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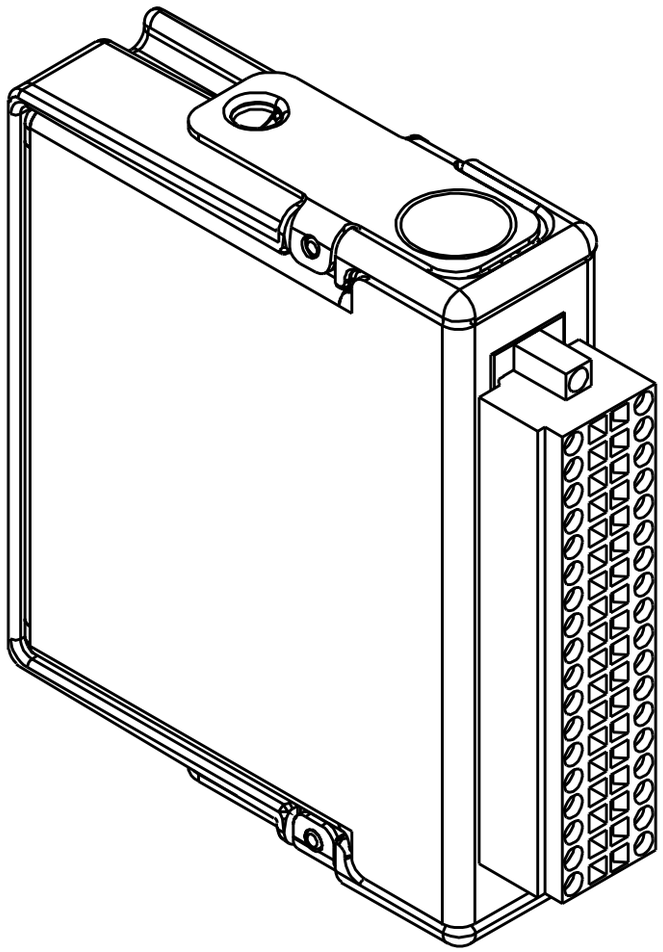
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Find the *National Instruments NI 9213* at our website: ***Click HERE***

GETTING STARTED GUIDE

NI 9213

16 TC, ±78 mV, 24 Bit, 75 S/s Aggregate



NATIONAL INSTRUMENTS™

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This document explains how to connect to the NI 9213.



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 9213. 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 9213 only as described in this document.



Caution Do not operate the NI 9213 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.

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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:

Between any two terminals	±30 V maximum
Isolation	
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.

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Caution Do not connect the NI 9213 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 9940 connector backshell kit to ensure that the terminals are not accessible.

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Safety Guidelines for Hazardous Locations

The NI 9213 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 9213 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.

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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 9213 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO Certificate No. 07 ATEX 0626664X and is IECEx UL 14.0089X certified. Each NI 9213 is marked Ex 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 9213 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.

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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

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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.

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Preparing the Environment

Ensure that the environment in which you are using the NI 9213 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

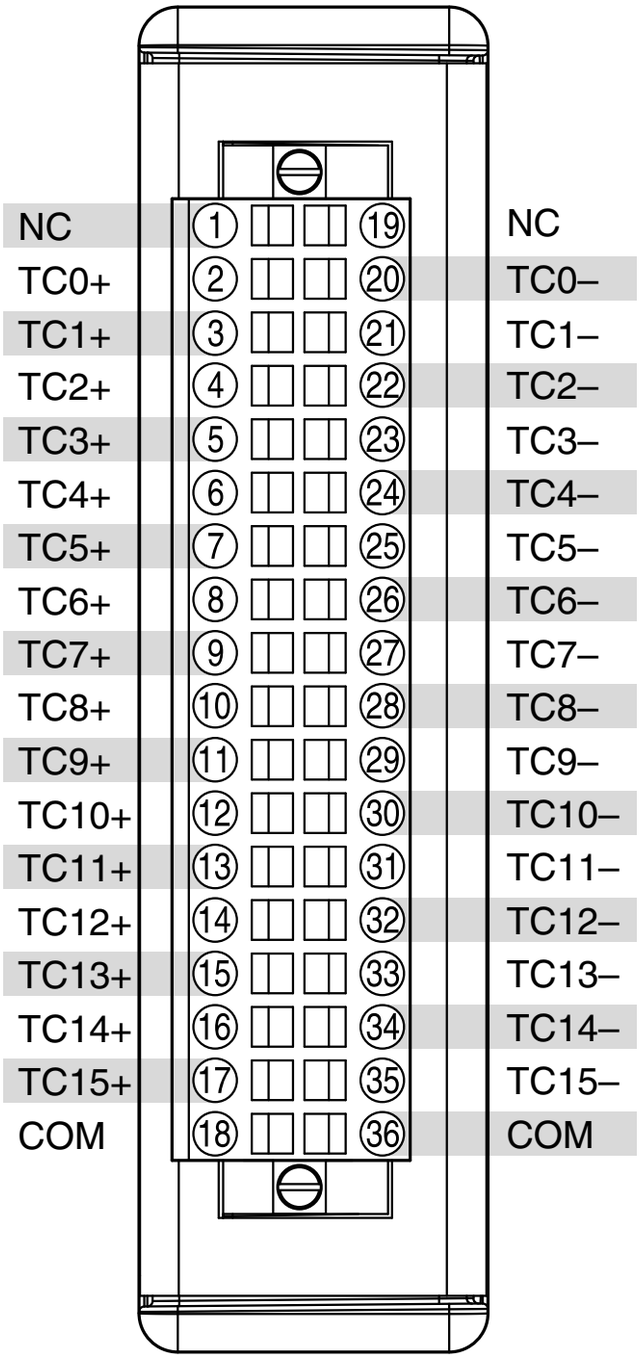
Indoor use only.



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

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NI 9213 Pinout



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Table 1. Signal Descriptions

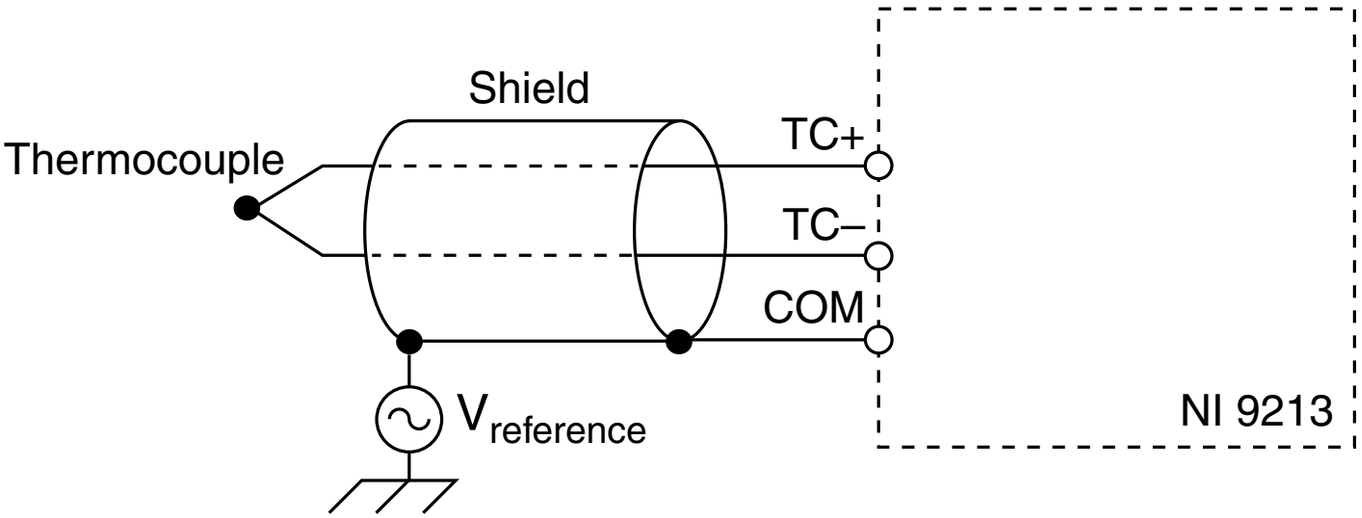
Signal	Description
COM	Common reference connection
NC	No connection
TC+	Positive thermocouple connection
TC-	Negative thermocouple connection

Connecting a Thermocouple

You can connect a shielded thermocouple to the NI 9213.

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Figure 1. Connecting a Thermocouple to the NI 9213



Connect the shield to a common-mode voltage reference on the thermocouple. A valid common-mode voltage reference is a voltage that is within ±1.2 V of the common-mode voltage of the thermocouple

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Connecting Wires to a Spring-Terminal Connector

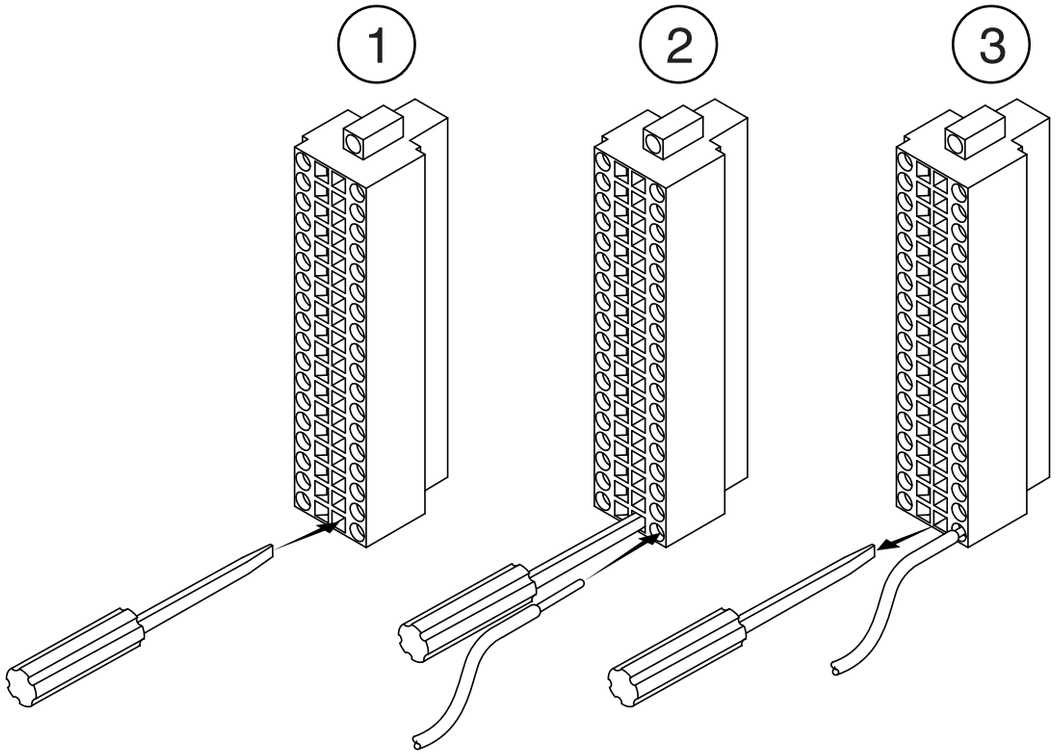
What to Use

- NI 9213 spring-terminal connector
- 0.8 mm^2 to 1.0 mm^2 (28 AWG to 18 AWG) copper conductor wire with 7 mm (0.276 in.) of insulation stripped from the end
- Flathead screwdriver with a 2.3 mm x 1.0 mm (0.09 in. x 0.04 in.) blade, included with the NI 9213

What to Do

Complete the following steps to connect wires to the spring-terminal connector.

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1. Insert the screwdriver into a spring clamp activation slot to open the corresponding connector terminal.
2. Press a wire into the open connector terminal.
3. Remove the screwdriver from the activation slot to clamp the wire into place.

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High-Vibration Application Connections

If your application is subject to high vibration, NI recommends that you use the NI 9940 backshell kit to protect connections to the NI 9213.

Minimizing Thermal Gradients

Changes in the ambient air temperature near the front connector or a thermocouple wire conducting heat directly to terminal junctions can cause thermal gradients. Observe the following guidelines to minimize thermal gradients and improve the system accuracy.

- Use small-gauge thermocouple wire. Smaller wire transfers less heat to or from the terminal junction.
- Run thermocouple wiring together near the spring-terminal connector to keep the wires at the same temperature.
- Avoid running thermocouple wires near hot or cold objects.
- Minimize adjacent heat sources and air flow across the terminals.
- Keep the ambient temperature as stable as possible.

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- Make sure the NI 9213 terminals are facing forward or upward.
- Keep the NI 9213 in a stable and consistent orientation.
- Allow the thermal gradients to settle after a change in system power or in ambient temperature. A change in system power can happen when the system powers on, the system comes out of sleep mode, or you insert/remove modules.
- If you connect any extension wires to thermocouple wires, use wires made of the same conductive material as the thermocouple wires.
- Use the NI 9940 backshell kit.

Overvoltage Protection

The NI 9213 provides overvoltage protection between any two inputs.

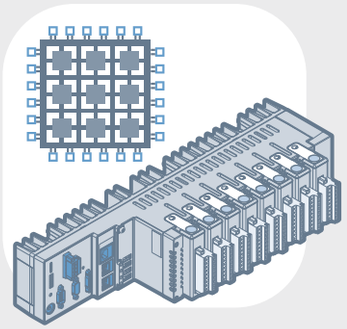


Note Refer to the device datasheet on *ni.com/manuals* for more information about overvoltage protection.

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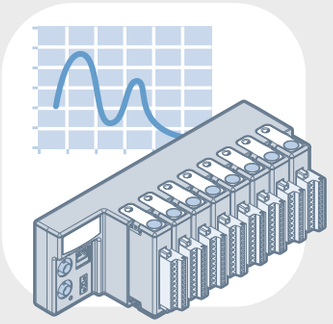
Where to Go Next

CompactRIO



- *NI 9213 Datasheet*
- *NI-RIO Help*
- *LabVIEW FPGA Help*

NI CompactDAQ



- *NI 9213 Datasheet*
- *NI-DAQmx Help*
- *LabVIEW Help*

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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*.

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