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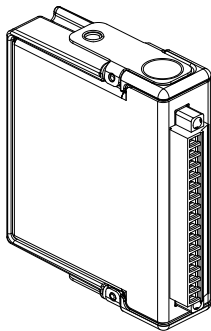
 **CLICK HERE**

**NI-9939**

## GETTING STARTED GUIDE

# NI 9217

4 RTD, 0  $\Omega$  to 400  $\Omega$ , 24 Bit, 400 S/s Aggregate,  
PT100



This document explains how to connect to the NI 9217.



**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 9217. 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

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Operate the NI 9217 only as described in this document.



**Caution** Do not operate the NI 9217 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.

## Safety Voltages

Connect only voltages that are within the following limits.

### Maximum Voltage

Connect only voltages that are within the following limits.<sup>1</sup>

All terminals-to-COM	$\pm 30$ V
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### Isolation Voltages

Channel-to-channel	None
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<sup>1</sup> The maximum voltage that can be applied between any channel or Vsup terminal and a COM terminal without damaging the module or other devices.

## Channel-to-earth ground

Continuous	
up to 2,000 m	250 Vrms, Measurement Category II
up to 5,000 m	60 VDC, Measurement Category I
Withstand	
up to 2,000 m	2,300 Vrms, verified by a 5 s dielectric withstand test
up to 5,000 m	1,000 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.



**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.



**Caution** Do not connect the NI 9217 to signals or use for measurements within Measurement Categories III or IV.

## Safety Guidelines for Hazardous Voltages

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 9939 connector backshell kit to ensure that the terminals are not accessible.

## Safety Guidelines for Hazardous Locations

The NI 9217 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 9217 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 Division 2 and Zone 2 applications, connected signals must be within the following limits.

Capacitance

0.2  $\mu$ F maximum

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

The NI 9217 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 9217 is marked  II 3G 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 9217 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

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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.



**Caution** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

## Special Conditions for Marine Applications

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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](https://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

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Ensure that the environment in which you are using the NI 9217 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 60068-2-78)	10% RH to 90% RH, noncondensing
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Pollution Degree	2
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Maximum altitude	5,000 m
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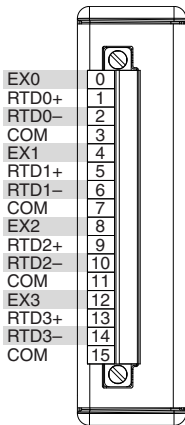
Indoor use only.



**Note** Refer to the device datasheet on [ni.com/manuals](https://ni.com/manuals) for complete specifications.

# NI 9217 Pinout

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**Table 1.** Signal Descriptions

<b>Signal</b>	<b>Description</b>
COM	Common reference connection to isolated ground
EX	Excitation source connection
RTD+	Positive resistance temperature detector connection
RTD-	Negative resistance temperature detector connection

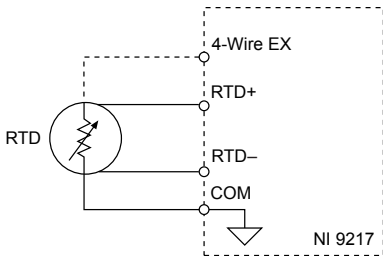
## Connecting 3-Wire and 4-Wire RTDs

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You can connect any combination of 3-wire or 4-wire RTDs to the NI 9217. Each NI 9217 channel contains circuitry that automatically detects the type of RTD connected to the channel. The NI 9217 scans all four input channels and automatically configures each channel for the appropriate mode. In 4-wire mode, the EX terminal is a 1 mA current source. In 3-wire mode, the RTD+ terminal is a 1 mA current source. The NI 9217 compensates for the error that lead resistance causes in 3-wire mode.

If you are using a 4-wire RTD, connect EX to the positive lead of the RTD. If you are using a 3-wire RTD, do not connect the RTD to the EX terminal.

**Figure 1.** Connecting an RTD to the NI 9217



For the best measurement results when using the NI 9217 with a 3-wire RTD, use equal-length wires between the RTD+ terminal and the RTD and between the COM terminal and the RTD. Also, keep the lead resistance within 5% of the nominal RTD value. The NI 9217 accuracy specifications account for this lead error.



**Note** The accessory used with the NI 9217 may introduce additional lead resistance mismatch error in

3-wire mode. Refer to the device datasheet on [ni.com/manuals](https://ni.com/manuals) for information about errors due to lead resistance mismatch.

## NI 9217 Connection Guidelines

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- Make sure that devices you connect to the NI 9217 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 9217.

## Wiring for High-Vibration Applications

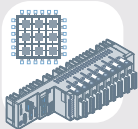
If your application is subject to high vibration, NI recommends that you follow these guidelines to protect connections to the NI 9217:

- Use ferrules to terminate wires to the detachable connector.
- Use the NI 9939 backshell kit.

# Where to Go Next

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## CompactRIO



*NI 9217 Datasheet*



*NI-RIO Help*



*LabVIEW FPGA Help*

## NI CompactDAQ



*NI 9217 Datasheet*



*NI-DAQmx Help*



*LabVIEW Help*

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### C Series Documentation & Resources

[ni.com/info](http://ni.com/info) ⇨ [cseriesdoc](http://cseriesdoc)



### Services

[ni.com/services](http://ni.com/services)



Located at [ni.com/manuals](http://ni.com/manuals)



Installs with the software



## Worldwide Support and Services

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The NI website is your complete resource for technical support. At [ni.com/support](https://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](https://ni.com/services) for NI Factory Installation Services, repairs, extended warranty, and other services.

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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