
NI-9214 Getting Started

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Overview

This document explains how to connect to the NI-9214.



Note Before you begin, read the **NI-9214 Safety, Environmental, and Regulatory Information** document on 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-9214. 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 Guidelines for Hazardous Voltages



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 ($>42.4 V_{pk}/60 V$ DC), you must ensure that devices and circuits connected to the module are properly insulated from human contact. You must use the TB-9214 included with the NI 9214 to ensure that the terminals are not accessible.



Note The TB-9214 contains a plastic insert to prevent accidental wire contact with the metal enclosure.

Safety Voltages

Connect only voltages that are within the following limits:

Between any two terminals	$\pm 30 V$ 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

Safety Guidelines for Hazardous Locations

The NI-9214 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-9214 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 9214 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO 07ATEX 0626664X and is IECEx UL 14.0089X certified. Each NI 9214 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 9214 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 9214 meets the following specifications.

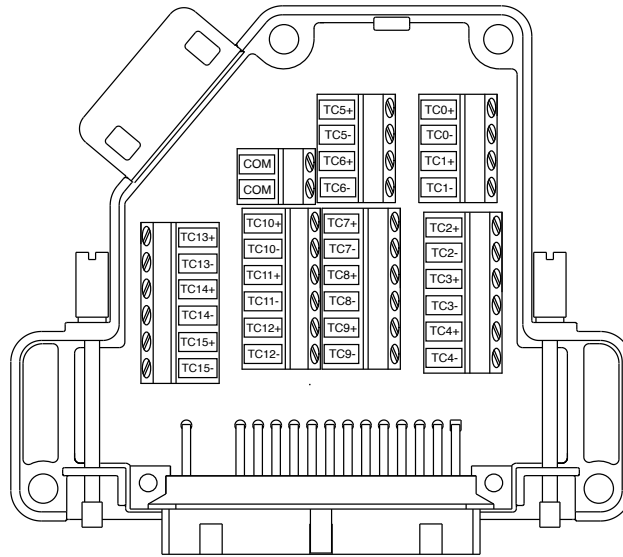
Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.



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

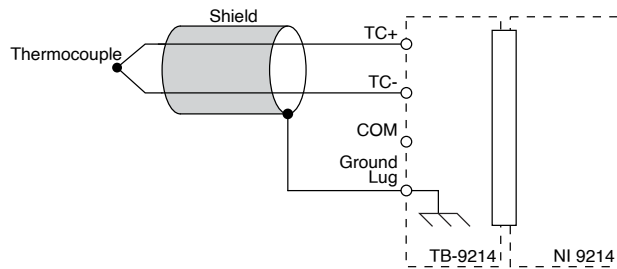
TB-9214 Pinout



Signal	Description
COM	Common reference connection
TC+	Positive thermocouple connection
TC-	Negative thermocouple connection

Table 1. Signal Descriptions

Thermocouple Connections



NI 9214 Connection Guidelines

- Make sure that devices you connect to the NI-9214 are compatible with the module specifications.

- The shield grounding methodology can vary depending on the application.
- Refer to your thermocouple documentation or the thermocouple wire spool to determine which wire is the positive lead and which wire is the negative lead.

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 TB-9214 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.
- Make sure the NI-9214 terminals are facing forward or upward.
- Keep the NI-9214 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 possible, use the foam pad in the TB-9214 opening to restrict airflow around the terminals.

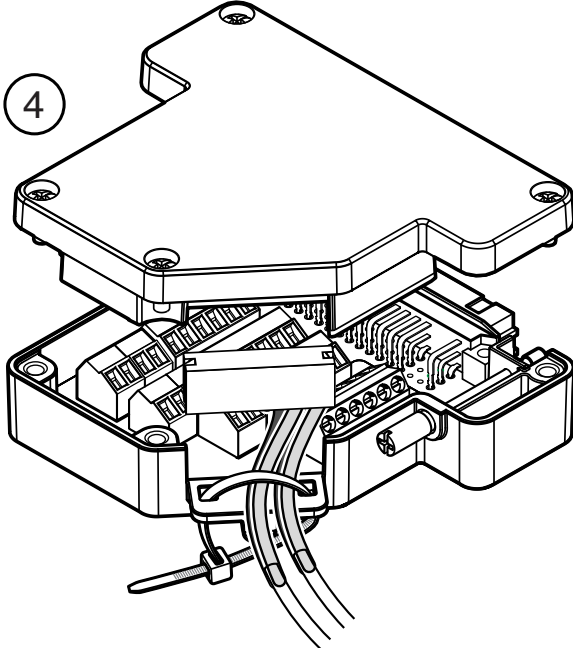
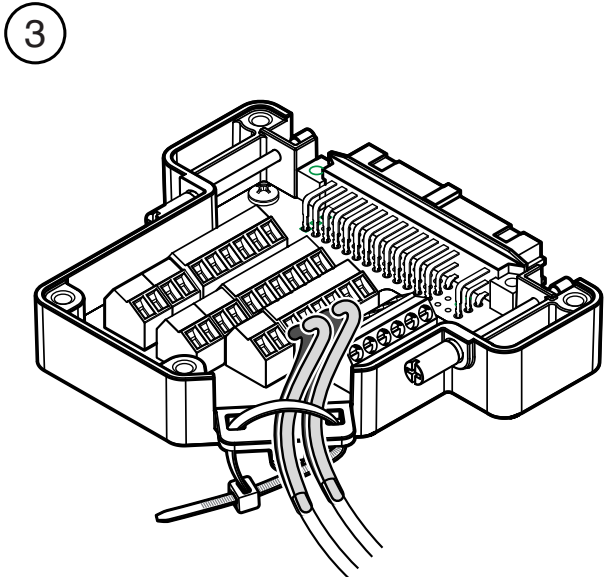
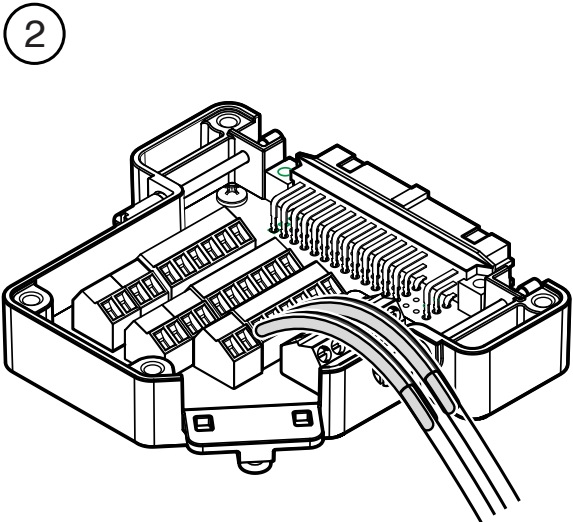
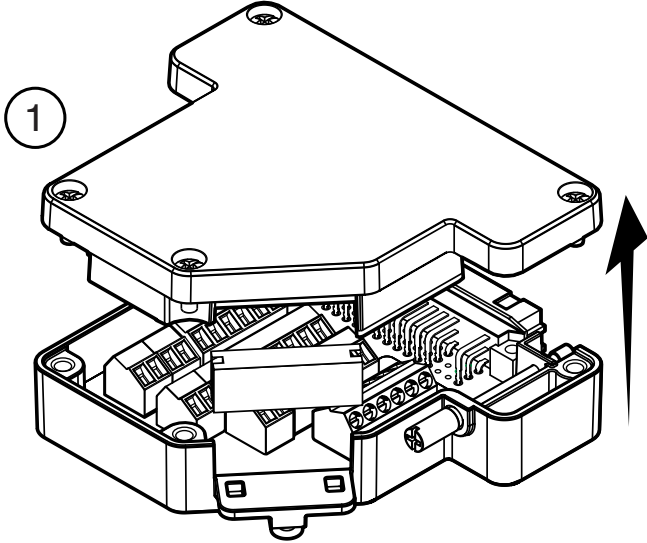
Wiring the TB-9214

What to Use

- TB-9214

- 0.05 mm² to 0.5 mm² (30 AWG to 20 AWG) wire with 5.1 mm (0.2 in.) of the inner insulation stripped and 51 mm (2.0 in.) of the outer insulation stripped
- Zip tie
- Screwdriver

What to Do



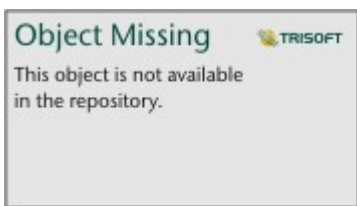
1. Loosen the captive screws on the TB-9214 and remove the top cover and foam pad.
2. Insert the stripped end of the wire fully into the appropriate terminal and tighten the screw for the terminal. Make sure no exposed wire extends past the screw terminal.
3. Route the wire through the TB-9214 opening, remove slack from the wiring, and secure the wires using a zip tie.
4. Replace the foam pad in the TB-9214 opening, reinstall the top cover, and tighten the captive screws.

Installing the TB-9214

What to Do

1. Connect the TB-9214 to the NI-9214 front connector.
2. Tighten the jackscrews to a maximum torque of 0.4 N · m (3.6 lb · in.). Do not overtighten the jackscrews.

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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