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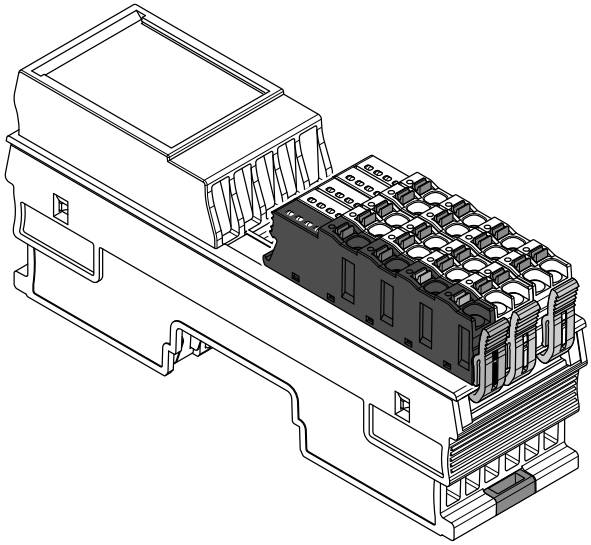
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GETTING STARTED GUIDE

# NI REM-11120

Temperature Input Module for Remote I/O



This document explains how to connect to the REM-11120.

**Note** The guidelines in this document are specific to the REM-11120. 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.

**Caution** Do not operate the REM-11120 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.

NATIONAL INSTRUMENTS

# Isolation Withstand Voltages

| Test section | Test voltage |
|---|---|
| 5 V communications power (logic), 24 V supply (I/O) | 500 VAC, 50 Hz, 1 min. |
| 5 V supply (logic) / analog inputs | 500 VAC, 50 Hz, 1 min. |
| 5 V supply (logic) / functional earth ground | 500 VAC, 50 Hz, 1 min. |
| 24 V supply (I/O) / analog inputs | 500 VAC, 50 Hz, 1 min. |
| 24 V supply (I/O) / functional earth ground | 500 VAC, 50 Hz, 1 min. |
| Analog inputs / functional earth ground | 500 VAC, 50 Hz, 1 min. |

# 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.

# Preparing the Environment

Ensure that the environment in which you are using the REM-11120 meets the following specifications.

| | |
|---|---|
| Operating temperature | -25 °C to 60 °C |
| Operating humidity | 5% RH to 95% RH, noncondensing |
| Pollution Degree | 2 |
| Maximum altitude | 3,000 m |

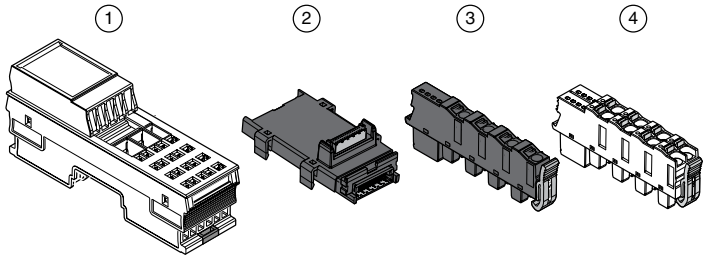
Indoor use only.

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

# Verifying the Kit Contents

Verify that the following items are included in the REM-11120 kit.

**Figure 1.** REM-11120 Kit Contents




1. NI REM-11120
2. Bus connector
3. Supply voltage connector
4. Spring-terminal block (x2)

# Unpacking the Kit

**Caution** To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.

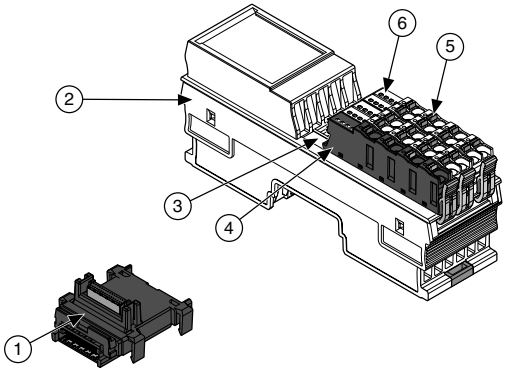
   **Caution** Never touch the exposed pins of connectors.

   **Note** Do not install a device if it appears damaged in any way.
3. Unpack any other items and documentation from the kit.

Store the device in the antistatic package when the device is not in use.

# Installing the REM-11120

**Figure 2.** Structure of the REM-11120




1. Bus connector
2. REM-11120
3. Module function label
4. Supply voltage connector
5. Spring-terminal block
6. LED indicators

**Table 1.** Module Function Labels

| Label Color | Module Function |
|---|---|
| Blue | Digital input |
| Red | Digital output |
| Green | Analog input, thermocouple |
| Yellow | Analog output |
| White | Bus coupler, power module |

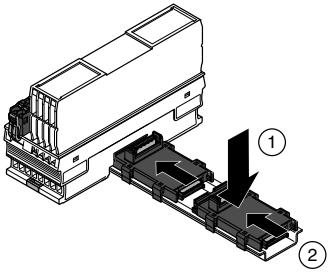
# Installing Bus Connectors

## What to Use

- Bus connector
- DIN rail

## What to Do

Complete the following steps to install bus connectors on the DIN rail.




1. Insert the bus connector for the REM-11120 into the DIN rail.

   **Caution** Verify that you are using the correct bus connector for the module width.

2. Slide the bus connector along the DIN rail until it connects to the preceding bus connector.

   **Note** A bus connector will not attach to a preceding bus connector with a mounted module. Remove the preceding module before installing additional bus connectors.

3. Repeat Steps 2 and 3 for additional bus connectors.

# Installing the Module

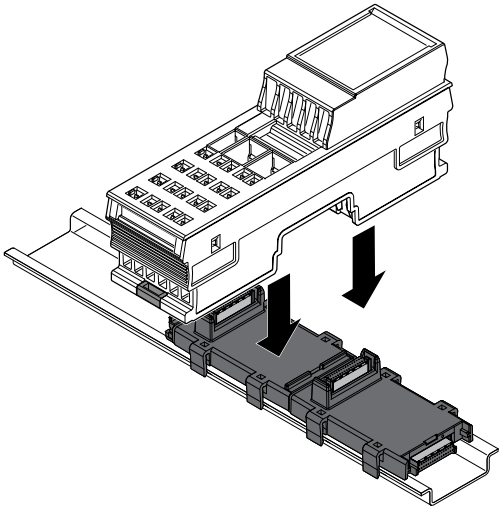
**Note** For best performance, NI recommends installing temperature modules at the end of the Remote I/O system. Increase typical measuring tolerance up to 0.9 K in temperature modules installed next to a bus coupler.

### What to Use

- REM-11120
- Mounted bus connector

### What to Do

Complete the following steps to install the REM-11120 on the DIN rail.



**Note** When using the Remote I/O Shield Set, install the shield rail supports before mounting the module.

1. Align the REM-11120 over the appropriate bus connector.

   **Note** Verify that the bus connector socket aligns with the socket on the underside of the module.

2. Press the REM-11120 directly onto the bus connector and DIN rail until it clicks into place.

   **Caution** Tilting the module when mounting it on the DIN rail will damage the contacts.

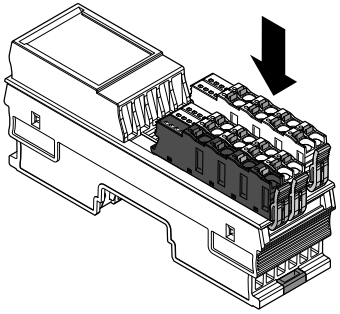
# Installing Spring-Terminal Blocks

### What to Use

- REM-11120
- Spring-terminal block

### What to Do

Align the spring-terminal block over the REM-11120 and press until it clicks into place.



# REM-11120 Pinout

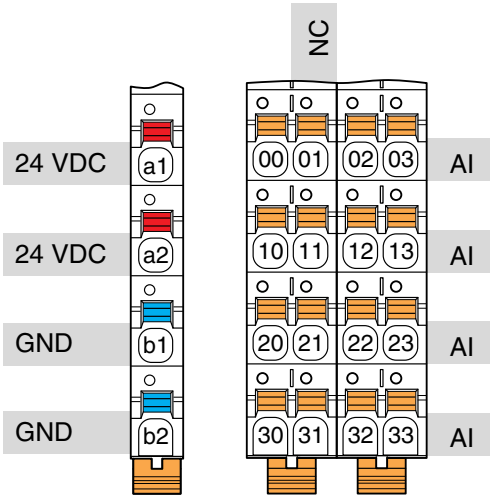



**Table 2.** REM-11120 Signal Descriptions

| Signal | Color | Description | |
|---|---|---|---|
| a1, a2 | Red | 24 VDC ($U_A$) | Analog module supply (internally jumpered) |
| b1, b2 | Blue | GND | Reference potential of the supply voltage (internally jumpered) |

**Table 2.** REM-11120 Signal Descriptions (Continued)

| Signal | Color | Description | |
|---|---|---|---|
| 00, 02 | Orange | CJ0+, CJ1+ | External cold junction input (+) |
| 01 | | — | No connection |
| 10, 12 | | CJ0-, CJ1- | External cold junction input (-) |
| 11 | | — | No connection |
| 03 | | AI+ | Voltage input 5 V (+) |
| 13 | | AI- | Voltage input 5 V (-) |
| 20 to 23 | | TC0+ to TC3+ | Thermocouple (+) |
| 30 to 33 | | TC0- to TC3- | Thermocouple (-) |

**Figure 3.** REM-11120 LEDs

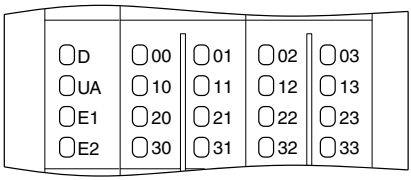



**Table 3.** LED Indicators

| LED | LED Color | LED Pattern | Indication |
|---|---|---|---|
| D | Green | Solid | The REM-11120 is ready for operation. |
| | | Flashing | Data is invalid or unavailable. |
| | Green/Yellow | Flashing | The REM-11120 cannot communicate with the connected devices. |

**Table 3.** LED Indicators (Continued)

| LED | LED Color | LED Pattern | Indication |
|---|---|---|---|
| D | Yellow | Solid | The REM-11120 did not detect a valid cycle after power-on. |
| | | Flashing | The REM-11120 is not part of the configuration. |
| | Red | Solid | The REM-11120 has lost connection to the Bus Coupler. |
| | | Flashing | The REM-11120 has lost connection to the preceding adjacent module. |
| | — | Off | The REM-11120 is in reset mode. |
| UA | Green | Solid | Supply to analog output module present. |
| | — | Off | No supply to analog output modules. |
| E1 | Red | Solid | Supply voltage is faulty. |
| | — | Off | Supply voltage is present. |
| E2 | Red | Solid | I/O or channel error has occurred. |
| | — | Off | No error |
| 10 to 13 | Orange | Flashing | Channel scouted |
| | Red | Solid | Open circuit, overrange or underrange or voltage UA not present |
| | Green | Solid | Normal operation |
| | — | Off | Channel set to inactive |

**Table 4.** Error Status of E1 and E2 LEDs

| Error | E1 LED | E2 LED |
|---|---|---|
| No error | Off | Off |
| Underrange | Off | On |
| Overrange | Off | On |
| Supply voltage faulty | On | On |
| Parameter table invalid | Off | On |

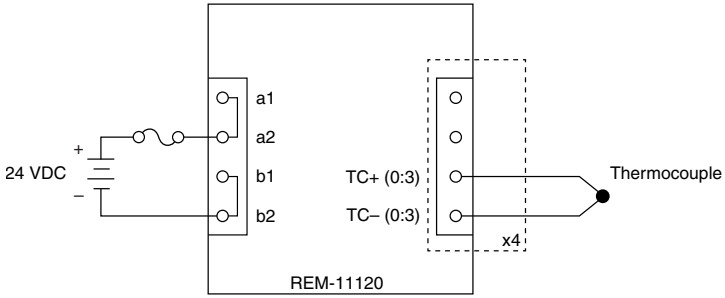
**Table 4.** Error Status of E1 and E2 LEDs (Continued)

| Error | E1 LED | E2 LED |
|---|---|---|
| Device error | Off | On |
| Flash format error | Off | On |

**Note** The reported error depends on the measuring range. For information about input scaling, refer to the device datasheet on *ni.com/manuals*.

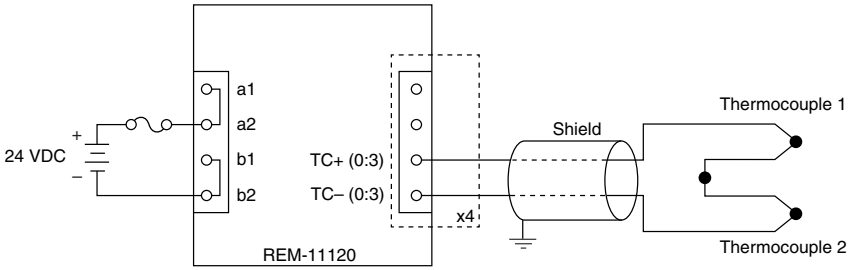
# Connecting a Thermocouple

**Figure 4.** Absolute Temperature Measurement




- Each channel can connect to a separate thermocouple.
- Internal cold junction compensation determines the measuring temperature.

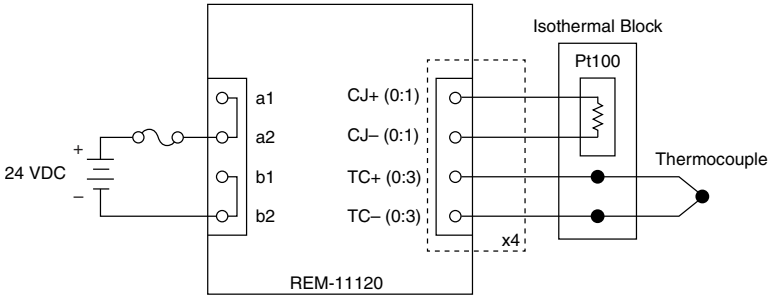
**Figure 5.** Differential Temperature Measurement




- To determine exact differential temperature, connect two thermocouples in series to one channel.

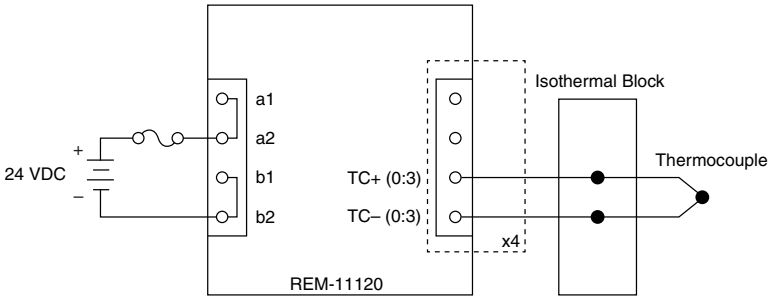
# Connecting an Isothermal Block

**Figure 6.** External Cold Junction Compensation




Connect the external Pt 100 cold junction sensor to the isothermal block using a Pt 100 input of connector 1 or 2.

**Figure 7.** Cold Junction Compensation with Temperature Specification




Write the cold junction temperature recorded externally by the isothermal block to the first process data output word of the module in your application.

# Connecting Linear Voltage Input Signals

**Figure 8.** Linear mV Voltage Connection

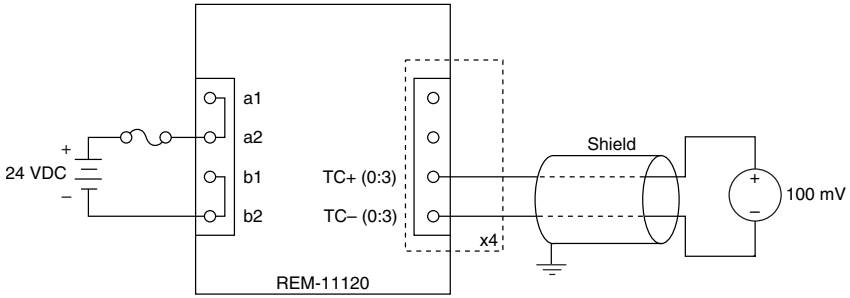
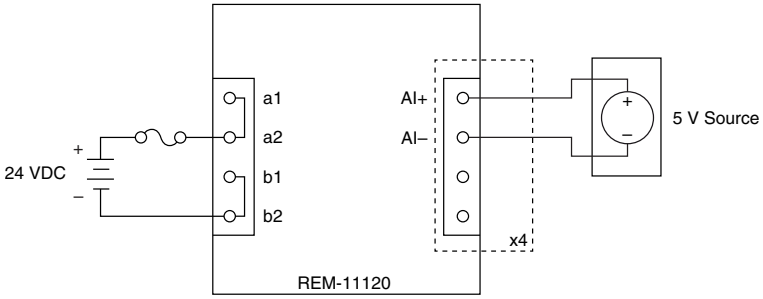


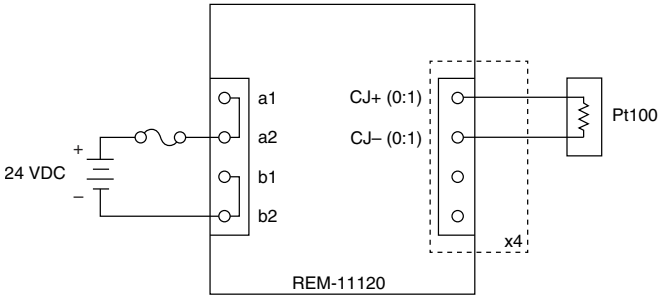

**Figure 9.** Linear VDC Voltage Connection




- Connect sensors to each channel which supply a linear voltage in ranges of ±100 mV or ±5 VDC.
- For mV sensors, cable lengths of up to 250 m (820 ft.) are possible.
- For VDC sensors, use shielded twisted sensor cables no longer than 5 m (16 ft.).

# Connecting an External Pt 100

**Figure 10.** Pt Sensor Connection




- Each spring-terminal block has a connection for an external Pt 100 cold junction sensor.
- Connect the external Pt 100 cold junction sensor using the Pt 100 input of spring-terminal 1 or 2.
- Do not use cabling that exceeds 10 m (30 ft.).

# Connection Guidelines

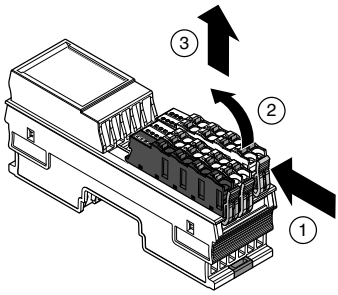
**Note** For information about fuse ratings for the REM-11120, refer to the device datasheet on *ni.com/manuals*.

- Make sure that devices you connect to the REM-11120 are compatible with the module specifications.
- Push the wire into the terminal when using a solid wire or a stranded wire with a ferrule.
- Open the terminal by pressing a screwdriver into the spring lever when using a stranded wire without a ferrule.
- Use encapsulated thermocouples.
- Always connect the thermocouples using twisted pair equalizing conductors.
- Use shielded twisted pair equalizing conductors for a cables longer than 10 m (32 ft.).
- For mV sensors in environments prone to interference or sensor cables longer than 10 m (32 ft), use shielded twisted connecting cables.
- For thermocouple sensors, use shielded thermocouple connecting cables.
- NI recommends using the NI Remote I/O Shield Set for optimal shield connection.
- For installation in a cabinet, connect the cable shield to functional earth ground immediately after the cables enter the cabinet.

# Removing Components

## Removing Spring Terminal Blocks

Complete the following steps to remove a spring-terminal block from the REM-11120.




1. Press the locking latch to release the spring-terminal block.
2. Tilt the block toward the center of the module.
3. Remove the connector from the module.

## Removing the REM-11120

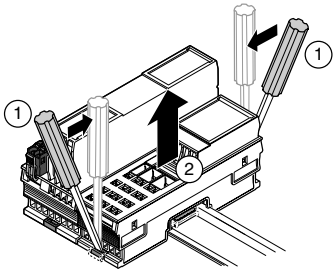
Remove all connections before removing the REM-11120, either by disconnecting the cables or removing the spring-terminal block.

### What to Use

- Flathead Screwdriver

### What to Do

Complete the following steps to remove the REM-11120 from the DIN rail.




1. Insert the screwdriver and loosen the base latches on either end of the module.
2. Remove REM-11120 perpendicular to the DIN rail.

**Caution** Tilting the module when removing it from the DIN rail will damage the contacts.

# Removing Bus Connectors

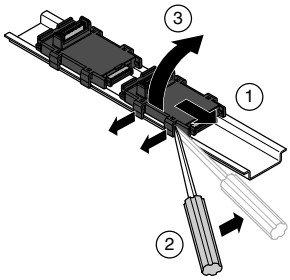
Complete the following steps to remove bus connectors from the DIN rail.

### What to Use

- Flathead Screwdriver

### What to Do

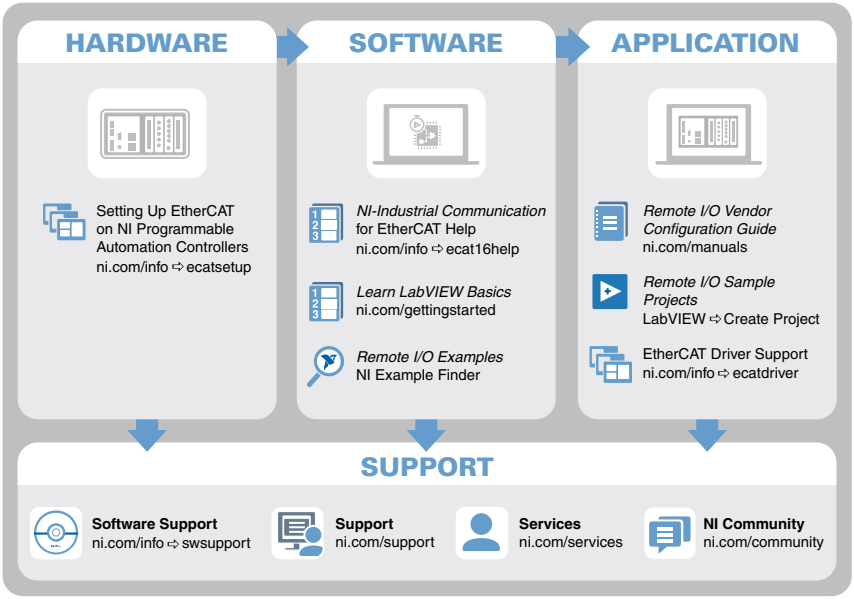
**Note** You must remove the preceding module before removing the bus connector.




1. Slide the bus connector away from the preceding bus connector at least 5.0 mm (0.20 in.).
2. Insert the screwdriver and loosen both latches on one side of the DIN rail.
3. Rotate the bus connector to remove it from the DIN rail.

**Note** If you want to remove a bus connector in the middle of the system, you must remove any modules or bus connectors following the desired connector or slide them along the DIN rail at least 15.0 mm (0.60 in.).

# Where to Go Next




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