum

## Special Conditions for Hazardous Locations Use in Europe and Internationally

The NI-9237 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO 07ATEX 0626664X and is IECEx UL 14.0089X certified. Each NI-9237 is marked  II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of  $-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$ . If you are using the NI-9237 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](https://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-9237 meets the following specifications.

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

Indoor use only.

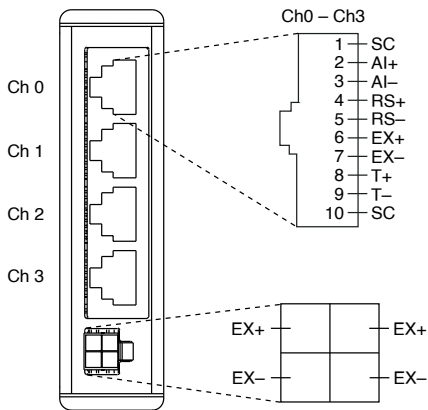



**Note** Refer to the **NI-9237 Specifications** on [ni.com/manuals](https://ni.com/manuals) for complete specifications.

## Connecting the NI-9237

The NI-9237 provides connections for four half or full bridges, and an external excitation voltage source.

Figure 1. NI-9237 Pinout





**Caution** Do not use RJ-45 cables with the NI-9237 with RJ-50. RJ-45 cables damage the RJ-50 connector, permanently disabling the shunt calibration, regardless of which connector you use.

## Signal Descriptions

Signal Name	Description
AI+	Positive analog input signal connection
AI-	Negative analog input signal connection
RS+	Positive remote sensing connection

Signal Name	Description
RS-	Negative remote sensing connection
EX+	Positive sensor excitation connection
EX-	Negative sensor excitation connection
T+	TEDS data connection
T-	TEDS return connection
SC	Shunt calibration connection

Table 1. NI-9237 Signal Descriptions

### Connecting a Full Bridge

You can connect a full bridge to the NI-9237.

Figure 2. Connecting a Full Bridge to the NI-9237

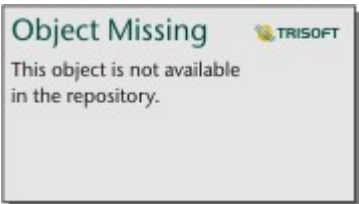


You also can connect floating signals to the NI-9237. If you connect floating signals to the NI-9237, NI recommends connecting the EX- signal to the earth ground or shield for better noise rejection.

### Connecting a Half Bridge

You can connect a half bridge to the NI-9237.

Figure 3. Connecting a Half Bridge to the NI-9237



You also can connect floating signals to the NI-9237. If you connect floating signals to the NI-9237, NI recommends connecting the EX- signal to the earth ground or shield for better noise rejection.



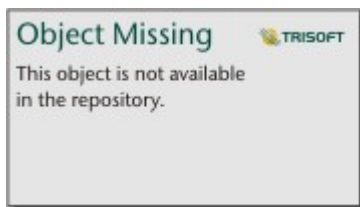
## Bridge Calibration

When you insert or remove a new sensor from the NI-9237, slight changes in the excitation voltages can cause a mismatch between the internal half-bridge completion resistors and the half-bridge sensors, which results in a change in the measurement offsets. NI recommends performing bridge calibrations of quarter- or half-bridge sensors after connecting all sensors to the NI-9237 and after removing or attaching any additional sensor. For more information about changes in voltage offsets in the NI-9237, visit [ni.com/info](http://ni.com/info) and enter the Info Code rdw9237.

## Connecting a Quarter Bridge

You can connect a quarter bridge to the NI-9237 by adding a resistor externally to create a half bridge.

Figure 4. Connecting a Quarter Bridge to the NI-9237

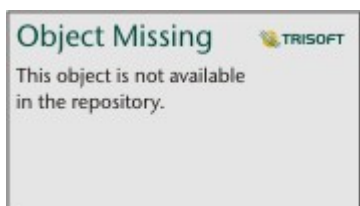


You also can use a quarter bridge with the NI-9237 with RJ-50 if you use the NI 9944 or NI 9945 Quarter Bridge Completion Accessory.

## Connecting TEDS Sensors

You can connect TEDS sensors to the NI-9237.

Figure 5. Connecting TEDS Sensors to the NI-9237



Ensure that neither the TEDS data (T+) nor the TEDS return (T-) signal is tied in common to any AI signals on the NI-9237. The NI-9237 connects all the T- signals together internally. The NI-9237 with DSUB has only three T- pins. To connect four TEDS sensors to the NI-9237 with DSUB, wire the TEDS return signals of two of the sensors to one of the T- pins.

## Where to Go Next

### NI Services

Visit [ni.com/support](https://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](https://ni.com/services) to learn about NI service offerings such as calibration options, repair, and replacement.

Visit [ni.com/register](https://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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