![TRANE logo]

Installation Instructions

Tracker™ Version 12 Hardware

Building Automation System

April 2020   **BMTK-SVN01H-EN**

TRANE TECHNOLOGIES

Introduction

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

The following warnings must appear in the Frontmatter section of ALL service literature:

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠**WARNING**

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

• **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**

• **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**

• **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

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Revision History

BMTK-SVN01G-EN (Aug 2012)

Removed all reference to Water Source Heat Pump (WSHP) and Tracer™ Loop Controller.

Table of Contents

Overview

The Tracker™ building automation system (BAS) is an energy management system for small- to medium-size buildings. The Tracker BAS controls heating, ventilating, and air conditioning (HVAC) equipment. It consists of a Tracker controller (Figure 1) and an optional PC workstation.

The Tracker BAS can be operated by using either a Tracker controller or a PC workstation that is running Tracker PC Workstation software. A visual interface enables an operator to set up and change HVAC operating parameters and to collect and display building information. The Tracker PC Workstation software allows a PC to be locally connected to the Tracker controller directly with a prescribed adapter and cable over a standard Ethernet local area network (LAN) connection, or remotely with a modem and standard phone line.

The Tracker BAS supports Comm5 communications architecture, which is the Trane implementation of LonTalk® protocol. It resides on a network (refer to Figure 2) that includes HVAC and other comfort-related equipment, such as:

- Trane VariTrac™ zoning systems

- Zoning controls

- Unit control modules (UCMs), which control and monitor other HVAC equipment

- Tracer™ LCI-V (LonTalk® communication interfaces for Voyager™ rooftop controls)

- Tracer LCI-R (LonTalk® communication interfaces for ReliaTel™ rooftop controls)

- External input/output (I/O) devices, which help to monitor and control specific areas or devices

- Miscellaneous equipment such as sensors, lights, and fans.

Figure 1.   Tracker Controller
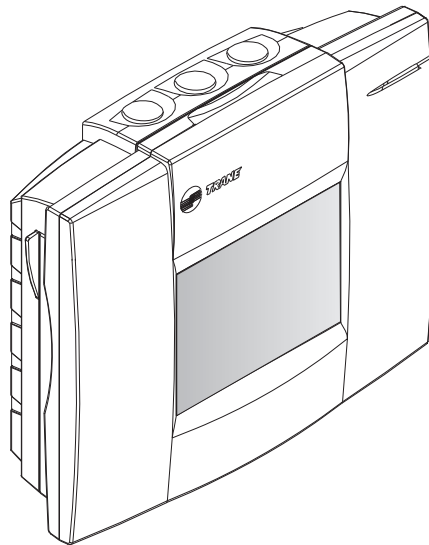
Figure 2.   Example Tracker Building Automation system (Models 12/24) On a Network

VariTrac or VariTrane zone dampers

Voyager constant volume rooftop

Voyager rooftop

Precedent rooftop with ReliaTel controls

Interconnecting wiring (Comm5 link): single, twisted pair, shielded wire for two-way communication.

TCI-V

VariTrac central control panel

Tracer LCI-V

Tracer LCI-R

Utility pulse meter input

Outdoor air temperature sensor input

Priority shutdown contact input

Alarm relay output

Universal inputs

Binary outputs

Tracer MP503 I/O module

Analog inputs

Binary inputs

Binary outputs

Generic rooftop

Tracer ZN517 unitary controller

Tracer controller

Tracer PC Workstation

Direct, dial-in (modem), or Ethernet connection

Controller Components

The controller consists of a termination module, main module, and display module as shown in Figure 3.

Figure 3.   Tracker Controller Components

Termination module

Main Module

Display Module
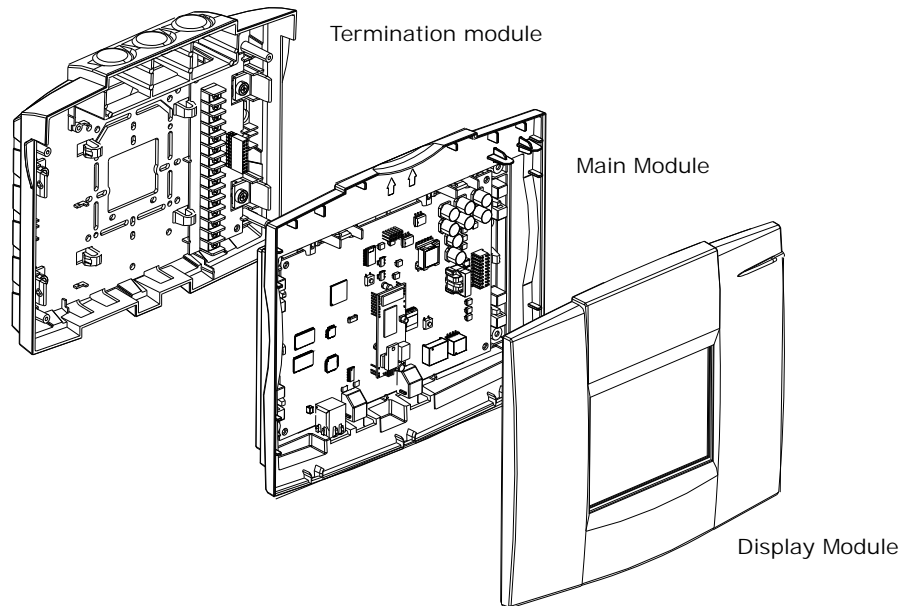
Termination Module

The termination module (Figure 4) is a housing that provides a termination board and cable access for power, communications, and system input connections. Mounting holes enable it to be mounted on a wall or in a recessed conduit box. The termination board accepts connections for power, communications, and system inputs.

Figure 4.   Termination Module

Termination Board

Cable Access (3x)
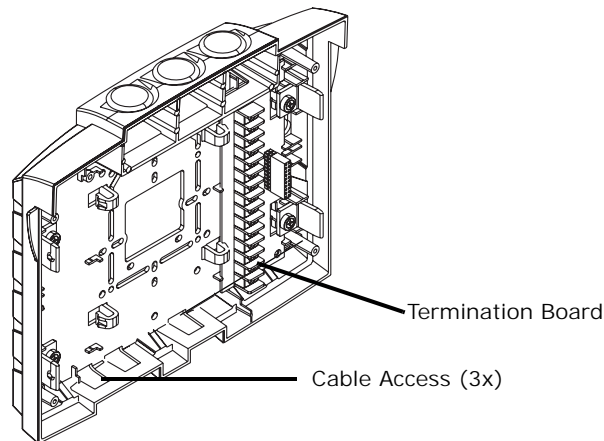
Main Module

The main module (Figure 5) is a housing that contains the main logic board and the Ethernet board. The main module can be *hot swapped*, meaning it can be removed and installed without removing

power from the termination module. When the main module is installed onto a powered termination module, it receives power and begins to operate automatically.

The main logic board provides an Ethernet LAN port, a PC interface port, and a modem port. It provides an internal interface to termination module I/O. In addition, it provides Comm5 communication, 24 VAC power, alarm, and communication indicators. It communicates and exchanges data with the devices wired to the termination module and communicates with the display module.

The Ethernet board provides two (2) LED indicators. One shows that an Ethernet link is detected and the other shows that there is serial traffic between the Ethernet board and the main logic board.
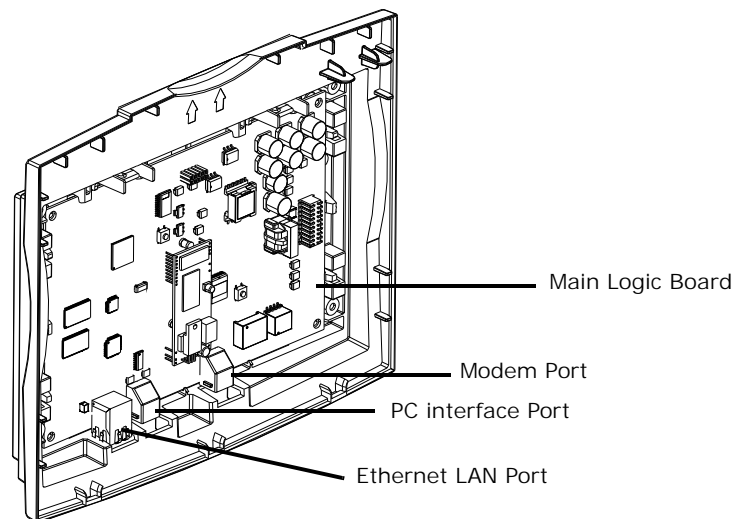
Figure 5.   Main Module

Main Logic Board

Modem Port

PC interface Port

Ethernet LAN Port

Display Module

The display module (Figure) is a housing that contains a printed circuit board, liquid crystal display (LCD) touch screen, and an alarm LED. The printed circuit board supports the LCD touch screen and the alarm LED. The touch screen provides the operator access to the user interface program.

The display module can be *hot swapped*, meaning it can be removed and installed without removing power from the main module. When the display module is installed onto a powered main module, it receives power and begins to operate automatically.

Alarm LED

LCD Touch Screen
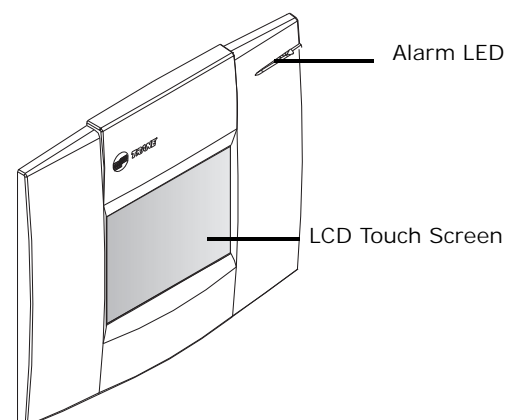
Model Numbers

Each controller is identified by a model number that provides information about the controller illustrated in the following table.

Table 1.   Model Number Description

Digit	Description
1, 2	BM= Building Management
3, 4	TK= Tracker
5, 6, 7	Customer ID: • 000= Customer Sales Office (CSO) • KBB= Independent Wholesale Distributor (IWD)
8	A= 24 VAC, 50–60 Hz
9	Ethernet Option: • A= Modem With No Ethernet LAN Option • B= Modem With Ethernet LAN Option
10, 11	BO= Redesign
12	Model/Software Options: • 1= Model 12 • 2= Model 24 • 3= N/A • 4= N/A • 5= N/A • 6= N/A
13	Display Options: 1= LCD Touch Screen
14	Language Options: • 0= English
Example: Digit Numbers: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 Model Number: BM T K 0 0 A B 0 x 1 0	

Tracker Controller Specifications

Table 2 lists the Tracker controller specifications.

Table 2.   Specifications

Specification	Description
Power	• 24 Vac nominal (19 Vac to 30 Vac) • 50/60 Hz, 1 phase 40 VA minimum • UL Class 2 transformer required
Operating Environment:	• From 32°F to 122°F (0°C to 50°C) • 10% to 90% relative humidity, non-condensing
Storage Environment:	• From −40°F to 185°F (−40°C to 85°C) • 5% to 95% relative humidity, non-condensing
Cabinet:	NEMA 1 resin enclosure—plenum rated
Mounting:	Flat wall surface with one of the following recessed conduit boxes: • 2 in. × 4 in. (5.08 cm × 10.15 cm) • 4 in. × 4 in. (10.15 cm × 10.15 cm)
Dimensions:	• Height: 8.75 in. (22.38 cm) • Width: 10.25 in. (26.04 cm) • Depth: 2.75 in. (6.99 cm)
Weight:	2.5 lbs. (1.13 kg)
Analog Input; Thermistor	• 10 kΩ at 77°F (25°C) • From −50°F to 200°F (−46°C to 93°C)
Binary Inputs; Utility Pulse Meter and Priority Shutdown	• User-supplied dry contacts only. • Tracker-supplied voltage of 12 Vdc nominal (10 Vdc to 14 Vdc) at 12 mA nominal (10 mA to 14 mA).
Binary Output; Alarm Relay	Tracker-supplied single-pole single-throw (SPST) dry contact rated at 24 Vac, 0.5 A maximum.
Memory Backup:	At power loss, the system backs up memory and stores all data for seven days. After seven days, trends and alarms are not retained.
Approvals:	Refer to "Appendix D; Declaration of CE Conformity," p. 47.

UCM Maximum Capacities for Tracker Models 12 and 24

The Tracker Models 12 and 24 controllers can control and monitor specific types and numbers of Trane unit control modules (UCMs) as specified in this topic. The supported UCMs are as follows:

• HVAC controllers that conform to the LonMark® Space Comfort Controller (SCC) profile: the primary controller options are the Voyager rooftop with a Tracer LCI-V, Precedent™ rooftop with ReliaTel controls and a Tracer LCI-R, and Tracer ZN517 unitary controller. Other controllers are limited to the Tracer ZN510, ZN511, and ZN524.

• VariTrac central control panels (CCPs) with a TCI-V.

• Tracer MP503 I/O module.

Table lists the maximum number of each UCM type that can be linked to each Tracker controller model. Any combination of the specified UCMs may be used in aggregate if they do not exceed the maximum. (For example, a fully loaded Tracker 24 controller can control 24 SCC devices, 10 VariTrac CCPs, and 4 Tracer MP503 I/O modules.)

The Trane VariTrac CCP is the main controller for either a changeover bypass system configuration or a delivered variable air volume (VAV) system configuration. Any combination of CCP configurations may be used in aggregate, as long as they do not exceed the maximum.

***Note:** Each VariTrac CCP configured for changeover bypass can control 1 HVAC device and up to 24 VAV UCMs.*

Each VariTrac CCP configured for delivered VAV can control 1 HVAC device and up to 32 VAV UCMs.

Table 3.   UCM Maximum Capacities for Tracker Models 12 and 24

Tracker Model	UCM Type	Maximum UCMs
24	SCC[a]	24
	Trane VariTrac CCP	10
	Tracer MP503 I/O Module	4
	Total Maximum UCMs Supported	**38**
12	SCC[a]	12
	Trane VariTrac CCP	5
	Tracer MP503 I/O Module	4
	Total Maximum UCMs Supported	**21**

(a) SCCS supported by Tracker are limited to Voyager rooftops, Precedent rooftops with ReliaTel controls, Tracer ZN517, ZN510, ZN511, and ZN524.

Before Installation

Before beginning to install the Tracker controller, ensure that all the necessary controller components are present and undamaged. Also, take steps to protect components until they are needed.

Important: *Before you install the Tracker hardware, review this guide and other supporting Tracker literature and create an installation plan. Any Tracker II that is Revision 103 or higher requires image 12.54.001 or higher to operate properly.*

Verify the Shipment

When the shipment arrives at the job site, carefully unpack the carton. Even though out-going orders are thoroughly reviewed before leaving the factory, compare the items in the shipment with the shipping authorization paper and verify that all items are present.

Verify that the controller model received is the model that you ordered and write down the model number for use later.

Inspect for Shipping Damage

Inspect the items in the shipment to verify that no shipping damage or loss occurred. If your inspection reveals damage or material shortage:

• Make the appropriate notation on the carrier delivery receipt.

• Immediately file a claim with the carrier, specifying the extent and type of damage and/or shortage found.

• Notify the appropriate Trane representative.

Store Unused Components Until Needed

NOTICE:
Avoid Equipment Damage!
Store all Tracker components off-site until most or all of the building construction is complete. Failure to do so could result in damage to components.

The termination module is shipped detached from the main module and display module assembly. To protect the controller from damage, Trane recommends storing the main module and display module assembly away from the construction and/or installation site to prevent it from being damaged or lost. Refer to Table 2, p. 11 for storage site specifications.

After Installation

After installing the Tracker hardware, use the following post-installation checklist to verify that all installation procedures are complete.

Table 4.   Post-installation Checklist

Inspect Shipment Upon Receipt	Verify Communication Wiring
☐ Verify that the shipment is complete.	☐ Verify that the wiring complies with specifications.
☐ Inspect the controller and accessories to verify that there has been no shipping damage or loss.	☐ Inspect communication wiring between devices.
☐ File a damage claim with the carrier, if necessary.	☐ Verify that all connections are properly shielded.
☐ Verify that the controller received is the one ordered.	**Verify Wire Terminations With A Voltmeter**
☐ Write down the controller model number for use later.	☐ Verify that the tests provide acceptable values. Refer to "Post-installation Checklist for Termination Module," p. 45.
Verify Termination Module Mounting	**Verify Main Module Installation**
☐ Verify that the controller is in a safe indoor environment.	☐ Verify that the main module is snapped in tightly against the termination module.
☐ Verify that the location enables appropriate personnel to access the controller.	☐ Verify that there is LED5 (HRT) activity.
☐ Verify that the controller is mounted securely with the recommended fasteners and screws.	**Verify Display Module Installation**
☐ Verify that the installation conforms to controller dimensions, recommended clearances, and viewing angles.	☐ Verify that the display module is snapped in tightly against the main module.
Verify 24 Vac Power Wiring	☐ Verify that the touch screen illuminates when touched.
☐ Verify that the power wiring complies with applicable codes.	**Verify Direct/Modem Communication Wiring**
☐ Verify that the 24 Vac power connection to the controller termination Block TB1.	☐ Verify that the recommended cable is used for a direct PC connection.
☐ Check the power wiring for shorts and improper grounds.	☐ Verify that the recommended adapter is used for the direct connection cable.
☐ If using conduit connections, ensure separate conduits are used for power and communications.	☐ Verify that the direct connection cable and phone cable are connected to the correct Tracker port.
☐ Inspect the controller printed circuit board for damage.	**Verify Ethernet Communication Wiring**
Verify Input/Output Wiring	☐ Verify that the recommended cable is used for the connection.
☐ Verify that the wiring complies with specifications.	☐ Verify that the Ethernet connection cable is connected to the correct Tracker port.
☐ Inspect all binary/analog terminations at TB1.	

FCC Compliance

The Tracker controller generates, uses, and radiates radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio and television reception. The Tracker controller has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a commercial installation.

There is no guarantee that interference will not occur in a particular installation. If the Tracker controller does cause interference, consult a radio or television technician for suggestions to correct the problem. Also, the booklet How to Identify and Resolve Radio-TV Interference Problems is available from the U.S. Government Printing Office, Washington DC 20402. Order stock number 004-000-00345-4.

Termination Module Mounting

After unpacking and inspecting the shipment, mount the termination module. The mounting process for the termination module consists of selecting a location and mounting the module. This chapter provides information and procedures that enable you to mount the termination module.

Selecting a Location

When selecting a location for the Tracker controller:

• Select a location that is in a clean, non-corrosive, indoor environment. The controller is only intended for indoor installation.

• Consider both security and control wire lengths when making the selection.

• Select a location that limits controller access to operating and service personnel.

• Select a location that conforms to the operating environment described in Table 1, p. 15. The recommended operating environment will extend the life of the electronic components. Verify that the location does not subject the controller to extreme operating conditions (including excessive vibration).

NOTICE:
Avoid Equipment Damage!
Install the Tracker controller out of direct sunlight. Failure to do so may cause overheating, which could result in equipment damage.

Important: *Do not install the Tracker controller near high-power radio signals, electrical switching gear, power buses, large motors, or other sources of electrical noise. The electrical interference may lead to control malfunctions.*

Controller Dimensions and Clearances

Verify that the selected location provides enough space to accommodate the controller as shown in Figure 6.

Figure 6.   Dimensions and Clearances
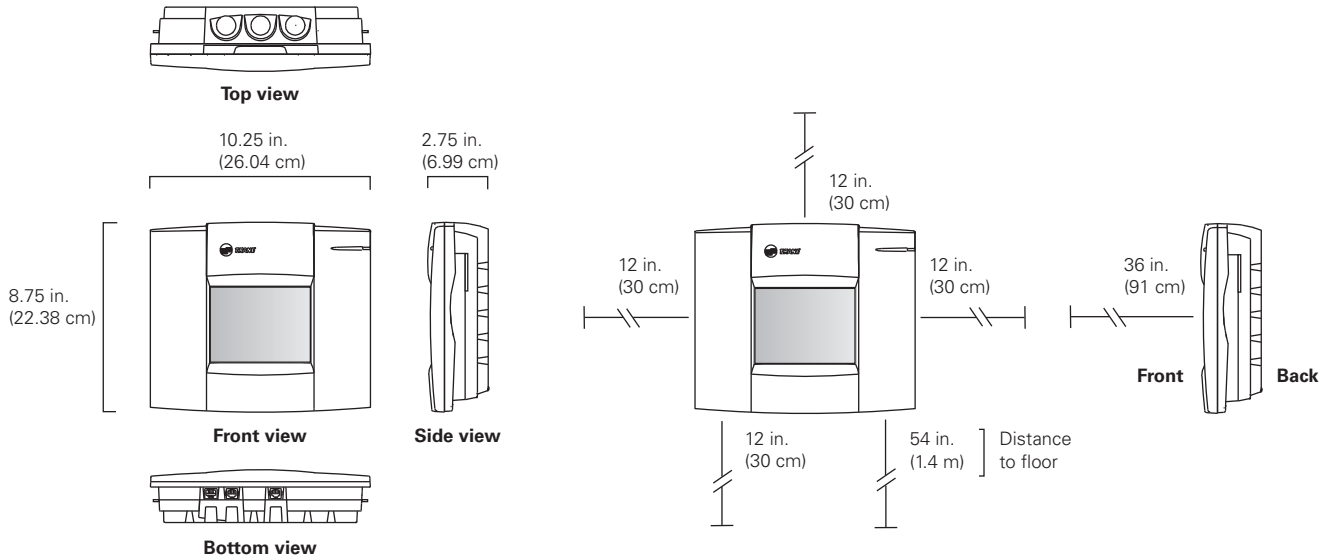
Clearance Information:

• Top clearances provides for ventilation and conduit entry.

• Bottom clearances provides for PC cable interface.

• Front clearances provides for operation and service access.

Optimal Touch Screen Viewing Angles

Verify that the height and location enable the user to view the touch screen at the optimal viewing angles (Figure 7).

Figure 7.   Optimal Touch Screen Viewing Angles
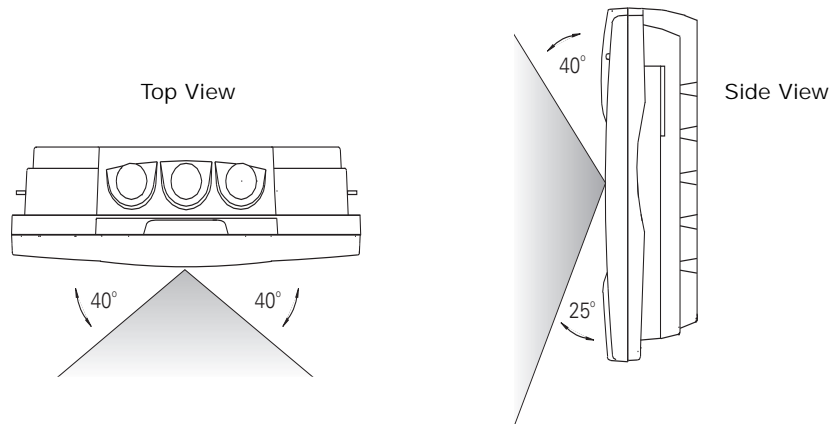
Mounting the Termination Module

After selecting a suitable location for the Tracker controller, mount the termination module. Mounting consists of securing the termination module to a wall or a 2 in. × 4 in. recessed conduit box (mounted vertically or horizontally) or a 4 in. × 4 in. recessed conduit box (several European electrical box sizes are also usable) and installing electrical conduit (optional). Figure 8 shows the conduit access and mounting holes on the termination module.

Figure 8.   Termination Module Conduit Access and Mounting Holes
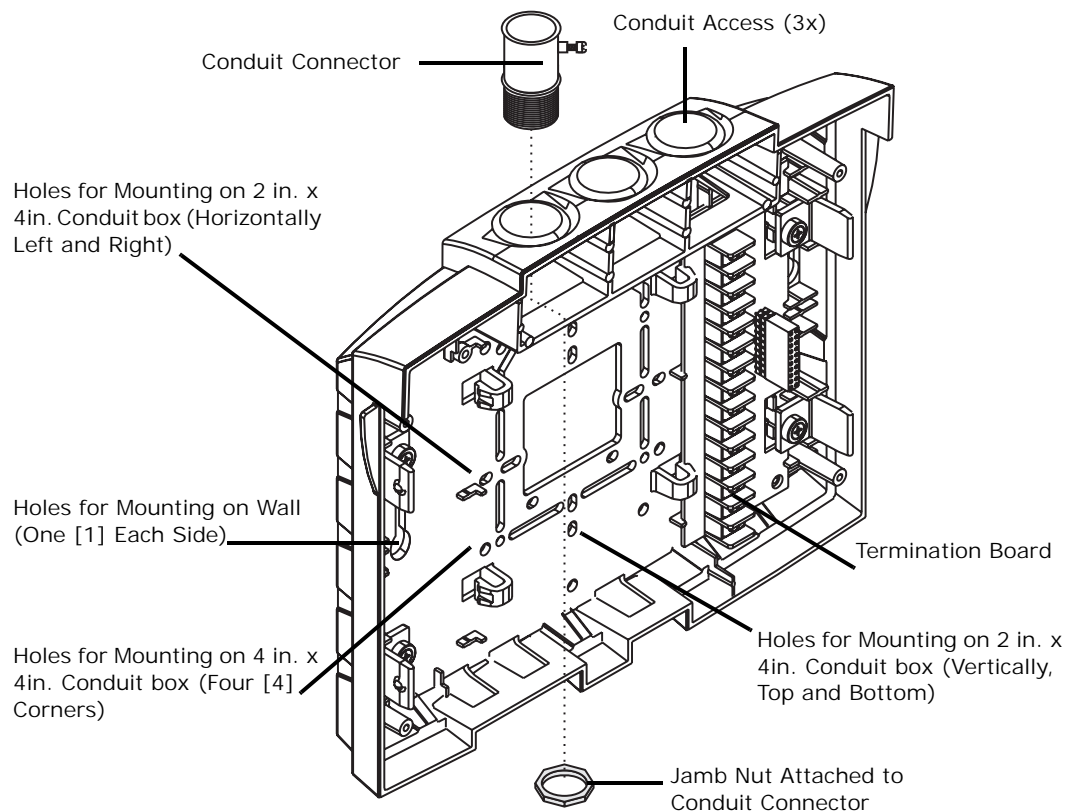
Securing the Termination Module to a Wall

1. Mark the location of the two (2) mounting holes on the wall.

2. Set the termination module aside and drill mounting holes.

3. Secure the termination module to the wall with the supplied hardware (#10 × 1 in. screw with plastic anchor).

Securing the Termination Module to a Conduit Box

4. Remove the screws from the conduit box.

5. Line up the conduit box screw holes on the termination module (refer to Figure 8, p. 17) with the screw holes on the conduit box.

6. Install the screws.

> **Note:** *When mounting the termination module to a 4 in. × 4 in. conduit box, removing the plastic cover over the box will provide easier access. <u>Do</u> <u>not</u> attempt to break away excess plastic. Instead, use a hack saw blade and carefully cut away the plastic.*

Installing Electrical Conduit

Use the conduit openings on the top of the Tracker termination module to supply power or communication wires to the controller.

If the controller is mounted on a wall, use electrical conduit. If the controller is mounted to a conduit box through which power, input/output, and communications are supplied, it is not necessary to use electrical conduit.

> **Important:** *The 24 Vac wire conduit <u>may</u> <u>not</u> contain input/output or communication wires. Failure to comply will cause the Tracker controller to malfunction due to electrical noise.*

7. Remove one of the 7/8 in. (22 mm) diameter plugs at the top of the termination module (Figure 9).

8. Install 1/2 in. (12 mm) conduit connector (refer to Figure 8, p. 17) in opening.

9. Install the conduit jamb nut on the conduit connector threads and tighten it to secure the connector to the Tracker panel.

Figure 9.   Electrical Conduit Installation

Termination Module, Top View
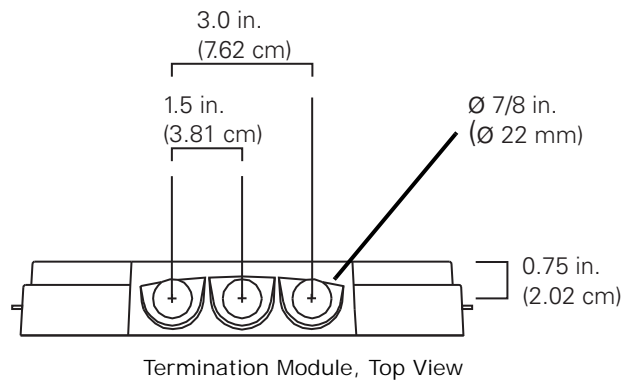
Wiring the Termination Board

After mounting the termination module, wire the termination board. The wiring process consists of wiring the termination board to 24 Vac power, inputs, outputs, and UCMs. This section provides information and procedures to assist in wiring the termination board (refer to Figure 10).

Refer to the section, "Appendix A, Supplies Checklists," p. 43 to verify all materials required to wire the Tracker controller. When termination board wiring is complete, refer to the section, "Appendix C; Pre-installation Wiring Notes and Post-installation Checklist," p. 45 to verify the wiring.

Figure 10.   Tracker Field Wiring Connections
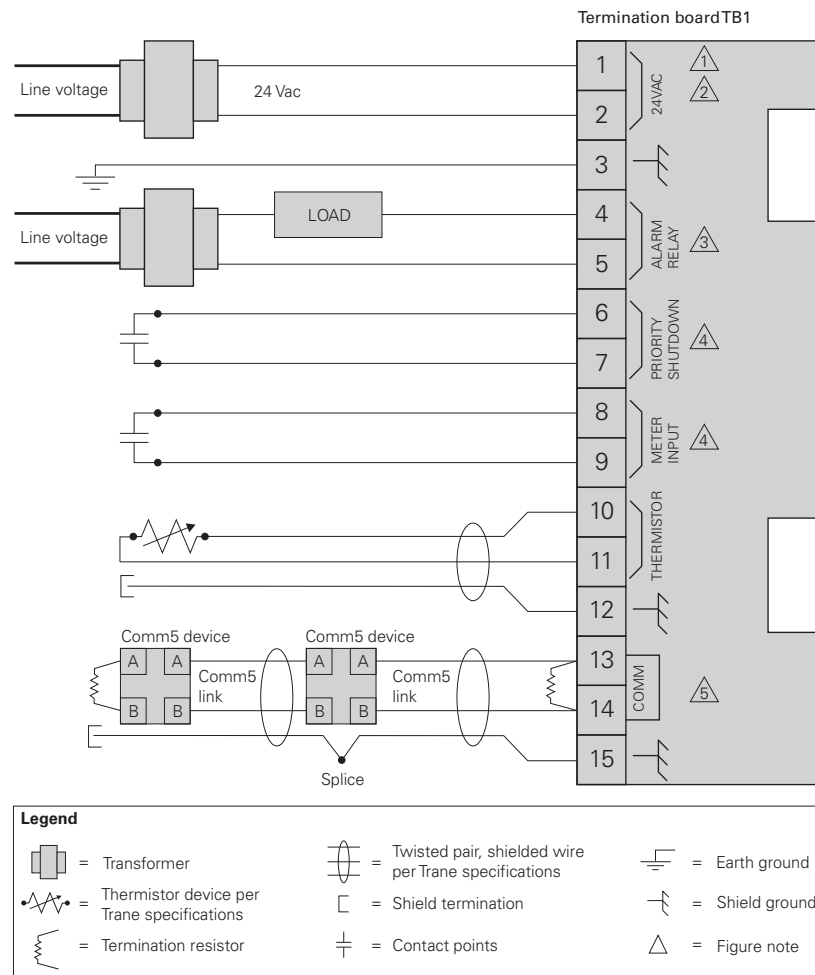
Important: All customer wiring must be in accordance with national, state, and local electrical codes.

Trane recommends a dedicated transformer for 24 Vac power.

Alarm relay circuit must not exceed 24 Vac, 1 A.

_Do_ _not_ apply voltage to the priority shutdown or meter inputs.

Refer to the Comm5 Wiring Instructions (3270 3274)

Wiring 24 Vac Power

After the termination module is mounted in the selected location, wire 24 Vac power to the termination board (refer to Figure 5).

Table 5. Power Wiring Specifications

24 Vac Power Terminals	Description	Wire Specifications
24 Vac: • TB1-1 • TB1-2 • Earth ground TB1-3	Power input: • 24 Vac nominal (19–30 Vac) • 50/60 Hz • 1 phase 40 VA minimum • Class 2 transformer required	• Trane recommends 18 AWG (1.02 mm^2) wire and metal conduit. • Low voltage (24 Vac) wire must comply with National Electrical Code™ (NEC) and federal, state, and local electrical codes.
24 Vac power terminals	Description	Wire specifications

> ☞ *Important:* *The 24 Vac wire conduit may not contain input/output or communication wires. Failure to comply may cause the Tracker controller to malfunction due to electrical noise.*

10. Route input wires into the termination module through the conduit box or any of the conduit access openings designated for input and communication wiring (refer to Figure 8, p. 17).

11. Wire the two 24 Vac power input wires and the ground wire to the controller 24 Vac terminals (refer to Figure 10, p. 19).

Wiring Optional Inputs/Outputs

The section provides information about the following:

• Wiring the alarm relay (optional)

• Wiring the priority shutdown device

• Wiring the utility pulse meter

• Wiring the thermistor

Refer to Table 6 for input and output wire specifications and to Figure 10, p. 19 for wiring all inputs and outputs.

Table 6. Input/Output Wiring Specifications

Input/Output Terminals	Description	Wire Specifications
Alarm relay output: • TB1-4 • TB1-5	Binary output: • Dry contact • Operating range: 24 V, 1 A maximum	Trane recommends 18 AWG (1.02 mm^2) wire and metal conduit. • Maximum length = 1000 ft (305 m) [a] [b]
Priority shutdown device input: • TB1-6 • TB1-7	Binary input: • Operating range: 12 Vdc nominal (10 Vdc to 14 Vdc) at 12 mA nominal (10 mA to 14 mA) • < 50 Ω = switch closed • > 1000 Ω = switch open	Trane recommends 18—22 AWG (1.02 mm^2—0.643mm^2) wire and metal conduit. • Maximum length = 1000 ft (305 m) [c]
Utility pulse meter input: • TB1-8 • TB1-9		
Thermistor input: • TB1-10 • TB1-11 • Shield ground TB1-12	Analog input for an outdoor air temperature sensor: • Operating range: From –50°F to 200°F (–46°C to 93°C) • Thermistor, 10 kΩ at 77°F (25°C)	Shielded wire, 18—22 AWG (1.02 mm^2—0.643mm^2) twisted pair. • Maximum length = 300 ft (91 m) [a][c]

(a) All field-installed binary wiring is low voltage and must comply with National Electrical Code (NEC) and federal, state, and local electrical codes.
(b) †Alarm relay wires and 24 Vac wires may reside in the same conduit.
(c) Do not run input wires and ac power wires together in the same conduit or wire bundle.

Wiring the Alarm Relay

Wire the alarm relay to the termination board output as follows:

> ⚠️**CAUTION**
>
> **Avoid Equipment Damage!**
>
> **Use a dedicated power transformer for this output. Failure to do so will damage the main module, if the alarm output is powered from the Tracker 24 Vac input (TB-1 and TB-2) and the circuit shorts to ground.**

12. Route input wires into the termination module through a conduit opening (refer to Figure 8, p. 17) or the conduit box.

13. Connect the wires to the ALARM RELAY terminals on the termination board (refer to Figure 10, p. 19).

14. Connect the other end of the wires to the customer-supplied power supply and load.

Wiring the Priority Shutdown Device

Wire the priority shutdown device to the termination board input as follows:

15. Route input wires into the termination module through a conduit opening (refer to Figure 8, p. 17) or the conduit box.

16. Connect the wires to the PRIORITY SHUTDOWN terminals on the termination board (refer to Figure 10, p. 19).

17. Connect the other end of the wires to the contacts of the priority shutdown device.

Wiring the Utility Pulse Meter

Wire the utility pulse meter to the termination board input as follows:

18. Route input wires into the termination module through a conduit opening (refer to Figure 8, p. 17) or the conduit box.

19. Connect the wires to the METER INPUT terminals on the termination board (refer to Figure 10, p. 19).

20. Connect the other end of the wires to the pulsed-output contacts of the electrical meter.

Wiring the Thermistor

The thermistor input is for a Trane outdoor air temperature sensor only. The input cannot be used for any other purpose. Using wire that meets the specifications listed in Table 6, p. 20, wire the thermistor to the termination board input as follows:

21. Route input wires into the termination module through a conduit opening (refer to Figure 8, p. 17) or the conduit box.

22. Connect the wires to the THERMISTOR terminals on the termination board (refer to Figure 10, p. 19).

23. Connect the shield to the ground terminal and connect the other end of the wires to the thermistor device.

> **Note:** *The thermistor input is not polarity sensitive.*

> **Important:** *Tape the shield at the sensor. Any connection between the shield and ground will cause a malfunction.*

Wiring the Unit Control Modules (UCM)

The Comm5 communication link connects the UCMs to the Tracker termination module. Each controller has one (1) Comm5 communication link. This topic includes information and procedures for wiring a UCM to a termination module:

☞ **Important:** *Do not exceed the maximum number of UCMs that can communicate on a Tracker controller Refer to the section, "UCM Maximum Capacities for Tracker Models 12 and 24," p. 11.*

Wire Specifications

Tracker Comm5 communication link and sensor wiring is low voltage, Class 2 wire, and must be field-supplied and installed in compliance with NEC and local codes. To prevent electrical noise interference, all wiring must comply with requirements outlined in this topic for wire selection and link-wiring topology.

Trane recommends that you use Level 4 (Echelon®) shielded cable for the Tracker communication link wiring between the Tracker and the Comm5 UCMs to which it communicates. Trane also recommends using it for communication wiring between the VariTrac CCP and its associated VariTrac or VariTrane UCMs, and for sensor wiring to these devices.

Level 4 cable is available in shielded, plenum, and non-plenum versions. Level 4 cable is available from Trane-approved suppliers as well as other suppliers. Table 7 lists the Trane approved suppliers and Table 8, p. 22, provides the specifications for Echelon Level 4 compliant cables.

Table 7. Approved Trane Wire Suppliers

Supplier	Cable Type[a]	Number of Pairs	Details	Catalog Number
Connect-Air International: • Phone: 1-800-247-1978 • FAX: 1-253-813-5699 • Web: www.connect-air.com	Level 4: • 22 AWG (0.643mm^2)	1	Shielded plenum UL type CMP	W221P-2002
	Level 4: • 22 AWG (0.643mm^2)	1	Shielded non-plenum UL type CM	W221P-1003
Windy City Wire: • Phone: 1-800-379-1191 • FAX: 1-708-493-1380 • Web: www.smartwire.com	Level 4: 22 AWG (0.643mm^2)	1	Shielded plenum UL type CMP	106500
	Level 4: • 22 AWG (0.643mm^2)	1	Shielded non-plenum UL type CM	107600

(a) Category 4 cable is not the same as Level 4 cable and should not be used. The Echelon Level 4 cable specification was originally defined by the National Electrical Manufacturers Association (NEMA) and differs from the Category 4 specification proposed by the Electronic Industries Association/Telecommunications Industry Association (EIA/TIA).

Table 8. Echelon Level 4 Compliant Cables Specifications

Specification		Value
Direct Current (dc) resistance. [Maximum resistance of a single copper conductor regardless of whether or not it is solid or stranded and regardless of whether or not it is metal coated.]		18.0 Ω/1000 feet at 20°C
Direct Current (dc) resistance unbalance {maximum]		5%
Mutual capacitance of a pair (maximum)		17 pF/foot
Pair-to-ground unbalance (maximum)		1000 pF/foot/1000 feet
Characteristic impedance	772 kHz	102 Ω ± 15%
	1.0 MHz	100 Ω ± 15%
	4.0 MHz	100 Ω ± 15%
	8.0 MHz	100 Ω ± 15%
	10.0 MHz	100 Ω ± 15%
	16.0 MHz	100 Ω ± 15%
	20.0 MHz	100 Ω ± 15%

Table 8.   Echelon Level 4 Compliant Cables Specifications

Specification		Value
Attenuation (maximum dB/1000 feet at 20°C)	772 kHz	4.5 dB/1000 feet at 20°C
	1.0 MHz	5.5 dB/1000 feet at 20°C
	4.0 MHz	11.0 dB/1000 feet at 20°C
	8.0 MHz	15.0 dB/1000 feet at 20°C
	10.0 MHz	17.0 dB/1000 feet at 20°C
	16.0 MHz	22.0 dB/1000 feet at 20°C
	20.0 MHz	24.0 dB/1000 feet at 20°C
Worst-pair, near-end crosstalk (minimum). [Values shown are for information <u>only</u>. The minimum *NEXT* coupling loss for any pair combination at room temperature is to be greater than (>) the value determined using the following formula: **NEXT (F_{MHz})>NEXT(0.772)- 15_{log10} (F_{MHz}/0.72)** for all frequencies in the range of 0.772 MHz—20 MHz for a length of 1000 feet.	772 kHz	58 dB
	1.0 MHz	56 dB
	4.0 MHz	47 dB
	8.0 MHz	42 dB
	10.0 MHz	41 dB
	16.0 MHz	38 dB
	20.0 MHz	36db
Direct Current (dc) resistance unbalance [maximum].		5%

UCM Wiring Configurations

The Tracker UCM Comm5 communication link wiring <u>must</u> be installed in a daisy-chain configuration as shown in Figure 11.

Figure 11.   Daisy Chain Configurations

Tracker Controller

Configuration for UCM Comm Link Wiring (Preferred Configuration)

Maximum Wire Length for Daisy Chain Wiring: 4,593 ft. (1,400 m)

Trane UCM   Trane UCM   Trane UCM

Tracker Controller

Configuration for UCM Comm Link Wiring With Tracker Controller in Middle of Link

Maximum Wire Length for Daisy Chain Wiring: 4,593 ft. (1,400 m) Unless Using a Comm5 Repeater

Trane UCM   Trane UCM   Trane UCM

Trane UCM   Trane UCM   Trane UCM

Termination Resistor Placement for Comm5 Links

Install one (1) 105 watt (W) resistor across the communication link terminals of the device at the beginning of the daisy chain, which is typically a Tracker controller. Then, install a second 105W resistor across the communication terminals at the last UCM on each link. Refer to Figure 12, p. 26 and Figure 13, p. 27 for examples of termination resistor placements.

Note: If, after installation, the link is extended to add more UCMs, the resistor must be relocated to the last new UCM on the link.

Important: *For maximum performance of the Comm5 link, use the 105W resistors that are included with the Tracker controller. If they are not available, as a second choice, use a 100W, ¼W, 5% tolerance resistor, or as a third choice, a 110W, ¼W, 5% tolerance resistor. Failure to comply may cause the controller to malfunction.*

The resistor value can be determined by reading its color bands. Table 9 lists the tolerances and color band sequence coding.

Table 9.   Resistor Color Band

Tolerance	Color Band Sequence
105 Ω ± 1% tolerance	Brown, black, green, brown
100 Ω ± 5% tolerance	Brown, black, brown, gold
110 Ω ± 5% tolerance	Brown, brown, brown, gold

If a repeater is used, each link of the configuration that is created by the repeater requires termination resistors (refer to the section, "Requirements for Repeaters on Comm5 Communication Links," p. 28).

Create a set of as-built drawings or a map of the communication wire layout during installation. Ensure that sketches of the communication layout show the placement of the termination resistors.

Figure 12. Daisy Chain Termination Resistor Placement
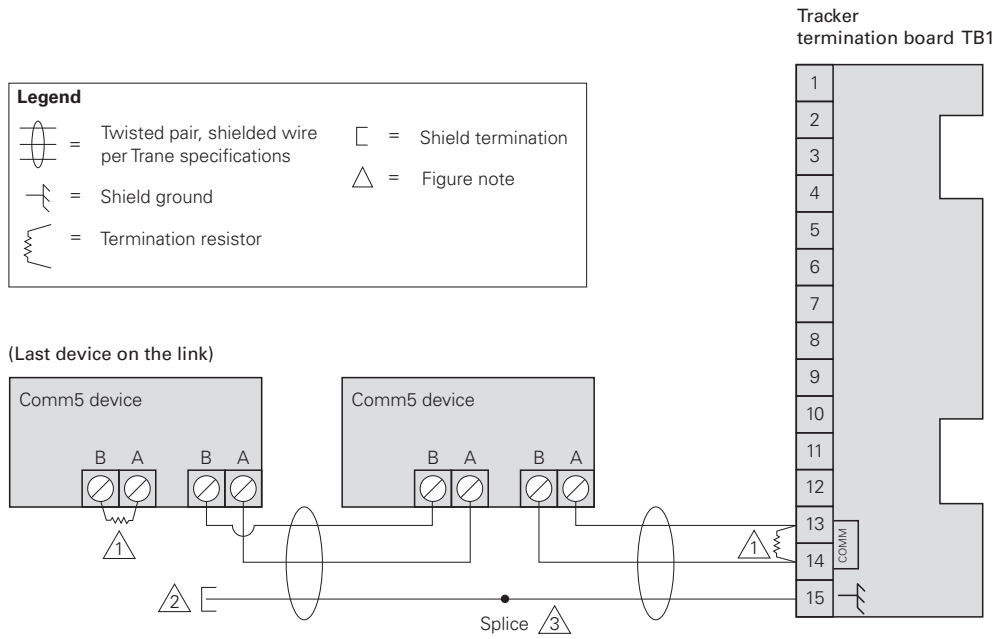
Important: 105 W termination resistor.

Shield must be cut back and taped at last unit controller.

A continuous shield is required. At each unit controller, splice shield wire and tape back to prevent grounding.

Figure 13. Termination Resistor Placement With Tracker Controller in Middle of Link
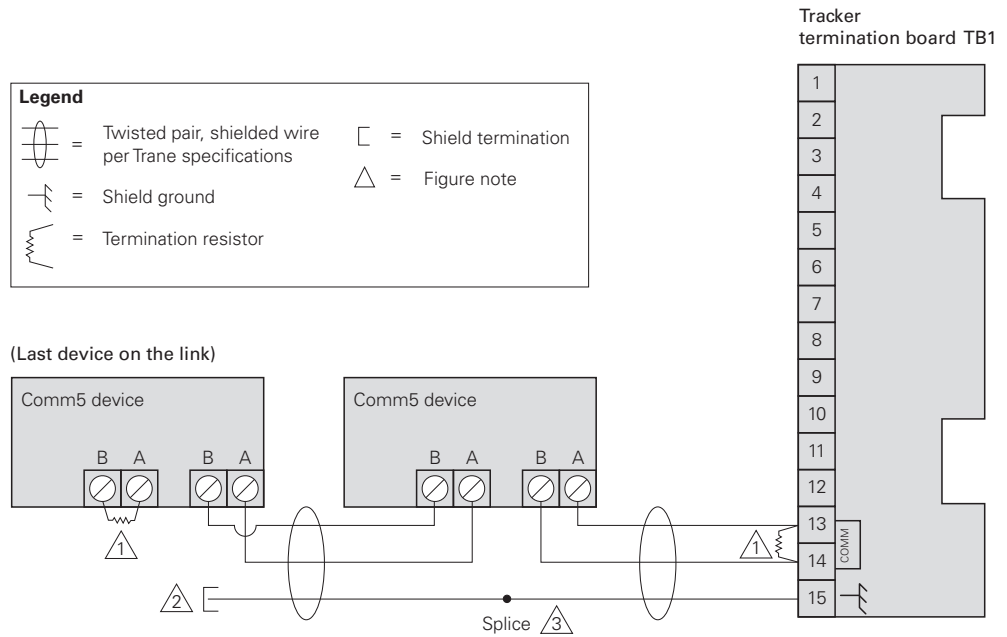

Important: 105 W termination resistor.

Shield must be cut back and taped at last unit controller.

A continuous shield is required. At each unit controller, splice shield wire and tape back to prevent grounding.

Wire Supported UCMs

Wire the supported UCMs to the Tracker termination board. When installing communication wire:

- Keep the polarity consistent throughout the site. Although Comm5 <u>is</u> <u>not</u> polarity sensitive, consistency will improve serviceability.
- Strip away a maximum of 2 inches (50 mm) of the outer conductor and foil shield when splicing or terminating shielded wire.

Important: *Use extreme care when stripping away the outer conductor and foil shield. Be careful not to nick the insulating jacket of the two conductors. A nick in the insulating jacket will cause communication problems.*

Wire the UCMs as follows:

24. Install termination resistors in the correct locations.
25. Route input wires into the termination module through the conduit box or any of the conduit openings designated for input and communication wiring (refer to Figure 8, p. 17).
26. Connect the wires to the COMM terminals on the termination board (refer to Figure 10, p. 19).
27. Connect the shield to the ground terminal.
28. Connect the other end of the wires to the UCMs, as necessary.

Requirements for Repeaters on Comm5 Communication Links

The Comm5 communication link repeater is a device that repeats and regenerates the signal on a Comm5 link in order to enhance signal quality or extend the length of the run. The Comm5 link goes from the Tracker controller to the UCMs to the repeater. A second link segment extends from the other side of the repeater to the rest of the devices. The configuration on either side of the repeater must be a daisy-chain configuration. Both link segments require termination.
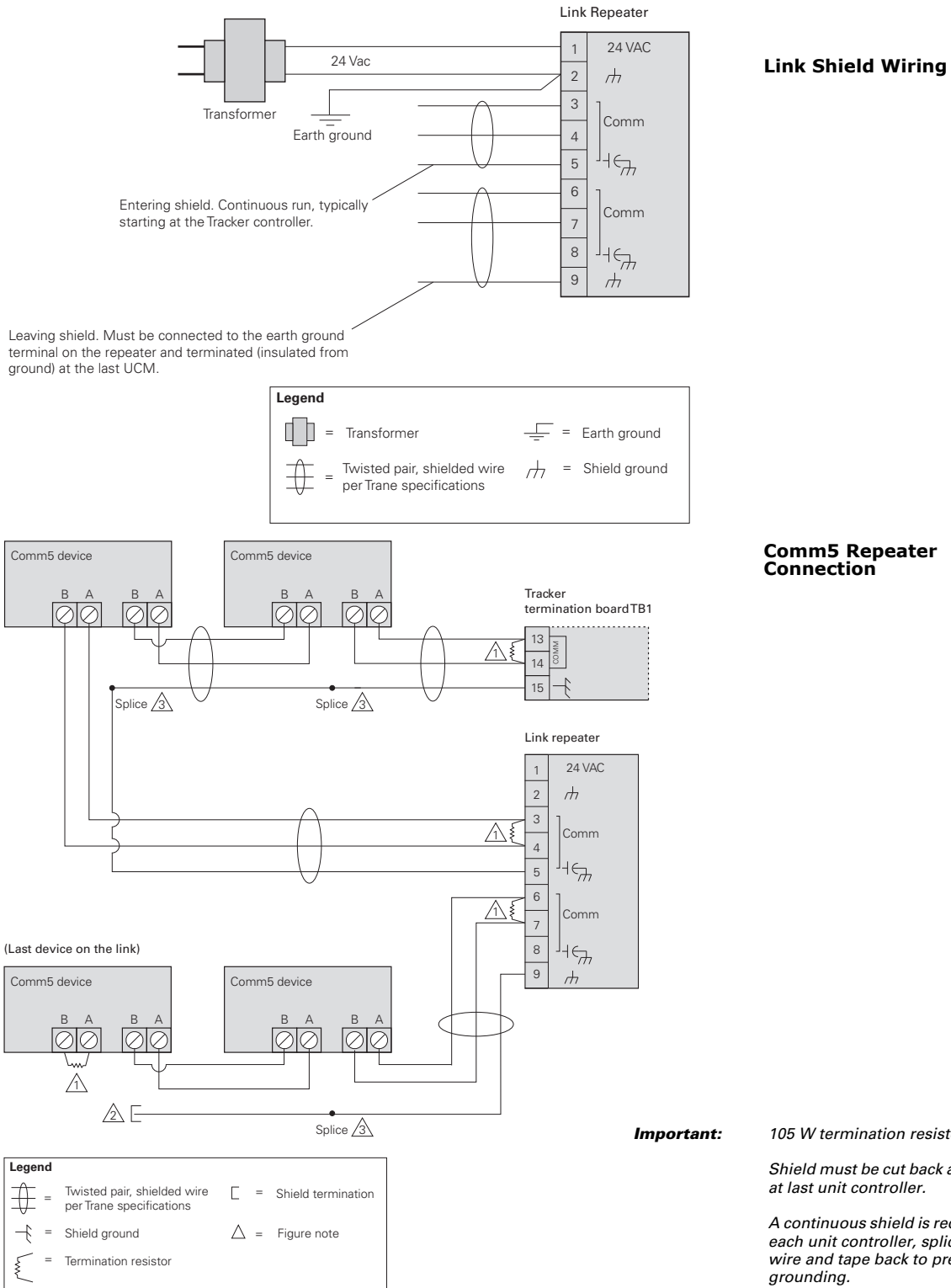
A link repeater is required when:

- The total wire length is greater than the maximum wire run length of 4,593 ft (1,400 m) for a daisy-chain configuration.
- More than 60 devices are connected to a link. This total <u>does</u> <u>not</u> include the Tracker controller, the link repeater, and the possible use of the Rover™ service tool on the same link.
- The link repeater has several limitations:
- <u>Only</u> one (1) link repeater can be used on a link.
- The use of a repeater doubles the maximum allowable wire length. For example, when a repeater is used with a daisy-chain configuration, the total wire length can be 9,186 ft (2,800 m) (with half the wire length on either side of the repeater).
- The link repeater is limited to 60 devices on either side of the link (120 devices total).
- The link repeater requires an earth ground. The installer should be aware of this before making power connections.

Figure 14, p. 29 shows the recommended shield connections and a daisy-chain repeater connection. Use the following guidelines when using a repeater:

- Reference the installation information that comes with the link repeater (refer to the *Comm5 Repeater Installation Instructions*, 3270 3285).
- Connect the shield-drain wires entering the repeater to a terminal marked with a capacitor symbol. The entering shield-drain wire must be connected to earth ground at the Tracker controller.
- Connect the shield-drain wires leaving the repeater to the repeater terminal marked with an earth ground symbol.

Figure 14. Connecting Communication Link Shield Wire to Repeater and Comm5 Repeater Connection

Link Shield Wiring

Comm5 Repeater Connection

Important: *105 W termination resistor.*

Shield must be cut back and taped at last unit controller.

A continuous shield is required. At each unit controller, splice shield wire and tape back to prevent grounding.

Mounting the Main Module

After mounting and wiring the termination module, attach the main module to the termination module. This section provides information and procedures that assists when mounting the main module.

Note: *The Tracker controller ships with the display module assembled to the main module. If those two modules are assembled, performing this procedure also mounts the display module.*

Note: *It is <u>not</u> necessary to turn off 24 Vac power to the Tracker controller prior to mounting or removing the main module.*

29. Verify that all wires on the termination module are securely fastened in place.

30. Carefully line up the alignment pins on the termination module with the back side of the main module (refer to Figure 15).

⚠CAUTION

Avoid Equipment Damage!

Do not use excessive force when mounting the module. If the module does not snap easily into place, slightly reposition it on the alignment pins. Failure to comply may cause damage to the module.

Figure 15.   Mounting the Main Module
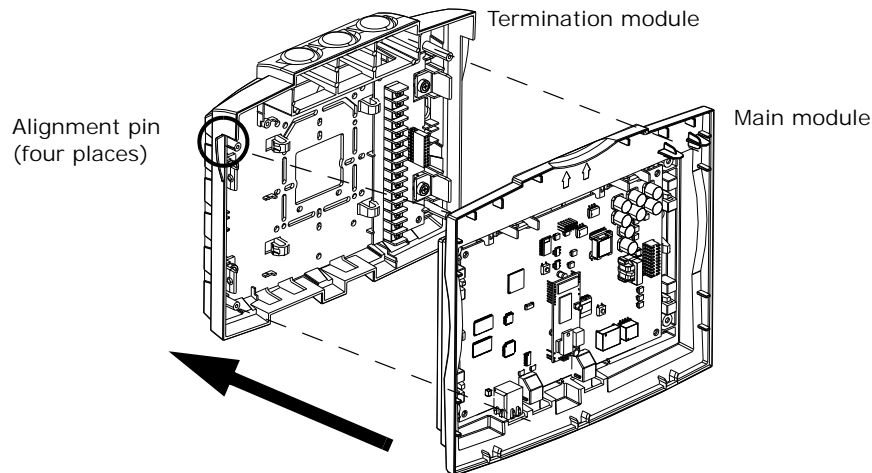
31. Firmly push the main module onto the termination module until it snaps into place. If 24 Vac power is applied, the main module will start. If the display module is <u>not</u> assembled to the main module, then the LEDs on the main module flash ON and OFF after a few seconds. If the display module is assembled to the main module, it turns on and display information.

Mounting the Display Module

After mounting the main module, attach the display module to the main module. This section provides information and procedures that assists when mounting the display module.

Note: *The Tracker controller ships with the display module assembled to the main module. If those two modules are assembled, then only perform the main module mounting procedure (refer to the section,* *"Mounting the Main Module," p. 30).*

Note: *It is not necessary to turn off 24 Vac power to the Tracker controller prior to mounting or removing the display module.*

32. Tilt the top of the display module about 30 degrees.

33. Line up the three (3) tabs on the bottom of the display module with the slots on the bottom of the main module (refer to Figure 16).

Figure 16. Tab/Slot Alignment

Main module

Display module

Slot (three places, two shown)

Tab (three places, not shown)
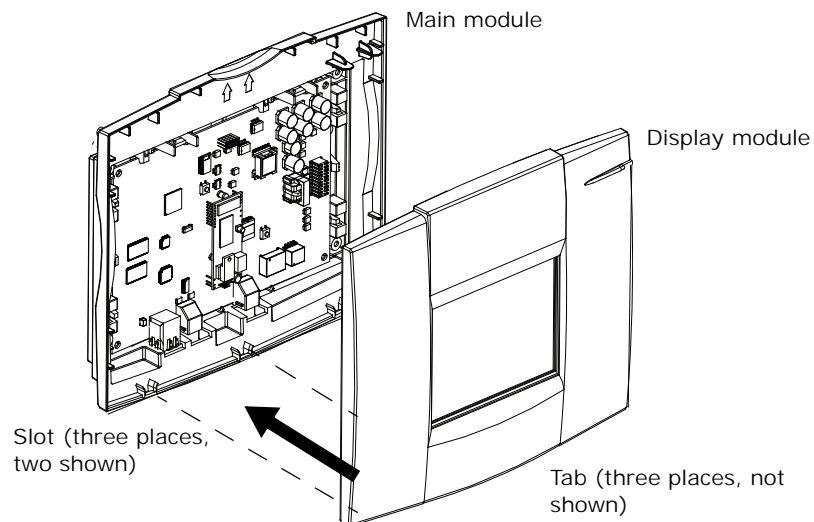
34. Starting with the center tab, insert the tabs into the slots.

⚠**CAUTION**

Avoid Equipment Damage!

Do not use excessive force when mounting the module. If the module does not snap easily into place, slightly reposition it on the alignment pins. Failure to comply may cause damage to the module.

35. Push the top of the display module toward the main module until it snaps into place while ensuring that the tabs on the display module engage the slots on the main module (refer to Figure 16). If 24 Vac power is applied to the Tracker controller, the display module turns on and display information.

Wiring the PC Workstation

The Tracker controller connects to a PC workstation with either a direct connection cable, an internal modem, or an Ethernet connection.

Verifying PC Workstation Specifications

Verify that the PC conforms to the minimum specifications listed on the insert in the CD jewel case and that the Tracker PC workstation software is installed.

Connecting Direct to PC Workstation

To make an EIA-232 direct connection between the controller and a PC workstation requires an RJ-12 cable and an adaptor matched to the serial port connector on the PC workstation (refer to Table 10).

Table 10. Cable and Adapter Specifications for Direct Connection

Description[a]	Trane Part Number
RJ-12 interface cable	3591 4260
9-pin female modular adapter	3591 4262
25-pin female modular adapter	3591 4263

(a) The cable and adapter are not shipped with the Tracker controller and must be purchased separately.

⚠CAUTION

Avoid Equipment Damage!

Do not use a standard phone cable for a direct connection. The RJ-12 cable is a 6-wire straight-through cable. Failure to comply will cause the Tracker controller to malfunction.

The maximum allowable length of the RJ-12 cable is 50 ft (15 m). Failure to comply may cause the Tracker controller to malfunction.

---

36. Locate the RJ-12 cable and the appropriate adapter.

37. Connect the RJ-12 cable to the RJ-12 port on the bottom side of the controller as shown on the right.

38. Connect the other end of the RJ-12 cable to a 9-pin or 25-pin adapter, as appropriate (refer to).

39. Connect the adaptor to the appropriate serial port on the PC workstation.

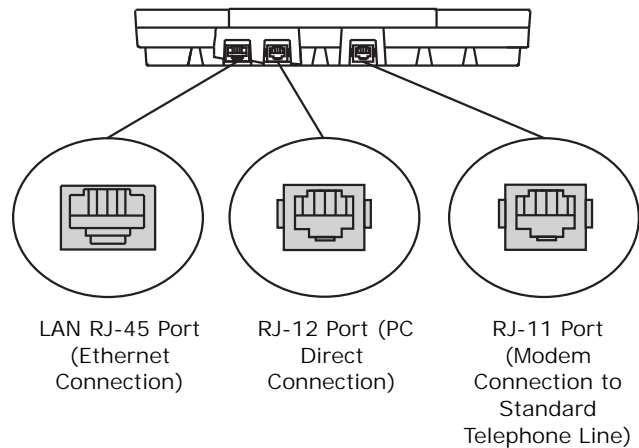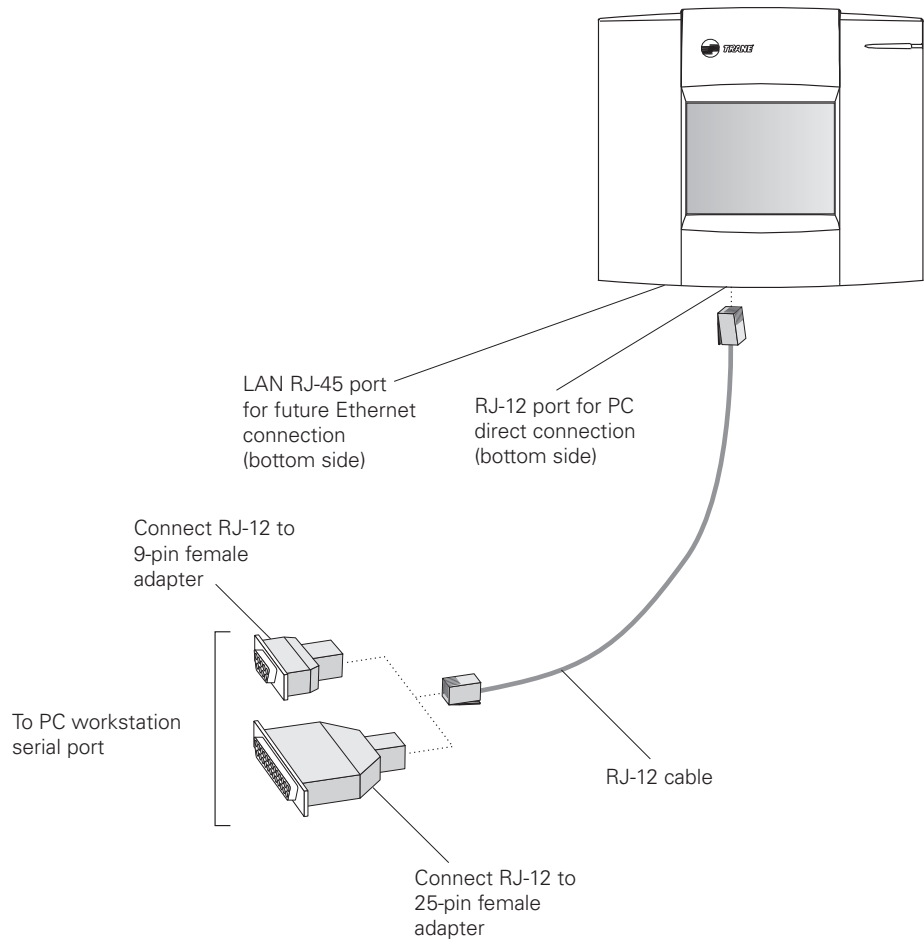LAN RJ-45 Port (Ethernet Connection)

RJ-12 Port (PC Direct Connection)

RJ-11 Port (Modem Connection to Standard Telephone Line)

Figure 17. Tracker Direct Connection to PC Workstation

LAN RJ-45 port
for future Ethernet
connection
(bottom side)

RJ-12 port for PC
direct connection
(bottom side)

Connect RJ-12 to
9-pin female
adapter

To PC workstation
serial port

RJ-12 cable

Connect RJ-12 to
25-pin female
adapter

Connecting the Modem to the PC Workstation

To make a modem connection between the controller and a PC workstation requires an RJ-11 cable (standard telephone cable).

Note: *The Trane Company reserves the right to support only selected modems for the Tracker PC workstation. This ensures proper operation of the Tracker software and makes troubleshooting easier, if a communication failure occurs.*
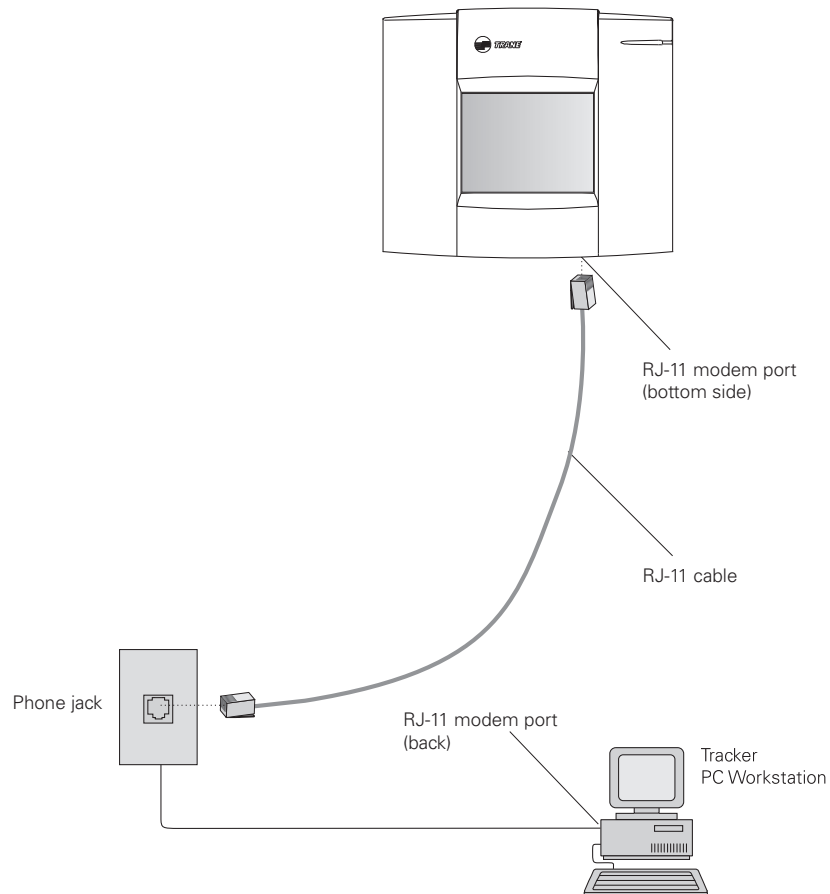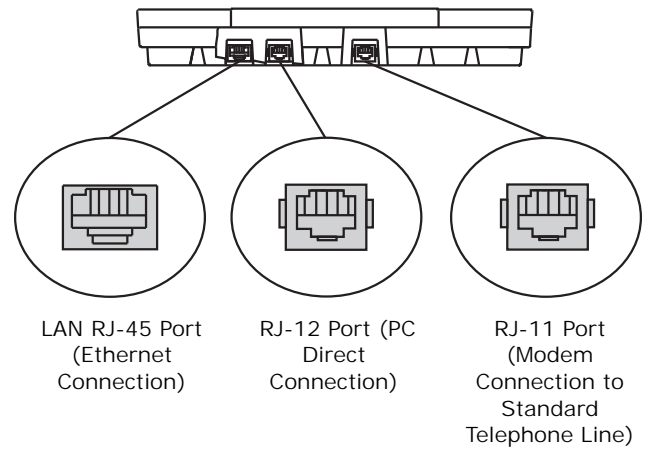
Modem specifications are subject to change. For a current list of specified modems, contact your local Trane office.

40. Connect a RJ-11 cable (standard telephone cable) into the RJ-11 port on the bottom side of the controller as shown on the right.

41. Connect the other end of the cable to a phone jack, a port on an external modem, or the PC workstation modem port (refer to Figure 18). The incoming modem port is typically labeled *Line* or *Line in*.

   Note: *Use the Tracker software to set the communication port that the modem will use.*

Figure 18. Tracker Modem Connection to PC Workstation

LAN RJ-45 Port (Ethernet Connection)

RJ-12 Port (PC Direct Connection)

RJ-11 Port (Modem Connection to Standard Telephone Line)

RJ-11 modem port (bottom side)

RJ-11 cable

Phone jack

RJ-11 modem port (back)

Tracker PC Workstation

Connecting Ethernet to the PC Workstation

This section describes three (3) ways to connect Ethernet to the PC workstation.

- Connecting over an existing LAN
- Connecting through a hub
- Connecting with one cable

Connecting Over an Existing LAN

To make an Ethernet LAN connection between the Tracker controller and a Tracker PC Workstation through an existing customer LAN requires two (2) CAT 5 patch cables. Connect as follows:

42. Connect one end of the first CAT 5 patch cable to the RJ-45 Ethernet port on the bottom side of the Tracker controller (refer to Figure 19).

43. Connect the other end of the cable to an RJ-45 Ethernet wall jack near the controller.

44. Connect one end of the second CAT 5 patch cable to an RJ-45 Ethernet wall jack near the Tracker PC Workstation.

45. Connect the other end of the cable to the RJ-45 Ethernet port on the PC workstation.

Figure 19. Connecting Over an Existing LAN
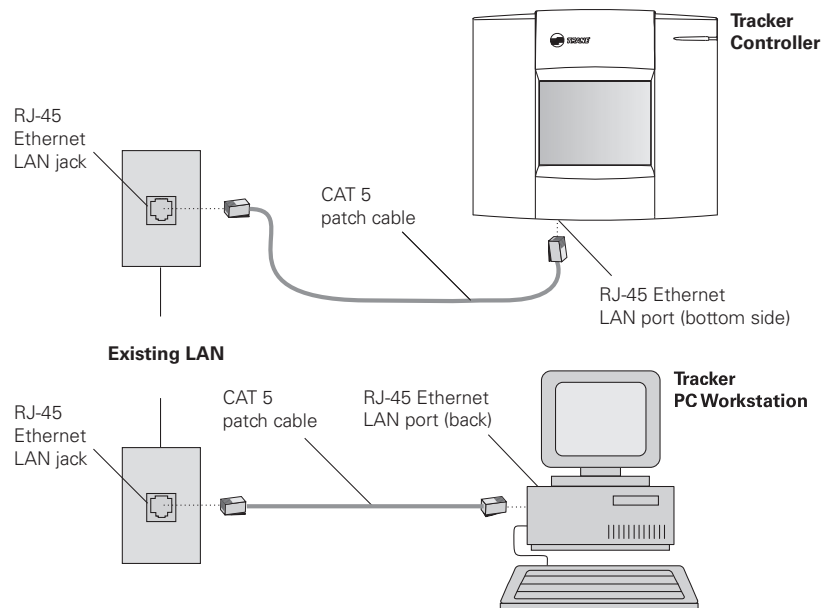
Connecting Through a Hub

To make an Ethernet connection between the Tracker controller and a Tracker PC Workstation through a hub requires two (2) CAT 5 patch cables. To connect through a hub:
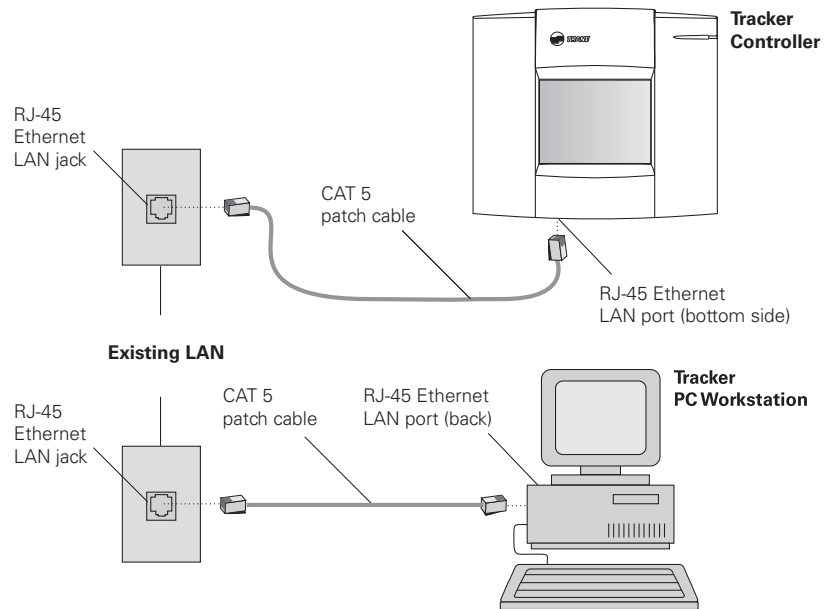
46. Connect one end of the first CAT 5 patch cable to the RJ-45 Ethernet port on the bottom side of the Tracker controller (refer to Figure 20).

47. Connect the other end of the cable to an RJ-45 Ethernet port on the hub.

48. Connect one end of the second CAT 5 patch cable to an RJ-45 Ethernet port on the hub.

49. Connect the other end of the cable to the RJ-45 Ethernet port on the Tracker PC Workstation.

**Figure 20. Connecting Through a Hub**

Connecting With One Cable

To make an Ethernet connection between the Tracker controller and a Tracker PC Workstation using one cable requires one (1) CAT 5 crossover cable. To connect with one cable:

50. Connect one end of the CAT 5 crossover cable to the RJ-45 Ethernet LAN port on the bottom side of the Tracker controller (Figure 21).

51. Connect the other end of the cable to the RJ-45 Ethernet LAN port on the Tracker PC Workstation.

Figure 21. Connecting With One Cable
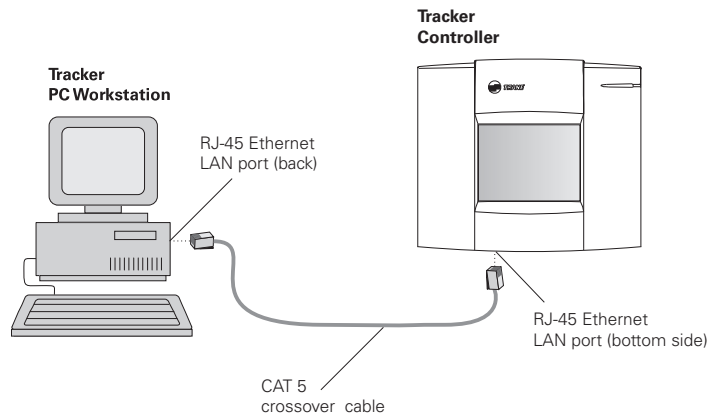
Troubleshooting

Troubleshooting Components

Light-emitting diodes (LEDs) and reset buttons are used for troubleshooting the Tracker system.

LEDs

The LEDs on the Tracker controller main logic board and display module show central processing unit (CPU) status and traffic on the Comm5 communication link, the Ethernet module, and the EIA-232 connection. Figure 22 shows the location of the main logic board LEDs, Ethernet LEDs, and Alarm LED on the display module. Refer to Table 11 and Table 12, p. 39 for completion descriptions of these LEDs.

Figure 22. Main Logic Board Component Locations
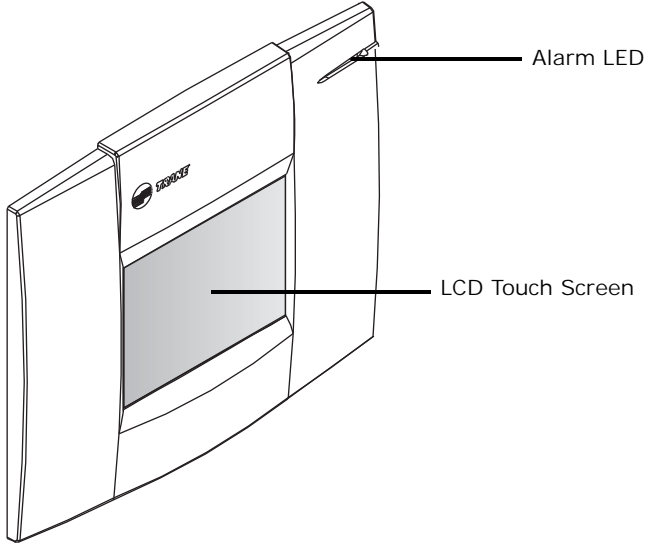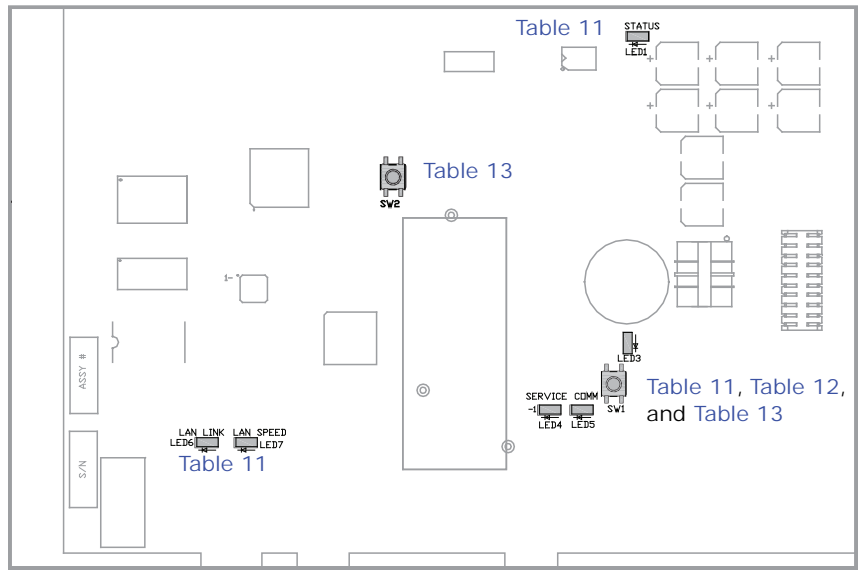
Reset Buttons

Refer to Table 13 for the functionality of the reset buttons that are located on the main logic board. They are used for rebooting the controller and for Neuron identification.

Table 11. Main Logic Board LED Descriptions

LED	LED Number	Color	Description
STATUS	LED1	Green	Shows the status of the CPU. This LED is ON continuously while the controller boots up and during normal operation.
BOP	LED3	Red	Flashes when the controller binary output relay is energized and when an appropriate alarm condition exists.
SERVICE	LED4	Red	Shows that Comm5 service is required. This LED is normally OFF. LED is ON continuously to show that controller hardware is defective. LED is ON continuously to show that the reset button (SW2) was pressed. Flashes to show that the controller must be rebooted.
COMM	LED5	Yellow	Shows that network traffic is on the Comm5 link. Flashes when the controller receives data from a Comm5 device.
LAN Link	LED6	Green	Shows that an Ethernet link is detected.
LAN Speed[a]	LED7	Green	When illuminated, this indicates that the LAN is not functioning due to improper LAN speed (possibly 100 MBps).

(a) LAN speed is functioning properly (10 MBps) only when the LED is not illuminated.

Table 12. Alarm LED Descriptions

State	Color	Description
Normal	Green	LED is ON continuously when the controller is operating normally and has received no alarms of the appropriate severity.
Alarm[a]	Red	Flashes when the controller receives an alarm of the appropriate severity. To acknowledge the alarm and turn OFF the LED, press the Alarm function button displayed on the user interface home screen.

(a) Alarm LED is _only_ available on the Operator Display

Table 13. Main Logic Board and Reset Button Functionality

Reset Buttons	Function
SW1	Momentarily pressing this button causes the controller to broadcast Neuron ID and Program ID. This action also turns ON LED4.
SW2[a]	This is the reset button. Pressing SW2 for more than 10 seconds reboots the controller. It starts the same operation as does rebooting the controller from either the controller or the PC software. All RAM data is permanently lost.

(a) Before pressing this button, attempt to restart the controller by cycling power; this method retains the RAM image.

Symptoms and Actions About the Tracker System

The following table provides troubleshooting symptoms and actions.

Table 14. Symptoms and Actions

Symptom	Action
Tracker controller does not communicate by modem.[a]	• Verify that the telephone cable is connected to the PC modem port. • Verify that the phone line is an analog line (not digital). • Perform the modem self-test procedure from the display module.
Tracker controller does not communicate by EIA-232 port.	• Verify that the cable is connected to the PC direct connect port. • Verify that the proper cable is used. • Verify that the PC workstation is using the Tracker controller software; other communications software will not work.
Tracker controller did not discover UCMs when initially started.	When the controller is initially powered up, it automatically discovers all communicating UCMs of the proper type and installs them into its database. The discovery process takes several minutes, depending on how many UCMs are installed on the communication link. After the controller has built its database after the initial power up, the controller no longer automatically discovers UCMs. If you want to initiate the discovery process, you must do so manually. Initiate the discovery process when a new UCM is added to the system or an existing UCM is replaced. • Verify proper wiring of the Comm5 communication link. (UCMs can be discovered only if Comm5 communication has been established.) • Wait at least 5 minutes for the controller to discover the UCMs.[b]
Touch screen beeps when touched but does not progress to the next screen.	Touch screen is out of calibration. Refer to the *Tracker Building Automation System Controller Operations Guide* (BMTK-SVU01) about procedures for calibrating the touch screen.
Touch-screen back light and contrast is out of adjustment.	Perform the adjust brightness and contrast procedure from the display module.
Tracker I/O status is wrong.	• Verify electrical connection using the post-installation checklist. • Verify I/O status as indicated on home display on the display module. • Display Tracker I/O status self test from display module.
Tracker alarm output is not working as expected.[c]	• Confirm proper wiring of the alarm relay output. Refer to the section, "Post-installation Checklist for Termination Module," p. 45s. • Initiate the BOP self test from the display module.
Tracker controller will not communicate with its UCMs.	• Look for wiring problems (shorts or opens, for example) that develop when wire is damaged during installation. • Look for shorts between the two conductors resulting from nicks in the insulating jacket. (This can be caused by improper technique when stripping away the outer jacket and shield.) • Look for a strong source of EMI/RFI interference nearby. • Look for ac power disturbances from nearby transformers and electrical equipment. This is especially true when running communication links in close proximity to florescent lighting ballasts. • Verify the UCM has not failed. • Verify proper termination resistance.
Tracker processor is locked up.	• Cycle power to the Tracker main module by removing it from the termination module. • If the processor is still locked up after cycling power to the controller, perform a reboot from the display module or the PC software (if the controller is able to communicate). • If the controller will not respond to the above listed methods, push the reset button (SW2)[d] on the main module.
Alarm LED[e] on the display is flashing red.	At the Tracker controller user interface home screen, push the alarm button on the display module to acknowledge the alarm, then take the proper corrective action.
Tracker controller is annunciating an alarm.[f]	At the Tracker controller user interface home screen, push the alarm button on the display module to acknowledge the alarm, then take the proper corrective action.
Display module is not illuminated.	• Press anywhere on the touch screen surface to turn the back light on. The controller automatically turns off the back light during extended periods of inactivity to conserve energy and bulb life. • Confirm that the controller has 24 Vac power. When the display module has power, the alarm LED will be either solid green or flashing red.

Table 14. Symptoms and Actions

Symptom	Action
Display module does not respond to the touch.	• Confirm that the controller has 24 Vac power. When the display module has power, the alarm LED will be either solid green or flashing red. • If the display module is not responding correctly when the display module is powered up and the back light is on, initiate the touch-screen calibration procedure from the display module.
Tracker controller displays the wrong date. [g]	Verify if the electrical power has been off for more 5 days at room temperature (the actual time varies depending on storage temperature).
Outdoor air temperature is not reading correctly. [h]	• Measure the resistance of the outdoor air temperature thermistor (preferably at the termination module). Check the measurement using Table 17, p. 46. • Inspect the location of the outdoor air temperature sensor. It must not be mounted in the sunlight or near another source of radiant heat.
Ethernet link is not detected (on the Ethernet board, the left LED is off)	Verify that the correct type of cable is used. When communicating over a network, use a patch cable. When communicating to an Ethernet card on a lap top computer, use a crossover cable.

(a) The modem is an integral component of the main module and is not field replaceable. Replacement of the modem requires replacement of the main module.

(b) You can press the reset button on a UCM at any time to check if it is communicating with the controller. Pressing the reset button causes the UCM status LED to flash on and off (known as "winking"), if the controller is communicating with that UCM.

(c) The binary output is for alarm notification only. There must be an unacknowledged alarm present of the proper severity to actuate the alarm output.

(d) Heartbeat LED (STATUS LED1) will be solid green.

(e) The alarm LED flashes when the controller receives an alarm of the appropriate severity. Pressing the Alarm button acknowledges the alarm and turns off the flashing LED (until the controller receives another alarm of the appropriate severity).

(f) The alarm relay energizes when the controller receives an alarm of the appropriate severity. Pressing the alarm button acknowledges the alarm and turns off the alarm relay output (until the controller receives another alarm of the appropriate severity).

(g) The controller default date (displayed when the controller is initially powered up or whenever the super capacitor is unable to back up the controller time) is January 1, 2000.

(h) The outdoor air temperature sensor can be used for this purpose only.

Maintenance

The only maintenance necessary for the controller is to occasionally clean and calibrate the touch screen.

Cleaning the Touch Screen

- To clean the touch screen, wipe it off with a non-abrasive cloth. For more aggressive cleaning, use low-pressure compressed air to blow off the surface and then wipe it off with a non-abrasive cloth.

- To clean fingerprints from the touch screen, lightly spray it with a mild glass cleaner. Immediately wipe the touch screen with an absorbent, non-abrasive cloth.

⚠ CAUTION
Avoid Equipment Damage!
Immediately wipe moisture from the surface of the LCD touch screen. Failure to do so will cause the operator display to malfunction.

Immediately wipe moisture from the surface of the LCD touch screen. Failure to do so will cause the operator display to malfunction.

Calibrating the Touch Screen

To calibrate the touch screen:

52. At the Tracker Home screen, press the Advanced button. The Advanced Selections screen displays.

53. Press the Calibrate Touch Screen button. A calibration screen displays.

⚠ CAUTION
Avoid Equipment Damage!
Do not allow the touch screen to come in contact with sharp objects.

54. Touch the target using a small, pliable, blunt object, such as a pencil eraser. Hold until the beeping stops. A second calibration screen displays.

55. Again, touch the target with the object. Hold until the beeping stops. The Advanced Selection screen displays.

56. Press the Home button to exit. The home screen displays.

Appendix A, Supplies Checklists

Required Supplies

Table 15 lists the supplies required for all Tracker installations.

Table 15. Required Supplies Checklist

Wiring Installation	Item	☒
24 Vac	18 AWG (1.02 mm^2) wire recommended	☐
	24 Vac, 40 VA minimum transformer	☐
Comm	Communication wire (refer to Table 7, p. 22 and Table 8, p. 22 for specifications)	☐

Optional Supplies

Table 16 lists the supplies that may or may not be necessary, depending on the Tracker installation.

Table 16. Optional Supplies Checklist

Inputs/Output Wiring Installation	Item	☒
Alarm relay wiring	18 AWG (1.02 mm^2) wire and metal conduit	☐
Priority shutdown wiring and Meter input	18—22 AWG (1.02 mm^2—0.643 mm^2) wire and metal conduit	☐
Thermistor wire	18—22 AWG (1.02 mm^2—0.643 mm^2) twisted pair, shielded wire	☐
Alarm relay power supply	Power supply for alarm relay output (not to exceed 24 Vac)	☐
Alarm relay output load	Load for alarm relay output (not to exceed 1 amp at 24 Vac)	☐
Thermistor	Outdoor air temperature sensor	☐

Appendix B; Recording the Comm5 UCM 12-Digit Identifier and Location

Each UCM has a unique 12-digit identifier that serves as its address that is used to communicate with the UCM. The installer must know the UCM addresses when assigning names to UCMs during setup.

Use the following table record the name, location, and ID of each UCM (SCCs, VariTrac CCPs, and I/O modules) connected to the Comm5 link. The 12-digit identifier is on a sticker attached to the UCM. Some UCMs have peel-away stickers that can be detached and applied to the table.

Space Comfort Controllers (Maximum of 24)		
Edited Name	Location or Area Served	12-Digit Identifier
Input/Output Modules (Maximum of 4)		
Edited Name	Location or Area Served	12-Digit Identifier

Appendix C; Pre-installation Wiring Notes and Post-installation Checklist

Pre-installation Wiring Notes

The wiring for the Tracker system will have been completed prior to Tracker installation. All Tracker wiring conforms to the following guidelines:

- The Tracker controller receives 24 Vac from a dedicated power circuit. If not, the Tracker controller may malfunction.
- Each UCM receives 24 Vac from a dedicated power source. If not, the UCM may malfunction.
- Input wires and ac power wires are run in separate conduits or wire bundles. If not, the Tracker controller may malfunction due to induced electrical noise.
- Comm5 cable and ac power wires are run in separate conduits or wire bundles. If not, the Tracker controller may malfunction due to induced electrical noise.
- UCM communication cables do not run near lighting ballasts or other transformers. If they do, the UCM may malfunction due to induced electrical noise.

Post-installation Checklist for Termination Module

Use the following as a checklist to verify that the circuits connected to the termination board on the termination module are wired correctly. Record test results in the *Actual Value* column. Refer to Table 17, p. 46 for Thermistor Sensor Electrical Characteristics.

Circuit	Test	Actual Value
24 Vac: [a] • TB1-1 • TB1-2 • TB1-3	Measure the voltage between TB1-1 and TB1-2. It must be 24 Vac nominal (19 Vac to 30 Vac).	
	Measure the voltage between TB1-1 and TB1-3. It must be approximately the same voltage as measured between TB1-1 and TB1-2	
	The ground wire must be connected to terminal TB-3. It must be tied to building or earth ground at nearest location. Measure the voltage between TB1-2 and TB1-3. It must be approximately 0 V.	
Alarm relay: • TB1-4 • TB1-5	Measure the voltage between TB1-4 and TB1-5. It must not exceed 24 Vac. these two terminals. The user-supplied load should now be energized and active.	
Priority shutdown: • TB1-6 • TB1-7	There must be no voltage applied to these terminals. These terminals must be connected to dry contacts only. Measure the resistance between TB1-6 and TB1-7. It must be approximately 0 Ω with the user-supplied contacts in the closed position, and infinity ohms with the contacts in the open position.	
Meter input: • TB1-8 • TB1-9	There must be no voltage applied to these terminals. The terminals must be connected to dry contacts only. Measure the resistance between TB1-8 and TB1-9. It must be approximately 0 Ω with demand meter contacts in the closed position, and infinity ohms with the contacts in the open position.	
Thermistor: • TB1-10 • TB1-11 • TB1-12	There must be no voltage applied to these terminals. The cable shield must be connected to terminal TB1-12. Measure the resistance between TB1-10 and TB1-11.	
Comm: [b] • TB1-13 • TB1-14 • TB1-15	There must be no voltage applied to these terminals. Measure the resistance between TB1-13 and TB1-14. The resistance must be approximately 50 Ω with daisy-chained wiring. This test confirms the correct usage of the termination resistors as well as the continuity of the wire.	

(a) All are mandatory to be wired.
(b) All are mandatory to be wired.

Table 17. Thermistor Sensor Electrical Characteristics

Temperature (°F)	Temperature (°C)	Sensor Resistance (Ohms x 1000)
−30	−34	241.1
−20	−29	170.1
−10	−23	121.4
0	−18	87.6
10	−12	63.8
20	−7	46.9
30	−1	34.5
40	4	26.2
50	10	20.0
60	16	15.3
70	21	11.9
77	25	10.0
80	27	9.3
90	32	7.3
100	38	5.8
110	43	4.7
120	49	3.8
130	54	3.0
140	60	2.5
150	66	2.0

Appendix D; Declaration of CE Conformity

Manufacturer name:	Trane
Manufacturer address:	4833 White Bear Parkway Saint Paul, MN 55110 USA

The manufacturer hereby declares that the product:

Product name:	Tracker Models 12 and 24	
Product numbers:	BMTK000AAB0110	BMTKKBBAAB0110
	BMTK000AAB0210	BMTKKBBAAB0210
	BMTK000AAB0510	BMTKKBBAAB0510
	BMTK000ABB0110	BMTKKBBABB0110
	BMTK000AAB0210	BMTKKBBABB0210

Conforms to the following standards or other normative documents:

Electromagnetic Emission: (by Council Directive 89/336/EEC)	EN61326-1:2006	Class A for radiated and conducted emission
Electromagnetic Immunity:	Industrial locations:	EN 61326-1:2006
		EN 61000-3-2:2006
		EN 61000-3-3:1995 +A1:2001+A2:2006
UL and C-UL listing	916, Energy management equipment	
Flammability rating	UL 94-5V (UL flammability rating for plenum use)	
FCC	FCC part 15, Class A, CFR 47	

Where and When Issued:	Electromagentic Emission	12/08/2009 - 12/11/2008
	Electromagentic Immunity	12/08/2009 - 12/11/2008
	Saint Paul, Minnesota USA	

Mark of Compliance:

$C\epsilon$

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F-88191 Golbey Cedex, France
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This document validates CE conformity of the Tracker Model 12 and 24.

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