Installation Manual

VariTrac™
Central Control Panel

June 2002 VAV-SVN03A-EN

VariTrac Central Control Panel Installation Manual

Printed in the U.S.A.

Contents

About This Manual

Contents

This manual describes the steps required to install and configure VariTrac™ Changeover Bypass Zoning and Delivered VAV Systems. Sections in this manual are highlighted below:

Compliance Information

Information about FCC approval and possible radio and telephone interference, and the CE compliance statement.

Specifications

Technical specifications for VariTrac Central Control Panel unit and system components.

VariTrac Changeover Bypass System

Overview

A brief description of a typical VariTrac changeover bypass system.

Getting Started

Pre-installation and setup information.

Installing and Configuring the System

Installation and configuration information, including an installation checklist.

Troubleshooting

General troubleshooting guidelines for common problems.

Delivered VAV System

Overview

A brief description of a typical delivered VAV system.

Getting Started

Pre-installation and setup information.

Installing and Configuring the System

Installation and configuration information, including an installation checklist.

Naming Conventions

The following is a list of naming conventions used in this manual:

- **CCP:** Refers to the system Central Control Panel
- **VariTrac:** Refers to the CCP used in a pressure dependent bypass zoning system
- **Delivered VAV:** Refers to the CCP used with a Commercial Voyager VAV rooftop unit and VariTrane pressure independent VAV boxes
- **VAV:** Variable air volume

Cautionary Statements

The following cautionary statements signal procedures or conditions that require particular attention.

⚠WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death.

⚠CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a situation in which property-damage-only accidents could occur. It is also used to alert against unsafe practices.

IMPORTANT

Alerts installer, servicer, or operator to potential actions that could cause the product or system to operate improperly, but will not likely result in potential for damage.

Related Literature

VAV-SVX01B-EN: UCM 4.0 and Wireless VAV Communication

VAV-SLB006-EN: Zone Occupancy Sensor

VAV-SLB007-EN: Digital Display Zone Sensor

VAV-SLB008-EN: Zone and Duct CO_2 Sensor

VAV-SVP01A-EN: VariTrac Operator's Guide

FCC Information

VariTrac and Delivered VAV Radio and Television Interference

VariTrac and Delivered VAV generate, use, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, interference to radio and television reception may occur. VariTrac and Delivered VAV are tested and comply with the limits for Class A computing devices in accordance with the specifications in Subpart J of Part 15 of FCC rules, 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 interference does occur, 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 #004-000-00345-4.

Declaration of Conformity

Manufacturer's Name: Trane
Manufacturer's Address: 4833 White Bear Parkway
Saint Paul, Minnesota 55110
USA

The manufacturer hereby declares that the product:

Product Name: VariTrac CCP Controller
Product Number: X13650940010; X13650942010
Product Option: Operator Display

Conforms to the following standards or other normative documents:

Electromagnetic Emission:
(by Council Directive 89/336/EEC)
EN 50081-1:1998
Radiated EN55022: 1998 Class B limit
Conducted EN55022: 1998 Class B limit

Electromagnetic Immunity: EN61326-1:1997 +A1: 1998

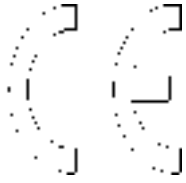
EN61000-4-2	±4 kV contact discharge ±8 kV air discharge
EN61000-4-3	3 V/m
EN61000-4-4	±1 kV
EN61000-4-5	±1 kV
EN61000-4-6	3 V
EN61000-4-8	30 A/m
EN61000-4-11	1 cycle/100%

When and where issued

Electromagnetic Emission : 4/3/2001
Electromagnetic Immunity: 4/17/2001
Saint Paul, Minnesota USA

Bounheng Saycocie
Design/Compliance Engineer

Mark of Compliance



European Contact

Societe Trane (Epinal, France)
1, rue des Ameriques, B.P. 6
F-88191 Golbey Cedex, France
Phone: (33) 329.31.73.00
Fax: (33) 329.81.24.98

This document validates CE conformity of the VariTrac CCP controller.

VariTrac Changeover-Bypass System

Overview

VariTrac Changeover-bypass VAV is a comfort system solution designed for light commercial applications. As the name implies, these systems deliver a varying volume of air to multiple zones, each with its own thermostat, while still utilizing a unitary machine with a constant volume fan. Changeover-bypass VAV combines the comfort benefits of VAV with the cost effectiveness and simplicity of packaged unitary equipment.

Central Control Panel

The VariTrac Central Control Panel is the central source of communications and decision making between the individual zones and the air conditioning unit. Connections to the central control panel are:

- 24 Vac power
- binary inputs for an occupied/unoccupied signal and external priority shutdown signal (optional)
- ICS communication bus to the Trane building automation system (optional)
- UCM communication bus to the zone dampers and communicating sensor/bypass damper control and Trane Voyager™/Reliatel™ rooftop unit
- binary outputs to heating, cooling, and fan of non-Voyager or Reliatel rooftop units

Unit Control Module (UCM)

A unit control module is mounted to each individual zone damper. Inputs and outputs consist of the twisted shielded pair communication link, zone temperature sensor, optional CO_2 and occupancy sensors, 24 Vac power, damper motor control, and local heat outputs. Local heat may be duct or space mounted, and can be staged electric, pulse-width modulating electric, and modulating or staged two-position hot water.

VariTrac Damper

Each VariTrac damper consists of an integrated 24 Vac actuator and control box that encloses the UCM circuit board. The damper is designed to operate in static pressures up to 1.75 inches wg.

VariTrac dampers are referred to by their dimensions:

- round damper sizes are 6, 8, 10, 12, 14, and 16 inches. The dampers consists of an 18 gage galvanized steel frame with a round damper blade assembly.

- rectangular damper sizes are 8 x 12, 8 x 14, 8 x 16, 10 x 16, 10 x 20, and 14 x 16 inches. The damper consists of a 16 gage galvanized steel frame and opposed blade damper assembly.

Communicating Sensor/Bypass Damper Control

The communicating sensor/bypass damper assembly is a bypass damper and communicating sensor/bypass control that resides on the same bus as the VariTrac dampers and Voyager/Reliatel rooftop unit.

VariTrac Bypass Damper

Bypass dampers are non-communicating VariTrac dampers which include an integrated actuator with a pre-wired interconnect cable that plugs into the communicating sensor/bypass control.

- round bypass damper sizes are 6, 8, 10, and 12 inches. The damper consists of an 18 gage galvanized steel frame with a round damper blade assembly. The round bypass damper operates in duct static pressures up to 1.75 inches wg.
- rectangular bypass damper sizes are 14 x 12, 16 x 16, 20 x 20, and 30 x 20 inches. The damper consists of a 13 gage galvanized steel frame and opposed blade damper assembly. The rectangular bypass damper operates in duct static pressures up to 2.00 inches wg.

Communicating Sensor/Bypass Control

The Communicating Sensor/Bypass Control is composed of an integrated UCM board, static pressure, and discharge air temperature sensors. It directly controls the bypass damper and communicates duct conditions to the central control panel.

The static pressure sensor measures duct static pressure and positions the bypass damper(s) to maintain the static pressure setpoint.

The discharge air temperature sensor allows the CCP to determine the heat/cool action of each individual UCM and cycles the heating and cooling stages to maintain the discharge air temperature. Discharge air temperature setpoints are also edited through the operator display or PC software.

Auxiliary Temperature Sensor

The auxiliary temperature sensor allows the operator to monitor air temperature leaving a reheat device or measure duct temperature for automatic operation of a standalone UCM.

Zone Temperature Sensors

Five zone temperature sensor configurations are available:

- sensor only
- sensor with adjustable setpoint and communications jack
- sensor with night setback override button, cancel button, and communications jack
- sensor with adjustable setpoint, night setback override button, cancel button, and communications jack

- sensor with digital display, adjustable setpoint, night setpoint override button, cancel button, and communications jack

CO_2 Sensor

A CO_2 sensor may be connected to the UCM damper control to sense CO_2 levels in the space. This signal is communicated to the CCP for demand ventilation calculation and control.

Occupancy Sensor

A normally open occupancy sensor contact may be connected to the UCM damper control binary input to indicate zone occupancy.

Operator Display (optional)

A 1/4 VGA monochrome LCD touch screen display is available for the CCP. This display provides setup, diagnostic, and seven-day scheduling functions to the system.

Service Model Number Description

Service model numbers determine product characteristics and are used when ordering replacement parts. Each digit signifies product characteristics. See Figure 1.

Figure 1: Service Model Number Description

VA DA06 BYP 1

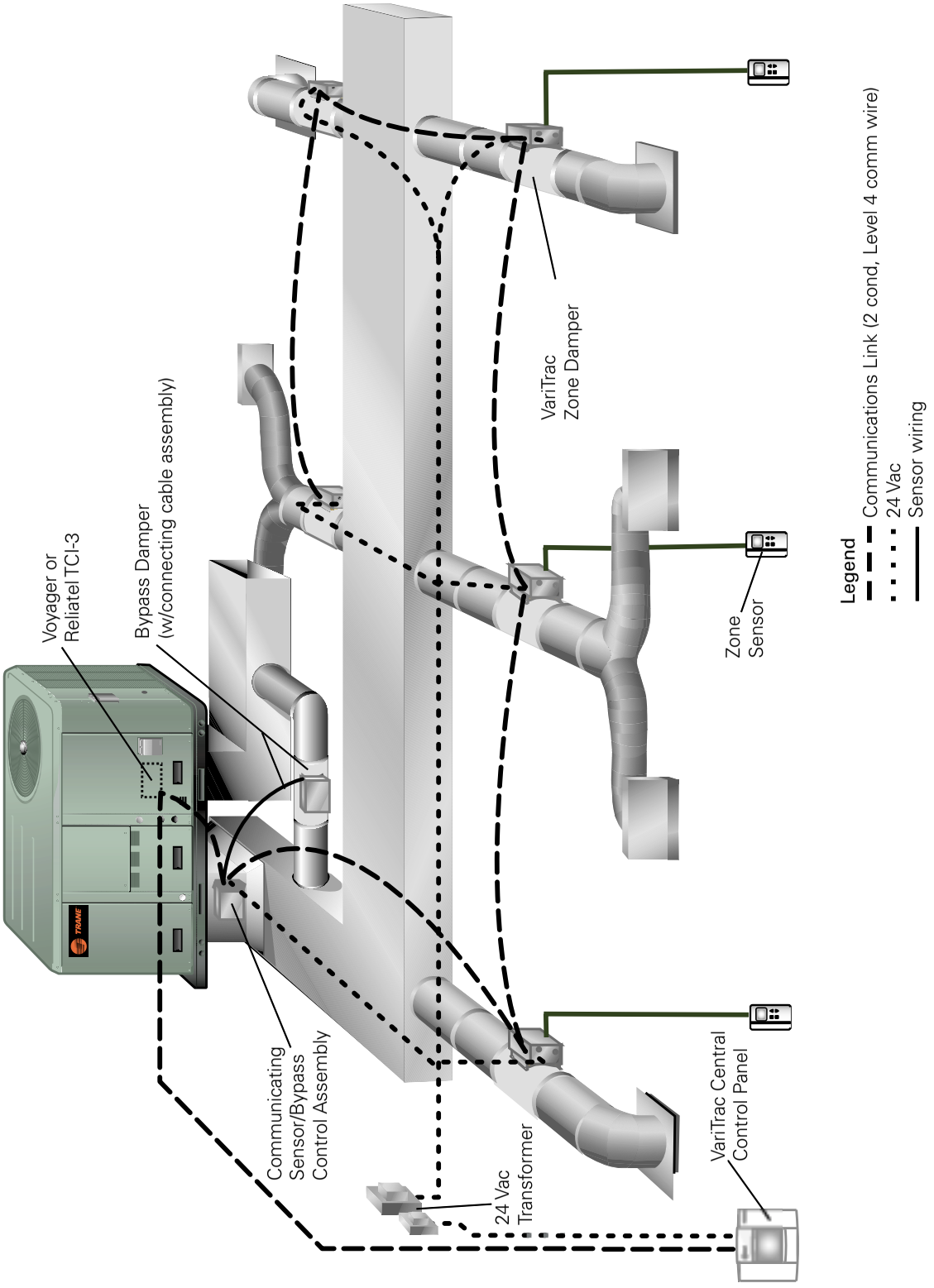
Product Type
VA = VariTrac Product Families
D = Damper
R = Rectangular Damper
A = Development Sequence

Damper Size
DA06 = 6″ Damper
DA08 = 8″ Damper
DA10 = 10″ Damper
DA12 = 12″ Damper
DA14 = 14″ Damper
DA16 = 16″ Damper
RA0812 = 8″ x 12″ Zone Damper
RA0814 = 8″ x 14″ Zone Damper
RA0816 = 8″ x 16″ Zone Damper
RA1016 = 10″ x 16″ Zone Damper
RA1020 = 10″ x 20″ Zone Damper
RA1418 = 14″ x 18″ Zone Damper
RA1412 = 14″ x 12″ Bypass Damper
RA1616 = 16″ x 16″ Bypass Damper
RA2020 = 20″ x 20″ Bypass Damper
RA3020 = 30″ x 20″ Bypass Damper

Damper Control
BYPS = Bypass Control
BYR = Rectangular Bypass Control
CHGR = Changeover Control
ELEC = 3 Stage, Primary Heat Disabled Control
NCHW = 1 Stage, Primary Heat Enabled

Inventory Number

Figure 2: VariTrac Changeover Bypass System Configuration



Specifications

VariTrac Central Control Panel

Power Requirements	20-30 Vac, 60 Hz, single phase, 30 VA minimum Class 2 transformer required
Operating Environment	32°F to 122°F, 10 to 90% relative humidity, non-condensing
Storage Environment	-40°F to 185°F, 5 to 95% relative humidity, non-condensing
Cabinet	NEMA 1 resin enclosure, plenum rated
Mounting	Mount directly on wall surface or mount on recessed 4 in. x 4 in. conduit box.
Dimensions	8.75 in. high x 10.25 in. wide x 2.75 in. deep.
Weight	1.5 pounds
Communication Link Wiring	Communication link wiring must be Level 4 22 AWG twisted shielded pair wire with stranded tinned copper conductors. Maximum total wire length is 3500 feet. Wire must meet Trane specifications. See "Communication Link Wire Specifications."
Binary Input	Voltage (provided by VariTrac CCP): 10 to 14 Vdc Current (provided by VariTrac CCP): 10 to 14 mA *Note: Only "dry" contacts may be attached to binary inputs.*
UL Approval	The VariTrac Central Control Panel is UL approved.
Memory Backup	Upon a power loss, all operator-edited data stored in the VariTrac Central Control Panel is maintained permanently.

Operator Display

Power Requirements	The operator display is powered by the CCP.
Operating Environment	32°F to 122°F 10 to 90% relative humidity, non-condensing
Storage Environment	-40°F to 185°F 5 to 95% relative humidity, non-condensing
Cabinet	NEMA 1 resin enclosure, plenum rated
Mounting	Plugs directly onto VariTrac CCP
Dimensions	8.75 in. high x 10.25 in. wide x 1.5 in. deep.
Weight	3 pounds

UCM Damper

Power Requirements	20 to 30 Vac, 60 Hz, single phase, 10 VA Minimum (plus load of optional heat outputs) Class 2 transformer required
Operating Environment	32°F to 120°F 10 to 90% relative humidity, non-condensing
Storage Environment	-50°F to 200°F 5 to 95% relative humidity, non-condensing
Control Box	NEMA 1 metal enclosure, plenum rated
Communication Link Wiring	Communication link wiring must be Level 4 22 AWG twisted shielded pair wire with stranded tinned copper conductors. Maximum total wire length is 3500 feet. Wire must meet Trane specifications. See Table 1: “Communication Link Wire Specifications.”

Communicating Sensor/Bypass Control Assembly

Power Requirements	20 to 30 Vac, 60 Hz, single phase, 15 VA minimum Class 2 transformer required
Operating Environment	32°F to 120°F 10 to 90% relative humidity, non-condensing
Storage Environment	-50°F to 200°F 5 to 95% relative humidity, non-condensing
Control Box	NEMA 1 metal enclosure, plenum rated
Communication Link Wiring	Communication link wiring must be Level 4 22 AWG twisted shielded pair wire with stranded tinned copper conductors. Maximum total wire length is 3500 feet. Wire must meet Trane specifications. See Table 1: "Communication Link Wire Specifications."

Relay Board Binary Outputs

Voltage provided: 24 Vac from air conditioning unit

Current: 10 VA maximum

Wire Specifications

Shielded Level 4 communication wire is now recommended for all communication link wiring on the new VariTrac CCP. This is the same wire which is recommended for the Tracker Version 10 Comm5 communication link.

The term "Level 4" is used to specify a particular performance of communication wire and is normally associated with LonTalk™. Level 4 wire is different from Category IV (four) wire and Category V (five) wire. The specification information for Level 4 wire can be found in the "LonWorks™ FTT-10A Free Topology Transceiver User's Guide" at www.echelon.com.

Shielded Level 4 communication wire can be purchased from two qualified suppliers: Windy City Wire and Connect-Air.

Table 1: Communication Link Wire Specifications

Specification	22 AWG Conductors, Shielded, Level 4 Plenum CMP Rated Number of Cond: 1 pr. Jacket Color: light blue Cond. Strand: 7/30 Nom. Jacket thick. inch: 0.009" Nom. Jacket thick. wall in: 0.015" Nom OD inch: 0.176" Weight per MFT: 22
Insulation	Premium grade color coded polymer
Jacket	• Premium grade natural polymer alloy (plenum) • Premium grade SR PVC (non-plenum) • Suitable for use from 0° C to +75° C • Suggested rating of 300V
Shield	Overall polyester supported aluminum foil, plus a stranded tinned copper drain wire to facilitate grounding
Packaging	1000 ft. (305m); pay-out cartons 1000 ft. (305m) spools or reels
Application	All cables are compatible with applications that incorporate LonWorks® technology
Industry Approvals	Listed by UL as Type CM, CMP, CL2P and/or PLTC cables for use in NEC Article 800 and/or 725 installation
Note: Comm4 link limits for new VariTrac CCP	3500 feet (daisy chain), 35 devices

Getting Started

Familiarize yourself with the system components and preview the installation procedures before installing and configuring the VariTrac system.

Installation and configuring procedures appear in suggested order of performance:

- Unpack and inspect the components
- Mount the wiring base
- Wire AC power
- Binary input wiring
- Output wiring
- Install communicating sensor/bypass damper control
- Install bypass damper(s) and connect to communicating sensor/bypass control assembly
- Install VariTrac dampers
- Connect UCM wiring
- Set UCM DIP switches
- Install slaved dampers (if used)
- Install zone temperature sensors
- Communication link wiring
- Mount main module
- Install operator display (optional)
- Connecting modem devices

IMPORTANT

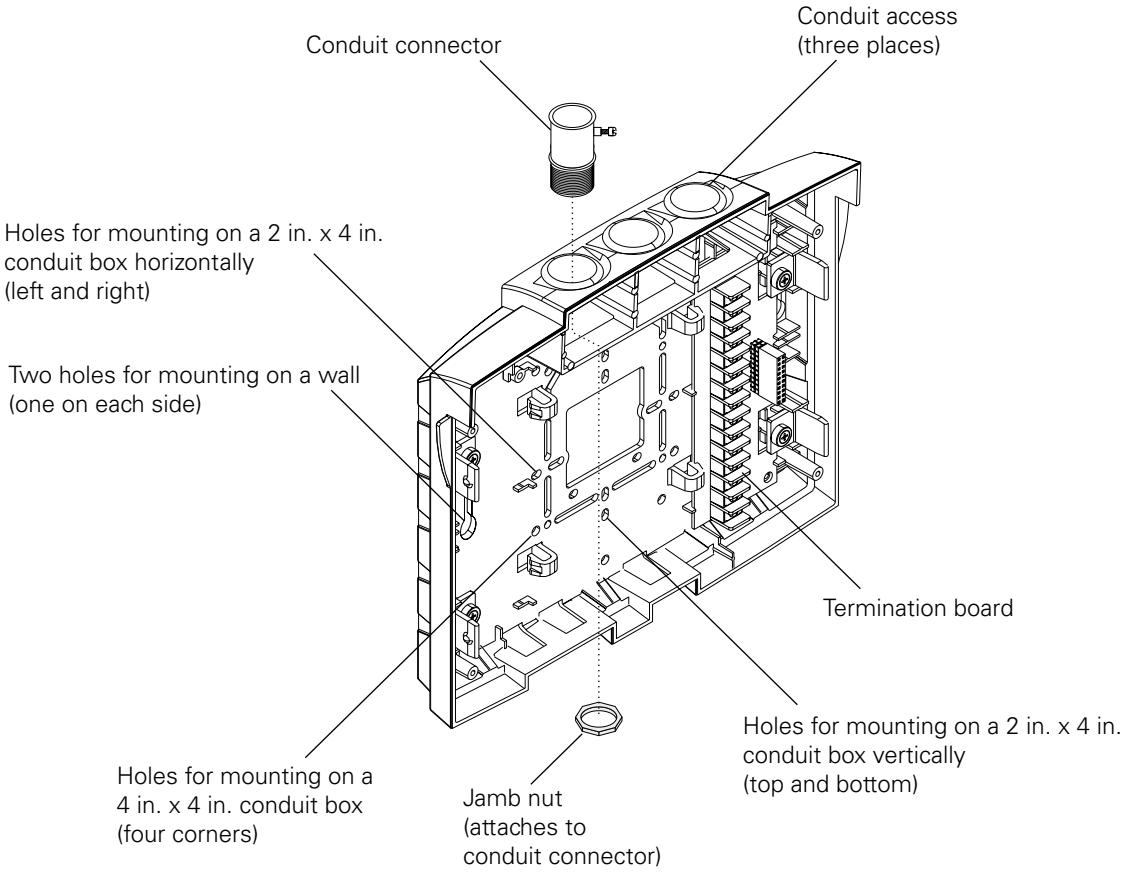
The CCP is designed to work with UCM III and IV VariTrac damper and VariTrane VAV controllers produced beginning January 1995. If any other dampers are used (especially on a retrofit job), please consult the factory to confirm VariTrac Central Control Panel compatibility prior to installation.

Unpack and Inspect the Components

Inspect components for damage. Match each component to the packing list to ensure that nothing was lost during shipment. Make sure that the literature is not lost or discarded with the packing material. Visually inspect the central control panel for damage. All components are thoroughly inspected before leaving the factory. Any claims for damage incurred in shipping must be filed with the carrier.

Mount the Wiring Base

Figure 3: Termination module conduit access and mounting holes



Mounting Requirements

Location

The VariTrac Central Control Panel should be mounted at a convenient level and located where it will be easily accessible. If possible, locate the CCP near the controlled equipment to reduce wiring cost.

Operating Environment

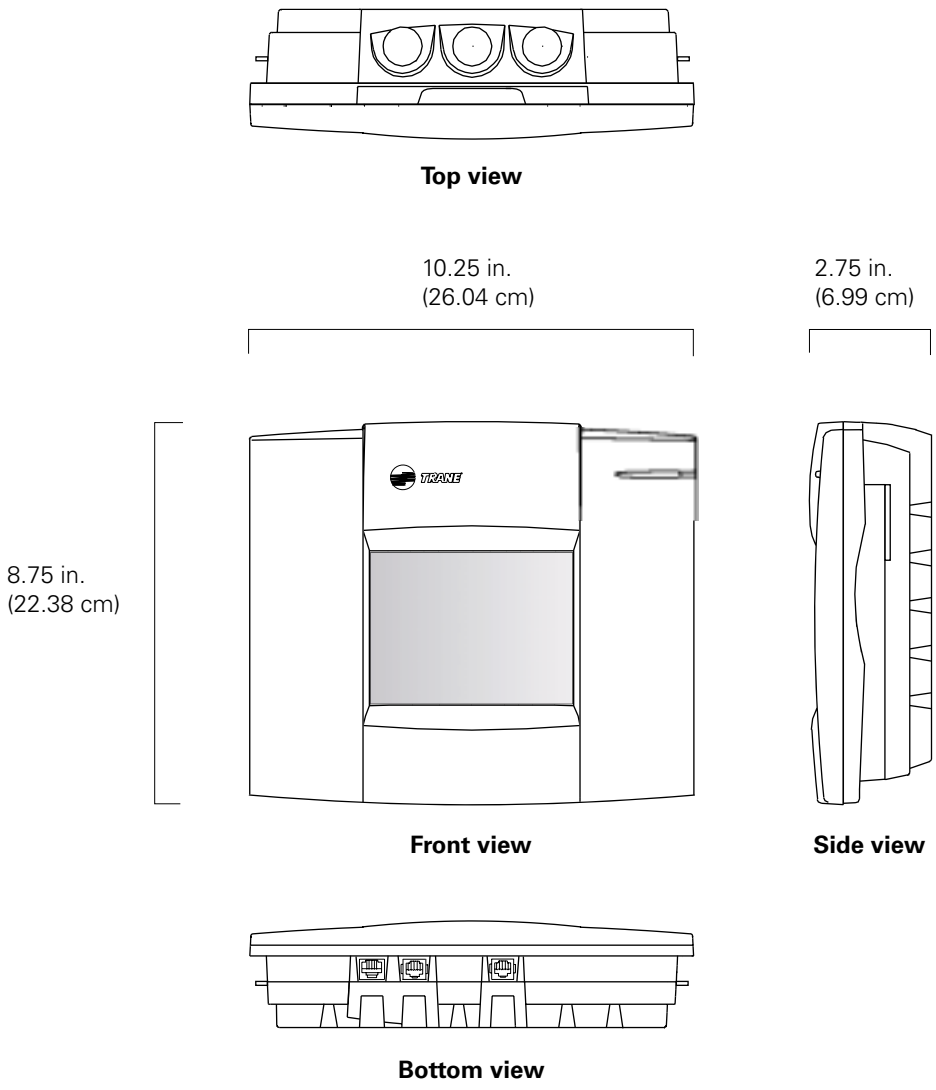
The VariTrac Central Control Panel is designed for indoor use only. It should be located in a dust-free and corrosive-free environment, and within a range of 32° to 120°F, and 10 to 90 percent humidity (non-condensing).

Clearances

Mount the VariTrac Central Control Panel on any vertical flat surface. The CCP is approximately 8.75 inches high, 10.25 inches wide and 2.75 inches deep.

The VariTrac Central Control Panel should be easily accessible for making wiring connections and for servicing. Provide two inches of clearance on the left and right sides, and sufficient clearance above the unit to make conduit connections. Sufficient space should be available in front of the unit to making wiring connections and perform maintenance.

Figure 4: Dimensions for VariTrac Central Control Panel Components



Secure Termination Module to Wall

1. Mark the location of the two 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 x 1 in. screw with plastic anchor).

Secure Termination Module to Conduit Box

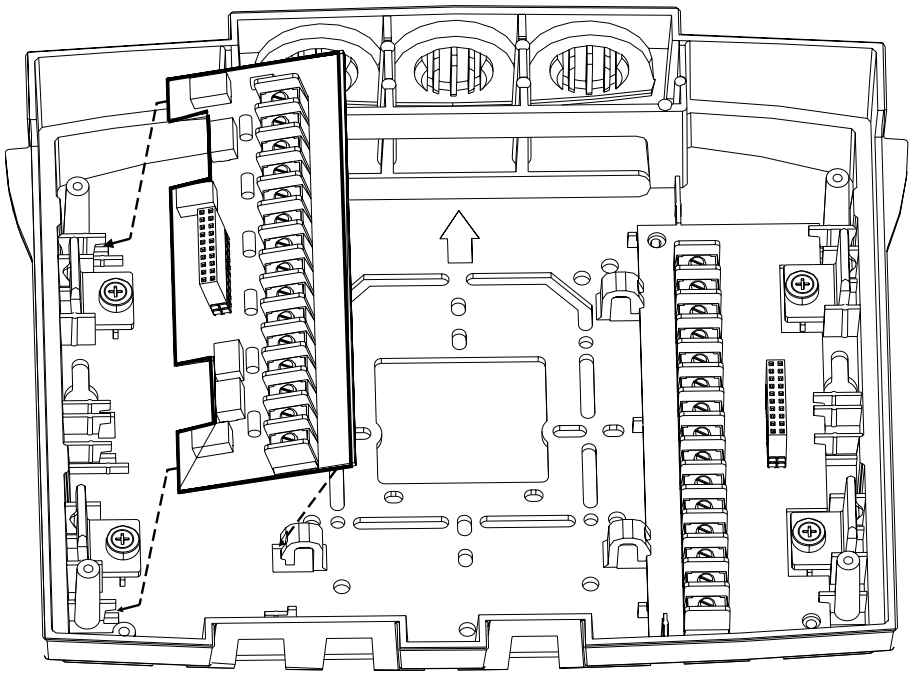
1. Remove the screws from the conduit box.
2. Line up the conduit box screw holes on the termination module (Figure 3) with the screw holes on the conduit box.
3. Install the screws.

NOTE: When mounting the termination module to a 4 in. x 4 in. conduit box, remove the plastic cover over the box for easier access. Do not attempt to break away excess plastic. Use a hack saw blade and carefully cut away the plastic.

Install VariTrac CCP Relay Board

1. Separate the main module and front panel from the termination module.
2. Remove the relay board from its packaging.
3. Orient the board so that its 20-pin socket connector faces left (see Figure 5).
4. Slide the left edge of the board underneath the catches on the left side.
5. Rotate the board to the catches on the right side.
6. Snap the board into place by pressing on the terminal block or on the right side of the board.

Figure 5: Installing Optional Relay Board



Wire AC Power

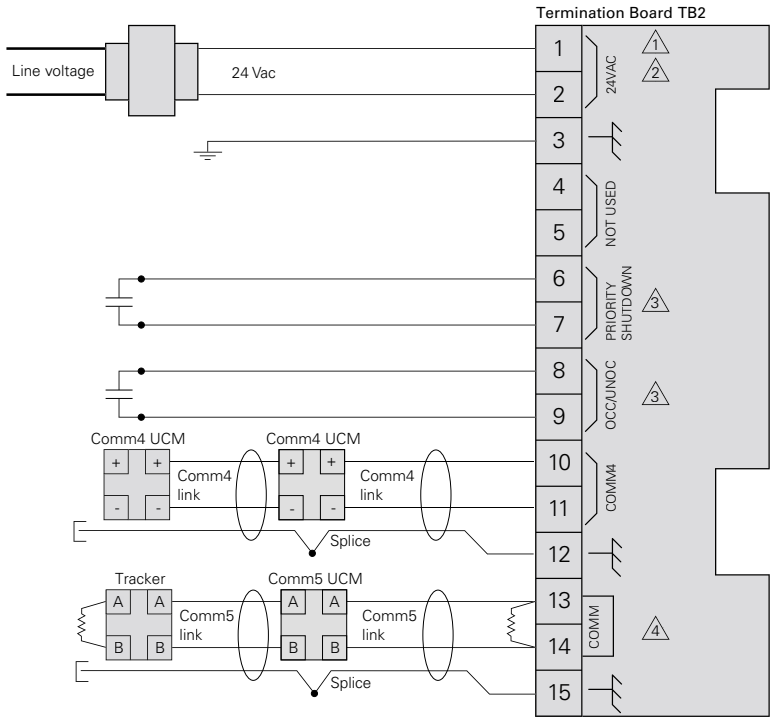
CCP Field Wiring

Field wiring to the VariTrac Central Control Panel includes:

- AC power wiring
- binary input wiring
- communication link wiring
- binary output wiring (requires optional relay board)

These procedures are detailed in the following sections. Refer to Figure 6 for wiring connections.

Figure 6: Field Wiring



Legend

- = Transformer
- = Figure note
- = Termination resistor
- = Twisted pair, shielded wire per Trane specifications
- = Shield termination
- = Contact points
- = Earth ground
- = Shield ground

Figure Notes

1 All customer wiring must be in acordance with national, state, and local electrical codes.

2 Trane recommends a dedicated transformer for 24 Vac power.

3 Do not apply voltage to the priority shutdown and occupancy inputs.

4 Example of Comm5 communication link wiring. See product-specific literature for Comm5 wire connection details.

AC Power Wiring

A dedicated 24 Vac, 30 VA Class 2 transformer is required to power the VariTrac Central Control Panel.

The VariTrac Central Control Panel requires 3-wire service with a nominal voltage of 24 Vac and a utilization range of 20 to 30 Vac. All wiring must comply with the National Electrical Code and local codes.

The 24 Vac line can enter the VariTrac Central Control Panel cabinet through the 4 in. x 4 in. knockout or through the knockouts in the top of the panel.

Figure 3 shows the 24 Vac conduit entry holes. Connect the 24 Vac power wires to TB2-1 and TB2-2 and the ground wire from the circuit breaker panel ground to TB2-3 as shown in Figure 6. Use copper conductor wire only.

AC Power Checkout

After the 24 Vac connections have been made at TB2, apply AC power by closing the circuit breaker for the Class 2 transformer.

Measure the voltages at TB2:

- The voltage between TB2-1 and TB2-2 should be 20 to 30 Vac.
- The voltage between TB2-1 and TB2-3 (ground) should be 20 to 30 Vac.
- The voltage between TB2-2 and TB2-3 (ground) should be 20 to 30 Vac.

IMPORTANT

The 24 Vac power supplies must not be used to power any devices other than the VariTrac Central Control Panel. This could result in malfunction of the VariTrac Central Control Panel due to electrical noise.

⚠WARNING

To prevent death or injuries from electrical shock, disconnect external power to the VariTrac Central Control Panel before making power connections.

⚠WARNING

When measurements are made with power on, use care to prevent injuries or death from electrical shock.

Binary Input Wiring

Use 18-22 AWG twisted pair copper conductor wire for binary input wiring. Wire run should be limited to less than 1,000 feet to avoid electrical noise problems.

Refer to Figure 6 for proper connection of binary inputs.

Priority Shutdown Input Wiring

This input closes the connection between TB2-6 and TB2-7. The most likely source of this input is a building management system or fire control panel, but any other device allowing a dry contact connection may be used. When the connection is open, the VariTrac Central Control Panel operates normally. When the connection is closed, the CCP goes into priority shutdown.

Occupied/Unoccupied Input Wiring

This input closes the connection between TB2-8 and TB2-9. This is most likely from an external time clock, but any other device allowing a dry contact connection may be used. When the connection is open, the VariTrac Central Control Panel operates in the occupied mode. When the connection is closed, the CCP operates in the unoccupied mode.

⚠CAUTION

Do not run binary input wires and AC power wires together in the same conduit or wire bundles.

⚠CAUTION

Controlling the binary inputs on multiple VariTrac Central Control Panels from a single contact closure is not permitted.

Output Wiring

Use only copper conductors for output wiring. The recommended wire size is 16-22 AWG. Do not run output wires in the same conduit or wire bundle with any AC power wires other than VariTrac Central Control Panel 24 V*ac* power.

Output wires should enter the cabinet through the conduit entry holes shown in Figure 3. Output wiring connections at the VariTrac Central Control Panel are shown in Figure 7.

The wire from the air conditioning unit to the CCP consists of one wire from each stage of heating, cooling, the supply fan, and the leg of the 24 Vac power source at the air conditioning unit. 24 Vac power single transformer systems terminate power at Rh and Rc (TB1-1 and TB1-2). Two transformer systems terminate the heating transformer at Rh (TB1-2) and the cooling transformer at Rc (TB1-1).

The remaining wires are terminated per the diagram in Figure 7.

Binary output relay contacts are rated at 24 Vac, 1 amp 24 VA pilot duty.

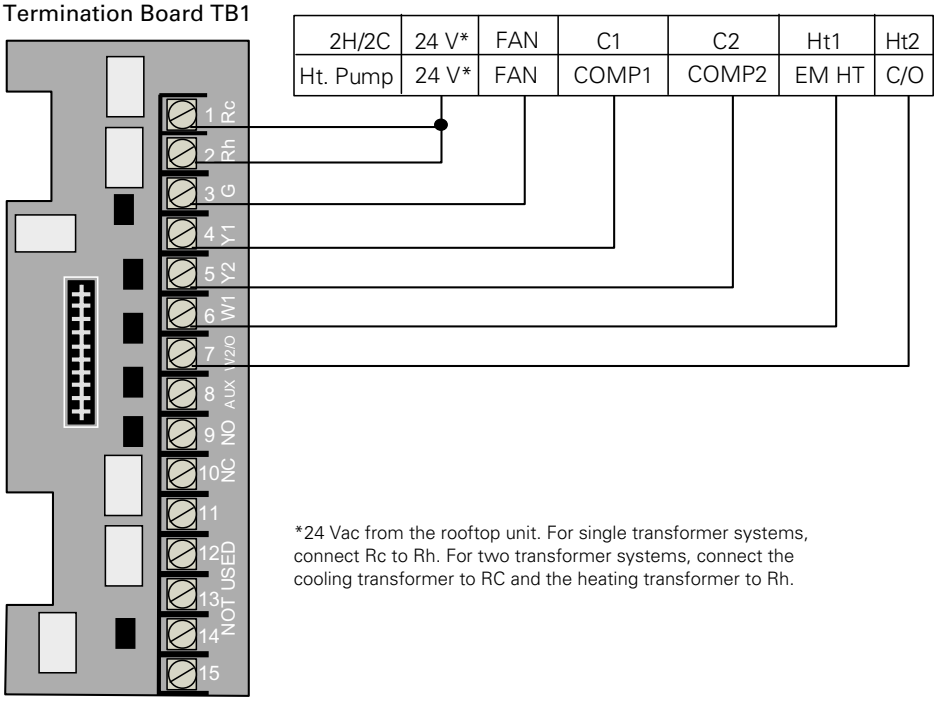
IMPORTANT

All output wiring must comply with applicable electrical codes. Metal conduit may be required by local codes.

IMPORTANT

Output wires run in the same conduit or wire bundle with any AC power wires other than VariTrac Central Control Panel 24 Vac power could cause the VariTrac Central Control Panel to malfunction due to electrical noise.

Figure 7: Binary Output Wiring for Optional Relay Board



Install the Bypass Dampers and Communicating Sensor/Bypass Control Assembly

Install Bypass Dampers

Bypass damper(s) should be located before the first zone runs out from the supply air duct. VariTrac dampers or supply duct branches should be installed downstream of bypass dampers. The distance between bypass dampers and the communicating sensor/bypass control should be two to three equivalent duct diameters.

In a ducted return system, bypass dampers will be ducted directly to the return air duct.

In systems with plenum return, bypass damper(s) should be ducted into the return air riser. Confirm that sufficient relief or exhaust exists to prevent return plenum pressurization. See Figure 8.

IMPORTANT

The use of a relief fan or backdraft damper is strongly recommended in the return air system. This will prevent bypassed air from pressurizing the return air duct system and spilling out of return grills into conditioned space, especially when the unit is in economizer mode.

Bypass Damper Wiring

The interconnect cable is pre-wired to the bypass damper and may be lengthened if necessary.

IMPORTANT

Mounting screws must be located towards the ends of the damper when hanging straps are used to avoid interference with the rotating damper. A label attached to the dampers indicates the acceptable areas for mounting screws.

IMPORTANT

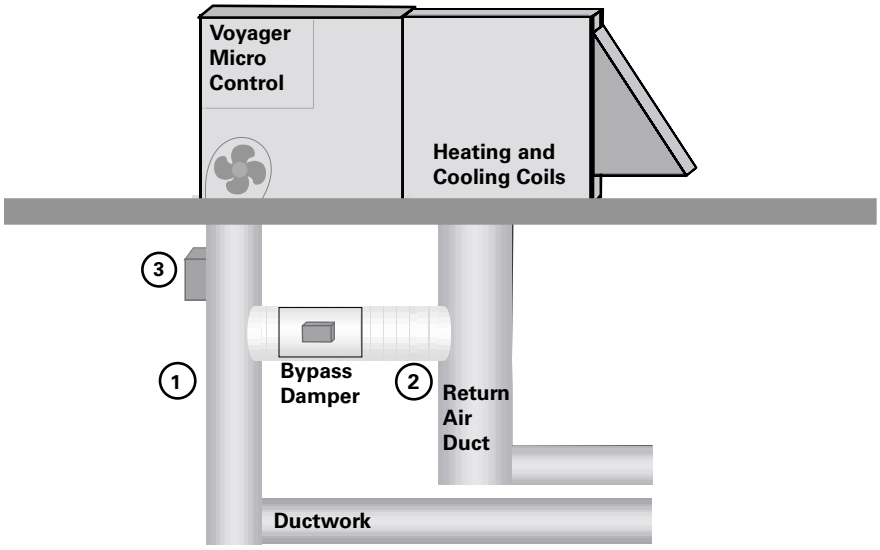
The bypass damper must be positioned to orient the drive shaft horizontally. Failure to do this may result in drive train malfunction (see Figure 11).

IMPORTANT

It is important to note the airflow direction when installing dampers. A label for this is present on each damper assembly.

Mount the Communicating Sensor/Bypass Control

Figure 8: Mounting the Bypass Damper Communicating Sensor/Bypass Control Assembly



1. Avoid high pressure turns and transitions
2. Use hard duct
3. Mount communicating Sensor/Bypass Controller 2-3 duct diameters upstream of bypass damper

The communicating sensor/bypass control is located between the supply fan and the bypass damper in the least turbulent location possible. It is recommended that the distance between the control and the nearest upstream transition be two to three equivalent duct diameters.

If the supply duct branches out at the riser, install the control in the largest supply duct.

A two-inch hole is required to insert the temperature and static pressure sensor. Use the supplied gasket to seal off air leaks. Secure the sensor to the duct with a minimum of three sheet metal screws.

IMPORTANT

The sensor assembly should be mounted on the side of the duct to keep the pressure transducer in a vertical orientation. Do not install horizontally on the top or bottom of a duct.

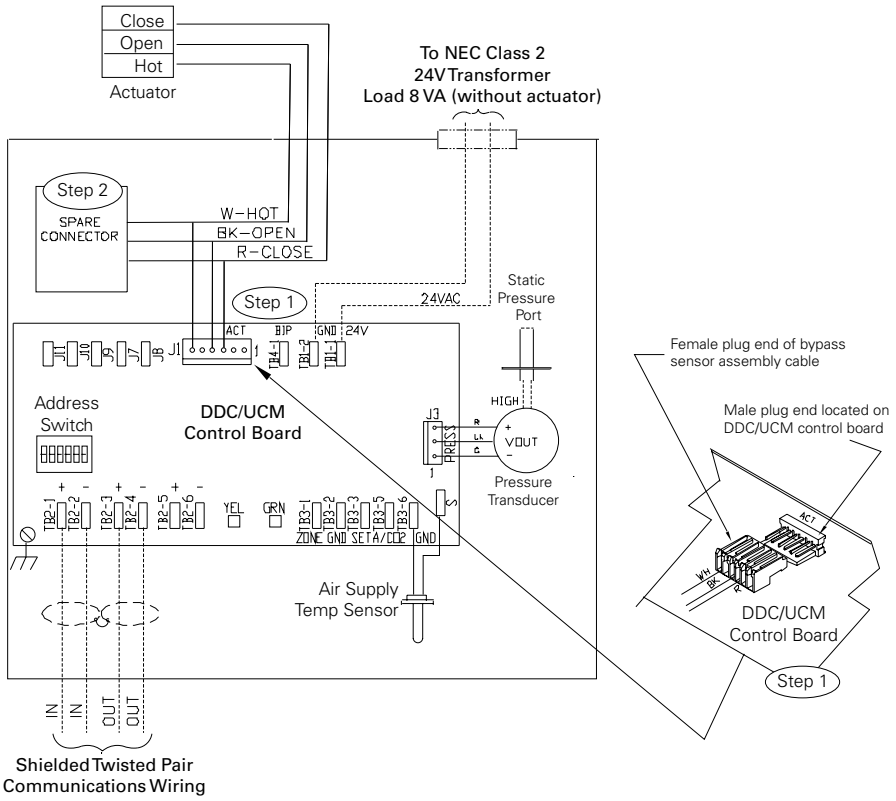
Connect the Communicating Sensor/Bypass Control Wiring

The pre-wired interconnect cable plugs into the actuator connector inside the control. The cable is designed to connect in one orientation only.

Refer to the diagram and connect as follows:

1. Plug the red actuator connector brom the BYPS damper onto the master damper UCM socket (ACT) as shown in Figure 9.
2. If two bypass dampers are used, connect the second bypass damper's red actuator plus to the spare connector socket pigtailed on the first BYPS damper cable assembly.
3. If cable assembly needs to be extended, cut and splice additional wire on the BYPS damper end of the cable.

Figure 9: Wiring the Communicating Sensor/Bypass Control



Install the VariTrac Dampers

A sketch of basic damper installation is shown in Figure 10. The damper may be connected with hard duct or flex duct at either end.

If two bypass dampers are installed, a pigtail socket is provided on the cable so the second damper can be plugged into the UCM.

IMPORTANT

Mounting screws must be located towards the ends of the damper when hanging straps are used to avoid interference with the rotating damper. A label attached to the dampers indicates the acceptable areas for mounting screws.

IMPORTANT

It is important to note airflow direction when installing the damper. A label for this is present on each damper assembly.

IMPORTANT

The control box on each damper must be positioned to orient the drive shaft horizontally. Failure to do this may result in drive train malfunction. (See Figure 11.)

Figure 10: VariTrac Damper Installation

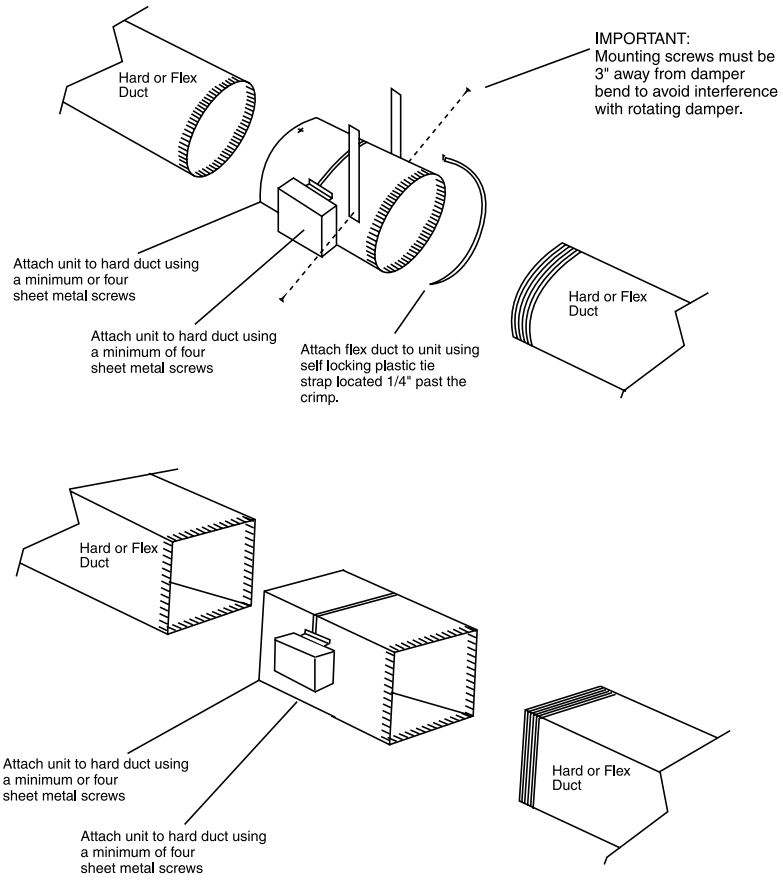
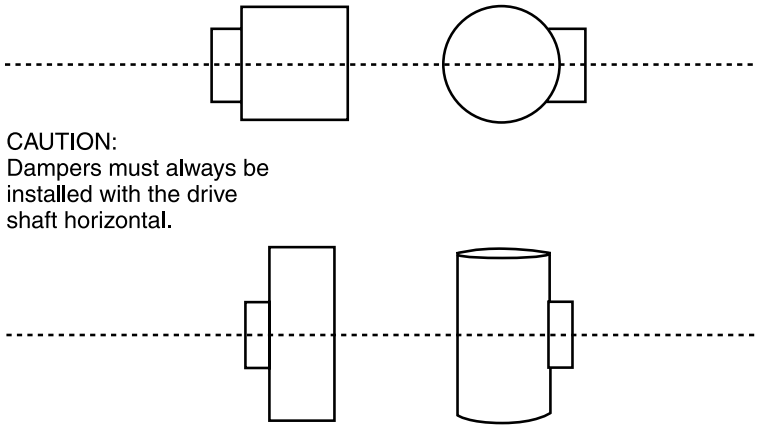


Figure 11: Proper Damper Mounting Positions



Connect UCM Wiring

Connect the power to terminals TB1-1 (24V) and TB1-2 (ground). 24 Vac is required to power the UCM control. 20 Vac to 28 Vac is acceptable. Use 18 to 20 AWG for power wiring.

The power consumption for an auto-changeover cooling-only UCM (model CHGR) is 10VA.

Local heat outputs are rated at 10VA maximum for each output. To determine the total UCM power requirements, add the power consumption of local heat to the circuit board power.

⚠CAUTION

Use wires with copper conductors only. The use of aluminum or other types of wire may result in overheating and equipment damage.

⚠CAUTION

Connecting a shared UCM power supply with reversed polarity will cause damage to the UCM, TCI, and central control panel.

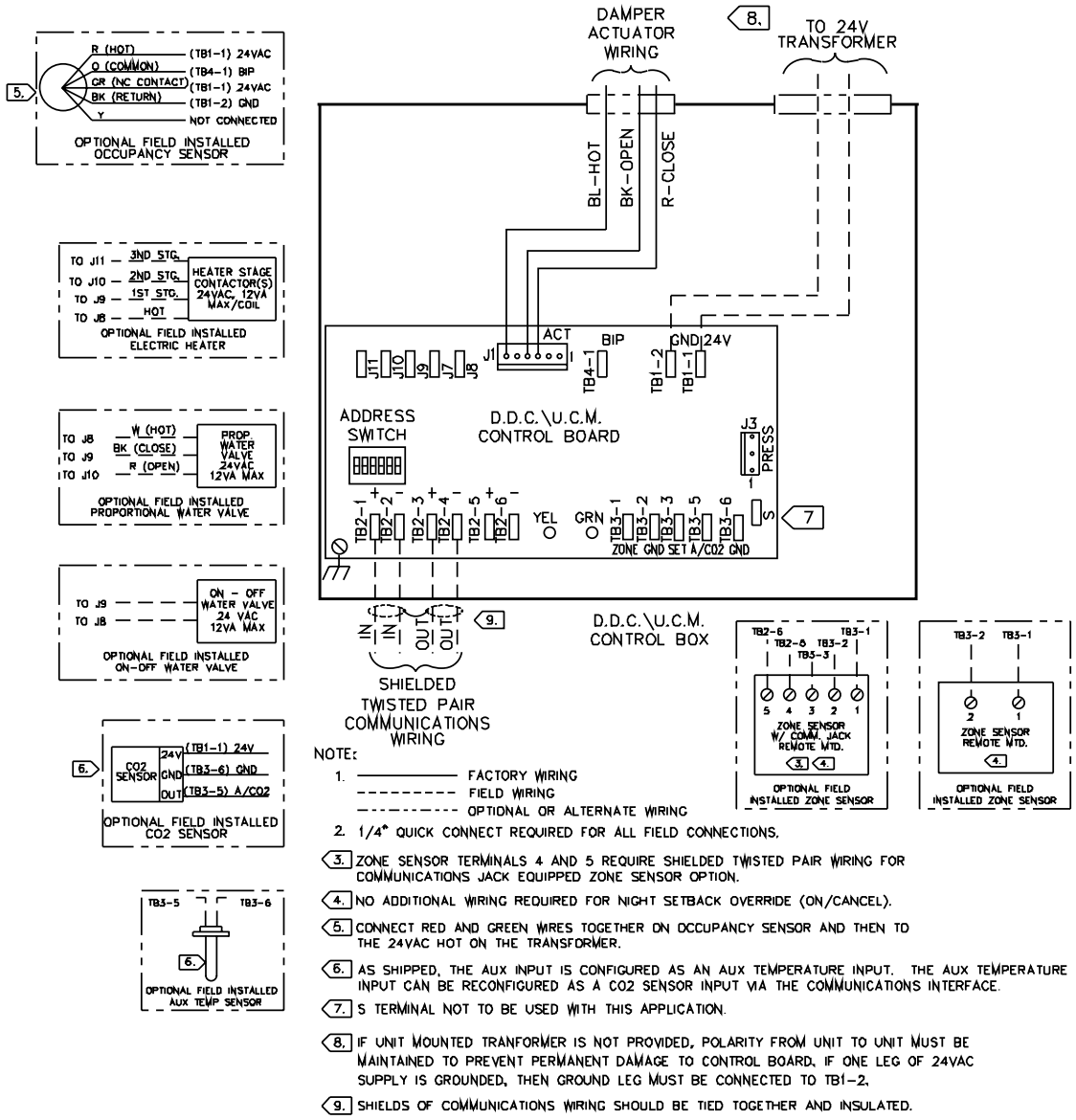
⚠CAUTION

When powering multiple UCMs from one transformer, polarity must be maintained. Terminal TB1-1 is designated positive (+) and Terminal TB1-2 is negative (–) to unit casing ground.

IMPORTANT

UCM control box cover must be replaced after field wiring to prevent electromagnetic interference.

Figure 12: UCM Wiring



Set the UCM DIP Switches

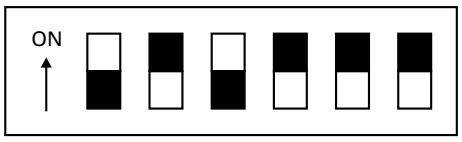
Each device connected to the VariTrac Central Control Panel must a unique address. No two devices (of the same type) can have the same address. Table 2 lists the address settings for UCM DIP switches connected to the VariTrac Central Control Panel.

IMPORTANT

The UCM located in the communicating sensor/bypass control must always be addressed as #33.

Table 2: DIP Switch Settings for UCM Damper Addresses

UCM Number	DIP Switch Settings					
	1	2	3	4	5	6
01		ON	ON	ON	ON	ON
02	ON		ON	ON	ON	ON
03			ON	ON	ON	ON
04	ON	ON		ON	ON	ON
05		ON		ON	ON	ON
06	ON			ON	ON	ON
07				ON	ON	ON
08	ON	ON	ON		ON	ON
09		ON	ON		ON	ON
10	ON		ON		ON	ON
11			ON		ON	ON
12	ON	ON			ON	ON
13					ON	ON
14	ON				ON	ON
15		ON			ON	ON
16	ON	ON	ON	ON		ON
17			ON	ON		ON
18	ON		ON	ON		ON
19		ON	ON	ON		ON
20	ON	ON		ON		ON
21				ON		ON
22	ON			ON		ON
23		ON		ON		ON
24	ON	ON	ON			ON
Addresses 25-32 used for Delivered VAV only						
25			ON			ON
26	ON		ON			ON
27		ON	ON			ON
28	ON	ON				ON
29						ON
30	ON					ON
31		ON				ON
32	ON	ON	ON	ON	ON	
Communicating Sensor/Bypass Control only						
33		ON	ON	ON	ON	
		= Off				



Example of Address #5

Slaved Dampers

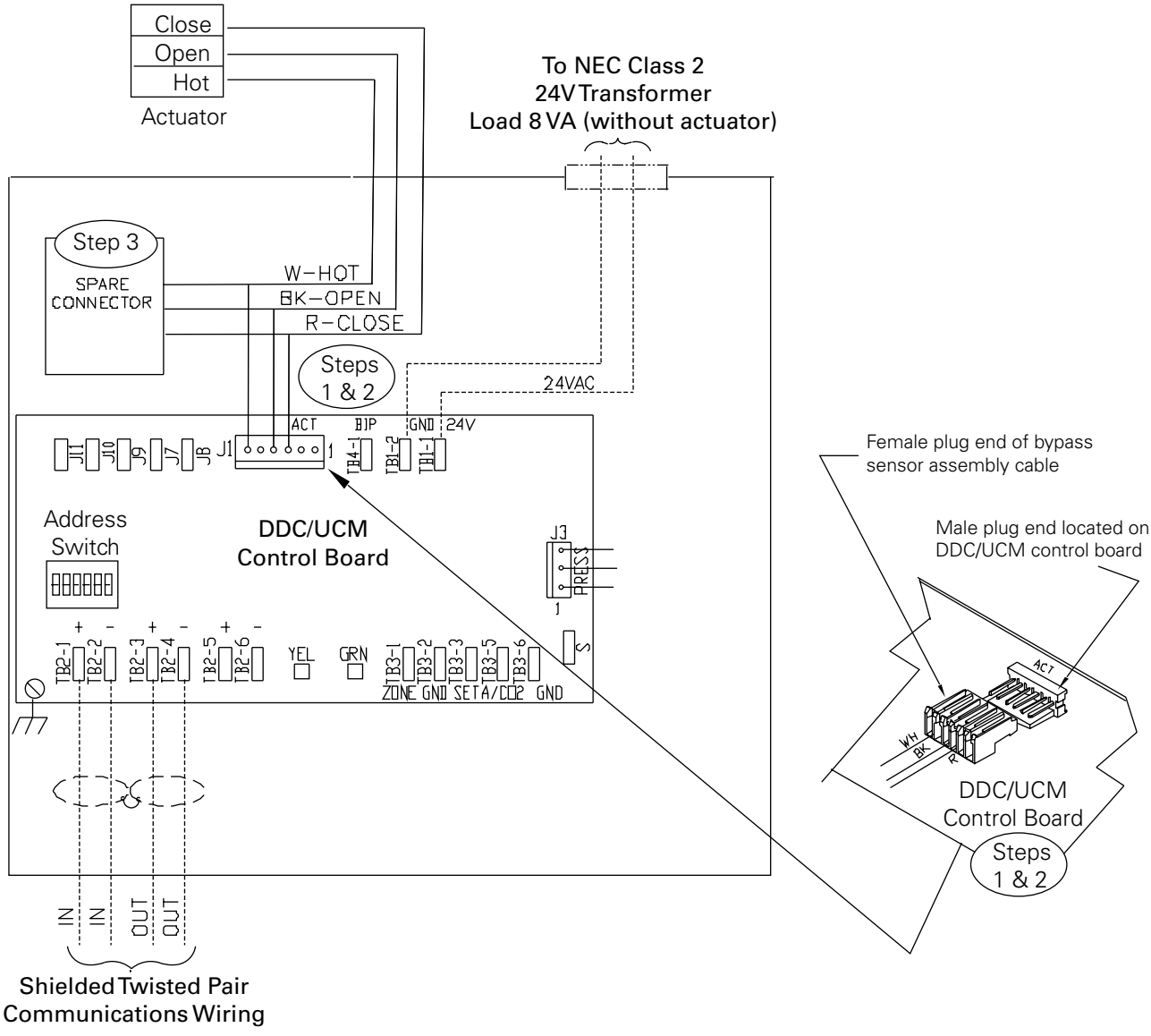
In some applications it may be desirable to control an additional damper from a single UCM. The slaved damper does not require a UCM circuit board. For this reason a model BYPS damper is paralleled directly to the

outputs of the UCM controlling the primary damper by using the BYPS damper cable assembly shipped with the BYPS damper.

Refer to diagram and connect as follows:

1. Disconnect the red actuator plug from the master damper UCM.
2. Plug the red actuator connector from the BYPS damper onto the master damper UCM socket (ACT) as shown in Figure 13.
3. Reconnect the master damper actuator's red connector to the spare connector socket pigtailed on the BYPS damper cable assembly.
4. If cable assembly needs to be extended, cut and splice additional wire on the BYPS damper end of the cable.

Figure 13: Wiring for Slaved Damper



Install the Zone Temperature Sensors

Five types of zone temperature sensors are available. The sensors are shown below in Figure 14:

- sensor with night setback override button, cancel button, and communications jack
- sensor with adjustable setpoint, night setback override button, cancel button, and communications jack
- sensor with adjustable setpoint and communications jack
- sensor with night setback override button, cancel button, and communications jack
- sensor only
- sensor with digital display, adjustable setpoint, night setpoint override button, cancel button, and communications jack.

Figure 14: Zone Sensor Options

Location

Proper temperature sensor location is crucial to occupant comfort. The sensor should be placed in the most critical area of the zone where there is free circulation of air. It should be mounted on a flat interior surface approximately 54 inches from the floor, or as specified by the project plans and specifications.

Avoid locating sensors in the following places:

- areas of direct sunlight
- areas blanketed by air from diffusers or subject to drafts
- surfaces with unconditioned areas behind them (such as an outside wall or the wall of a storeroom)

- areas near heat sources like equipment (appliances, computers, copiers, etc.) or concealed pipes or chimneys
- dead spots behind doors, draperies, or in corners.

Mounting Standard and Digital Zone Temperature Sensors

Zone temperature sensors consist of two basic pieces: the base and cover. Externally adjustable versions have an external adjustment knob. To remove the sensor cover from the base:

1. Note the position of the adjustment knob (if present).
2. Use a small screwdriver to gently pry the adjustment knob from the cover.
3. Before mounting a zone temperature sensor, remove zone sensor cover by easing the tip of a small screwdriver between the base and the cover. Gently lift the top of the screwdriver up. Do not force.

Follow these steps to replace the zone temperature sensor cover and (if present) adjustment knob after mounting:

1. Align the cover with the sides of the base.
2. Press the cover toward the wall until it snaps into place.
3. Align the knob to the position noted prior to its removal.
4. Push the stem through the cover hole until the stem sits firmly in setpoint potentiometer.
5. Turn the knob to assure that it rotates freely through the entire range of temperature settings.

Wall Mount

With the cover removed, feed the control wires through the rectangular opening in the base. Follow these steps if mounting the sensor to a wall:

1. Assuring that the base is level, position the back of the base over the wire entry in the wall.
2. Mark the centers of the two oblong mounting holes, then set aside the base.
3. Drill a 3/16 in. diameter hole approximately 1 in. deep at the marked locations.
4. Insert plastic anchors into the holes until they are firmly seated.
5. Feed the control wires through the base and fasten the base to the wall with the supplied mounting screws.
6. Connect the control wires to the proper terminals on the temperature sensor (See Figure 15).
7. Replace the sensor cover.

Junction Box Mount

1. With the cover removed, feed the control wires through the rectangular opening in the base.

2 Using two #6-32 screws, fasten the base to the junction box's threaded mounting holes.

3 Connect the control wires to the proper terminals on the temperature sensor (See Figure 15).

4 Replace the sensor cover.

Zone Temperature Sensor Wiring

A zone temperature sensor designed specifically for UCM damper control must control each unit. Field wiring for the zone temperature sensors must meet local code. If local codes require enclosed conductors, the zone temperature sensor wires should be installed in conduit

Do not route zone temperature sensor wires in conduit with 24V or any other high power conducting wires.

Different numbers of conductors are required based on the zone temperature sensor used. The following table lists the options and number of wires required.

Table 3: Zone Sensor Options

Zone Sensor Option	Number of Required Wires[1]
Sensor only	2
Sensor with adjustable setpoint	3
Sensor with night setback override and cancel buttons	2
Sensor with adjustable setpoint and night setback override and cancel buttons	3
Sensor with LCD display and adjustable setpoint and night setback override and cancel buttons	5[2]

1. *Some sensors have a communication jack available as an option. If these jacks are used, they must be wired to the UCM using a separate two-conductor, shielded cable that meets the specification for communication link wiring. Tape back the shield of the communication link (if used) at the zone temperature sensor and splice the other end into the adjoining communication link shield. The communication jacks do not need to be wired for the system to operate properly.*

2. *3 wires are required for sensor connection. 2 wires are required for 24 Vac power connection. For wire lengths less than 75 feet, an 18 gage, 5 conductor cable may be used. For wire lengths greater than 75 feet, use 18 gage, 2 conductor cable for the power wiring (TB1-TB1), and 18 gage, 3 conductor cable for signal wiring (TB2-TB3).*

Figure 15: Zone Temperature Sensor Controller Wiring

Terminal Connection Chart

Sensor TB1-#	UCM TB3-#	Field Wire Color Code
1	1	
2	2	
3	3	
4 (+)	+	
5 (-)	-	

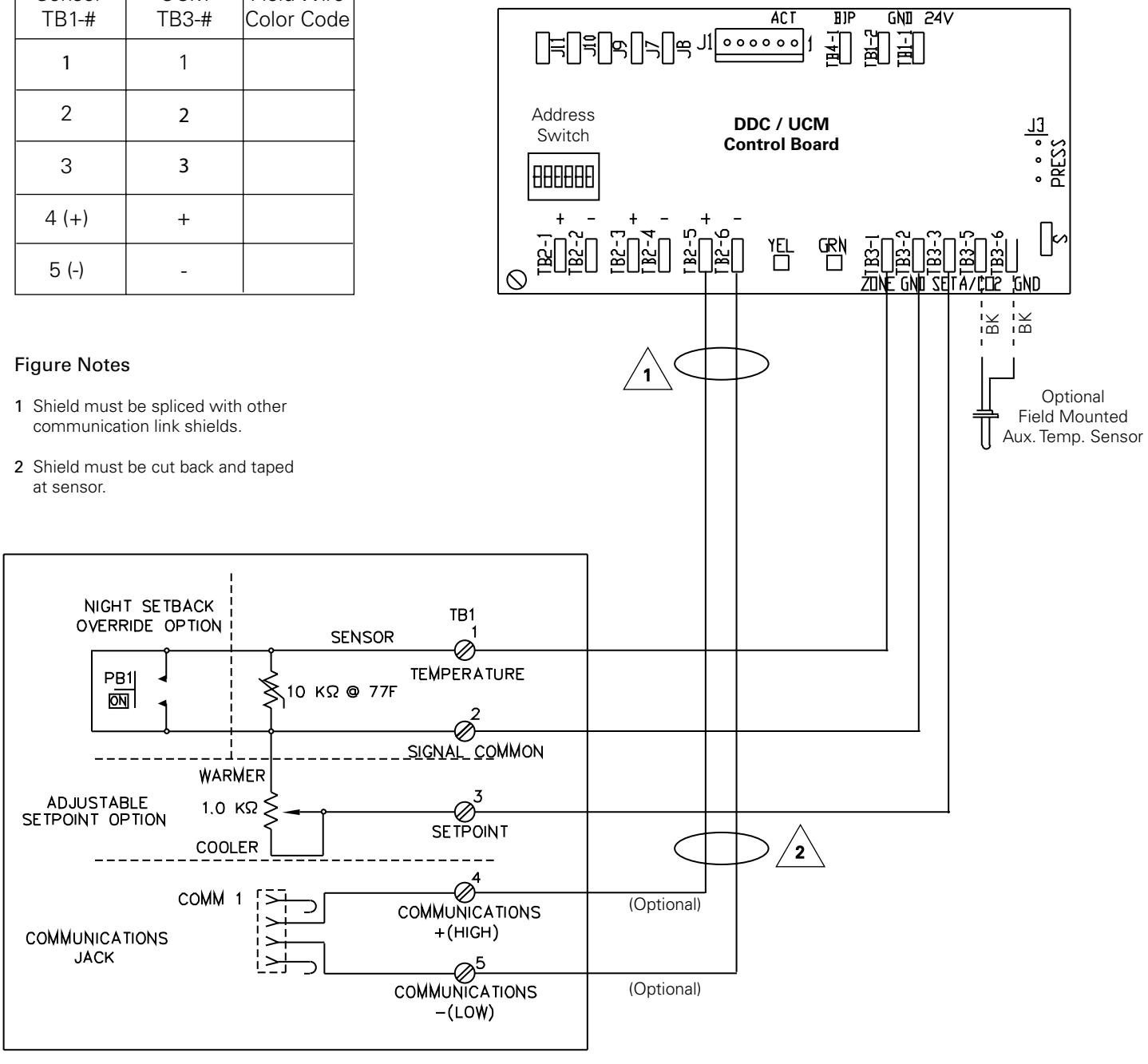


Figure Notes

1 Shield must be spliced with other communication link shields.

2 Shield must be cut back and taped at sensor.

Communication Link Wiring

The VariTrac Central Control Panel communication link (TB2-10, 11, and 12) connects the CCP, UCM dampers, communicating sensor/bypass damper control assembly, and Voyager/Reliatel rooftop units. Field wiring for the communication link must meet the following requirements:

- All wiring must be in accordance with the National Electrical Code and local codes.
- Communication link wiring must be Level 4 22 AWG twisted, shielded pair wire (meets or exceeds Trane specifications. See wiring specifications sections in this manual for further information).
- The maximum total wire length is 3,500 feet for the communication link.

At the VariTrac Central Control Panel, the communication link wires must be connected to Terminals TB2-10 (+) and TB2-11 (–). Refer to Figure 17. This connection is polarity sensitive.

IMPORTANT

Connections between lengths of link wiring should be soldered and taped. Wire nuts are not acceptable.

⚠CAUTION

Connecting the communication link with reversed polarity will lead to system malfunction and possible equipment damage.

The shield on the communication link wiring must be connected to TB2-12. The shield wire should be spliced with the shield from the next section of communication link wiring at every junction. Tape each splice to prevent any contact between the shield and ground. The shield should be cut and taped back at the end of the link.

Communication link wiring cannot pass between buildings.

IMPORTANT

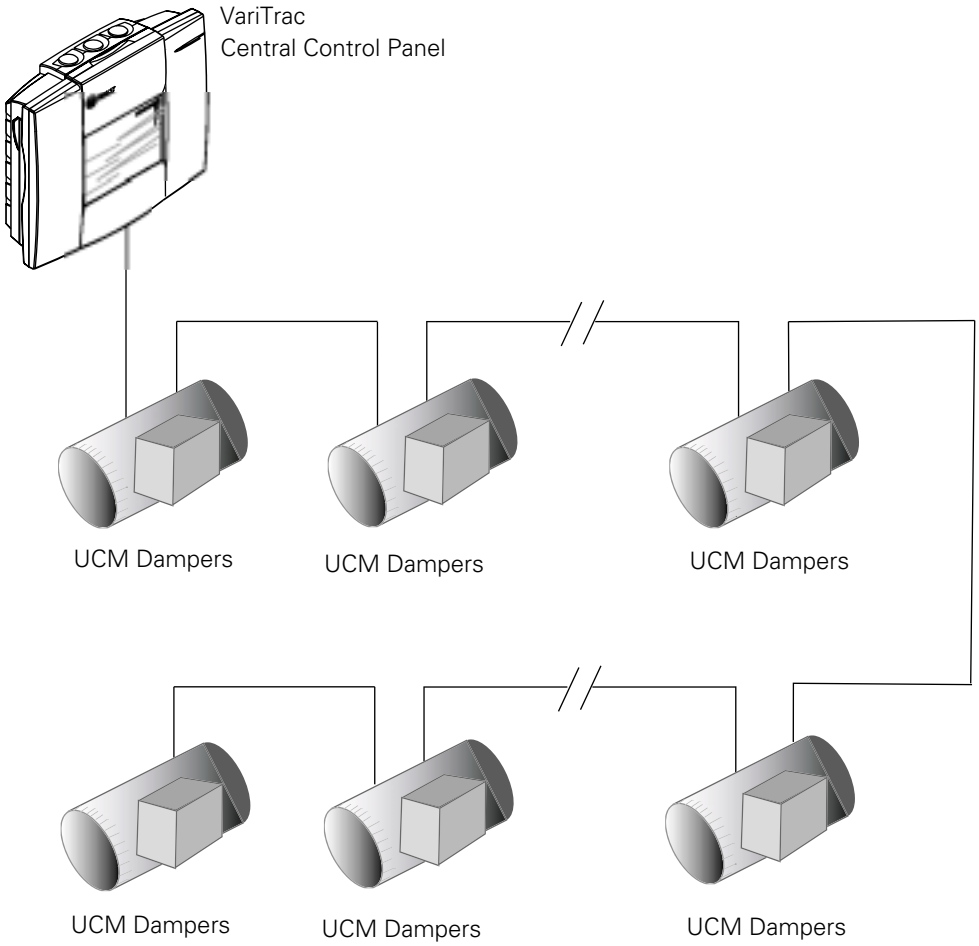
Improper communication link shield connections will lead to system malfunction.

IMPORTANT

Improper communication link routing will lead to system malfunction.

Connect UCMs on the communication link in a daisy-chain configuration. With this configuration, it is easier to solve communication problems by isolating portions of the communication link. See Figure 16 for an example of a daisy-chain configuration.

Figure 16: Daisy Chain Configuration for Communication Link Wiring



Each Voyager/Reliatel Rooftop requires a Trane communications interface (TCI) board for connection to the VariTrac Central Control Panel communication link.

Refer to the TCI installation manual for more information on connecting a rooftop to the communication link.

Figure 17: UCM Communication Link Wiring

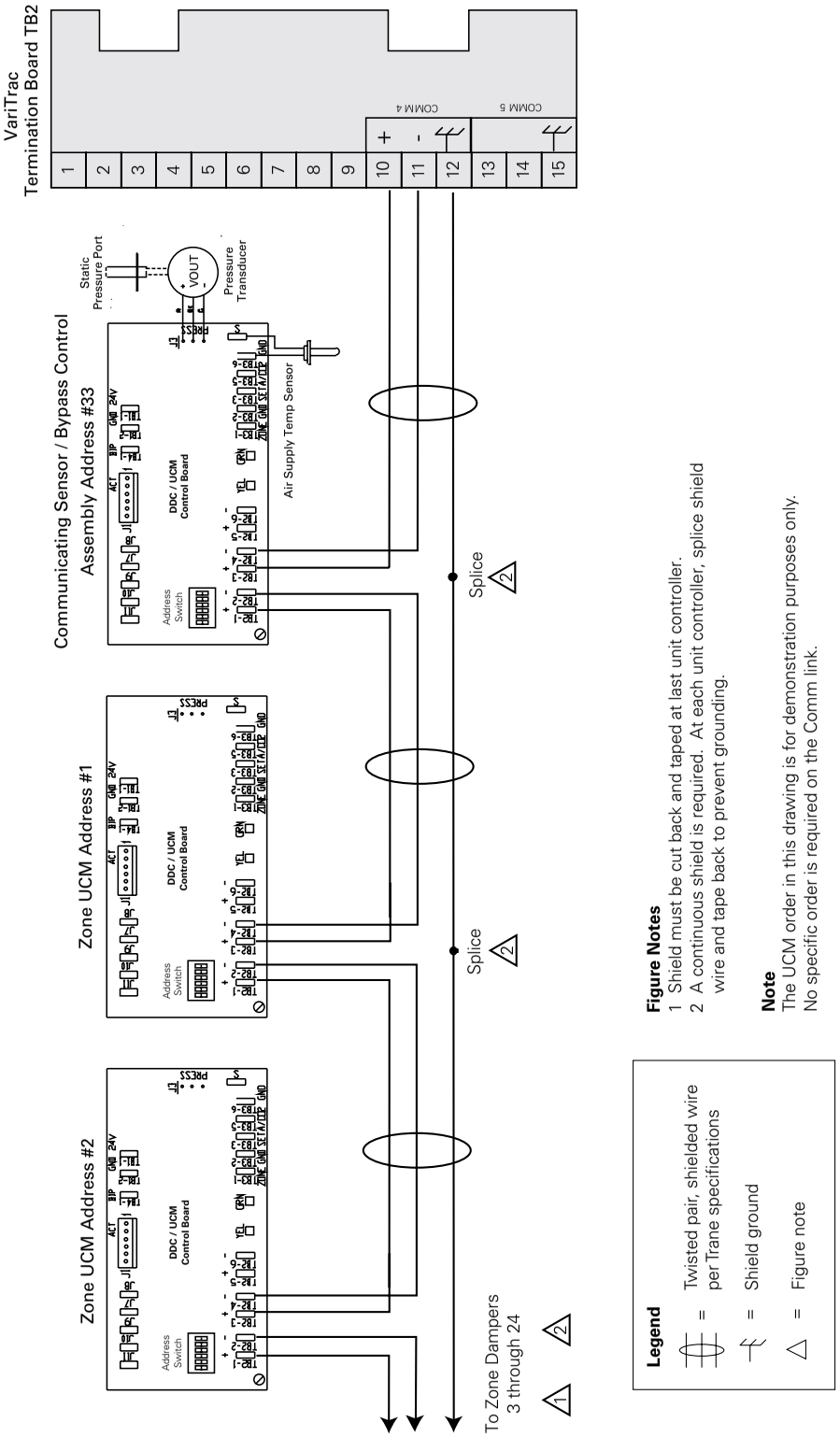


Figure 18: Voyager Communication Link Wiring

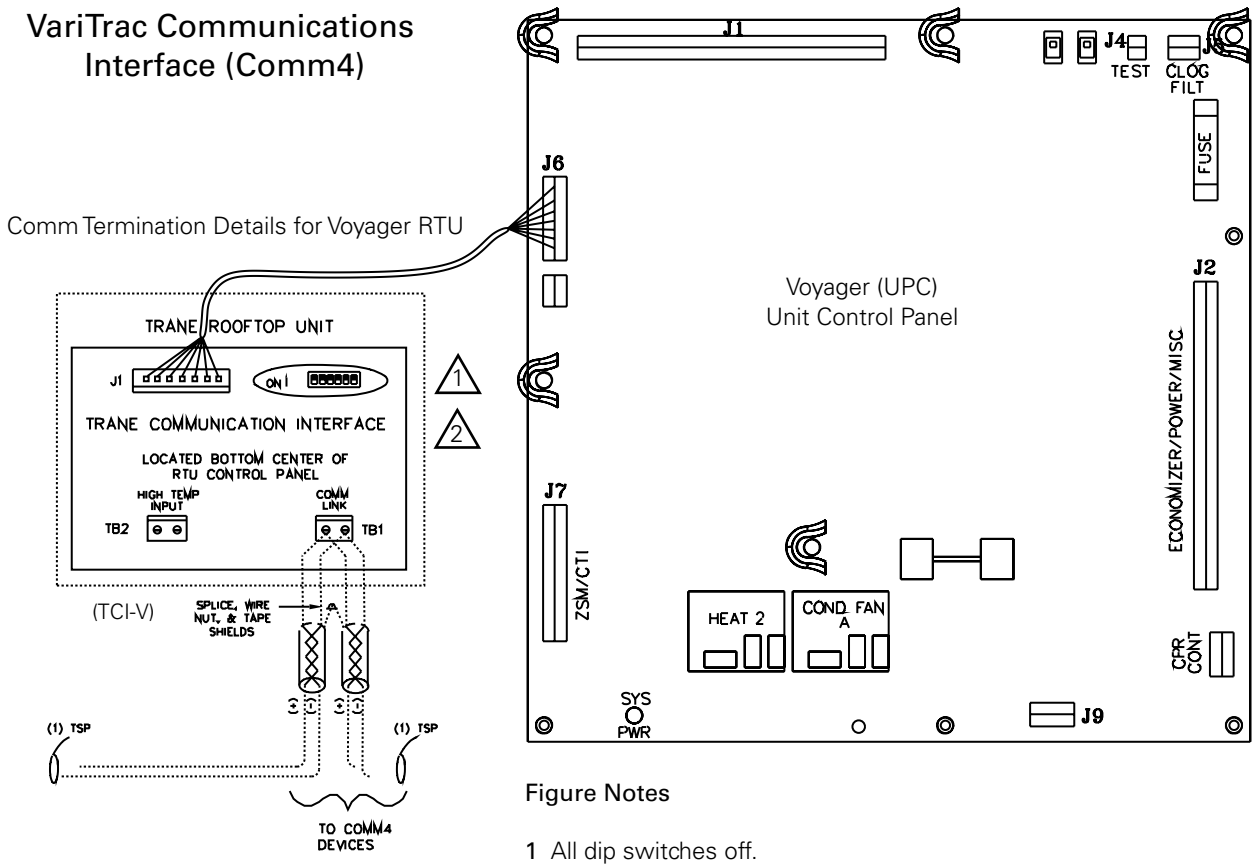


Figure Notes

1 All dip switches off.

2 Comm board to non-isolated Comm3 or Comm4 option.

Figure 19: Precedent Communication Link Wiring

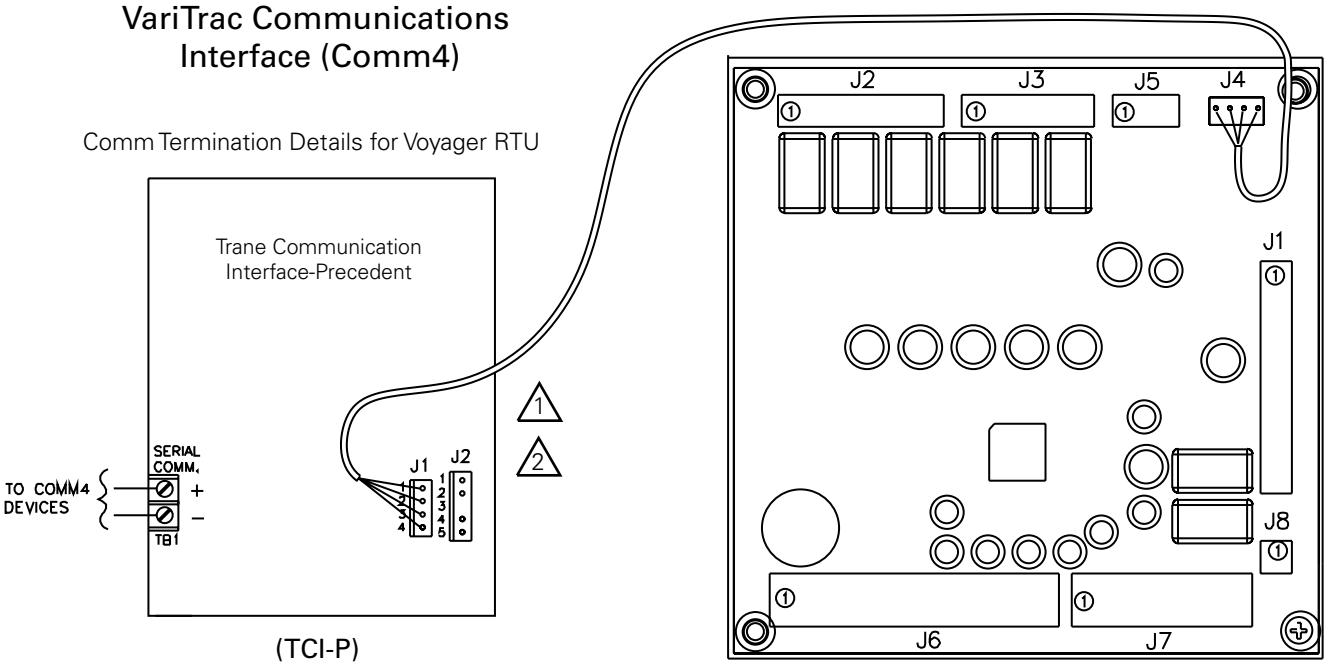


Figure Notes

1 All dip switches off.

2 Comm board to non-isolated Comm3 or Comm4 option.

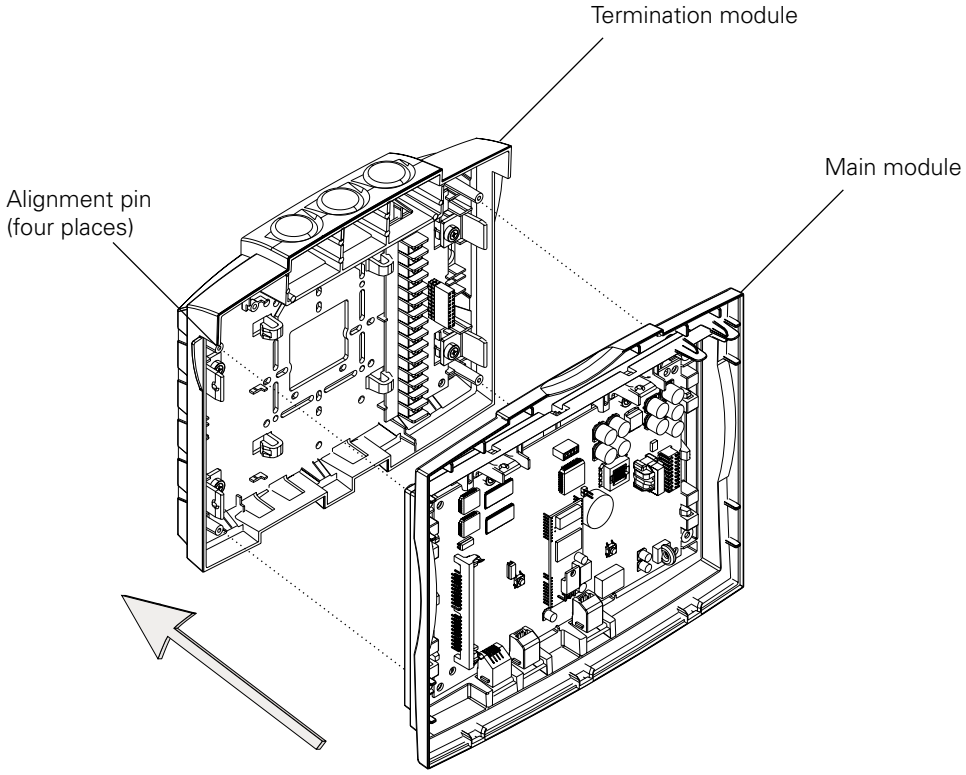
Mount Main Module

After mounting and wiring the wiring base, attach the main module.

NOTE: It is not necessary to turn off 24 Vac power to the wiring base prior to mounting and removing the main module.

- Verify that all the wires on the wiring base are securely fastened in place.
- Carefully line up the alignment pins on the wiring base with the back of the main module (Figure 20).

Figure 20: Mounting Main Module



IMPORTANT

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.

Firmly push the main module onto the wiring base until it snaps into place.

If 24 Vac is applied, the main module will start. The LEDs on the main module will flash on and off after a few seconds

Install Operator Display (optional)

An operator display is available to provide monitoring and control of VariTrac systems and UCM zones from one central location. The display provides a ¼ VGA touch screen to allow the operator to interface with the system. Temperature and system failure diagnostics and Voyager and Precedent Rooftop unit alarms are indicated on the operator display screen and in PC software.

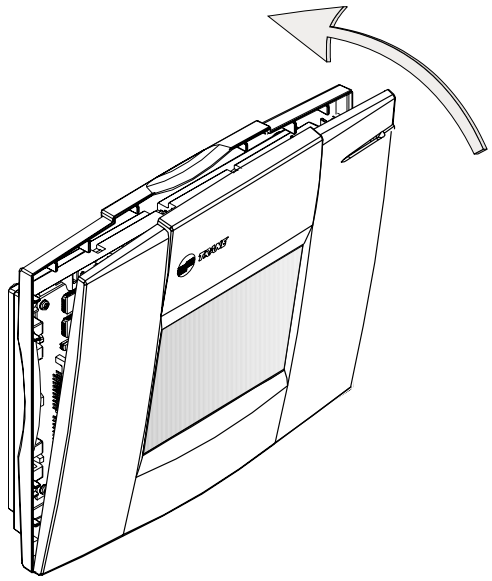
NOTE: It is not necessary to turn off 24 Vac power to the wiring base prior to mounting and removing the operator display.

After mounting the main module, attach the operator display.

- Tilt the top of the operator display about 30 degrees towards you.

- Align the three tabs on the bottom of the display with the slots in the bottom of the main module. (Figure 21).
- Starting with the center tab, insert the tabs into the slots.

Figure 21: Install operator display



IMPORTANT

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.

Push the top of the display module toward the main module until it snaps into place.

If 24 Vac is applied, the operator will turn on and display data.

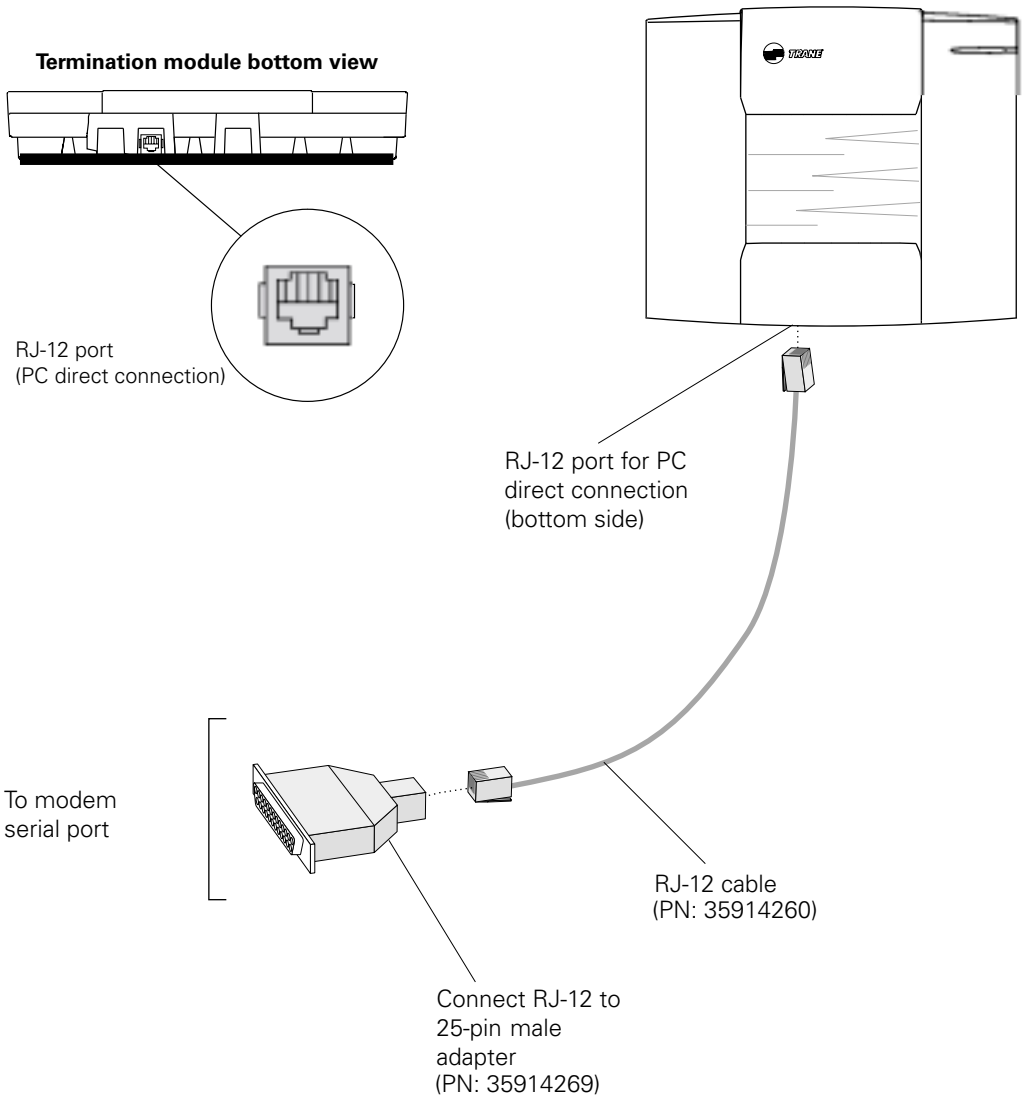
Connecting Modem Devices

Remote communications may be accomplished through a Trane building management system or with stand-alone modem attached to a single CCP via the RS-232 port.

A US Robotics Sportster™ fax/data external modem is recommended for CCP applications. Modems require hardware and software configurations for use with the CCP

Physical connection of the modem to the VariTrac Central Control Panel is shown in Figure 22.

Figure 22: Modular Adapters, Cable, and Connections for External Modems



Connecting PC with VariTrac Software to CCP

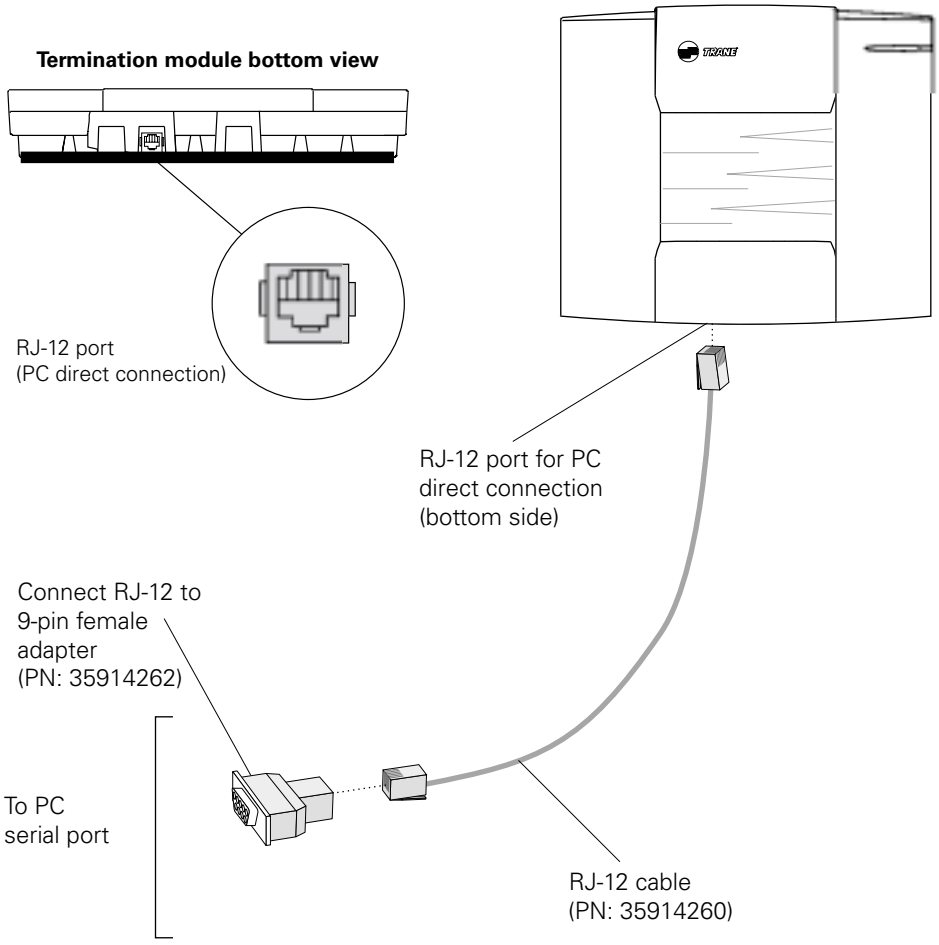
The VariTrac PC Software provides a graphic user interface for VariTrac and Delivered VAV systems. Advanced status and set-up information are available via a PC serial port connection.

Install the PC software on your PC following the instructions provided with the software CD.

Connect your PC to the Central Control Panel as shown in Figure 23. The connection is made using a PC serial port adapter and cable:

Adapter:	DB9 female to RJ12	(PN: 3591 4262)
Cable:	RJ12 to RJ12	(PN: 3591 4260)

Figure 23: Typical VariTrac Central Control Panel to PC serial port connections



Installation Checklist

Complete this checklist as the VariTrac Central Control Panel is installed to verify that all recommended procedures are performed. This checklist does not replace the detailed instructions provided in the manual. Read the entire manual carefully to become familiar with the installation procedures before installing the unit.

Shipment

- ☐ Inspect VariTrac Central Control Panel for shipping damage. File claim if necessary.
- ☐ Inspect zone dampers and accessories for shipping damage. File claim if necessary.

Unit Location

- ☐ Install VariTrac Central Control Panel in environment that meets temperature and humidity requirements.
- ☐ Securely mount VariTrac Central Control Panel on wall at an accessible location with proper clearances.

AC Power Wiring

- ☐ Field installed AC power wiring complies with all applicable codes.
- ☐ 24 Vac line from dedicated Class 2 transformer connected to VariTrac Central Control Panel at TB2.
- ☐ Voltage measured at TB2-1 to TB2-2 is 20 to 30 Vac.
- ☐ Assure that a reliable earth ground has been attached to TB2-3.

Communicating Sensor/Bypass Assembly

- ☐ Bypass damper(s) properly installed between supply/return ductwork per instructions.
- ☐ Communicating Sensor/Bypass Control mounted and wired to the bypass damper(s).
- ☐ Communication cable properly terminated at the Communicating Sensor/Bypass Control and routed back to VariTrac Central Control Panel.

Input Wiring

- ☐ Field installed input wiring complies with all applicable codes.
- ☐ Optional time clock and priority shutdown inputs terminated at TB2-6 through TB2-9 per instructions.

Output Wiring

- ☐ Field installed output wiring complies with all applicable codes. If used, relay wiring is terminated at TB1-1 through 11 per instructions.

VariTrac Dampers

☐ UCM dampers mounted and secure according to recommendations.

Zone Temperature Sensors

☐ Sensors are properly mounted and wired per instructions and in the correct space.

UCM Wiring

☐ UCM power is properly wired to TB1-1 and TB1-2.

NOTE: TB1-2 is COMMON (case ground) if grounded secondary transformers are being used. Confirm polarity from one UCM to the next if more than one UCM is being powered from a single transformer.

☐ Confirm voltage present between 20 Vac and 28 Vac.

☐ Ensure that the sensor is properly terminated.

☐ If optional local heat is being used, confirm wiring per appropriate diagram.

Communication Link Wiring

☐ Field installed communications wiring complies with all applicable codes.

☐ VariTrac Central Control Panel communication link wiring to UCMs is connected at TB2-10, TB2-11, and TB2-12 on the CCP.

☐ Communication link wiring is properly terminated at each zone damper UCM on terminals TB2-1 through TB2-6. Ensure that polarity (+ -) has been maintained through the link.

☐ Communication link wire shields spliced at each device junction and taped to prevent contact with earth ground.

System Start-Up and Checkout

Pre-power-Up Checkout

Central Control Panel

- Measure the supply voltage to the CCP TB2-1 and TB2-2. The supply voltage should be between 20 Vac and 30 Vac.
- Assure that a reliable ground is attached to TB2-3 on the CCP.
- Check the UCM communication link to assure that the wire designated (+) is connected to the TB2-10 and the wire designated (–) is terminated at the TB2-11. The shield must be connected to TB2-12.

⚠WARNING

The following test should not be performed until all people and equipment are clear of the air conditioning unit.

If the air handling unit is controlled by the optional field installed relay board, check the operation of the supply fan and heating and cooling stages by jumping the appropriate terminals of the binary output terminal block TB1. This check assures that the wires are properly terminated at the CCP and that the air conditioning unit is operational.

UCM

- Verify that the damper is installed with the drive shaft horizontal. See the Installation and Wiring section of this manual for more details.
- Check to assure that all mounting screws are a minimum of three inches away from the center damper bead if hanging straps are used. This allows full rotation of the damper.
- Check the supply voltage at TB1-1 and TB1-2. Polarity is important. Notice that TB1-1 is designated 24V and TB1-2 is designated ground to unit casing ground. The acceptable voltage present is 20 Vac to 28 Vac.

⚠CAUTION

Connecting a shared UCM power supply with reversed polarity will cause damage to the UCM, TCI, and Central Control Panel.

When powering multiple UCMs from one transformer, polarity must be maintained. Terminal TB1-1 is designated 24V and Terminal TB1-2 is GND to unit casing ground.

- Verify that communications wiring is terminated at TB2-1 (+) and TB2-2 (–). Polarity is important.
- Verify that zone sensor connections are correct as detailed in the Installation and Wiring section of this manual.

- Verify that the proper unit address is set on each UCM.

Occupied Mode

After the system is completely wired and installed it is ready for the initial power-up. Upon power-up the CCP and UCMs will initiate the sequence of events that follows.

IMPORTANT

For the CCP start-up sequence to begin, it is necessary for one UCM and a communicating sensor/bypass control on the loop to communicate with the CCP.

- The CCP prepares for static calibration.
- UCMs begin driving closed to perform their calibration reset.
- After calibration, the UCMs are driven to maximum position, and the bypass begins to close.
- The "zero flow" voltage reading is taken with the fan off.
- System fan is turned on for approximately 45 seconds.
- High flow static sensor voltage is taken and stored in the CCP.
- The bypass damper is then driven to 50 percent and released.
- The UCMs are released from their MAX flow position.
- UCMs are scanned and heating/cooling callers are established.
- Fan remains on if edited to occupied fan mode "on".
- Fan energizes if occupied fan mode is edited to "auto" and sufficient requests are present.
- The control action of each UCM changes as appropriate.
- Heating or cooling is staged to maintain the discharge air temperature.

Unoccupied Mode

Each time the CCP enters the unoccupied mode, a static sensor self-calibration sequence takes place.

Powering Down the System

CCP power must be disconnected to avoid unnecessary zone tagging and personal injury during service.

UCM LEDs

Green and yellow LEDs on the circuit board help diagnose communication or circuit board problems. Conditions indicated by the LEDs are:

Green LED

ON	Normal Operation
OFF	No 24 Vac power, or defective board
BLINKING	Defective Board

Yellow LED

ON	Reversed communication link polarity
OFF	No communication link activity or defective board
SLOW BLINK	Communication on the link not intended for that UCM
FAST BLINK	The UCM communicated with the CCP

Tests and Troubleshooting

Displayed Failures

Static Sensor Calibration Failure

If static sensor calibration fails, the CCP uses 0.50 inch wg as the static pressure setpoint.

The zone dampers continue to control normally. Failed static sensor calibration may indicate that the position or location of the sensor is not correct. See mounting the communicating sensor/bypass control in this manual. The following conditions create a static sensor calibration failure:

- No UCMs are communicating
- No UCM can be driven to MAX due to group level overrides
- Zero static reading was not in the range of 0.15 to 0.45 Vdc
- High flow static reading is less than 0.10 Vdc greater than the zero static reading
- Fan does not run during the start-up calibration sequence
- Design static pressure value is too low
- Bypass damper(s) are operating incorrectly

Discharge Air Temperature Sensor Failure

If the discharge air temperature sensor fails, the CCP issues a priority shutdown command:

- All zone dampers drive to maximum
- Bypass damper drives to 50 percent
- Fan and all stages of heating and cooling are de-energized

This failure appears in diagnostics on the operator display and PC software

A shorted or open temperature sensor or failed communicating sensor/bypass control is the cause.

Communication Failure

If communications fails (no UCMs communicating), the CCP:

- De-energizes the fan and all stages of heating and cooling
- Drives the bypass to 50 percent

Individual UCM communications failures will be displayed in diagnostics on the operator display and PC software.

Check all wiring connections and polarity. See the Communications

Troubleshooting section in this manual for more details.

Zone Sensor Failure

If the zone sensor fails, the damper drives to minimum position, and its vote is excluded.

Zone Setpoint Failure

If a setpoint fails, the UCM automatically uses the edited occupied cooling and heating setpoints.

Auxiliary Sensor Failure

If the auxiliary sensor circuit opens, the temperature reading on the display screen reads and a diagnostic is be displayed on the operator display and PC software. If the auxiliary sensor is used on a stand alone UCM to establish the control action, the UCM remains in the current control action.

Static Pressure Sensor Troubleshooting

The static pressure sensor signal enables the CCP to recognize system static and adjust the bypass damper accordingly. If a problem exists with the sensor or its location, the bypass damper controls with default values. If a "failure" persists, perform the following:

1. On the communicating sensor/bypass control UCM, read the voltage across J3-1 (green wire) and J3-3 (red wire). Voltage should be between 4.50 Vdc and 5.50 Vdc.
2. Read the transducer output voltage across J3-1 (green wire) and J3-2 (black wire). Voltage should be between 0.20 Vdc and 0.45 Vdc. Record the zero flow voltage.
3. Wait approximately 4 minutes after power-up for the system fan to start. Read the transducer output voltage again across J3-1 (green wire) and J3-2 (black wire). The difference between this voltage and the zero flow voltage should be 0.10 Vdc minimum.
4. If a defective transducer is suspected, check the output voltage with a low-pressure source and Magnahelic gauge. Record the zero flow voltage. Connect a low-pressure source and Magnahelic gauge to the "hi" port of the transducer. Input 1 inch of pressure. The voltage should be approximately 0.750 Vdc greater than the zero flow voltage. The reading on the voltmeter will include the zero flow voltage.

⚠CAUTION

Do not exceed 2 inches of input pressure or the transducer will be damaged.

Signal change must be 0.10 Vdc minimum or a "AHU air flow" "failed" message will be displayed

Zone, Auxiliary and System Temperature Sensor Checkout

If temperature is reported to the UCM or CCP seems wrong use the temperature-resistance table (Table 4) to verify the integrity of the adjustable

setpoint potentiometer or the sensor. Measure resistance across the terminals the device is connected to. For details of terminal connections see the Installation and Wiring section of this manual.

Table 4: Temperature Resistance Table

Temp	Thumbwheel Resistance	Sensor Resistance
-30	-	241000
-20	-	170000
-10	-	121000
0	-	88000
10	-	64000
20	-	47000
30	-	35000
40	-	26000
50	-	20000
55	792	16958
56	772	16541
57	753	16135
58	733	15741
59	714	15358
60	694	14962
61	675	14605
62	656	14257
63	636	13918
64	617	13588
65	597	13266
66	578	12652
67	558	12346
68	539	12347
69	519	12056
70	500	11771
71	481	11493
72	461	11222
73	442	10957
74	422	10698
75	403	10445
76	383	10197
77	364	9995
78	344	9718
79	325	9487
80	306	9260
81	286	9038
82	267	8821
83	247	8608
84	228	8399
85	208	8195
90	-	7300
100	-	5800
120	-	3800
130	-	3000
140	-	2500
150	-	2000
175	-	1300
200	-	837

UCM Local Heat Checkout

Turn the adjustable zone sensor to full heating, or adjust the temperature setpoints at the CCP.

IMPORTANT

Model DCEA local heat outputs are disabled in the heating control action. Model DCWA local heat outputs are enabled in the heating or cooling control action.

To check the local heat outputs:

- Disconnect any connections to Terminals J8, J9, J10, or J11.
- Place a 500 to 1000 ohm resistor between Terminals common (J8) and the terminals (J9, J10, or J11) tested. This simulates a load condition across the triacs within the circuit board.
- Measure the voltage between J8 (common) and the appropriate output (J9, J10, and J11). When the heat is off, the voltage will measure between 0 and 1.5 Vac. When heat is on, voltage should read 24 Vac.

Central Control Panel Input/Output Test

Binary Input Tests

With the system in the occupied mode:

- Jump the priority shutdown input (TB2-5 and TB2-6) with a wire. The system goes into priority shutdown.
- Remove the jumper on the priority shutdown input. Normal system operation is restored.
- Jump the uncc input with a wire (TB2-6 and TB2-7). The system goes into the unoccupied mode.
- Remove the jumper wire from the uncc input. The system will go into the occupied mode.

Communicating Sensor/Bypass Control Test

The following defines the procedure necessary to test the supply air temperature and static pressure sensor inputs to the communicating sensor/bypass sensor control:

Supply Air Temperature Input Test

- Disconnect the supply air temperature sensor from communicating sensor/bypass control terminals TB3-6 and TB3-7.
- System goes into priority shutdown.
- Disconnect the static sensor from J3.
- System displays static pressure failure.
- Input a resistance value between 9.4K and 10.5K across terminals TB3-6 and TB3-7. System returns to normal operation.

Static Pressure Sensor Input Test

In order to perform this test a voltage between 0.25 Vdc and 0.7 Vdc must be present at J3 pins 2 and 3. This voltage is from the pressure transducer in the communicating sensor/bypass control. If system pressure is insufficient to create at least .25 Vdc apply pressure to the transducer with an alternate pressure source.

⚠CAUTION

Do not over pressurize the transducer. The maximum pressure signal should not exceed 2 inches H20.

When the voltage is between 0.25 Vdc and 0.7 Vdc the static pressure failure clears.

Binary Output Test

The relay board binary outputs may be manually controlled from either the operator display or the PC software.

Great care must be taken when manually controlling these relays. There are NO minimum on-off timers or safe guards in effect during test mode. See the CCP operator guide for complete description of the binary output test.

⚠WARNING

This test can energize the fan and both stages of heating and cooling at the rooftop unit. Before starting this test make sure that all persons, tools, etc. are clear.

System Troubleshooting

Contact your Trane representative for problems that cannot be resolved using these guidelines.

Delivered VAV System

Overview

What is Delivered VAV?

Delivered VAV is a small tonnage VAV system made up of three Trane product families. It is the combination of:

- Voyager Commercial 27 ½ to 50 ton VAV Packaged Rooftop Unit
- Up to 32 VariTrane VAV boxes with DDC Controls
- VariTrac Central Control Panel with Operator Display

Delivered VAV will only work with this combination of Trane products. It will not support any other types of equipment.

The Voyager Commercial 27 ½ to 50 ton rooftop unit must be a VAV model with factory installed inlet guide vanes or variable frequency drive, microprocessor controls, and Trane Communications Interface.

Delivered VAV will support up to 32 VariTrane VAV boxes with the DDC controls option. They may be single duct boxes or fan powered boxes, and may have a factory installed local heat option if desired.

The heart of the system is the VariTrac Central Control Panel with Operator Display. The CCP acts as the communications hub of the system. It is responsible for coordinating the actions of the VAV rooftop and the actions of the VAV boxes with each other to meet the comfort requirements of the zones.

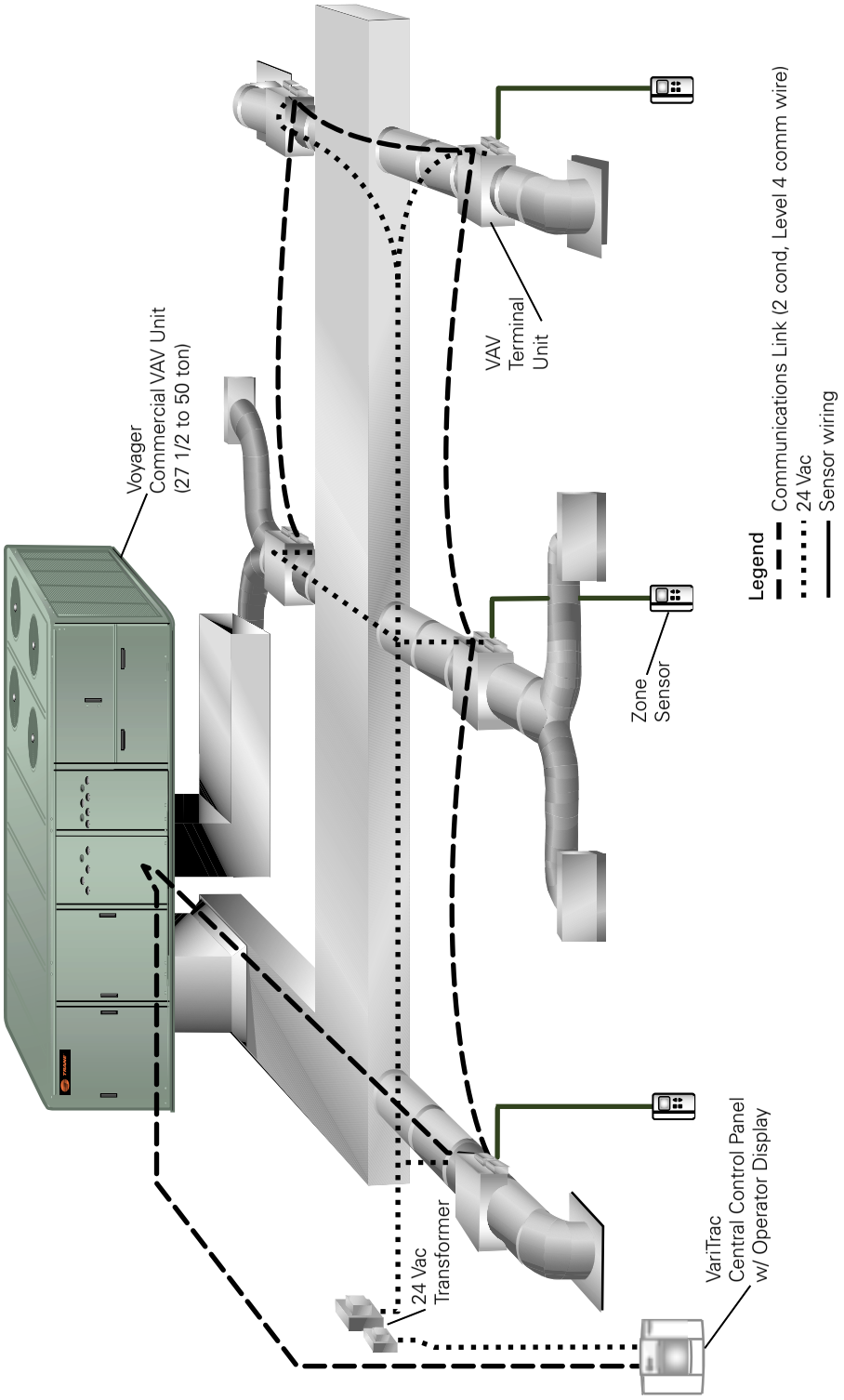
As in any other application, the Voyager Commercial VAV unit runs the supply fan at full constant volume whenever it goes into the heating mode, with all the VAV boxes commanded to maximum flow. For this reason the unit heat is only used for the Morning Warm-up and Daytime Warm-up modes available on the Voyager Commercial unit. In both of these modes the VAV boxes are commanded to maximum flow. If individual zone heating is required during normal daytime operation, a local heat source must be provided at the box.

What Delivered VAV is Not

Delivered VAV is not changeover-bypass VAV. It is a true pressure independent VAV system. The fact that we utilize the VariTrac Central Control Panel as the heart of the system does not make it a VariTrac system. There is no bypass damper in this system.

Additionally, Delivered VAV will only work with the combination of the Voyager Commercial VAV unit, VariTrane VAV boxes with DDC controls, and the VariTrac CCP with Operator Display. It will not support any other types of equipment.

Figure 24: Delivered VAV System Configuration



Central Control Panel

The VariTrac Central Control Panel is the central source of communications and decision making between the individual zones and the air conditioning unit. Connections to the CCP are:

- 24 Vac power
- binary inputs for an occupied/unoccupied signal and external priority shutdown signal (optional)
- ICS communication bus to the Trane building automation system (optional)
- UCM communication bus to the VAV boxes and Trane Voyager commercial 27 ½ - 50 ton VAV rooftop unit

Unit Control Module (UCM)

A unit control module is mounted to each individual VAV terminal unit. Inputs and outputs consist of the twisted shielded pair communication link, zone temperature sensor, optional CO_2 and occupancy sensors, 24 Vac power, damper motor control, and local heat outputs. Local heat may be duct or space mounted, and can be staged electric, pulse-width modulating electric, and modulating or staged two-position hot water.

VariTrane VAV Terminal Units

The function of the VariTrane terminal unit in a VAV control zone is to vary the volumetric airflow rate to the zone. VariTrane units are supplied with microprocessor-based DDC controls. Factory-installed controls are required with all types of terminal units.

VariTrane VAV Terminal Unit Types

Single Duct

Single duct terminal units control the volumetric flow of supply air to the space to maintain the zone temperature at setpoint. These units are generally applied in cooling-only VAV zones that require no heat during occupied hours. If local zone heat is necessary, it can be provided either remotely (for example, perimeter heat) or by terminal reheat (either electric or hot water coils).

Parallel Fan-Powered

Parallel fan-powered units are commonly used in VAV zones that require some degree of heat during occupied hours when the primary supply air is cool. The terminal unit fan is in parallel with the central unit fan; no primary air from the central fan passes through the terminal unit fan. The terminal unit fan draws air from the space return plenum.

Series Fan-Powered

Series fan-powered terminal units are used commonly in VAV zones that not only require heat during occupied hours, but also desire constant air volume delivery. The terminal unit fan is in series with the central fan. Primary air from the central fan always passes through the terminal unit fan.

The local series fan within the terminal unit operates whenever the unit is in the occupied mode. The volume of air delivered to the VAV zone is constant, but the temperature of the delivered air varies. As the zone requires less cooling, the primary air damper closes. As the primary air damper closes, the air mixture supplied to the zone contains less cool air and more warm plenum air. Remote heat or terminal reheat can provide additional local heating.

Auxiliary Temperature Sensor

The auxiliary temperature sensor allows the operator to monitor air temperature leaving a reheat device or measure duct temperature for automatic operation of a standalone UCM.

Zone Temperature Sensors

Five zone temperature sensor configurations are available:

- sensor only
- sensor with adjustable setpoint and communications jack
- sensor with night setback override button, cancel button, and communications jack
- sensor with adjustable setpoint, night setback override button, cancel button, and communications jack
- sensor with digital display, adjustable setpoint, night setpoint override button, cancel button, and communications jack

CO_2 Sensor

A CO_2 sensor may be connected to the UCM damper control to sense CO_2 levels in the space. This signal is communicated to the CCP for demand ventilation calculation and control.

Occupancy Sensor

A normally open occupancy sensor contact may be connected to the UCM damper control binary input to indicate zone occupancy.

Operator Display

A ¼ VGA monochrome LCD touch screen display is installed on the CCP. This display provides setup, diagnostic, and seven-day scheduling functions to the system.

Getting Started

Familiarize yourself with the system components and preview the installation procedures before installing and configuring the Delivered VAV system.

Installation and configuring procedures appear in suggested order of performance:

Installing the Central Control Panel

Refer to the following installation procedures for the CCP in this manual

- Unpacking and inspecting the components
- Wiring AC power
- Binary input wiring

NOTE: Ignore the sections referring to Installation of the CCP Relay Board and Binary Output Wiring. Those sections do not apply to this system.

Install VariTrane VAV Terminal Units

Refer to the appropriate installation instructions shipped with the VariTrane air terminal devices for proper installation.

Connect UCM Wiring

Refer to Connect UCM Wiring in this manual, and the appropriate installation instructions shipped with the VariTrane air terminal devices.

Set UCM DIP Switches

Refer to Set UCM DIP Switches and Table 2 in this manual, and the appropriate installation instructions shipped with the VariTrane air terminal devices.

Installing Zone Temperature Sensors

Refer to Installing Zone Temperature Sensors in this manual.

Communications Link Wiring

The VariTrac Central Control Panel communication link (TB2-10, 11, and 12) connects the CCP, VAV UCMs, and Voyager VAV rooftop unit. Field wiring for the communication link must meet the following requirements:

- All wiring must be in accordance with the National Electrical Code and local codes.
- Communication link wiring must be Level 4 22 AWG twisted, shielded pair wire (meets or exceeds Trane specifications. See wiring specifications sections in this manual for further information).
- The maximum total wire length is 3,500 feet for the communication link.

At the VariTrac Central Control Panel, the communication link wires must be connected to Terminals TB2-10 (+) and TB2-11 (–). Refer to Figure 26. This connection is polarity sensitive.

IMPORTANT

Connections between lengths of link wiring should be soldered and taped. Wire nuts are not acceptable.

⚠CAUTION

Connecting the communication link with reversed polarity will lead to system malfunction and possible equipment damage.

The shield on the communication link wiring must be connected to TB2-12. The shield wire should be spliced with the shield from the next section of communication link wiring at every junction. Tape each splice to prevent any contact between the shield and ground. The shield should be cut and taped back at the end of the link.

Communication link wiring cannot pass between buildings.

IMPORTANT

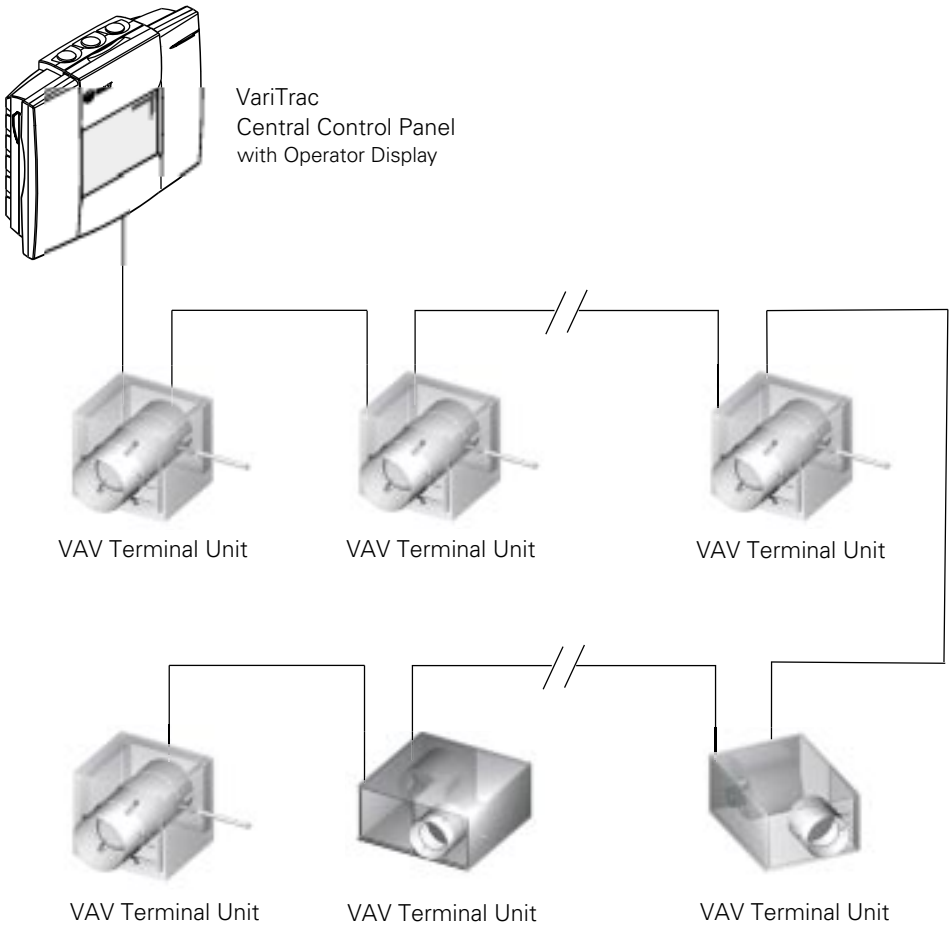
Improper communication link shield connections will lead to system malfunction.

IMPORTANT

Improper communication link routing will lead to system malfunction.

Connect UCMs on the communication link in a daisy-chain configuration. With this configuration, it is easier to solve communication problems by isolating portions of the communication link. See Figure 25 for an example of a daisy-chain configuration.

Figure 25: Daisy Chain Configuration for Communication Link Wiring



Each Voyager VAV Rooftop requires a Trane communications interface (TCI) board for connection to the VariTrac Central Control Panel communication link.

Refer to the TCI installation manual for more information on connecting a rooftop to the communication link.

Figure 26: UCM Communication Link Wiring

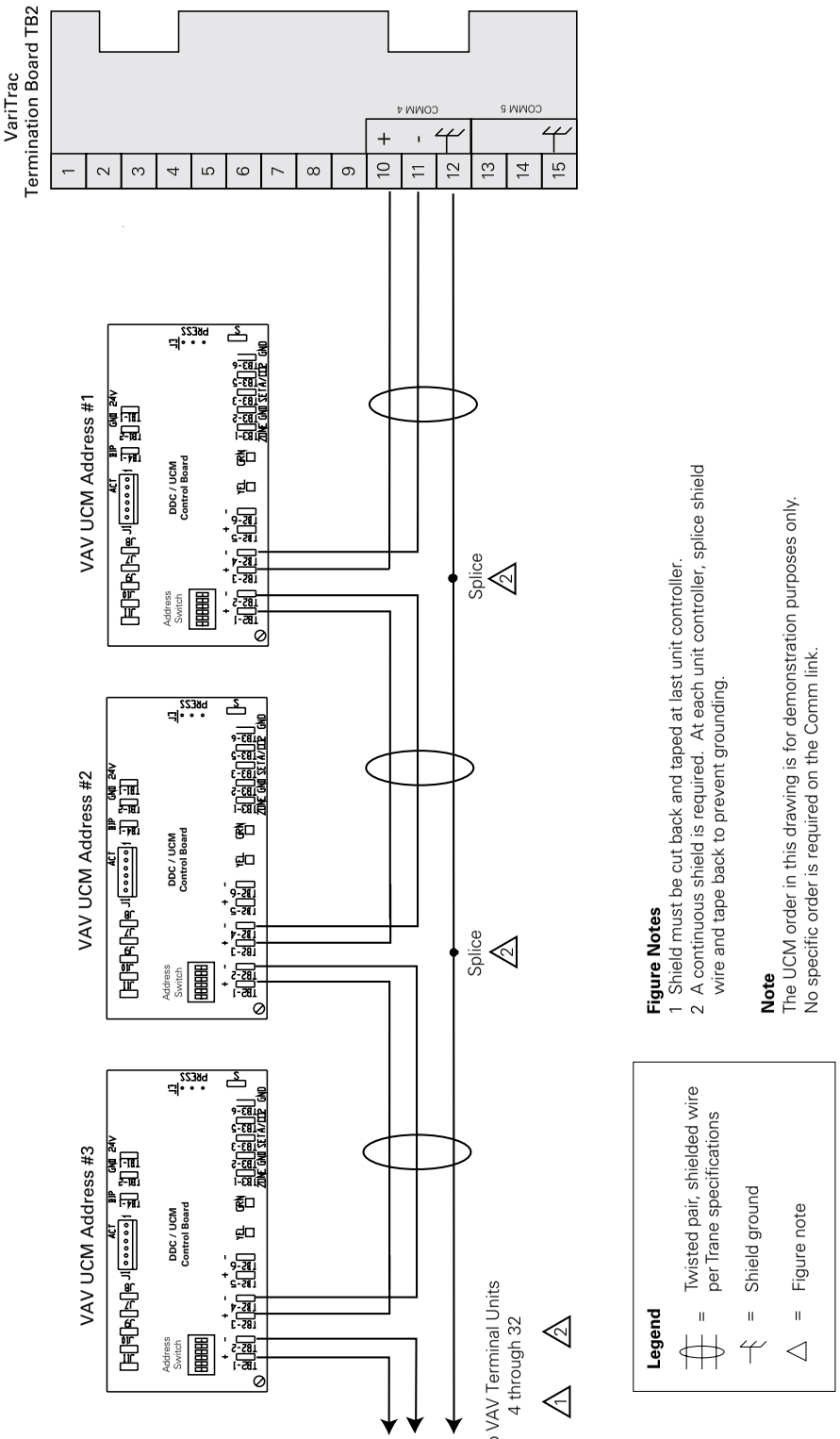


Figure 27: Voyager Communication Link Wiring

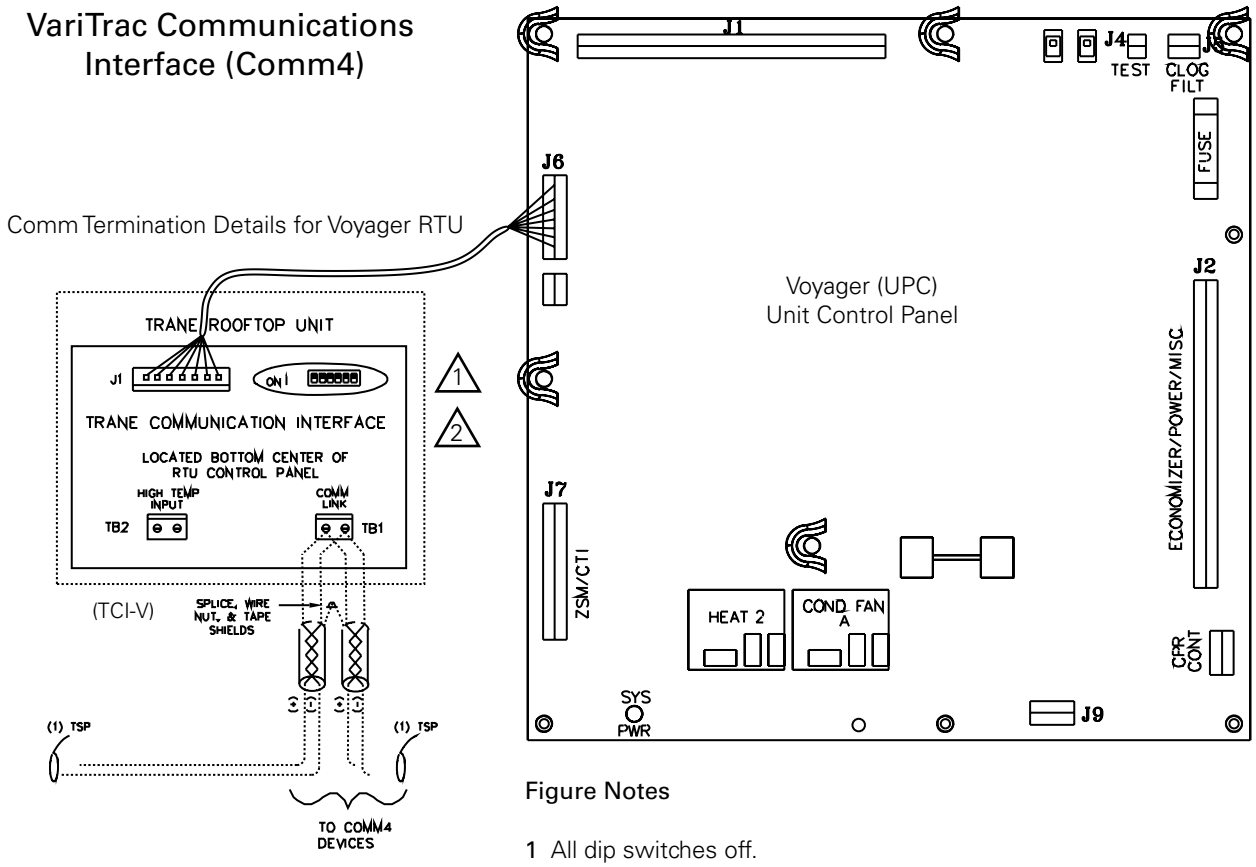


Figure Notes

1 All dip switches off.

2 Comm board to non-isolated Comm3 or Comm4 option.

Installation Checklist

Complete this checklist as the VariTrac Central Control Panel is installed to verify that all recommended procedures are performed. This checklist does not replace the detailed instructions provided in the manual. Read the entire manual carefully to become familiar with the installation procedures before installing the unit.

Shipment

- ☐ Inspect VariTrac Central Control Panel for shipping damage. File claim if necessary.
- ☐ Inspect VAV terminal units and accessories for shipping damage. File claim if necessary.

Unit Location

- ☐ Install VariTrac Central Control Panel in environment that meets temperature and humidity requirements.
- ☐ Securely mount VariTrac Central Control Panel on wall at an accessible location with proper clearances.

AC Power Wiring

- ☐ Field installed AC power wiring complies with all applicable codes.
- ☐ 24 Vac line from dedicated Class 2 transformer connected to VariTrac Central Control Panel at TB2.
- ☐ Voltage measured at TB2-1 to TB2-2 is 20 to 30 Vac.
- ☐ Assure that a reliable earth ground has been attached to TB2-3.

Input Wiring

- ☐ Field installed input wiring complies with all applicable codes.
- ☐ Optional time clock and priority shutdown inputs terminated at TB2-6 through TB2-9 per instructions.

VariTrane Terminal Units

- ☐ Air terminal units mounted and secure according to recommendations.

Zone Temperature Sensors

- ☐ Sensors are properly mounted and wired per instructions and in the correct space.

UCM Wiring

- ☐ UCM power is properly wired to TB1-1 and TB1-2.

NOTE: TB1-2 is COMMON (case ground) if grounded secondary transformers are being used. Confirm polarity from one UCM to the next if more than one UCM is being powered from a single transformer.

- ☐ Confirm voltage present between 20 Vac and 28 Vac.
- ☐ Ensure that the sensor is properly terminated.
- ☐ If optional local heat is being used, confirm wiring per appropriate diagram.

Communication Link Wiring

- ☐ Field installed communications wiring complies with all applicable codes.
- ☐ VariTrac Central Control Panel communication link wiring to VAV UCMs and Voyager VAV rooftop unit is connected at TB2-10, TB2-11, and TB2-12 on the CCP.
- ☐ Communication link wiring is properly terminated at each zone damper UCM on terminals TB2-1 through TB2-6. Ensure that polarity (+ -) has been maintained through the link.
- ☐ Communication link wire shields spliced at each device junction and taped to prevent contact with earth ground.

Completing Central Control Panel Assembly

Mount Main Module

Refer to Mount Main Module instructions in this manual.

Install Operator Display

Refer to Install Operator Display instructions in this manual. The Operator Display is required for the Delivered VAV system to function.

Connecting Modem Devices

Refer to Connecting Modem Devices instructions in this manual.

TRANE®

Trane
An American Standard Company
www.trane.com

For more information contact your local district office or e-mail us at comfort@trane.com

Literature Order Number	VAV-SVN03A-EN
File Number	SV-AH-VAV-000-SVN03A
Supersedes	VADA-IN-2
Stocking Location	La Crosse