Raychem

MoniTrace 200N System Installation Manual

Software Version 2

MoniTrace 200N

RMM2

RMC
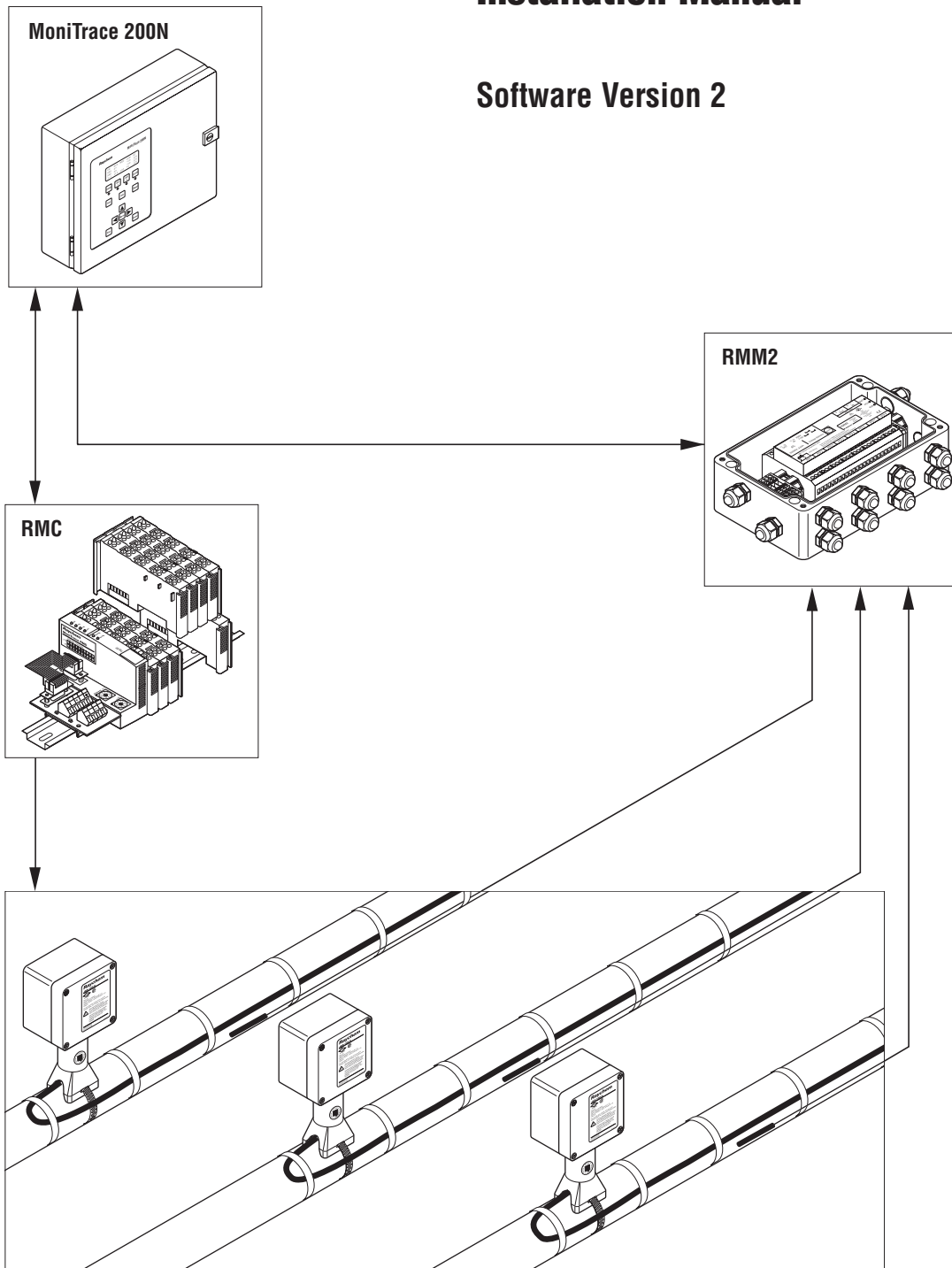
Identifying MoniTrace 200N Features

1 Mounting holes (4)

2 Removable gland plate

3 RS-485 connection to remote monitoring modules (RMM2s) and remote modules for control (RMCs)

4 RS-232/RS-485 connection to DCS or host computer

5a `GRP-1-O` control relay connection (to contactor)

5b `GRP-2-O` control relay connection (to contactor)

6 Relay connection for remote alarm annunciation

7a `RTD-1-I` sensor connection

7b `RTD-2-I` sensor connection

8a `INT-1-I` and `INT-2-I` digital inputs for contactor feedback and ground-fault alarm monitoring

8b `INT-3-I` and `INT-4-I` digital inputs for contactor feedback and ground-fault alarm monitoring

9 Voltage selector switch

10 Line voltage supply terminal block

11 Chassis ground lug

12 LCD contrast adjustment

13 Audible alarm volume adjustment

14 Host test port

15 Selector switch for host port communications (RS-232 or RS-485)

16 Ribbon cable

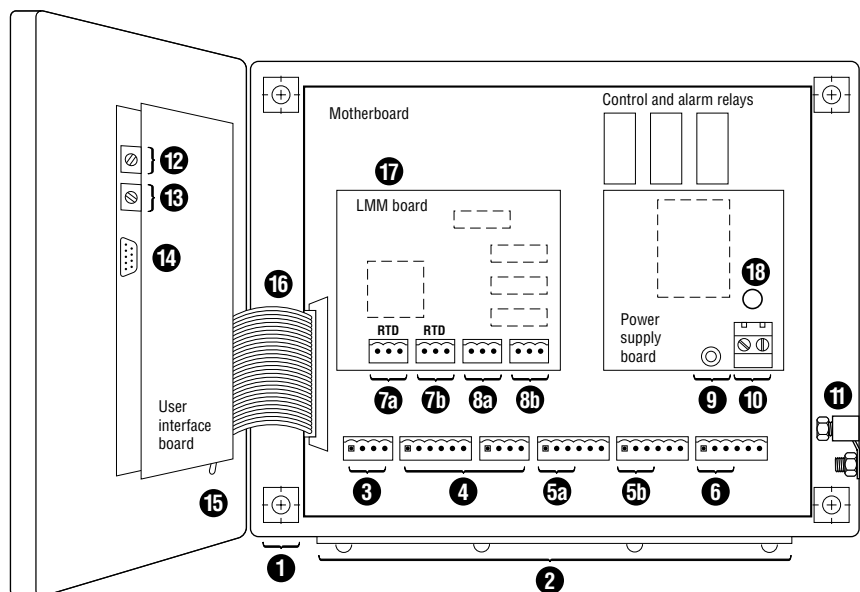**17** Local monitoring module (LMM) board

18 Fuse

Table of Contents

Introduction

This installation manual will help you install a MoniTrace 200N heat-tracing controller, as well as test and record installation of other system components. The manual has four sections:

1. Overview
2. MoniTrace 200N Installation
3. Basic Test Procedures
4. Installation Record Forms

This installation manual complements several other documents on the MoniTrace 200N system, which may include several types of MoniTrace devices (as described in Section 1).

Description	Literature reference
Design	
MoniTrace 200N System Design Guide	DOC-466
Installation	
MoniTrace RMM2 Installation Instructions	INSTALL-061
MoniTrace RMC Installation Instructions	INSTALL-079
MoniTrace 200N System Installation Manual	INSTALL-084
Setup and Operation	
MoniTrace 200N System Operation Manual	INSTALL-065
Communication with Host Systems	
MoniTrace 200N Modbus Configuration	H56599

You can obtain these documents and other Tyco Thermal Controls literature through several sources:

- On-line Literature
  Many documents can be downloaded as Adobe Acrobat files from the Tyco Thermal Controls Web site at http://www.tycothermal.com (click on *Heat Tracing,* then *Literature*).

- Contact Tyco Thermal Controls
  You can request documents and other information by contacting Tyco Thermal Controls or your local Tyco Thermal Controls representative. The back cover of this installation manual provides contact information to reach Tyco Thermal Controls directly.

1. Overview

The MoniTrace 200N unit is the central element of a system to control and monitor multiple circuits of electric heat tracing. The MoniTrace 200N controls the system and provides the user interface. Two other elements of the MoniTrace 200N system enable it to control and monitor large numbers of heat-tracing circuits (see Figure 1.1). Remote monitoring modules (RMM2s) provide inputs for resistance temperature detectors (RTDs). Remote modules for control (RMCs) provide relay outputs to control heat-tracing circuits. RMM2s and RMCs communicate with the MoniTrace 200N through a single RS-485 cable.

MoniTrace 200N controller

Remote modules for control (RMCs)

Remote monitoring modules (RMM2s)

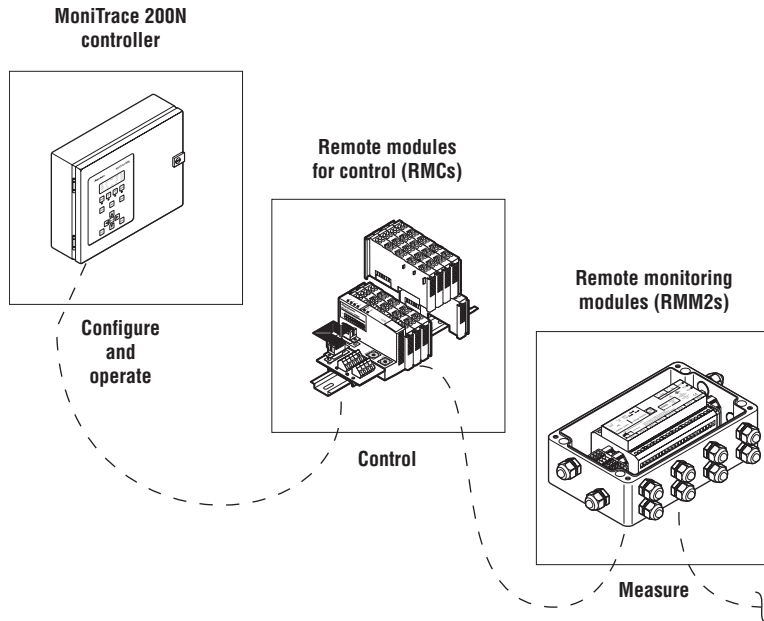**Configure and operate**

Control

Measure

Figure 1.1. Elements of a MoniTrace 200N system.

The MoniTrace 200N system can be used for both process-temperature-maintenance and freeze-protection applications.

Figure 1.2 illustrates the distributed architecture of the MoniTrace 200N system:

• The MoniTrace 200N unit supervises the control and monitoring system and provides the user interface.

• An RS-485 network connects RMM2s and RMCs to the MoniTrace 200N.

• RTD temperature sensors may be connected to RMM2s or the MoniTrace 200N controller.

• Contactors may be controlled by relays in RMCs or the MoniTrace 200N controller.

• The MoniTrace 200N controller may be connected to a host computer or distributed control system (DCS) supporting the Modbus protocol.
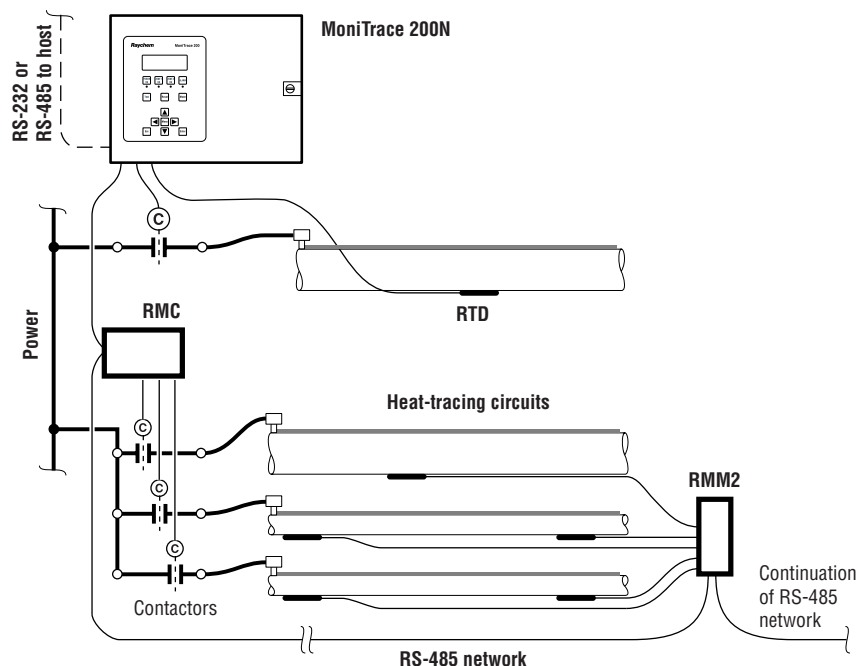

Figure 1.2. MoniTrace 200N system architecture.

Temperature inputs. The MoniTrace 200N unit accepts two RTD inputs, which can be used to monitor pipe or ambient air temperatures. The MoniTrace unit can monitor 128 additional RTDs connected to MoniTrace RMM2s. MoniTrace RMM2 units may be remotely located; the RMM2s communicate with the MoniTrace 200N over an RS-485 network, which may have a total cable length of 1200 m (4000 feet).

Heat tracing circuit control. The MoniTrace 200N unit has two relay outputs to control heat tracing; these relays can be used to control *individual* circuits or *groups* of circuits. The MoniTrace 200N can control 128 additional relay outputs using MoniTrace RMCs. The MoniTrace 200N communicates with the RMCs over the same RS-485 network as used for the RMM2s. A single MoniTrace 200N system can be used for line-sensing control of individual circuits and ambient-sensing control of groups of circuits.

Integrity monitoring. MoniTrace 200N and RMC units accept digital inputs. A digital input can be used to monitor the alarm relay from a ground-fault circuit breaker panel or to verify contactor operation. The MoniTrace 200N has four digital inputs, and each RMC has two.

Configuration flexibility. The MoniTrace 200N operating software enables the user to readily configure the system. Setup options for a heat-tracing circuit include the control mode, control settings (such as set point and dead band), and high- and low-temperature alarm limits. Setup for a temperature sensor includes defining the type of sensor (pipe or ambient-sensing) and assigning it to a heat-tracing circuit.

Communication with host systems. The MoniTrace 200N unit can be connected to a DCS or host computer using an RS-485 or RS-232 serial connection. All data and setup options can be accessed with communications that follow the Modbus protocol. Refer to the separate *MoniTrace 200N Version 2 Modbus Configuration* manual (Raychem reference H56599) for details.

2. MoniTrace 200N Installation

2.1 Procedure for Installation of MoniTrace 200N System as a Whole

This page outlines the procedure to install, test, and configure an entire MoniTrace 200N control and monitoring system. The remainder of this section explains how to install the MoniTrace 200N controller itself, and how to connect it to other parts of the system.

For installation of other MoniTrace modules, see the separate instructions that accompany them. Other applicable literature is identified in the introduction to this manual.

2.1.1 Install Hardware

The MoniTrace 200N system uses three types of modules to control and monitor electric heat-tracing circuits: the MoniTrace 200N controller, remote modules for control (RMCs), and remote monitoring modules (RMM2s). Install each module in accordance with the detailed instructions that come with it, and use the forms in Section 4 to record the wiring details (terminal assignments, etc.). The steps below outline the basic approach to use for all three types of modules.

• Mount module.
• Connect power.
• Connect temperature sensors (if applicable).
• Connect control relays and contactors (if applicable).
• Connect digital inputs (if specified in design).
• Connect RS-485 network.

2.1.2 Test and Configure the System

After the hardware is installed, use the MoniTrace 200N software to test and configure the system. Refer to Appendix F in the *MoniTrace 200N System Operation Manual* for detail, and use its Test and Configuration Record to record test results and configuration details. The steps below outline the approach to commission the control and monitoring system.

• Energize the system and perform General Setup (enter the correct time/date, units, and other necessary elements).
• Update the RMM2/RMC network to recognize new devices on the system.
• Test connections and verify device addresses using the MoniTrace 200N Status and Self Tests menu functions.
• Use the system software to set up the heat-tracing circuits.
  Note: Each circuit should be defined beforehand using the Circuit Definition Worksheet in the *MoniTrace 200N System Design Guide* (DOC-466).
• Set up remote alarm annunciation (if specified in design).
• Set up communications with host system (if specified in design).

2.2 Mounting the Enclosure

The MoniTrace 200N controller must be mounted in a nonhazardous indoor area. Choose a location indoors where the controller will be protected from the elements and kept above 0°C (32°F) and below 50°C (122°F).

Install the enclosure using the four screws in the prepunched 8 mm (5/16-inch) mounting holes with centers as shown in Figure 2.1. If plastic plugs are in the mounting holes, remove them. Make sure the rubber elastomeric washers (provided in the MoniTrace 200N shipping box) are aligned to seal around the mounting screws to maintain the NEMA 12 and IP54 ratings.
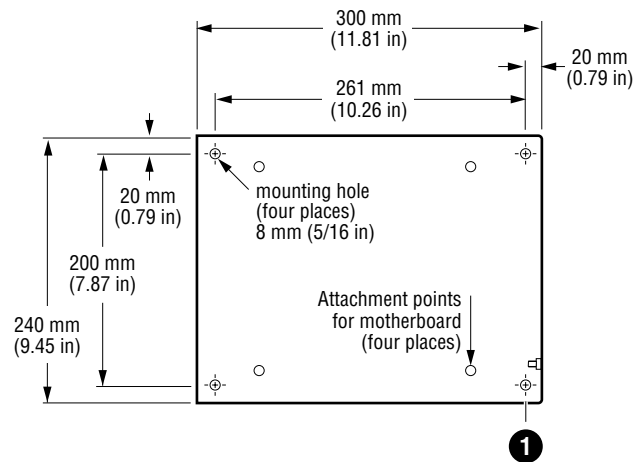
Figure 2.1. Mounting hole locations.

2.3 Making Enclosure Entries Using the Removable Gland Plate

The removable gland plate on the bottom edge of the enclosure provides a location to feed wires through (Figure 2.2). The plate is attached with eight screws. Unscrew these to remove the gland plate. You can drill or punch holes appropriate for your application. There is sufficient width for up to five 1/2-inch or M20 holes. Remove all metal filings and dust from the gland plate before remounting. Take care not to damage the gasket on the gland plate. You must secure the gland plate ground wire to the chassis ground lug.
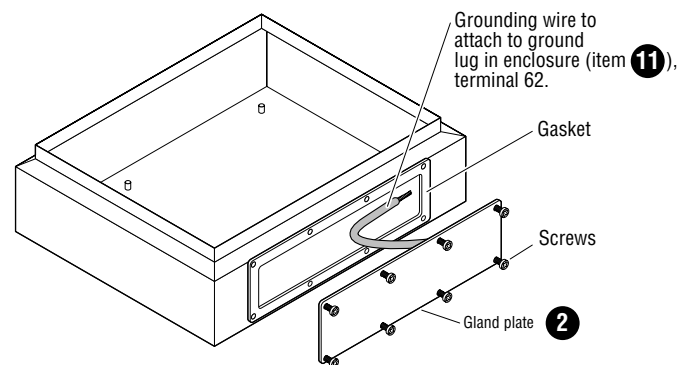

Figure 2.2. Removable gland plate.

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2.4 Electrical Safety

Follow electrical safety procedures when installing and maintaining the MoniTrace 200N unit, as line voltage is present inside.

Connections in the "Signal Voltage" area in Figure 2.3 are securely isolated from power supply and relay outputs.
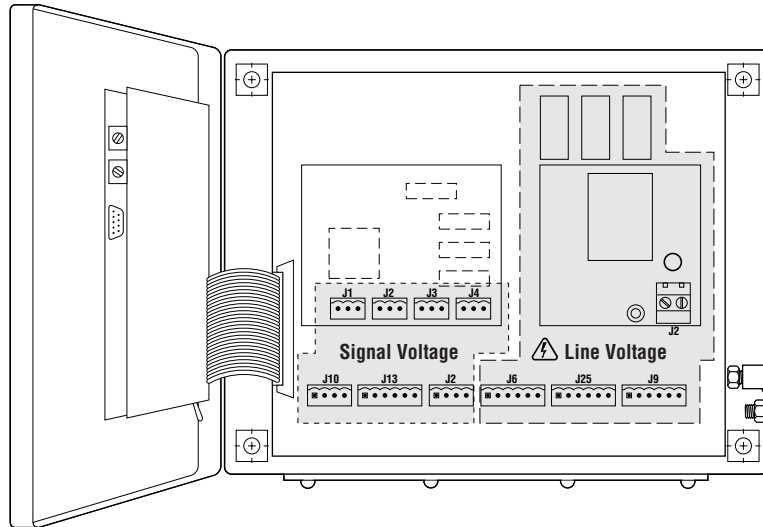
Figure 2.3. Location of signal and line voltage connection areas.

2.5 Selecting Input Voltage

Position the voltage selector switch for the correct controller voltage (Figure 2.4). The factory-set switch position is 220.
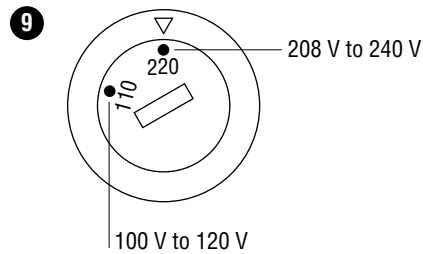

Figure 2.4. Voltage selector switch.

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2.6 Connecting Main Power

Use only copper conductors for field wiring. A close-up of the power connection terminals is shown in Figure 2.5. This connection energizes the MoniTrace 200N electronics only; it does not provide power to the heat tracing or contactor coils.

Note: If the MoniTrace 200N controller has a different source of power than the heat tracing, it may be worthwhile to install an uninterruptible power supply (UPS) so the unit can continue to control and/or monitor the heat tracing in the event of a localized power failure.
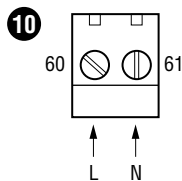

Figure 2.5. Power connection pin locations.

2.7 Connecting Chassis Ground

Connect the ground wire of the power cable (that is, the system ground) to terminal 62, the chassis ground lug located on the right side of the box (Figure 2.6).
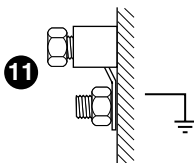

Figure 2.6. Enclosure chassis ground connection.

2.8 Connecting RTDs

Figure 2.7 shows a close-up of the RTD connections to the MoniTrace 200N unit local monitoring module (LMM) board. The MoniTrace 200N requires the use of 3-wire 100 Ω RTDs. These devices have two wires of one color, and one wire of another color. The single-color wire is connected to the left terminal. The two wires of the same color are connected to the middle and right terminals.

The addresses for the RTDs connected to the LMM board will be `RTD-1-I` and `RTD-2-I`. To connect RTD temperature sensors to MoniTrace RMM2s, refer to the installation instructions provided with them.
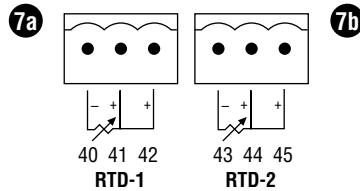

Figure 2.7. RTD connections in the MoniTrace 200N.

Figure 2.8 illustrates the wiring for an ambient-sensing RTD connected to the MoniTrace 200N. An ambient-sensing RTD must sense an air temperature that is representative for the pipes being controlled or monitored as a group; the ambient-sensing RTD should be securely mounted in a shaded location near the pipes being controlled.

The maximum length of RTD extension wire is 150 m (500 feet); for greater distances, consider connecting the RTD to a MoniTrace RMM2.

An ambient-sensing RTD is supplied with the MoniTrace 200N; this RTD is for use in nonhazardous areas only.
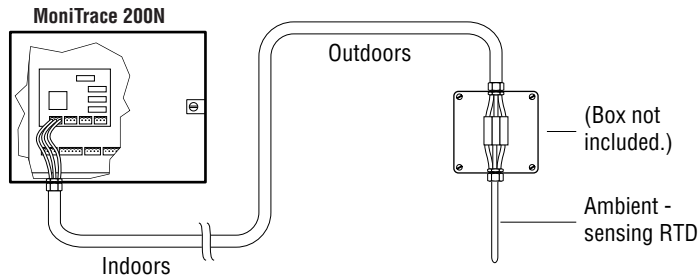

Figure 2.8. Wiring detail for an ambient-sensing RTD.

Figure 2.9 illustrates the wiring for a pipe-sensing RTD connected to the MoniTrace 200N. The maximum length of RTD extension wire is 150 m (500 feet); for greater distances, consider connecting the RTD to a MoniTrace RMM2.
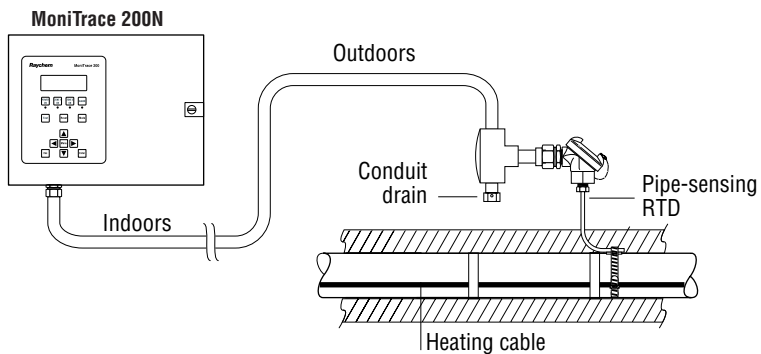

Figure 2.9. Wiring wetail for a line-sensing RTD.

2.9 Connecting Control Relays to Contactors

Control relays in the MoniTrace 200N or in MoniTrace RMCs can be used to control electrical contactors. To use a MoniTrace RMC, see the RMC installation instructions (Tyco Thermal Controls literature reference number INSTALL-079). Figure 2.10 illustrates how the MoniTrace 200N should be connected to a contactor to control a heat-tracing circuit. The terminals in the MoniTrace 200N are labeled NC for *normally closed,* and COM for *common.* The contactor coil should be connected to the NC and COM terminals, enabling the MoniTrace 200N to open and close the contactor. Note that the MoniTrace 200N control relay terminals are dry contacts; the contactor control circuit must be powered from a source outside the MoniTrace 200N controller.

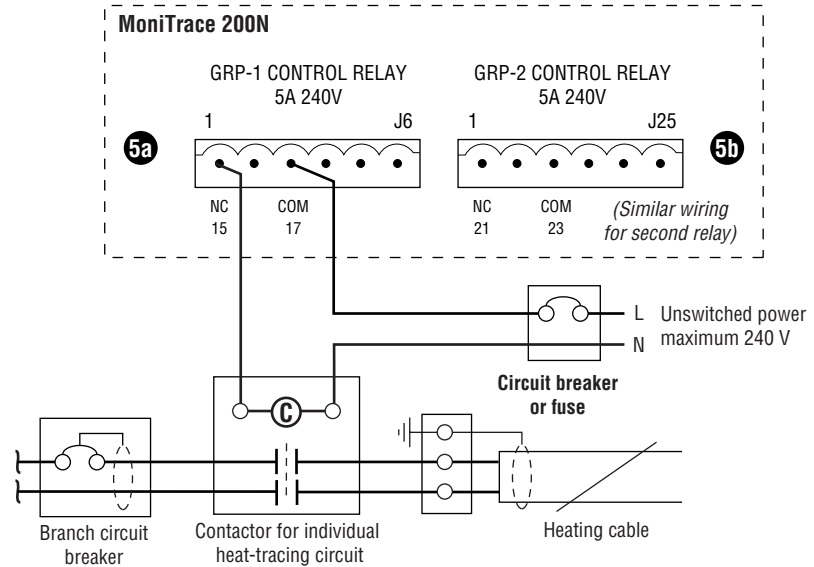**Note:** Use only copper conductors for field wiring.

Figure 2.10. Wiring detail: Contactor controlling an individual heat-tracing circuit.

Figure 2.11 illustrates the wiring to a contactor to control a *group* of heat-tracing circuits. A contactor controlling a group of circuits must be sized accordingly (all circuits connected to the contactor will be turned on and off at the same time).
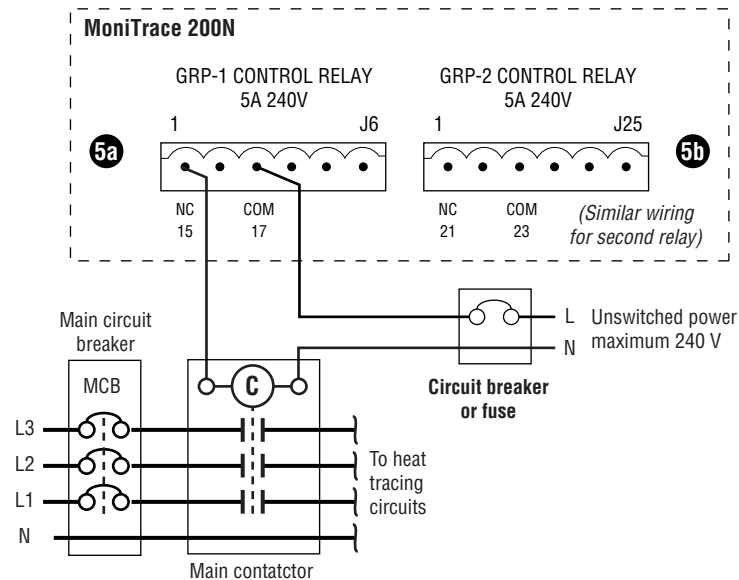

Figure 2.11. Wiring detail: Contactor controlling a group of heat-tracing circuits.

Note: The inductive current that occurs when a large contactor opens could damage the MoniTrace 200N control relay. With contactors rated over 80 A, use a surge suppressor (sometimes referred to as an RC noise suppression filter) on the contactor coil; a surge suppressor is often available as an option with the contactor.

2.10 Connections to Monitor Contactor Actuation

The LMM board of the MoniTrace 200N provides two sets of terminals for digital inputs; these allow monitoring of contactor actuation and/or ground-leakage circuit breaker (GLCB) alarms (Figure 2.12). To monitor contactor actuation or GLCB alarms with a MoniTrace RMC unit, refer to the instructions provided with the RMC (Tyco Thermal Controls literature reference number INSTALL-079).
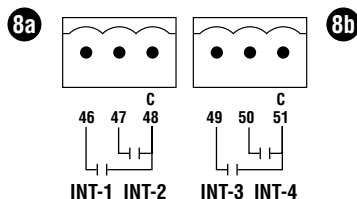

Figure 2.12. Terminals for monitoring contactor actuation and GLCB alarms.

To monitor operation of a contactor controlled by the MoniTrace 200N, wire a relay on the output side of the contactor in parallel with the heat tracing, as shown in Figure 2.13. This provides feedback to the MoniTrace 200N controller when the contactor operates. Wire the relay so a closed circuit signals that the heat tracing is energized, and an open circuit signals that the heat tracing is de-energized. The MoniTrace 200N controller will compare the relay status with its control signal to the contactor, and trigger an alarm if there is a discrepancy.

Note: The MoniTrace 200N monitors the power feedback relay with an internally sourced 5 V circuit; do **not** connect it to an external source of power.
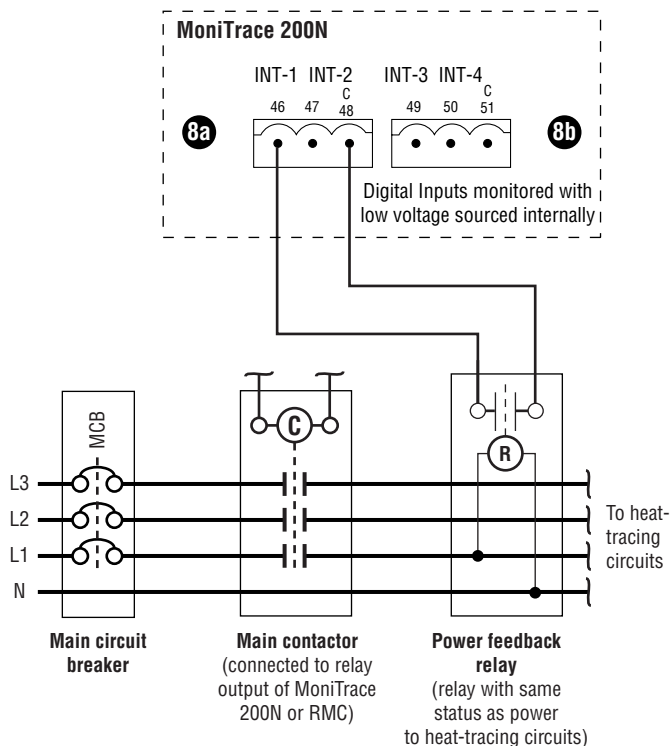

Figure 2.13. Wiring detail: Power feedback relay to verify contactor actuation.

Note: For the MoniTrace 200N to properly monitor the contactor and generate alarms, the address of the digital input must be entered as the Power Alarm Address when setting up the circuit (see Power Monitoring, in the *MoniTrace 200N System Operation Manual*, INSTALL-065). The addresses of the digital inputs are:

- `INT-1-I` if connected to terminals 46 and 48
- `INT-2-I` if connected to terminals 47 and 48
- `INT-3-I` if connected to terminals 49 and 51
- `INT-4-I` if connected to terminals 50 and 51

2.11 Connections to Monitor Ground-Fault Circuit Breaker Alarms

The MoniTrace 200N can monitor the alarm relay from ground-fault equipment, for example, the common alarm relay output from a GLCB panel. This feature enables the MoniTrace 200N to provide a complete view of the status of your heat-tracing system in a single, central location.

To monitor for circuit breaker trips, wire the common alarm output from a GLCB panel to the MoniTrace 200N controller, as shown in Figure 2.14. The MoniTrace 200N controller monitors the relay and will interpret a relay closure as a circuit breaker trip, and signal an alarm. (To connect a GLCB alarm relay to a MoniTrace RMC unit, refer to the installation instructions provided with the RMC, Tyco Thermal Controls literature reference number INSTALL-079.)

Note: That the MoniTrace 200N monitors the alarm relay circuit with an internally sourced 5 V circuit; do **not** connect it to an external power source.

⚠️ **WARNING: Fire hazard.**
A ground-fault alarm may mean the heating cable has been damaged or improperly installed; it must not be ignored—sustained electrical arcing or fire could result. To minimize the risk of fire if the alarm is triggered, shut off the power and repair the system immediately.
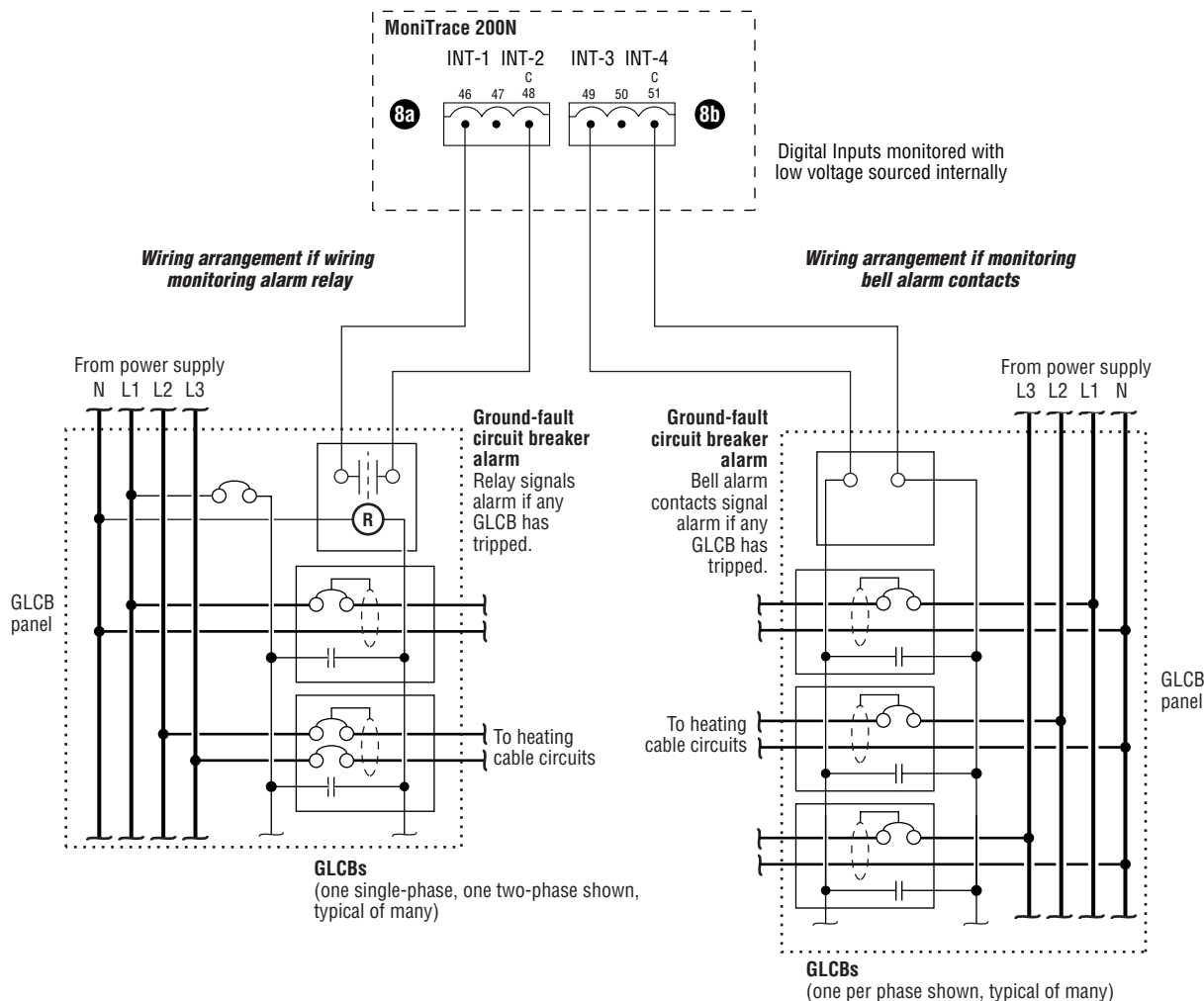

Figure 2.14. Wiring detail: Monitoring ground-fault circuit breaker alarms.

Note: For the MoniTrace 200N to generate alarms, the address of the digital input must be entered as the CB Trip Address when setting up the circuit (see Power Monitoring in the *MoniTrace 200N System Operation Manual*, INSTALL-065). The addresses of the digital inputs are:

- INT-1-I if connected to terminals 46 and 48
- INT-2-I if connected to terminals 47 and 48
- INT-3-I if connected to terminals 49 and 5
- INT-4-I if connected to terminals 50 and 51

2.12 Connecting the RS-485 Network of MoniTrace RMM2s and RMCs

The MoniTrace 200N controller is typically linked to a network of MoniTrace RMM2s and RMCs. These are connected to the MoniTrace 200N using an RS-485 communications cable, a shielded, two-conductor (twisted-pair) cable. Figure 2.15 illustrates how the RS-485 network for the MoniTrace 200N system may be configured.

Devices must be mounted in series.

Branching of the network is not allowed.

Connect no more than two RS-485 cables to any device.
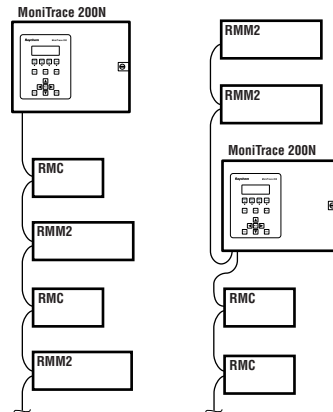
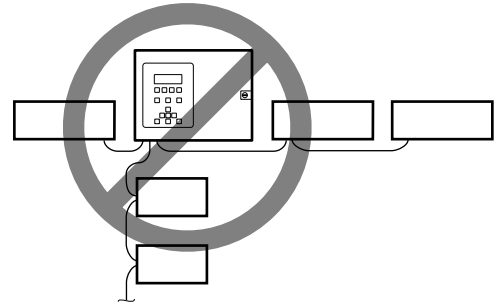Up to 1200 m (4000 ft) of RS-485 cable

Figure 2.15. RS-485 network linking MoniTrace 200N, RMM2s, and RMCs.

There are only a few restrictions on the RS-485 network:

- Modules must be connected serially; the network may *not* be branched.
- The number of MoniTrace RMM2 and RMC modules must not exceed 32.
- Each module (RMM2 or RMC) must be assigned a unique address.
- Total length of RS-485 cable must not exceed 1200 m (4000 ft).

Aside from these restrictions, there are virtually no constraints on the network layout. For example, the MoniTrace 200N unit may be located anywhere along the RS-485 serial network—at an end or anywhere in between.

Communications between the MoniTrace 200N and an RMM2 or RMC are based on the address assigned to that module. Each RMM2 and RMC must have a unique address so that the MoniTrace 200N can distinguish between modules. The address for an RMM2 or RMC is set using its address switch, as detailed in the installation instructions for the module.

Note: If two RMM2s or two RMCs have the same address, communication problems will result; confirm that each module has been assigned a unique address before connecting it to the MoniTrace network.

Figure 2.16 illustrates the RS-485 wiring to connect the MoniTrace network. Connect the "+" terminal on the MoniTrace 200N to the "+" terminal of an RMM2 or RMC, and similarly connect the "–" terminals together. Terminate each end of the cable shield to the module terminal indicated in Figure 2.16. In the MoniTrace 200N controller, connect a jumper wire from the remaining shield terminal to the chassis ground stud to provide a ground reference.

Important: Do not connect the shield of the RS-485 cable to the grounding terminal of an RMM2 or RMC enclosure. To avoid the potential for spurious ground loops, the RS-485 cable shield should be connected to ground only in the MoniTrace 200N controller.
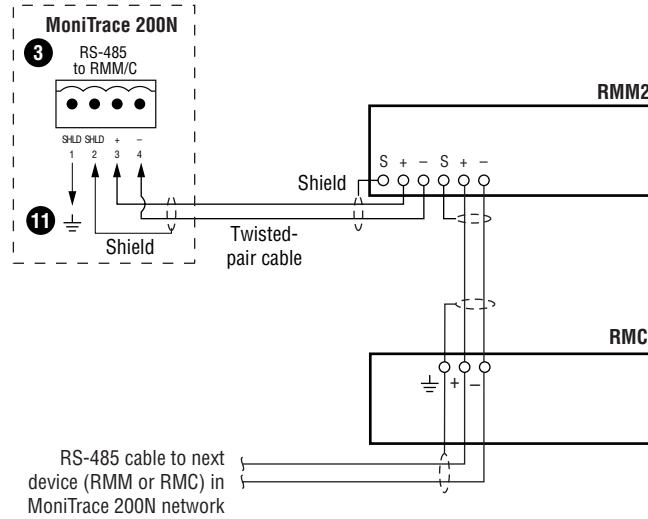
Figure 2.16. Wiring detail: Connecting RS-485 network of RMM2 and RMC units.

2.13 Connections for Remote Alarm Annunciation

Figure 2.17 shows the relay connection for an external alarm. The MoniTrace 200N alarm relay can be connected to an annunciator light or distributed control system. Use NC to close the annunciator circuit on alarm. Use NO to open the annunciator circuit on alarm. Note that the MoniTrace 200N alarm relay terminals are dry contacts; the annunciation circuit must be powered from a source outside the MoniTrace 200N controller.

If wired to the NC terminal as illustrated, the alarm relay is normally an open circuit, closing only when an alarm condition exists. Once an alarm condition exists, the relay remains closed until the condition is cleared. If another alarm occurs, and Alarm Reflash is enabled (see the *MoniTrace 200N System Operation Manual*, Tyco Thermal Controls literature reference INSTALL-065), the relay will cycle open, then close, to signal the new alarm.

Note:
• A power loss will cause the NC alarm relay to close and signal an alarm.
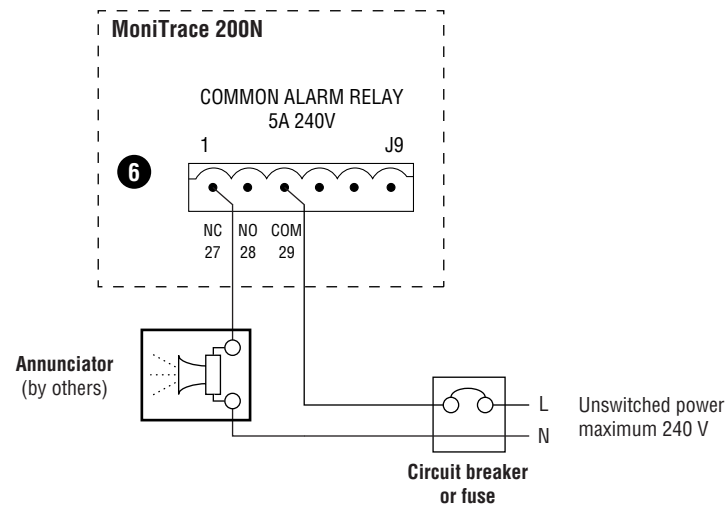
• Use only copper conductors for field wiring.

Figure 2.17. Wiring detail: Relay connection for remote annunciation.
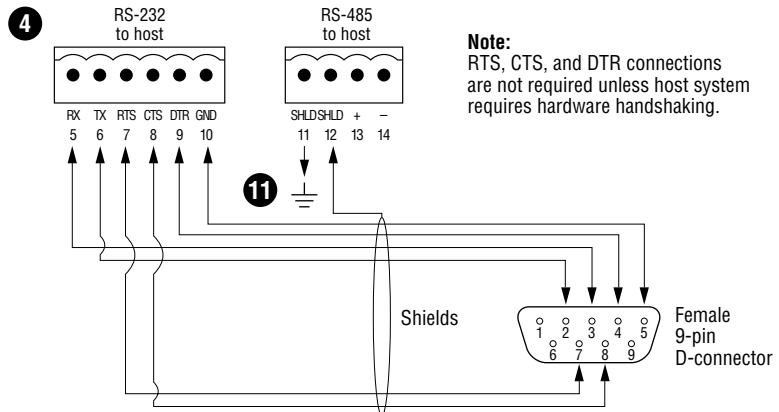
2.14 Making an RS-232 or RS-485 Connection to a Host Computer

The MoniTrace 200N can communicate with a DCS (distributed control system) or other host computer using serial communications through the MoniTrace 200N external communications port. The MoniTrace 200N port can be configured for either RS-232 or RS-485 serial communications.

The RS-232 connection can be three wire (TX, RX, GND) or five wire (adding RTS/CTS handshaking). The switch on the user interface board is positioned for RS-232 at the factory. Only one MoniTrace 200N controller can be connected to the master device (host computer) using RS-232. Use RS-485 when multiple MoniTrace units are to be connected to a host computer, or the connection is longer than 50 feet. Use RS-232 to connect to a single MoniTrace 200N with a connection shorter than 50 feet.

Follow the wiring diagram appropriate to your installation (Figure 2.18). Note, ground reference for the connection should be provided at the host computer or at the MoniTrace 200N controller, but not at both. To provide a ground reference at the MoniTrace 200N controller, connect a jumper wire from the remaining shield terminal to the chassis ground stud.

RS-232 connection using a 9-pin D-cable

RS-232 connection using a 25-pin D-cable
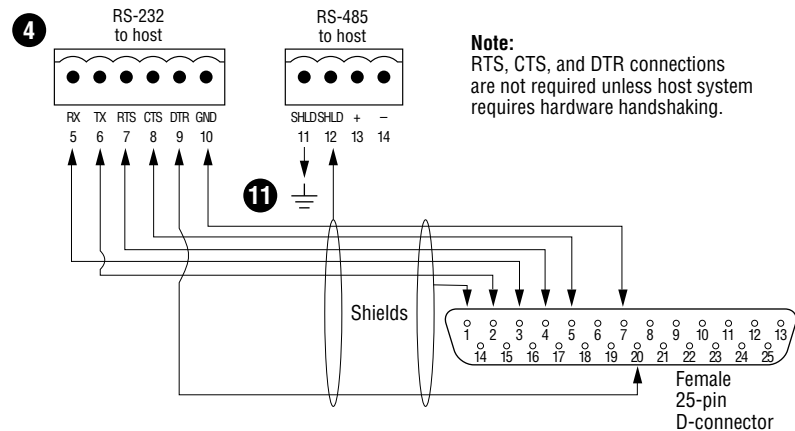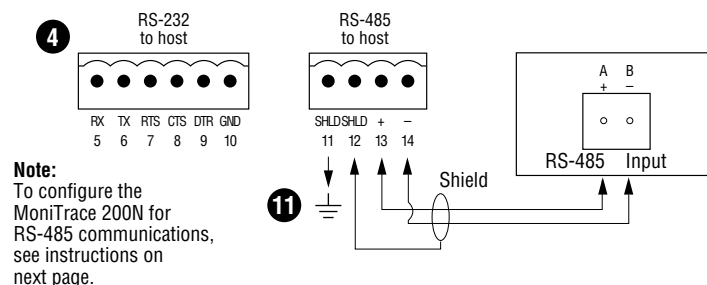

RS-485 connection

Figure 2.18. RS-232 or RS-485 connection to host computer.

The MoniTrace 200N is configured at the factory for RS-232 host communication. To change the unit for host communication using an RS-485 bus (two-wire twisted pair), flip the switch on the user interface board to the RS-485 position (toward the hinge), as illustrated in Figure 2.19. The selection switch is identified as item **15** .
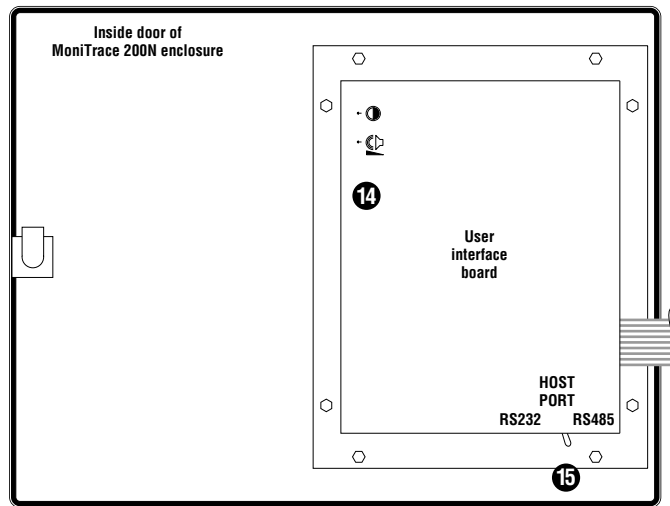

Figure 2.19. Selector switch for host port communications (RS-232 or RS-485).

Up to 31 MoniTrace 200N controllers can be connected on the two-wire bus, plus one master device (host computer). The address for each MoniTrace 200N controller is selected during setup (see Setup—Host Port, in the *MoniTrace 200N System Operation Manual*, INSTALL-065).

Note: The RS-232 host test port (item **14** in Figure 2.19) is for temporary connections only. It is intended for use during setup and diagnostic work. It provides a convenient means to connect a laptop computer running Raychem's MoniTrace Supervisor software. If using this test port, disconnect wiring to the DCS or host PC, if present. Also, ensure the selector switch for host port communications (item **15**) is set to RS-232. When done using the test port, replace the host port wiring and set the selector switch to the correct position.
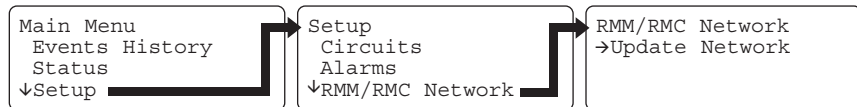
3. Basic Test Procedures

3.1 Energizing the System and Updating the RMM2/RMC Network

Turn on power to the MoniTrace 200N controller and each MoniTrace RMM2 and RMC in the system.

Press the **Menu** key on the MoniTrace 200N controller to bring up the Main Menu on the display. Move the selection arrow (the blinking arrow) using the up (▲) and down (▼) keys. With the selection arrow highlighting the item, press **Enter** to access a menu or make a selection. Press the **Esc** key to return to the previous menu or display, or to exit a menu or setup option without making any changes. (For additional detail, see User Interface, in the *MoniTrace 200N System Operation Manual*, INSTALL-065.)

To update the network, navigate through the Main Menu and Setup menu to reach the Update Network option, as shown below.

```
Main Menu              Setup                  RMM/RMC Network
 Events History         Circuits             →Update Network
 Status                 Alarms
↓Setup                 ↓RMM/RMC Network
```

Press **Enter** to update the network. Using this command triggers the MoniTrace 200N to scan the RMM2/RMC network to recognize all hardware connected to the system (RMM2s, RTDs, RMCs, control relays, and digital inputs).

3.2 Using the Status Menu to List Recognized Devices

To view lists of the devices recognized by the MoniTrace 200N, select Status from the Main Menu. Selections in the Status menu include Circuits, Sensors, Relays, and Digital Inputs (not shown).

Status Menu

```
Status
↓Circuits
 Sensors
 Relays
```
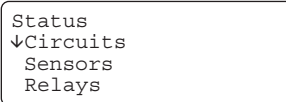
After you make one of these selections, the MoniTrace 200N controller provides a list of the devices recognized by the system, as illustrated and explained in the screen displays shown below. Use the ▲ and ▼ keys to scroll through the list; use the ◀ key to go to the top of the list, or the ▶ key to go to the bottom of the list. Press **Enter** to select the one you want to view.

Menu Selected: `Sensors`

```
Sensors
↓ 1-01-I A  -3C
  1-02-I P  13C
  1-03-I P  14C
```
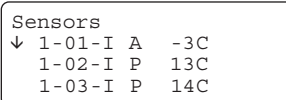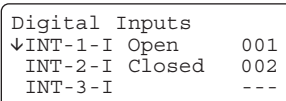
For sensors, the status list shows:
Sensor Address, then a code to indicate type of sensor (A for ambient, P for pipe; pipe sensor is the default), and then the temperature measured by the sensor.

Menu Selected: `Relays`

```
Relays
↓51-01-O Closed   001
 51-02-O Open     002
 51-03-O          ---
```
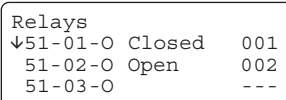
For relays, the status list shows:
Relay Address; the state of the relay (open or closed); and Circuit No. for which the relay is used. If the relay has not yet been assigned to a circuit, dashes (---) appear in this Circuit No. field.
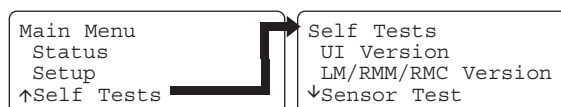
Menu Selected: `Digital Inputs`

```
Digital Inputs
↓INT-1-I Open     001
 INT-2-I Closed   002
 INT-3-I          ---
```

For digital inputs, the status list shows:
Digital Input Address; the state of the relay (open or closed); and Circuit No. for which the digital input is used. If the input has not yet been assigned, dashes (---) appear in Circuit No. field.

3.3 Using the Self Test Menu to Verify Device Operation

To access the Self Tests menu options, scroll down the Main Menu and press **Enter** when the selection arrow highlights `Self Tests`.

```
Main Menu              Self Tests
 Status                 UI Version
 Setup                  LM/RMM/RMC Version
↑Self Tests            ↓Sensor Test
```

3.3.1 Sensor Test

The Sensor Test allows you to verify that an RTD sensor has been correctly connected to the MoniTrace 200N system before assigning it to a circuit. The screen below shows the sensor test display.

```
Sensor Test
→Sensor Addr 1-04-I
 Temp          -3°C
```

Press **Enter** on Sensor Addr and then use the ▲ and ▼ keys to scroll through the sensors recognized by the controller. Press **Enter** to select the desired sensor. The temperature measured by the sensor at the address selected is displayed.

3.3.2 Relay Test

The Relay Test allows you to manually open and close relays in the MoniTrace 200N system so you can verify that they have been connected correctly and are operating properly. The screen below shows the options provided by the relay test display.

Relay Test Options

```
Relay Test
→Relay Outputs
 Alarm Relay
```

The screen below shows the display that appears if you select Relay Outputs.

```
Relay Outputs
→Relay Addr  -----
 State        ---
```

Press **Enter** on Relay Addr and then use the ▲ and ▼ keys to scroll through the relays recognized by the controller. Press **Enter** to select the relay with address shown in the display; this will result in the screen shown below.

```
State
 Open
 Closed
→---
```

Use the ▲ and ▼ keys to select the desired state for the relay and press **Enter**. The display then shows the Relay Address and its state, as illustrated in the screen below.

```
Relay Outputs
→Relay Addr 51-01-O
 State       Closed
 Press ESC to Exit
```

Pressing **Esc** ends the relay test and returns control of the relay to the MoniTrace 200N unit.

3.3.3 Digital Inputs Test

The Digital Inputs Test allows you to verify that a digital input has been correctly connected to the MoniTrace 200N system. The screen below shows the display that appears if you select Digital Inputs.

```
Digital Inputs
→Input Addr  -----
 State        ---
```

Press **Enter** on Input Addr and then use the ▲ and ▼ keys to scroll through the digital inputs recognized by the controller. Press **Enter** to select the digital input with address shown in the display; this will result in the screen shown below.

```
Digital Input Test
→Input Addr INT-1-I
 State        Open
 Press ESC to Exit
```

You can now toggle the digital input and see the State change on the display.

Pressing **Esc** ends the Digital Input test.

4.0 Installation Record Forms

Note: Make a photocopy of the appropriate form for each MoniTrace 200N, RMC, ACP, and RMM2 installed.

A. Installation Record for MoniTrace 200N Controller

MoniTrace 200N Controller
Reference (Location/ID) _____

_____

Mount the MoniTrace 200N
☐ Mount the enclosure.
    ☐ Indoors, protected from the elements
    ☐ Ordinary (nonhazardous) location
☐ Make enclosure entries.

Connect power
☐ Select input voltage.
☐ Install surge protection if needed.
☐ Connect main power.
☐ Connect ground wire to chassis.
☐ Observe electrical safety.
    Keep signal-voltage and line-voltage wiring separate.

Connect temperature sensors (if specified in design)
☐ Connect temperature sensors to MoniTrace 200N RTD terminals.
☐ Record location/identification for each temperature sensor
  in the space provided at the bottom of this form.

Connect control relays to contactors (if specified in design)
☐ Connect MoniTrace 200N internal control relays to contactors.
☐ Record heat-tracing circuit assignments at the bottom of this form.

Connect digital inputs (if specified in design)
☐ Connect MoniTrace internal digital inputs (if specified in design).
    ☐ To monitor contactor actuation
    ☐ To monitor ground-fault circuit breaker alarms
☐ Record digital input assignments (circuit and use) at the bottom of this form.

Connect RS-485 network
☐ Connect RS-485 network of MoniTrace RMM2s and RMCs.

	MoniTrace 200N terminal	Sensor identification (e.g., P&ID or drawing ID)	Type of sensor		
			Pipe-sensing	or	Ambient-sensing
Temp. sensors	**RTD-1**		☐	or	☐
	RTD-2		☐	or	☐

	MoniTrace 200N terminal	ID of circuits controlled (P&ID line numbers, etc.)	Used to control		
			Branch circuit	or	Main contactor
Relay outputs	**GRP-1**		☐	or	☐
	GRP-2		☐	or	☐

	MoniTrace 200N terminal	ID of circuits monitored (P&ID line numbers, etc.)	Used to monitor		
			Contactor	or	GLCB
Digital inputs	**INT-1**		☐	or	☐
	INT-2		☐	or	☐
	INT-3		☐	or	☐
	INT-4		☐	or	☐

B. Installation Record for MoniTrace RMC

Refer to installation instructions:
MoniTrace RMC Installation Instructions

Tyco Thermal Controls literature reference
INSTALL-079

RMC or ACP Reference
(Location/ID) _____

Mount MoniTrace RMC Components
☐ Select enclosure and/or verify suitability for the environment.
    ☐ Ordinary (nonhazardous) location or NEMA 7 enclosure
    ☐ Not in wet environment
        ☐ Indoors, or use IP 55 enclosure
        ☐ Use conduit drain where condensation is likely.
☐ Mount the enclosure.
☐ Make enclosure entries.
☐ Mount MoniTrace RMC components (as required).

Connect power
☐ Connect 24 Vdc wiring (RMC only).
☐ Connect main power and ground wire.

Connect control relays to contactors
☐ Connect contactor wiring (RMC only).
    ☐ For contactors >80 A use surge suppressors.
☐ Record heat-tracing circuit assignment for each contactor in the space provided at the bottom of this form.

Connect digital inputs (if specified in design)
☐ Connect digital inputs.
    ☐ To monitor contactor actuation
    ☐ To monitor ground-fault circuit breaker alarms
☐ Record digital input assignments at the bottom of this form.

Connect RS-485 network
☐ Select and set RS-485 address for MoniTrace RMC unit.
☐ Record the RS-485 address on the bottom of this form.
☐ Connect RS-485 cables.

	Terminal	ID of circuits controlled (P&ID line nos., etc.)	Used to control — Branch circuit	Used to control — Main contactor		Terminal	ID of circuits controlled (P&ID line nos., etc.)	Used to control — Branch circuit	Used to control — Main contactor
Relay outputs	1		☐	*or* ☐		17		☐	*or* ☐
	2		☐	*or* ☐		18		☐	*or* ☐
	3		☐	*or* ☐		19		☐	*or* ☐
	4		☐	*or* ☐		20		☐	*or* ☐
	5		☐	*or* ☐		21		☐	*or* ☐
	6		☐	*or* ☐		22		☐	*or* ☐
	7		☐	*or* ☐		23		☐	*or* ☐
	8		☐	*or* ☐		24		☐	*or* ☐
	9		☐	*or* ☐		25		☐	*or* ☐
	10		☐	*or* ☐		26		☐	*or* ☐
	11		☐	*or* ☐		27		☐	*or* ☐
	12		☐	*or* ☐		28		☐	*or* ☐
	13		☐	*or* ☐		29		☐	*or* ☐
	14		☐	*or* ☐		30		☐	*or* ☐
	15		☐	*or* ☐		31		☐	*or* ☐
	16		☐	*or* ☐		32		☐	*or* ☐

	Terminal	ID of circuits monitored (P&ID line nos., etc.)	Used to monitor — Contactor	Used to monitor — GLCB
Digital inputs	1		☐	*or* ☐
	2		☐	*or* ☐

RS-485 address
Set the RS-485 address per the installation instructions.
Check the appropriate box below for the address of this unit.

50	51	52	53	54	55	56	57	58	59
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

C. Installation Record for MoniTrace RMM2

Refer to *MoniTrace RMM2 Installation Instructions* (INSTALL-061).

MoniTrace RMM2
Reference (Location/ID) _____

Mount MoniTrace Remote Monitoring Module
☐ Select electrical enclosure suitable for the use environment.
☐ Make entries into enclosure before mounting the RMM2.
☐ Mount the electrical enclosure.
☐ Attach the RMM2 to the DIN 35 rail in the enclosure.
☐ Connect RMM2 ground wire to the enclosure ground bus.

Connect power
☐ Connect power wiring.
☐ Connect ground wiring.
☐ Select input voltage.

Connect RTD sensors
☐ Connect lead wires from each RTD to the selected terminal block.
☐ Record the ID/location of each RTD at the bottom of this form.

Connect to RS-485 network
☐ Select the RS-485 address for the RMM2 unit.
☐ Set the RS-485 address for the RMM2 unit.
☐ Record the RS-485 address at the bottom of this form.
☐ Connect to RS-485 network for the MoniTrace 200N system.

		Sensor Identification (e.g., P&ID or drawing ID; description or location)	**Type of sensor**	
			Pipe- sensing	Ambient- sensing
RMM2 **terminal**	**RTD-1**	_____	☐ *or*	☐
	RTD-2	_____	☐ *or*	☐
	RTD-3	_____	☐ *or*	☐
	RTD-4	_____	☐ *or*	☐
	RTD-5	_____	☐ *or*	☐
	RTD-6	_____	☐ *or*	☐
	RTD-7	_____	☐ *or*	☐
	RTD-8	_____	☐ *or*	☐

RS-485
address   Set the RS-485 address per the installation instructions.
Check the appropriate box below for the address of this unit.

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

www.tycothermal.com
info@tycothermal.com

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Tyco Thermal Controls
Staatsbaan 4A
3210 Lubbeek
Tel. (016) 213 511
Fax (016) 213 610