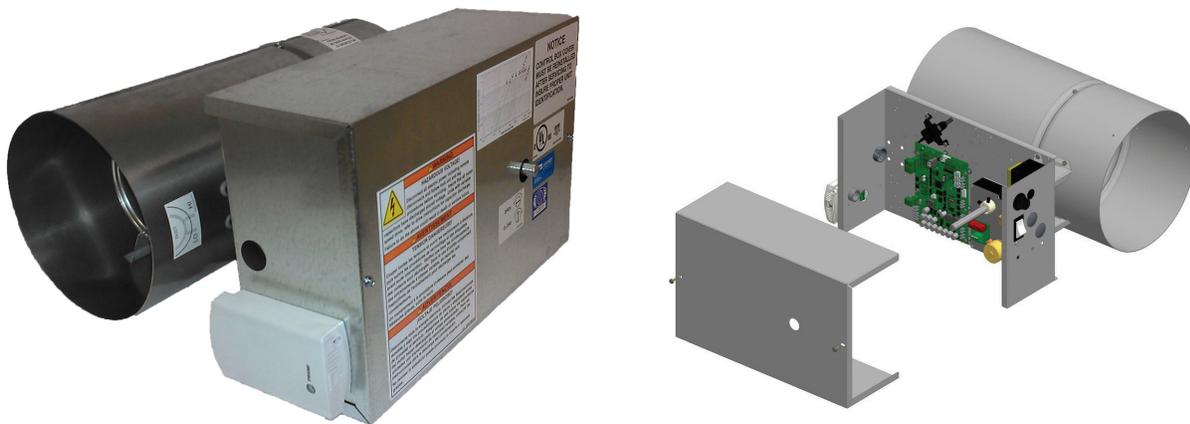




# Installation, Operation, and Maintenance

## VariTrane™

### Round Inlet/Round Outlet



Model: VRRF

#### SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.



# Introduction

Read this manual thoroughly before operating or servicing this unit.

## 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.

**⚠ 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/national electrical codes.

**⚠ 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.**

**⚠ WARNING****Follow EHS Policies!**

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

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## Revision History

- Updated Digit 12, Digit 20, and Digit 23 in Model Number Descriptions chapter.
- Updated General Information chapter.
- Updated Installation chapter.
- Added specifications, inputs and outputs of Symbio™ 210 and Symbio™ 500 in Installation chapter.
- Updated figure titles in Wiring chapter.



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# Model Number Descriptions

## Digits 1-4— Unit Type

VRRF= VariTrane™ Round Inlet and Outlet (Retrofit)

## Digit 5, 6—Primary Air Valve

- 04 = 4in. inlet (225 cfm)
- 05 = 5in. inlet (350 cfm)
- 06 = 6in. inlet (500 cfm)
- 08 = 8in. inlet (900 cfm)
- 10 = 10in. inlet (1400 cfm)
- 12 = 12in. inlet (2000 cfm)
- 14 = 14in. inlet (3000 cfm)
- 16 = 16in. inlet (4000 cfm)
- 0A = 4in. inlet (225 cfm) - Control Box Only
- 0B = 5in. inlet (350 cfm) - Control Box Only
- 0C = 6in. inlet (500 cfm) - Control Box Only
- 0D = 8in. inlet (900 cfm) - Control Box Only
- 0E = 10in. inlet (1400 cfm) - Control Box Only
- 0F = 12in. inlet (2000 cfm) - Control Box Only
- 0G = 14in. inlet (3000 cfm) - Control Box Only
- 0H = 16in. inlet (4000 cfm) - Control Box Only
- G0 = Control Box Only (200 cfm)
- G1 = Control Box Only (250 cfm)
- G2 = Control Box Only (300 cfm)
- G3 = Control Box Only (350 cfm)
- G4 = Control Box Only (400 cfm)
- G5 = Control Box Only (450 cfm)
- G6 = Control Box Only (500 cfm)
- G7 = Control Box Only (600 cfm)
- G8 = Control Box Only (650 cfm)
- G9 = Control Box Only (700 cfm)
- GA = Control Box Only (800 cfm)
- GB = Control Box Only (1000 cfm)
- GC = Control Box Only (1050 cfm)
- GD = Control Box Only (1200 cfm)
- GE = Control Box Only (1300 cfm)
- GF = Control Box Only (1400 cfm)
- GG = Control Box Only (1500 cfm)
- GH = Control Box Only (1600 cfm)
- GI = Control Box Only (1700 cfm)
- GJ = Control Box Only (1800 cfm)
- GK = Control Box Only (2000 cfm)
- GL = Control Box Only (2100 cfm)
- GM = Control Box Only (2300 cfm)
- GN = Control Box Only (2400 cfm)
- GP = Control Box Only (2800 cfm)
- GQ = Control Box Only (3000 cfm)
- GR = Control Box Only (3100 cfm)
- GS = Control Box Only (3200 cfm)
- GT = Control Box Only (3400 cfm)
- GU = Control Box Only (4000 cfm)
- GV = Control Box Only (5200 cfm)

## Digits 7, 8—Design Sequence

\*\* = Factory Assigned

## Digits 9-12—Unit Controls

- ENCL = Shaft Only in Enclosure
- DD00= Trane Actuator Only
- DD01= UCM4 Cooling Only Control
- DD02= UCM4 N.C. On/Off Hot Water
- DD03= UCM4 Prop Hot Water

- DD04= UCM4 Staged On/Off Electric Heat
- DD05= UCM4 Pulse-width Modulation of Electric Heat
- DD07= UCM4 N.O. On/Off Hot Water
- DD11= VV550 DDC Controller—Cooling Only
- DD12= VV550 DDC Controller w/N.C. On/Off HW valve
- DD13= VV550 DDC Controller w/Prop HW valve
- DD14= VV550 DDC Controller—On/Off Electric Heat
- DD15= VV550 DDC Controller w/Pulse-width Modulation
- DD16= VV550 DDC Controller - Ventilation Flow
- DD17= VV550 DDC Controller w/N.O. On/Off HW valve
- DD19= VV550 DDC Controller w/Flow Tracking
- DD20= VV550 DDC - Ventilation Flow w/N.C. On/Off valve
- DD21= VV550 DDC - Ventilation Flow w/On/Off Electric Heat
- DD22= VV550 DDC - Ventilation Flow w/Prop HW Valve
- DD33= VV550 DDC - Ventilation Flow w/N.O. On/Off valve
- DD41= UC400 DDC - Basic (Cooling Only)
- DD42= UC400 DDC - Basic (Water Heat- N.C. 2 position)
- DD43= UC400 DDC - Basic (Water Heat-modulating)
- DD44= UC400 DDC - Basic (Electric Heat-staged)
- DD45= UC400 DDC - Basic (Electric Heat-PWM)
- DD46= UC400 DDC - Ventilation Flow (No Reheat)
- DD47= UC400 DDC - Basic (Water Heat- N.O. 2 position)
- DD49= UC400 DDC - Flow Track (Cooling Only)
- DD50= UC400 DDC - Ventilation Flow (N.C. 2 position)
- DD51= UC400 DDC - Ventilation Flow (Electric Heat-staged)
- DD52= UC400 DDC - Ventilation Flow (Water Heat-modulating)
- DD63= UC400 DDC - Ventilation Flow (Water Heat- N.O. 2 position)
- DD71= UC210 DDC - Basic (Cooling Only)
- DD72= UC210 DDC - Basic (Water Heat- N.C. 2 position)
- DD73= UC400 DDC - Basic (Water Heat- modulating)
- DD74= UC210 DDC - Basic (Electric Heat- staged)
- DD75= UC210 DDC - Basic (Electric Heat-PWM)
- DD76= UC210 DDC Ventilation Flow- No Reheat
- DD77= UC210 DDC - Basic (Water Heat- N.O. 2 position)
- DD79= UC210 DDC - Flow Tracking (Cooling Only)
- DD80= UC210 DDC - Ventilation Flow (N. C. 2 position)
- DD81= UC210 DDC - Ventilation Flow (Electric Heat-staged)
- DD82= UC210 DDC - Ventilation Flow (Water Heat-modulating)
- DD93= UC210-Ventilation Flow (Water Heat- N.O. 2 position)
- SE41= Symbio™ 500 DDC - Basic (Cooling Only)
- SE42= Symbio™ 500 DDC - Basic (Water Heat- N.O. 2 position)
- SE43= Symbio™ 500 DDC - Basic (Water Heat-modulating)
- SE44= Symbio™ 500 DDC - Basic (Electric Heat-staged)
- SE45= Symbio™ 500 DDC - Basic (Electric Heat-PWM)
- SE46= Symbio™ 500 DDC - Ventilation Flow (No Reheat)
- SE47= Symbio™ 500 DDC - Basic (Water Heat- N.O. 2 position)
- SE49= Symbio™ 500 DDC - Flow Track (Cooling Only)
- SE50= Symbio™ 500 DDC - Ventilation Flow (N.C. 2 position)
- SE51= Symbio™ 500 DDC - Ventilation Flow (Electric Heat-staged)
- SE52= Symbio™ 500 DDC - Ventilation Flow (Water Heat-modulating)
- SE63= Symbio™ 500 DDC - Ventilation Flow (Water Heat- N.O. 2 position)
- SE71= Symbio™ 210e DDC - Basic (Cooling Only)
- SE72= Symbio™ 210e DDC - Basic (Water Heat- N.C. 2 position)
- SE73= Symbio™ 210e DDC - Basic (Water Heat-modulating)
- SE74= Symbio™ 210e DDC - Basic (Electric Heat-staged)
- SE75= Symbio™ 210e DDC - Basic (Electric Heat-PWM)
- SE76= Symbio™ 210e DDC - Ventilation Flow (No Reheat)
- SE77= Symbio™ 210e DDC - Basic (Water Heat- N.O. 2 position)
- SE79= Symbio™ 210e DDC - Flow Track (Cooling Only)
- SE80= Symbio™ 210e DDC - Ventilation Flow (N.C. 2 position)
- SE81= Symbio™ 210e DDC - Ventilation Flow (Electric Heat-staged)
- SE82= Symbio™ 210e DDC - Ventilation Flow (Water Heat-modulating)
- SE93= Symbio™ 210e DDC - Ventilation Flow (Water Heat- N.O.- 2 position)
- SY71= Symbio™ 210 DDC - Basic (Cooling Only)
- SY72= Symbio™ 210 DDC - Basic (Water Heat- N.C. 2 position)
- SY73= Symbio™ 210 DDC - Basic (Water Heat-modulating)
- SY74= Symbio™ 210 DDC - Basic (Electric Heat-staged)
- SY75= Symbio™ 210 DDC - Basic (Electric Heat-PWM)
- SY76= Symbio™ 210 DDC - Ventilation Flow (No Reheat)
- SY77= Symbio™ 210 DDC -Basic (Water Heat- N.O. 2 position)
- SY79= Symbio™ 210 DDC - Flow Track (Cooling Only)



## Model Number Descriptions

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- SY80= Symbio™ 210 DDC - Ventilation Flow (N.C. 2 position)  
SY81= Symbio™ 210 DDC - Ventilation Flow (Electric Heat-staged)  
SY82= Symbio™ 210 DDC - Ventilation Flow (Water Heat-modulating)  
SY93= Symbio™ 210 DDC - Ventilation Flow (Water Heat- N.O. 2 position)

**Notes:** N.C. = *Normally-closed*  
N.O. = *Normally-opened*

### Digit 13—Transformer

- 0 = None  
1 = 120/24 volt (50 VA)  
2 = 208/24 volt (50 VA)  
3 = 240/24 volt (50 VA)  
4 = 277/24 volt (50 VA)  
5 = 480/24 volt (50 VA)  
6 = 347/24 volt (50 VA)  
7 = 575/24 volt (50 VA)  
8 = 380/24 volt (50 VA)

### Digit 14—Disconnect Switch

- 0 = No Power Disconnect  
W = With Power Disconnect Switch

### Digit 15—Power Fuse

- 0 = No Fusing  
W = With Power Fuse

### Digit 16—Unit Orientation

- H = Horizontal Airflow  
V = Vertical Airflow (up or down)

### Digit 17—Wireless Sensor Options

- 0 = No Wireless Receiver (Wired Sensor Only)  
1 = Factory Installation Wireless Receiver  
2 = Wireless Comm Interface Modular FM  
3 = Air-Fi® Wireless Comm Interface (FM)

### Digit 18—Outlet Adapters

- 0 = None  
C = Adapter (C Style)  
D = Adapter (D or E Style)

### Digit 19—Relay Kit(s)

- 0 = None  
W = With One or More Relay Kits

### Digit 20—Water Valve

- 0 = None  
A = Proportional HW Valve, 0.7 Cv  
F = 2-Position, HW Valve, 5.0 Cv  
G = 2-Position, HW Valve, 8.0 Cv  
H = 3-Way Modulating HW Valve, 0.7 Cv  
J = 3-Way Modulating HW Valve, 2.7 Cv  
K = 3-Way Modulating HW Valve, 6.6 Cv  
L = 3-Way Modulating HW Valve, 8.0 Cv  
M = Analog HW Valve, field provided (Symbio™ 210/210e, Symbio™ 500, UC210, UC400)

### Digit 21—Zone Sensor

- 0 = None  
A = DDC Sensor Only  
B = DDC Sensor, ext. adj., Comm Jack  
C = DDC Sensor, NSB, Comm Jack  
D = DDC Sensor, ext. adj., NSB, Comm Jack  
E = Digital Display Zone Sensor  
F = Wireless-DDC Sensor, ext. adj., on/cancel, °F  
G = Wireless-DDC Sensor, ext. adj., on/cancel, °C  
H = Wireless-DDC Sensor ONLY, °F  
J = Wireless-DDC Sensor ONLY, °C  
K = Wireless-digital display sensor  
M = Air-Fi® WCS/SD (Display)  
N = Air-Fi® WCS/SB (Base)

### Digit 22—Factory Installed Solution

- 0 = None  
W = Factory-mounted DTS  
1 = Factory-installed DTS  
2 = HW Valve Harness  
3 = Both DTS and HW Valve Harness

### Digit 23—Actuator

- 0 = None  
A = Standard Actuator  
B = Belimo Actuator  
G = Trane Analog Actuator (Symbio™ 210/210e, Symbio™ 500, UC210, UC400)

### Digit 24—Special Options

- 0 = None  
S = Special Options



# General Information

This manual describes the installation of the Round In Round out (VRRF) VAV units with mounting and recommended wiring of the VRRF units.

For controls setup and operation parameters, refer the following literature:

- VAV-SVX01\*-EN – UCM 4.2 IOM
- CNT-SVX17\*-EN – Tracer® VV550/551 IOM
- VAV-SVX07\*-EN – Tracer® UC400 Programmable BACnet® Controller
- BAS-SVX62\*-EN – Tracer® UC210 Programmable Variable-Air-Volume(VAV) Box Controller
- BAS-SVX40\*-EN – Air-Fi® Wireless System IOM
- BAS-SVX55\*-EN – Air-Fi® Network Design IOM
- BAS-SVX084\*-EN – Symbio™ 210 Programmable Variable-Air-Volume (VAV) Box Controller
- BAS-SVX091\*-EN – Symbio™ 500 Programmable BACnet® Controller for VAV units

The VRRF can be used in new installations as well as retrofitting older style units.

**Note:** *Not all older-style Trane VAV units can be retrofitted with the VRRF and should be researched before ordering the VRRF on a case-by-case basis.*

The VRRF can be ordered with or without DDC controls. If ordered with controls, the unit would have either a Symbio™ 210/210e, Symbio™ 500, UCM 4.2, VV550 or UC400/UC210 DDC control module.

The controls will be factory mounted to the RIRO damper and field installed to existing system. How this installation takes place will be dependent on if it is a new installation or if the unit is being retrofitted to a pre-existing unit type.

The VRRF product can also be ordered without an air damper and consists of just the control box, control box cover, Trane unit controller (Symbio™ 210/210e, Symbio™ 500, VAV UCM, Tracer® VV550, Tracer® UC210, or Tracer® UC400), differential pressure sensor, flow sensor tubing, and 1/4-turn damper actuator (Trane or optional Belimo) and it factory downloaded and configured to order.

## Receiving and Handling

The unit may be shipped from the factory in a number of different ways. Upon receiving the equipment, complete the following:

- Locate the nameplate and refer to the model and sales order number and check that the correct units have been delivered.
- Check that the facility can provide the correct voltage to the unit according to the name plate.
- Inspect the control enclosure if applicable and the air damper casing for dents or punctures.

- Verify the options have been included, such as controls, water valve, adapters, and relays kits which include wiring harnesses.
- Manually rotate the damper actuator to assure that there are no obstructions within the housing.
- Claims for in-transit damage must be filed immediately with the delivery carrier.
- Locate and verify that the correct zone sensors are with the order. These will be marked with an orange “Accessories Enclosed” label. Store in a secure location until needed. Accessories lost at the jobsite are NOT covered by Trane’s warranty.
- If a discrepancy occurs between what was ordered and what is received, contact your local Trane representative immediately.
- Read the appropriate section in this manual for installation procedures prior to actual starting of equipment.

Upon receiving the equipment, please inspect each unit and components for external or internal damage. Refer to the bill of lading to insure all equipment and accessories have been received. Contact your local Trane sales representative and notify the trucking company immediately of any short ship or damaged equipment.

## Unit Information

The basic unit consists of a sheet metal casing with an air damper which is used to modulate the air being delivered into the occupied zone. The unit is designed to modulate either cooling or heating air between the temperatures of 40°F and 140°F. Primary air enters the air valve through its round inlet and sent into the air valve cylinder and exits from the round outlet. This air could be sent straight to the diffusers or in conjunction with a VAV unit that is being retrofitted.

The basic unit with an integral air valve supports both for vertical or horizontal airflow. A control-box-only option is also available with factory downloading/configuring of the unit controller. Available options include the following:

- Power Fuse
- Transformer
- Electrical Disconnect
- Adapter
- DDC Controller
- Wireless zone sensor receiver (WZSR) and wireless communications interface (WCI) for use with wireless zone sensors (WZSs) and wireless communication sensors (WCSs) respectively

Other options available if retrofitting electric heat or hot water units are relay kits to support the control of electric heat strips. Two-position or modulating hot water valves for control of hot water in the reheat coil are also available. For retrofit of a fan



## General Information

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powered unit, the relay kit(s) with the wiring harness is an option.

All types of DDC controllers for the VRRF have 24 Vac TRIAC outputs. The Symbio™ 500 and UC400 also have relay-based binary outputs. The outputs are available for retrofitting a single duct or a fan-powered unit. A single-duct unit could use the outputs available to control three (3) stages of electric heat, modulating hot water valve or two position hot water valve. For a fan-powered unit, the controller would use one output for the fan and the other two to control two stages of electric heat. If it had a hot water coil, then the two extra outputs could be used to control a modulating hot water valve or a two-position hot water valve. These re-heat units are used primarily to reheat air-to-zone temperature when the load in the occupied space is low. Primary air is modulated through the VariTrane™ air valve by rotating the damper blade. All air valves have a round inlet for easy fit-up with incoming ductwork.

## Agency Listings Compliance

- UL listed
- AHRI 880 certified

# Installation

Due to their weight and size, VRRF units should be suspended from the uppermost ceiling, independent of the false ceiling grid. Suspension devices VAV-SVN09\*-EN are to be supplied by the installer. Units must be installed level in the vertical or horizontal position. To check if the unit is a vertical or horizontal unit, look at the model number of the unit as compared to the Service Model Number Description in this installation guide.

**Note:** A VRRF unit must be mounted so that the damper shaft is horizontal. This keeps the flow transducer's orientation good for proper detection of differential pressure from the air-flow sensor. Incorrect installation will void the warranty on the unit.

**Figure 1. Round in/round out common installation options**

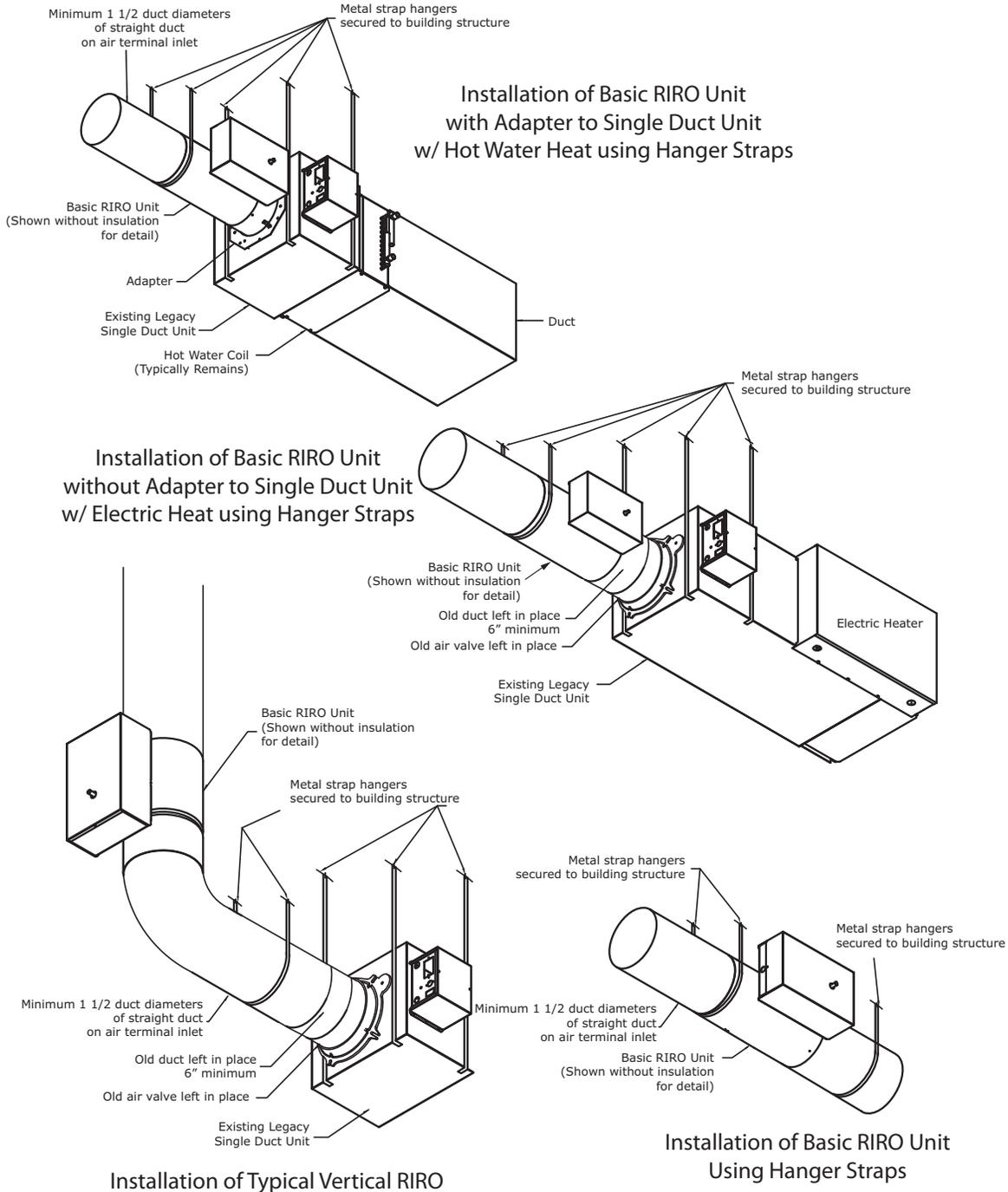


Figure 2. Round in/round out weights and sizes

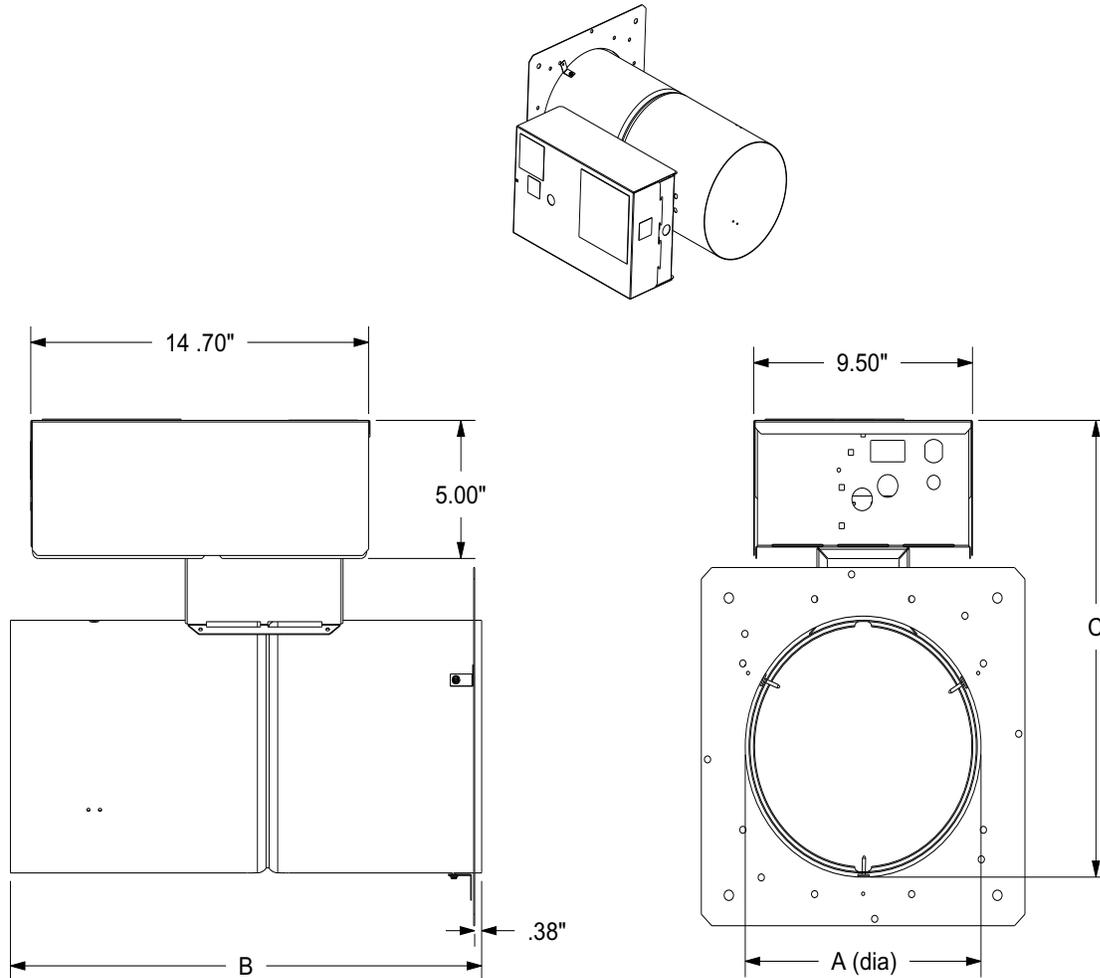


Table 1. Unit dimensions and weights

Damper Size	A	B <sup>(a)</sup>	C	Nominal CFM	Unit Weight (lb)	Adapter Panel Weight (lb)
0 (Control Box Only) <sup>(b)</sup>	n/a	n/a	n/a		4.75	n/a
4 <sup>(c)</sup>	4.000	21	13	225	21	0.5
5 <sup>(c)</sup>	5.000	21	13	350	21	0.5
6	5.875	21	13	500	20	0.5
8	7.875	21	15	900	22	0.8
10	9.875	21	17	1400	24	1.4
12	11.875	21	19	2000	25	1.6
14	13.875	21	21	3000	27	1.6
16	15.875	21	23	4000	30	1.9

(a) Table values do not include adapter. The adapter increases B dimension by 2.50 in.

(b) Control box dimensions on the Size 0 unit are the same as those shown in graphic above for all VRRF units that include damper.

(c) Size 4 and 5 units require a reducer that will increase the B dimension. One or two reducers may be required depending on application. (Not shown in diagram.)

**Table 2. C, D, or E style units<sup>(a)</sup>**

Controls	Air Valve	Type	Outlet Connection Type
Pneumatic	Normally Closed	Single Duct Electric Heat	Retrofit not possible <sup>(b)</sup>
Pneumatic	Normally Closed	Parallel Fan Electric Heat	Retrofit not possible <sup>(b)</sup>
Pneumatic	Normally Closed	All Others	1
Pneumatic	Normally Open	Single Duct Electric Heat	2
Pneumatic	Normally Open	Parallel Fan Electric Heat	2
Pneumatic	Normally Open	All Others	1 and 2
Analog	Normally Open	Single Duct Electric Heat	2
Analog	Normally Open	Parallel Fan Electric Heat	2
Analog	Normally Open	All Others	1 and 2
DDC	Normally Open	Single Duct Electric Heat	2
DDC	Normally Open	Parallel Fan Electric Heat	2
DDC	Normally Open	All Others	1 and 2

**Notes:**

1. Adapter design (Remove Old Air Valve and replace with Adapter for RIRO).
2. Standard RIRO unit. (Drive valve to maximum and install RIRO upstream of unit.)

- (a) C, D, E digit is found in the 4th digit of model number.  
 (b) When retrofit not possible, replace the existing unit.

**Table 3. F style units<sup>(a)</sup>**

Controls	Air Valve	Type	Outlet Connection Type
Pneumatic	Normally Closed	All	2
Analog	Normally Open	All	2
DDC	Normally Open	All	2

**Note:** Standard RIRO unit (Drive valve to maximum and install RIRO upstream of unit.)

- (a) F digit is found in the 4th digit of model number.

No hanger brackets are provided on these units since the unit should be supported by means of a hanger strap. The hanger strap should be secured to the unit casing as shown in [Figure 1, p. 9](#).

## Unit Accessibility

VRRF does not provide internal access, as all functioning components are external to the unit.

## Clearances

For proper service it is recommended that 36 in. side clearance be provided for service and access. It is also recommended that 6 in. of top and bottom clearance be provided.

The minimum clearance for the controls is 36 in.

NEC and/or local codes overrides all clearance requirements.

## Duct Connections Installation

### WARNING

#### Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

### WARNING

#### Heavy Objects!

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

### ⚠ WARNING

#### Fiberglass Wool!

Exposure to glass wool fibers without all necessary PPE equipment could result in cancer, respiratory, skin or eye irritation, which could result in death or serious injury. Disturbing the insulation in this product during installation, maintenance or repair will expose you to airborne particles of glass wool fibers and ceramic fibers known to the state of California to cause cancer through inhalation. You **MUST** wear all necessary Personal Protective Equipment (PPE) including gloves, eye protection, a NIOSH approved dust/mist respirator, long sleeves and pants when working with products containing fiberglass wool.

#### Precautionary Measures:

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing; rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respirator.

#### First Aid Measures:

- **Eye Contact** - Flush eyes with water to remove dust. If symptoms persist, seek medical attention.
- **Skin Contact** - Wash affected areas gently with soap and warm water after handling.

All VRRF units should have a minimum of 1.5 duct diameters of straight duct prior to the inlet of the VRRF. This is to allow accurate reading from the flow ring. The outlet connection is dependent on a number of factors.

The main factor is your application. If the VRRF is used as a new installation, then you connect the outlet of the VRRF to the ductwork. If it is a retrofit of an existing unit, then it depends upon what type of unit you are looking to replace. (Table 2, p. 11 and Table 3, p. 11 show the different styles of units and the possible outlet connection. When determining which of these two tables to use, reference the fourth digit in Model Number of the existing VAV unit.)

When installing the VRRF to a pre-existing unit, remove power from pre-existing unit and lock and tag out unit.

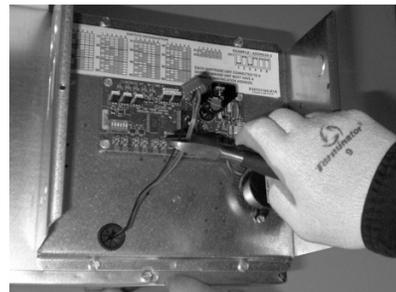
Remove or pull back insulation and remove the amount of inlet ductwork necessary to install the RIRO damper. (See Figure 2, p. 10 for VRRF lengths.)

**Note:** Make sure existing VAV unit and inlet ductwork is adequately supported before removing the section of ductwork necessary to install VRRF.

### Adapter Option Installation

1. Ensure power has been removed from pre-existing unit and it has been locked and tagged out.
2. If not already done, begin removing insulation from the primary air inlet of pre-existing VAV unit.
3. On electric air valves, remove plug connection from J1 terminal and cut plug off of wire and feed wiring from the control enclosure into the existing unit. (See Figure 3, p. 12.)

**Figure 3. Remove plug connection**



**Note:** Both the control enclosure and existing unit has a grommet that may need to be removed to get wire into existing VAV unit.

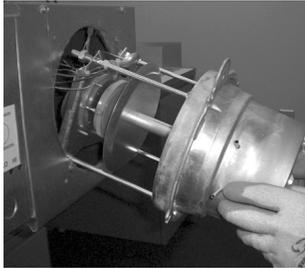
4. On pneumatic air valves, remove pneumatic tubing from air valve.
 

**Note:** Be aware, on a limited number of units the pneumatic air valve was too large to remove from inlet and the hole unit would have to be taken down to remove the air valve.
5. Remove self tapping screws from air inlet mounting bracket. In addition, remove pneumatic tubing from airflow ring (see Figure 4, p. 12).

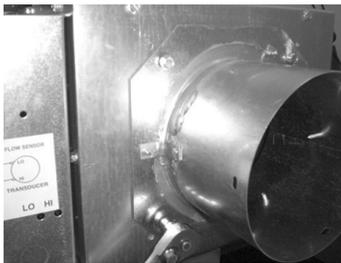
**Figure 4. Remove pneumatic tubing**



6. Remove air valve from existing VAV unit by breaking the seal around air inlet and the VAV unit. Once it is loose, remove air valve (see Figure 5, p. 13).

**Figure 5. Remove air valve**


7. Clean the surface on existing VAV unit where the air valve connected to existing VAV unit. Place new sealant around adapter mounting flange.
8. Mount adapter plate, as attached to the Round In/Round Out (VRRF) VAV unit, to the existing VAV unit by aligning the adapter to the proper hole pattern on the existing VAV unit and screwing in screws. Make sure that the adapter is also mounted with hole pattern so that the VRRF controller is level to the ground. Hang straps to support VRRF. (See the following figure, refer to [Figure 1, p. 9](#) for installation and [Figure 2, p. 10](#) for weights.)

**Figure 6. Adapter mounting**


9. Seal around flange of adapter and between cylinder and adapter with duct sealant.
10. Connect inlet ductwork to VRRF and screw in self tapping screws.
11. Seal around flange of ductwork and VRRF with duct sealant.

**Note:** When retrofitting single duct units with electric heat and series Fan powered pneumatic electric heat units, the electric heat airflow switch has to have its input removed from existing air valve and connected to the new VRRF. This is done by removing the old tubing from the airflow switch and using the black tubing provided in the adapter kit. Connect the airflow switch to the high pressure port of the VRRF unit. There is a tee located in the VRRF unit control box for this.

### Installation Option Original Ductwork

1. Make sure the existing VAV unit has its air valve set to the open position allowing airflow. With a DDC unit this can be done with Summit (BMTW-SVN01\*-EN), Rover™ (EMTX-SVX01\*-EN). The analog unit can have the damper driven open by removing the pneumatic tubing from the flow ring

and adjusting the analog sensor thumbwheel to its lowest possible setting. See programming guide for your particular access tool. With a pneumatic system, you would release the actuator pressure inlet and cap pneumatic tubing. This will open the Normally Open Valve and allow airflow.

2. Ensure power has been removed from pre-existing unit and it has been locked and tagged out.

### **⚠ WARNING**

#### **Hazardous Voltage!**

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

3. If not already done, begin removing about four inches of insulation from the ductwork where the inlet and outlet of the Round In/Round Out (VRRF) will connect.

**Note:** Do not disconnect flow ring tubing. It may need to stay attached for proper VRRF unit operation.

### **⚠ WARNING**

#### **Fiberglass Wool!**

Exposure to glass wool fibers without all necessary PPE equipment could result in cancer, respiratory, skin or eye irritation, which could result in death or serious injury. Disturbing the insulation in this product during installation, maintenance or repair will expose you to airborne particles of glass wool fibers and ceramic fibers known to the state of California to cause cancer through inhalation. You MUST wear all necessary Personal Protective Equipment (PPE) including gloves, eye protection, a NIOSH approved dust/mist respirator, long sleeves and pants when working with products containing fiberglass wool.

#### **Precautionary Measures:**

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing; rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respirator.

#### **First Aid Measures:**

- **Eye Contact** - Flush eyes with water to remove dust. If symptoms persist, seek medical attention.
- **Skin Contact** - Wash affected areas gently with soap and warm water after handling.

- Remove adapter plate by removing the three screws connecting the L-brackets to the cylinder. Hang the VRRF with straps. (See [Figure 1, p. 9](#) for installation and [Figure 2, p. 10](#) for weights.)

**⚠ WARNING**

**Heavy Objects!**

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

- Connect inlet ductwork to VRRF and screw in self tapping screws.
- Seal around flange of ductwork and VRRF with duct sealant.
- Connect outlet ductwork to VRRF and screw in self tapping screws.
- Seal around flange of ductwork and VRRF with duct sealant.

### Existing Installation Wrap-Up

- After all connections are made (for either using the adapter or original ductwork), check to ensure the entire ductwork is air tight. Apply duct sealer as necessary.
- Cut to specifications on your unit, as shown in [Figure 8, p. 15](#) and [Table 4, p. 14](#). Cut “slits” in the insulation for the flow tubes and brackets. Secure with duct tape. Encase VRRF with insulation (see [Figure 7, p. 14](#)).

**Figure 7. VRRF insulation**



- Use care not to damage the flow tubes when making ductwork connections or insulating.

### New Facility VRRF Installation (Non-Retrofit)

**Note:** When installing VRRF, make sure the controller is level so the transducer can read airflow accurately.

**Important:** Make sure inlet and outlet ductwork are adequately supported before installing VRRF.

- Before hanging VRRF, ensure that the VRRF will have a minimum of 1.5 duct diameters of strait duct prior to the inlet of the VRRF.
- Remove adapter plate by removing the three screws connecting the L-brackets to the cylinder. Hang the VRRF with straps. (See [Figure 1, p. 9](#) for Install and [Figure 2, p. 10](#) for weights.)

**⚠ WARNING**

**Heavy Objects!**

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

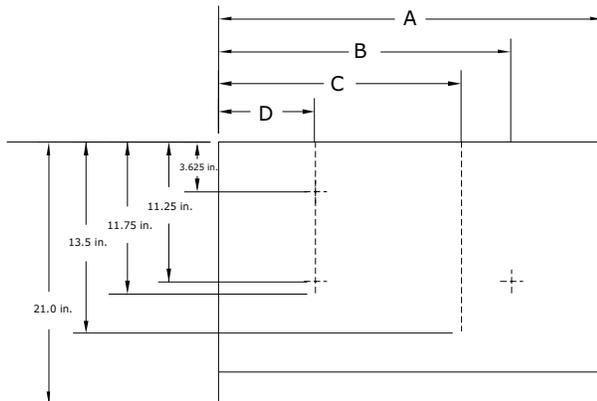
- Connect inlet ductwork to VRRF and screw in self tapping screws.
- Seal around flange of ductwork and VRRF with duct sealant.
- Connect outlet ductwork to VRRF and screw in self tapping screws.
- Seal around flange of ductwork and VRRF with duct sealant.
- After all connections are made, check to insure the entire ductwork is air tight. Apply duct sealer as necessary.
- Cut to specifications on your unit, as shown in [Figure 8, p. 15](#) and table below. Cut “slits” in the insulation for the flow tubes and brackets. Secure with duct tape. Encase VRRF with insulation. See [Figure 7, p. 14](#).
- Use care not to damage the flow tubes when making ductwork connections or insulating.

**Table 4. Insulation for RIRO**

	A	B	C	D	Length
4 in.	21.5	16.75	10.75	5.25	21
5 in.	21.5	16.75	10.75	5.25	21
6 in.	21.5	16.75	10.75	5.25	21
8 in.	29.5	21.5	12.75	6.5	21
10 in.	36	25	15.75	7.5	21
12 in.	41.5	28	16.5	8	21

**Table 4. Insulation for RIRO (continued)**

	A	B	C	D	Length
14 in.	47.5	32.75	18.25	9.5	21
16 in.	56	35.5	18.75	9.25	21

**Figure 8. Insulation cut measurements**


## Installation — Control Box Only VRRF

### **⚠ WARNING**

#### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

### Pre-Installation

The existing unit controls (including pneumatic actuators, volume regulators and any miscellaneous auxiliary controls) must be removed prior to installing the control box only VRRF.

The communications power and zone sensor wiring should be pulled to the unit. The wiring procedures and guidelines used are outlined in the “Wiring,” p. 52.

### Control Box Mounting

The controller should be mounted at any convenient location on the existing unit.

**Important:** *The controller must be mounted in a vertical plane to the flow transducer will function properly.*

In a typical installation, the controller is mounted on one side of the unit, and the actuator on the other side due to space limitations. However, Trane’s controller may be mounted on the ductwork adjacent to the terminal unit. The only requirement is the flow sensor tubing cannot exceed 10 feet.

### Actuator Installation

When installing the actuator, the convention of the damper rotation is assumed as:

- Clockwise rotation of the damper shaft will close the damper.
- Counterclockwise rotation of the damper shaft will open the damper.

All of the wiring diagrams assume this convention.

### Specifications

#### UCM 4.2

##### Power Requirements

Supply: 18 to 32 Vac (24 Vac nominal) at 50/60 Hz

##### Operating Environment Temperature:

32°F to 140°F (0°C to 60°C)

##### Relative Humidity

10% to 90% non-condensing

##### Storage Environment Temperature:

-40°F to 150°F (-40°C to 65.6°C)

##### Relative Humidity

10% to 90% non-condensing

##### Analog inputs

Space temperature

Thermistor

10 kΩ at 77°F (25°C)

From 14°F to 122°F (-10°C to 50°C)

Space setpoint

Potentiometer

1 kΩ

From 50°F to 90°F (10°C to 32.2°C)

Primary discharge air temperature

10 kΩ at 77°F(25°C)

From -40°F to 212°F (-40°C to 100°C)

Primary airflow

Transducer

0 to 2 in. water (0 to 498 Pa)

Binary input

Occupancy or generic (dry contact)

Binary outputs

Air valve open

Maximum output rating for Triac: 12 VA

Air valve close

Maximum output rating for Triac: 12 VA

Heat stage 1:

Maximum output rating for Triac: 12 VA

Heat stage 2:

Maximum output rating for Triac: 12 VA

Heat stage 3 or Fan output:

Maximum output rating for Triac: 12 VA



## Installation

### UCM VV550

#### Power Requirements

Supply: 18 to 32 Vac (24 Vac nominal) at 50/60 Hz

#### Operating Environment Temperature:

32°F to 140°F (0°C to 60°C)

#### Relative Humidity

5% to 95% non-condensing

#### Storage Environment Temperature:

-40°F to 185°F (-40°C to 85°C)

#### Relative Humidity

5% to 95% non-condensing

#### Analog inputs

##### Space temperature

##### Thermistor

10 kΩ at 77°F (25°C)

From 14°F to 122°F (-10°C to 50°C)

##### Space setpoint

##### Potentiometer

1 kΩ

From 50°F to 90°F (10°C to 32.2°C)

##### Primary discharge air temperature

10 kΩ at 77 °F (25°C)

From -40°F to 212°F (-40°C to 100°C)

##### Primary airflow

##### Transducer

0 to 2 in. water (0 to 498 Pa)

##### Binary input

occupancy or generic (dry contact)

##### Binary outputs

##### Air valve open

Maximum output rating for Triac: 12 VA

##### Air valve close

Maximum output rating for Triac: 12 VA

##### Heat stage 1:

Maximum output rating for Triac: 12 VA

##### Heat stage 2:

Maximum output rating for Triac: 12 VA

##### Heat stage 3 or Fan output:

Maximum output rating for Triac: 12 VA

### UC400

**Table 5. UC400 specifications**

Storage	
Temperature:	-48°F to 203°F (-44°C to 95°C)
Relative Humidity:	Between 5% and 95% (non-condensing)
Operating	
Temperature:	-40°F to 185°F (-40°C to 70°C)
Humidity:	Between 5% and 95% (non-condensing)
Input Voltage:	20.4 to 27.6 Vac (24, ±15% nominal), 50 to 60 Hz
Mounting weight of controller:	Mounting surface must support 0.80 lb. (.364 kg)
Environmental rating (enclosure):	NEMA 1

**Table 5. UC400 specifications (continued)**

Altitude:	9,842 ft. maximum (3,000 m)
Installation:	U.L. 840: Category 3
Pollution:	U.L. 840: Degree2
Housing Material:	Polycarbonate/ABS Blend UV protected U.L. 94-5 VA flammability rating
Mounting:	Mounts on EN 50 022 - 35 x 15 DIN rail that is included in the VAV unit control box when the UC400 is factory mounted.

#### Agency Listing/Compliance

- UL916 PAZX, Open Energy Management Equipment
- UL94-5V, Flammability
- CE Marked
- FCC Part 15, Subpart B, Class B Limit
- AS/NZS CISPR 22:2006
- VCCI V-3/2008.04
- ICES-003, Issue 4:2004
- Communications BACnet® MS/TP, supports BACnet® protocol ASHRAE 135-2004 and meets BACnet® Testing Laboratory (BTL) as an Application Specific Controller (ASC) profile device UL864/UUKL listed when installed and programmed in accordance with the Trane Applications Guide, BAS-APG019\*-EN.

#### Device Inputs/Outputs

Below is a list of device inputs and outputs.

- A twisted/shielded communication link
- Zone sensor
- Occupancy sensor (optional)
- Discharge Air Temperature (DAT) and/or Supply Air Temperature (SAT)
- CO<sub>2</sub> sensor
- 24 Vac, Class II power

In addition to the points used for the VAV application, the spare inputs and outputs on the UC400 controller may be used for ancillary control and programmed using Tracer® TU Tracer Graphical Programming 2 (TGP2).

**Note:** For more information on wiring spare points, refer to the Tracer UC400 Programmable Controller Installation, Operation, and Maintenance Manual (BAS-SVX20\*-EN).

#### Analog Inputs

- AI1
  - Space temperature; thermistor: 10 kΩ at 77°F (25°C)
  - Range: 32°F to 122°F (0°C to 50°C)
- AI2
  - Space setpoint; potentiometer: 1 kΩ
  - Range: from 50°F to 90°F (10°C to 32.2°C), \*/\*\* (thumbwheel) functionality supported
- AI3
  - Spare

- AI4
  - Discharge air temperature: 10 k $\Omega$  at 77°F (25°C)
  - Range: from -40°F to 212°F (-40°C to 100°C)
- AI5
  - Supply air temperature: 10 k $\Omega$  at 77°F (25°C)
  - Range: from -40°F to 212°F (-40°C to 100°C)

### Universal Inputs

- UI1;
  - Spare, but recommended for relative humidity
  - Resistive/thermistor inputs: 0 to 10 Vdc inputs or 4 to 20 mA inputs
  - Current Mode Impedance: 200  $\Omega$ , Voltage Mode Impedance: 10 k $\Omega$  minimum
- UI2;
  - Provided point for CO<sub>2</sub>
  - Resistive/thermistor inputs: 0 to 10 Vdc inputs or 4 to 20 mA inputs
  - Current Mode Impedance: 200  $\Omega$ , Voltage Mode Impedance: 10 k $\Omega$  minimum

### Pressure Inputs

- P1
  - Supply airflow, pressure transducer
  - From 0 to 2 in. water column (0 to 498 Pa)
- P2
  - Spare (recommended for dual duct secondary airflow)

### Binary Inputs

- BI1
  - Occupancy
- BI2
  - Spare
- BI3
  - Spare

### Binary Outputs

Binary Outputs	Type	Output Rating	Pilot duty
BO1	Fan	10 A up to 277 Vac	10 A at 30 Vac/Vdc, 2 A at 120 Vac, 8 A at 250 Vac
BO2	Spare Relay	10 A up to 277 Vac	10 A at 30 Vac/Vdc, 2 A at 120 Vac, 8 A at 250 Vac
BO3	Spare Relay	10 A up to 277 Vac	10 A at 30 Vac/Vdc, 2 A at 120 Vac, 8 A at 250 Vac
BO4	Fan ON/OFF	24 to 27 Vac, 0.5 A Resistive VA	
BO5	Heat stage 3 TRIAC	24 to 27 Vac, 0.5 A Resistive VA	
BO6	Heat stage 2/Water Valve Close TRIAC	24 to 27 Vac, 0.5 A Resistive VA	

Binary Outputs	Type	Output Rating	Pilot duty
BO7	Heat stage 1/Water Valve Open TRIAC	24 to 27 Vac, 0.5 A Resistive VA	
BO8	Air Damper Close TRIAC	24 to 27 Vac, 0.5 A Resistive VA	
BO9	Air Damper Open TRIAC	24 to 27 Vac, 0.5 A Resistive VA	

### Analog Outputs

- AO1
  - Spare output
  - Voltage output is 0 to 10 Vdc, 500  $\Omega$  minimum impedance
  - Current output is 4 to 20 mA, 500  $\Omega$  maximum impedance
  - Also can output 100 Hz PWM signal for control of a Trane fan-powered ECM fan setpoint signal to the EC motor
- AO2
  - Spare.
  - Voltage output is 0 to 10 Vdc, 500  $\Omega$  minimum impedance.
  - Current output is 4 to 20 mA, 500  $\Omega$  maximum impedance.
  - Also used on Trane VAV units for SCR electric heat 0 to 10 Vdc modulation control.

**Note:** For more information on wiring spare points, refer to the Tracer<sup>®</sup> UC400 Programmable Controller Installation, Operation, and Maintenance Manual (BAS-SVX20\*-EN).

### UC210

**Table 6. UC210 specifications**

Storage	
Temperature:	-40°F to 185°F (-40°C to 85°C)
Humidity:	5% to 95% (non-condensing)
Operating	
Temperature:	-40°F to 158°F (-40°C to 70°C)
Humidity:	5% to 95% (non-condensing)
Input Voltage:	20.4 to 27.6 Vac, (24 Vac $\pm$ 15% nominal), 50 to 60 Hz, 10.5 VA plus 1 VA per 20 mA of 24 Vdc load plus 12 VA maximum per binary load
Environmental Rating (Enclosure):	NEMA 1
Installation:	UL 840: Category 3
Pollution:	UL 840: Degree 2



## Installation

**Table 6. UC210 specifications (continued)**

Agency Listing/Compliance
<ul style="list-style-type: none"> <li>• UL916 PAZX, Open Energy Management Equipment</li> <li>• UL94-5V, Flammability</li> <li>• CE Marked</li> <li>• FCC Part 15, Subpart B, Class B Limit</li> <li>• AS/NZS CISPR 22:2006</li> <li>• VCCI V-3/2008.04</li> <li>• ICES-003, Issue 4:2004</li> <li>• Communications BACnet® MS/TP, supports BACnet® protocol ASHRAE 135-2004 and meets BACnet® Testing Laboratory (BTL) as an Application Specific Controller (ASC) profile device</li> <li>• Suitable for Plenum mounting</li> </ul>

### Device Inputs/Outputs

Below is a list of device inputs and outputs.

- Twisted/shielded communication link
- Zone sensor
- Occupancy sensor (optional)
- Discharge Air Temperature (DAT)
- CO<sub>2</sub> sensor
- 24 Vac, Class II power

Table 7, p. 18 provides details for each type input/output.

**Table 7. UC210 inputs and outputs**

Analog Input 1 through 3	Universal Inputs UI1 and UI2
<p><b>Note:</b> Configuration options when used as spare; 10 kΩ thermistor, 0 Ω to 1 kΩ linear setpoint, 200 Ω to 20 kΩ linear.</p> <ul style="list-style-type: none"> <li>• <b>AI1:</b> Space temperature; thermistor: 10 kΩ at 77°F (25°C) range: 32°F to 122°F (0°C to 50°C)</li> <li>• <b>AI2:</b> Space setpoint; potentiometer: 1 kΩ from 50°F to 90°F (10°C to 32.2°C), */** (thumbwheel) functionality supported</li> <li>• <b>AI3:</b> Discharge air temperature: 10 kΩ at 77°F (25°C) from -40°F to 212°F (-40°C to 100°C)</li> </ul>	<p><b>Note:</b> Configuration options when used as spare; resistor/ thermistor inputs, 10 Vdc inputs, or 4 to 20 mA, current mode impedance is 200 Ω.</p> <ul style="list-style-type: none"> <li>• <b>UI1:</b> Relative Humidity</li> <li>• <b>UI2:</b> CO<sub>2</sub></li> </ul>
Pressure Input P1	Binary Input BI1, Dry Contact
<p><b>P1:</b> Supply air flow; pressure transducer: From 0 to 2 in. water column (0 to 498 Pa)</p>	<p><b>BI1:</b> Occupancy</p>
Analog Outputs AO1 and AO2	Binary Outputs 1 through 5
<p><b>Note:</b> Configuration options when used as spare; Voltage output is 0 to 10 Vdc, 500 Ω min. impedance. Current output is 4 to 20 mA, 500 Ω maximum impedance.</p> <ul style="list-style-type: none"> <li>• <b>AO1:</b> ECM</li> <li>• <b>AO2:</b> SCR Heat</li> </ul>	<p><b>Note:</b> 0.5A Resistive Maximum Rating.</p> <ul style="list-style-type: none"> <li>• <b>BO1:</b> Heat stage 3 TRIAC</li> <li>• <b>BO2:</b> Heat stage 2/Water Valve Close TRIAC</li> <li>• <b>BO3:</b> Heat stage 1/Water Valve Open TRIAC</li> <li>• <b>BO4:</b> Air Damper Close TRIAC</li> <li>• <b>BO5:</b> Damper Open TRIAC</li> </ul>

## Symbio™ 210

**Table 8. Symbio™ 210 specifications**

Storage	
Temperature:	-67°F to 203°F (-55°C to 95°C)
Humidity:	5% to 95% (non-condensing)
Operating	
Temperature:	-40°F to 122°F (-40°C to 50°C)
Humidity:	5% to 95% (non-condensing)
Power:	20.4 to 27.6 Vac, (24 Vac ± 15% nominal, 50 to 60 Hz, 10.5 VA)
Environmental Rating (Enclosure):	NEMA 1
Pollution:	UL 840: Degree 2

### Agency Listing/Compliance

- UL916 PAZX, Open Energy Management Equipment
- UL94-5V, Flammability
- UL2043 Plenum Rated (Plastic enclosure versions without actuators only)
- CE Marked
- FCC Part 15, Subpart B, Class B Limit
- VCCI-CSPR 32:2016
- CAN ICES-003(B)/NMB-003(B)
- Communications BACnet® MS/TP, BACnet® IP, BACnet® Zigbee (Air-Fi®)
- The Symbio™ 210 is BACnet Testing Laboratory (BTL) certified to revision 15 of the ASHRAE BACnet-135 standard as a Building Controller (BC) profile device.
- The European Union (EU) Declaration of Conformity is available from your local Trane office.

### Device Inputs/Outputs

Below is a list of device inputs and outputs.

- Twisted/shielded communication link
- Zone sensor
- Occupancy sensor (optional)
- Discharge Air Temperature (DAT)
- CO<sub>2</sub> sensor
- 24 Vac, Class II power

Table 9, p. 18 provides details for each type input/output.

**Table 9. Symbio™ 210 inputs and outputs**

Analog Input 1 through 3	Universal Inputs UI1 and UI2
<p><b>Note:</b> Configuration options when used as spare; 10 kΩ thermistor, 0 Ω to 1 kΩ linear setpoint, 200 Ω to 20 kΩ linear.</p> <ul style="list-style-type: none"> <li>• <b>AI1:</b> Space temperature; thermistor: 10 kΩ at 77°F (25°C) range: 32°F to 122°F (0°C to 50°C)</li> <li>• <b>AI2:</b> Space setpoint; potentiometer: 1 kΩ from 50°F to 90°F (10°C to 32.2°C), */** (thumbwheel) functionality supported</li> <li>• <b>AI3:</b> Discharge air temperature: 10 kΩ at 77°F (25°C) from -40°F to 212°F (-40°C to 100°C)</li> </ul>	<p><b>Note:</b> Configuration options when used as spare; 4 to 20 mA, 0 V to 10 V, resistive (see all specifications), binary (solid state open collector).</p> <ul style="list-style-type: none"> <li>• <b>UI1:</b> Relative Humidity</li> <li>• <b>UI2:</b> CO<sub>2</sub></li> </ul>

**Table 9. Symbio™ 210 inputs and outputs (continued)**

Pressure Input P1	Binary Input BI1, Dry Contact
<b>P1:</b> Supply air flow; pressure transducer: From 0 to 5 in. water column (0 to 1245 Pa)	<b>BI1:</b> Occupancy
Analog Outputs AO1 and AO2	Binary Outputs 1 through 5
<b>Note:</b> Configuration options when used a spare; Voltage output is 0 to 10 Vdc, 500 Ω min. impedance. Current output is 4 to 20 mA, 500 Ω maximum impedance.	<b>Note:</b> 0.5 A Resistive Maximum Rating.
<ul style="list-style-type: none"> <li>• <b>AO1/BI2:</b> ECM</li> <li>• <b>AO2/BI3:</b> SCR Heat/Waver Valve Signal</li> </ul>	<ul style="list-style-type: none"> <li>• <b>BO1:</b> Heat stage 3 TRIAC</li> <li>• <b>BO2:</b> Heat stage 2/Water Valve Close TRIAC</li> <li>• <b>BO3:</b> Heat stage 1/Water Valve Open TRIAC</li> <li>• <b>BO4:</b> Air Damper Close TRIAC</li> <li>• <b>BO5:</b> Damper Open TRIAC</li> </ul>

## Symbio™ 500

**Table 10. Symbio™ 500 specifications**

Storage	
Temperature:	-67°F to 203°F (-55°C to 95°C)
Humidity:	5% to 95% (non-condensing)
Operating	

**Table 10. Symbio™ 500 specifications (continued)**

Temperature:	-40°F to 158°F (-40°C to 70°C)
Humidity:	5% to 95% (non-condensing)
Power:	20.4 to 27.6 Vac, (24 Vac ± 15% nominal, 50 to 60 Hz, 24 VA)
Mounting weight of controller:	Mounting surface must support 0.80 lb. (0.364 kg)
Environmental Rating (Enclosure):	NEMA 1
Housing material:	<ul style="list-style-type: none"> <li>• Polycarbonate/ABS Blend</li> <li>• UV protected</li> <li>• UL 94-5 VA flammability rating</li> </ul>
Mounting:	Mounts on EN 50 022 — 35 x 15 DIN rail that is included in the VAV unit control box when the Symbio™ 500 is factory mounted.

### Agency Listing/Compliance

- UL60730-1 PAZX, Open Energy Management Equipment
- UL94-5V, Flammability
- CE Marked. The European Union (EU) Declaration of Conformity is available from your local Trane office.
- UKCA Marked
- FCC Part 15, Subpart B, Class B Limit
- VCCI-CSPR 32:2016, Class B Limit
- AS/NZS CISPR 32:2015, Class B Limit
- CAN ICES-003(B)/NMB-003(B)

## Device Connections

**Table 11. Device connections**

Connection	Quantity	Types	Range	Notes
Analog input (AI1 to AI5)	5	Temperature	10 kΩ – Type II, 10 kΩ – Type III, 2252 Ω – Type II, 20 kΩ – Type IV, 100 kΩ	AI1 to AI4 can be configured for timed override capability.
		Setpoint	189 Ω to 889 Ω	
		Resistive	100 Ω to 100 kΩ	Typically used for fan speed switch.
		RTD	Balco™ (Ni-Fe) 1 kΩ, 385 (Pt) 1 kΩ, 375 (Pt) 1 kΩ, 672 (Ni) 1 kΩ	RTDs are not used in this application.
Universal input (UI1 and UI2)	2	Linear	0–20 mA	These inputs may be configured to be thermistor or resistive inputs, 0–10 Vdc inputs, or 0–20 mA inputs.
		Linear	0–10 Vdc	
		Temperature	10 kΩ thermistor	
		Setpoint	189 Ω to 889 Ω	
		Resistive	100 Ω to 100 kΩ	
		Binary	Open collector/dry contact	Low impedance relay contacts recommended.
		Pulse	Solid state open collector	Minimum dwell time is 25 ms On and 25 ms Off.
RTD	Balco™ (Ni-Fe) 1 kΩ, 385 (Pt) 1 kΩ, 375 (Pt) 1 kΩ, 672 (Ni) 1 kΩ	RTDs are not used in this application.		
Binary input (BI1 to BI3)	3		24 Vac detect	The Symbio™ 500 controller provides the 24 Vac that is required to drive the binary inputs when using the recommended connections.
Binary output (BO1 to BO3)	3	Relay	0.05 A @24 Vac pilot duty	Power needs to be wired to the binary output. All outputs are isolated from each other and from ground or power. Ranges given are per contact.

**Table 11. Device connections (continued)**

Connection	Quantity	Types	Range	Notes
Binary output (BO4 to BO9)	6	TRIAC	0.05 A max@24-277 Vac, resistive and pilot duty	Use for modulating TRIAC. User determines whether closing high side (providing voltage to the grounded load) or low side (providing ground to the power load). Ranges given are per contact and power comes from TRIAC SUPPLY circuit.
Analog output/binary input (AO1/BI4 and AO2/BI5)	2	Linear output	0–20 mA	Each termination must be configured as either an analog output or binary input.
		Linear output	0–10 Vdc	
		Binary input	Dry contact	
		PWM output	80 Hz signal @ 15 Vdc	
Pressure inputs (PI1 and PI2)	2	3-wire	0–5 in H <sub>2</sub> O	Pressure inputs supplied with 5 volts of power. Designed for Kavlico™ pressure transducers.
<b>Overall Point Total</b>	<b>23</b>			

## Electrical Connections

Wired sensor and for the wireless sensor BAS-SVX04\*-EN

Zone Sensor Wiring: Location and Mounting

A zone sensor in each control zone should be located in the most critical area of the zone. Sensors should not be mounted in direct sunlight or in the area's supply air stream. Subdivision of the zone may be necessary for adequate control and comfort.

Avoid mounting zone sensors in areas subject to the following:

- Drafts or “dead spots” behind doors or corners
- Hot or cold air ducts
- Radiant heat from the sun or appliances
- Concealed pipes or chimneys
- Unheated or uncooled surfaces behind the sensor such as outside walls
- Air flows from adjacent zones or other units

## Power Wiring and Requirements

### **⚠ WARNING**

#### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

Use at least 16 AWG for power wiring and connect to terminal TB1-1 (+) and TB1-2 (-). 24 Vac is required to power the UCM control and has an acceptable voltage tolerance of 20 to 28 Vac on UCM 4.2 and 18 to 32 Vac on VV550. Replace the UCM control box cover after field wiring to prevent any electromagnetic interference.

**Note:** A dedicated 24 Vac, 50VA NEC class 2 transformer is recommended to power the UCM. When powering multiple UCMs from one transformer, polarity must be maintained. Terminal TB1-1 is designated positive (+) and terminal TB1-2 is negative (-) to the unit casing ground. All wiring must comply with the National Electric Code (NEC) and local codes. Maximum wire lengths should be based on NEC specifications.

See Control Diagrams in “Wiring,” p. 52.

## Zone Sensor Wiring

Each unit must be controlled by a zone sensor that is designated specifically for use with the UCM control. Field wiring for the zone sensors must meet the following requirements:

- Must be 14 to 18 AWG.
- Refer to the sensor instructions for terminal connections.
- If local codes require enclosed conductors, the zone sensor wires should be installed in conduit. Do not route zone sensor wires in conduit with 24 Vac or other high power conducting wires.
- Cost of wiring labor can be reduced through the use of a Trane wireless zone sensor. It requires no wiring from the UCM to the zone sensor. The receiver will be powered and wired to the UCM when wireless sensor is ordered factory installed.

## Auxiliary Duct Temperature Sensor

The typical mounting position of the auxiliary sensor is upstream of the VRRF unit and connected into the DDC controller at TB3-5 and TB3-6.

Comm5 could be mounted downstream of the reheat for improved diagnostics. See Control Diagrams in “Wiring,” p. 52.

## Stand Alone VAV Controls

### Stand Alone UCM 4.2

When there is no communication to the UCM control and the unit is in the stand alone mode the control action is determined by the auxiliary temperature sensor located on TB3-5 and TB3-6 terminals on the UCM board. In order for the auxiliary sensor to determine the control action (heat, cool) it must be located in the supply duct. The auxiliary temperature is then compared to the zone temperature. If the supply air temperature is 10 degrees above the zone temperature, then the control action will be heat. If the supply air temperature is less than or equal to the zone temperature, then the control action will be cool. If the supply air temperature is between the zone temperature and the zone temperature + 10°F (5.5°C) (zone temperature < supply air temperature < zone temperature + 10°F) (5.5°C), the control action remains the same and the UCM controls to the minimum flow set point. If an auxiliary sensor is not installed the UCM will retain the last control action in effect.

### Stand Alone VV550

When there is no communication to the VV550 control and the unit is in the stand alone mode the control action is determined by the auxiliary temperature sensor located on TB3-5 and TB3-6 terminals on the VV550 board. The control must also be configured through the "Inputs Tab" of Analog Input 4 as "Primary Supply Air Sensor". In order for the auxiliary sensor to determine the control action (heat, cool) it must be located in the supply inlet of the duct. The auxiliary temperature is then compared to the zone temperature. If the supply air temperature is 10 degrees above the zone temperature, then the control action will be heat. If the supply air temperature is less than or equal to the zone temperature, then the control action will be cool. If the supply air temperature is between the zone temperature and the zone temperature + 10°F (5.5°C) (zone temperature < supply air temperature < zone temperature + 10°F) (5.5°C), the control action remains the same and the UCM controls to the minimum flow set point. If an auxiliary sensor is not installed the UCM will retain the last control action in effect.

### Stand Alone UC400 and Symbio™ 500

When there is no communication to the UC400 or Symbio™ 500 control and the unit is in the stand alone mode the control action is determined by the auxiliary temperature sensor located on AI5 terminals on the UC400 or Symbio™ 500 control. Note that optional factory installed auxiliary temperature sensors are wired to AI4 for use as discharge temperature sensors. For these to be used as supply air temperature sensor, they need to be disconnected from AI4 and connected to AI5. If the unit has reheat, the supply air temperature sensor needs to be installed upstream of the VAV unit. The supply air temperature is then compared to the zone temperature. If the supply air temperature is 10 degrees above the zone temperature, then the control action will be heat. If the supply air temperature is less than or equal to the zone temperature, then the control action will be cool. If the supply air temperature is between the zone temperature and the zone temperature + 10°F (5.5°C) (zone temperature < supply air

temperature < zone temperature + 10°F) (5.5°C), the control action remains the same and the UCM controls to the minimum flow set point. If an auxiliary sensor is not installed the UCM will retain the last control action in effect.

### Stand Alone UC210 and Symbio™ 210

When there is no communication to the UC210 or Symbio™ 210 control and the unit is in the stand alone mode the control action is determined by the auxiliary temperature sensor located on AI3 terminals on the UC210 or Symbio™ 210 control. The point configuration for AI3 is configured from the factory for discharge air temperature and would need to be reconfigured for supply air temperature using Tracer® TU to remove the discharge air temperature AI3 hardware reference and to add the AI3 hardware reference to supply air temperature. In order for the auxiliary sensor to function as a supply air temperature sensor on VAV units with reheat and to properly determine the control action (heat, cool) it must be located upstream of the VAV unit. The auxiliary temperature is then compared to the zone temperature. If the supply air temperature is 10 degrees above the zone temperature, then the control action will be heat. If the supply air temperature is less than or equal to the zone temperature, then the control action will be cool. If the supply air temperature is between the zone temperature and the zone temperature + 10°F (5.5°C) (zone temperature < supply air temperature < zone temperature + 10°F) (5.5°C), the control action remains the same and the UCM controls to the minimum flow set point. If an auxiliary sensor is not installed the UCM will retain the last control action in effect.

## Communication Link Wiring UCM 4.2

The "Communication Link" is the communication wiring between Tracer® Summit™ and all VAV box Unit Control Modules (UCM). Tracer Summit can be connected to the UCM communication link in a "daisy chain" configuration.

**Note:** *All wiring from the zone sensor to the Comm link must be twisted shielded pair wiring.*

The "Communication Link" is the communication wiring between Tracer Summit and all VAV box Unit Control Modules (UCM). Tracer Summit can be connected to the UCM.

**Note:** *It is not necessary for each UCM to be connected to the line in sequential order by address. Also, multiple communication links may be run and terminated at the Tracer Summit. However, a consistent, documented wiring path will help troubleshoot communication problems after installation.*

Field wiring for the communication link must meet the following requirements:

1. All wiring must be in accordance with the National Electrical code and local codes.
2. Communication link wiring must be at least 18 AWG twisted shielded pair wire. Shields must be grounded at the Tracer Summit or Central Control Panel (CCP) only. More than one ground reference will cause communications failures. Shields must be daisy chained. Tape the shield at the last VAV UCM to prevent any connection between the



## Installation

shield and ground. Plenum Cable and Non-Plenum Cable wire specifications are as follows:

- Plenum Cable: Stranded, tinned copper insulated with extruded FEP. Conductors cabled and shielded with overall aluminum/Mylar tape and stranded, tinned copper drawn wire. Extruded jacket, 300 volt, 150°C NEC 725-2 (b) class 2, type CL2P, 25 pF/ft.
- Non-Plenum Cable: Stranded tinned copper insulated with polyethylene. Conductors cabled and shielded with overall aluminum/polyester tape and stranded, tinned copper drain wire. Chrome gray PVC jacket, 300 volt, 60°C NEC type CM, 24 pF/ft.

### Wire Capacitance

Wire capacitance must comply with the following table:

**Table 12. Maximum wire capacitance**

Maximum Communication Link Wiring Length	Maximum Wire Capacitance
1,000 feet (304.8 m)	Up to 60 pF/ft. (196.9 pF/m)
2,000 feet (609.6 m)	Up to 50 pF/ft. (164.0 pF/m)
3,000 feet (914.4 m)	Up to 40 pF/ft. (131.2 pF/m)
4,000 feet (1,219.2 m)	Up to 30 pF/ft. (98.4 pF/m)
5,000 feet (1,524 m)	Up to 25 pF/ft. (82.0 pF/m)

1. The maximum wire length should not exceed 5,000 feet (1,524 m).
2. Communication link wiring cannot pass between buildings.
3. A maximum of 63 UCMs can be connected to each COM Link. Daisy chaining is a typical configuration.
4. Polarity is extremely important and must be observed on communication link connections.
5. At the VAV box, communication link wires must be connected to TB2-1, 3 (+) and TB2-2, 4 (-) terminals on the UCM.
6. Verify that the UCM address is properly set (DIP switch SW1). See [Table 12, p. 22](#) for proper DIP switch settings.

### DIP Switch Settings

DIP Switch SW1 contains six switches for addressing the UCM. These switches allow a user to set a unique communication address for each UCM. Each UCM on a given communication link must have a unique address in order for Tracer<sup>®</sup> Summit or the CCP to communicate to it. See the following table for UCM 4.2 DIP switch settings.

**Table 13. DIP switch settings**

UCM Unit #	Eware Address	Dip 1	Dip 2	Dip 3	Dip 4	Dip 5	Dip 6
1	65	OFF	ON	ON	ON	ON	ON
2	66	ON	OFF	ON	ON	ON	ON
3	67	OFF	OFF	ON	ON	ON	ON
4	68	ON	ON	OFF	ON	ON	ON
5	69	OFF	ON	OFF	ON	ON	ON

**Table 13. DIP switch settings (continued)**

UCM Unit #	Eware Address	Dip 1	Dip 2	Dip 3	Dip 4	Dip 5	Dip 6
6	70	ON	OFF	OFF	ON	ON	ON
7	71	OFF	OFF	OFF	ON	ON	ON
8	72	ON	ON	ON	OFF	ON	ON
9	73	OFF	ON	ON	OFF	ON	ON
10	74	ON	OFF	ON	OFF	ON	ON
11	75	OFF	OFF	ON	OFF	ON	ON
12	76	ON	ON	OFF	OFF	ON	ON
13	77	OFF	ON	OFF	OFF	ON	ON
14	78	ON	OFF	OFF	OFF	ON	ON
15	79	OFF	OFF	OFF	OFF	ON	ON
16	80	ON	ON	ON	ON	OFF	ON
17	81	OFF	ON	ON	ON	OFF	ON
18	82	ON	OFF	ON	ON	OFF	ON
19	83	OFF	OFF	ON	ON	OFF	ON
20	84	ON	ON	OFF	ON	OFF	ON
21	85	OFF	ON	OFF	ON	OFF	ON
22	86	ON	OFF	OFF	ON	OFF	ON
23	87	OFF	OFF	OFF	ON	OFF	ON
24	88	ON	ON	ON	OFF	OFF	ON
25	89	OFF	ON	ON	OFF	OFF	ON
26	90	ON	OFF	ON	OFF	OFF	ON
27	91	OFF	OFF	ON	OFF	OFF	ON
28	92	ON	ON	OFF	OFF	OFF	ON
29	93	OFF	ON	OFF	OFF	OFF	ON
30	94	ON	OFF	OFF	OFF	OFF	ON
31	95	OFF	OFF	OFF	OFF	OFF	ON
32	96	ON	ON	ON	ON	ON	OFF
33	97	OFF	ON	ON	ON	ON	OFF
34	98	ON	OFF	ON	ON	ON	OFF
35	99	OFF	OFF	ON	ON	ON	OFF
36	100	ON	ON	OFF	ON	ON	OFF
37	101	OFF	ON	OFF	ON	ON	OFF
38	102	ON	OFF	OFF	ON	ON	OFF
39	103	OFF	OFF	OFF	ON	ON	OFF
40	104	ON	ON	ON	OFF	ON	OFF
41	105	OFF	ON	ON	OFF	ON	OFF
42	106	ON	OFF	ON	OFF	ON	OFF
43	107	OFF	OFF	ON	OFF	ON	OFF
44	108	ON	ON	OFF	OFF	ON	OFF
45	109	OFF	ON	OFF	OFF	ON	OFF
46	110	ON	OFF	OFF	OFF	ON	OFF
47	111	OFF	OFF	OFF	OFF	ON	OFF
48	112	ON	ON	ON	ON	OFF	OFF
49	113	OFF	ON	ON	ON	OFF	OFF
50	114	ON	OFF	ON	ON	OFF	OFF
51	115	OFF	OFF	ON	ON	OFF	OFF
52	116	ON	ON	OFF	ON	OFF	OFF

**Table 13. DIP switch settings (continued)**

UCM Unit #	Eware Address	Dip 1	Dip 2	Dip 3	Dip 4	Dip 5	Dip 6
53	117	OFF	ON	OFF	ON	OFF	OFF
54	118	ON	OFF	OFF	ON	OFF	OFF
55	119	OFF	OFF	OFF	ON	OFF	OFF
56	120	ON	ON	ON	OFF	OFF	OFF
57	121	OFF	ON	ON	OFF	OFF	OFF
58	122	ON	OFF	ON	OFF	OFF	OFF
59	123	OFF	OFF	ON	OFF	OFF	OFF
60	124	ON	ON	OFF	OFF	OFF	OFF
61	125	OFF	ON	OFF	OFF	OFF	OFF
62	126	ON	OFF	OFF	OFF	OFF	OFF
63	127	OFF	OFF	OFF	OFF	OFF	OFF

### Communication Link Wiring UCM VV550

Follow these guidelines for Comm5 wiring:

- Use 22 AWG unshielded Level 4 communication wire for most Comm5 installations.
- Use shielded Level 4 wire for Comm5 Tracker and VariTrac™ CCP installations.
- Always use termination resistors.
- Use 105, watt, 1% resistor at each end for Level 4 wire.
- Use 82.5, watt, 1% resistor at each end for Trane purple wire.
- Use the daisy chain topology for Comm5 links.
- Limit the Comm5 link to 4500 feet.
- Limit the link to 60 devices.
- Limit zone sensor communication stubs to 8 per link, 50 feet each (maximum).
- Use one repeater for an additional 4500 feet, an additional 60 devices, and an additional 8 communication stubs.

Limit the distance of Comm5 links to 4500 feet. In addition, limit Comm5 links to 60 devices. The BCU, repeater, and Rover™ do not count toward this total.

### Daisy chain

Although other topologies have been used in the past, we recommend using only the daisy chain topology on your Comm5 installations. The likelihood of communication problems increases with other configurations.

### Zone sensor comm stubs

For the most reliable communications, limit the number of zone sensor communication stubs to 8 per Comm5 link. Each stub should not exceed 50 feet. Exceeding these limits increases the likelihood of communication problems.

### Binary Outputs

Wiring to air damper is factory installed but the outputs to reheat or fan control need to be field installed when applicable.

**Note:** All field installed wiring must comply with NEC and local codes.

All binary outputs from control board are 24 Vac. Connection points for unit UCM controller are shown in Control Diagrams in “Wiring,” p. 52.

The type of wire used would be a Plenum rated class 2 circuit cable (CL2P) or approved substitute. The wire can be 18 to 22 gauge and be used at a distance of up to 100 feet.

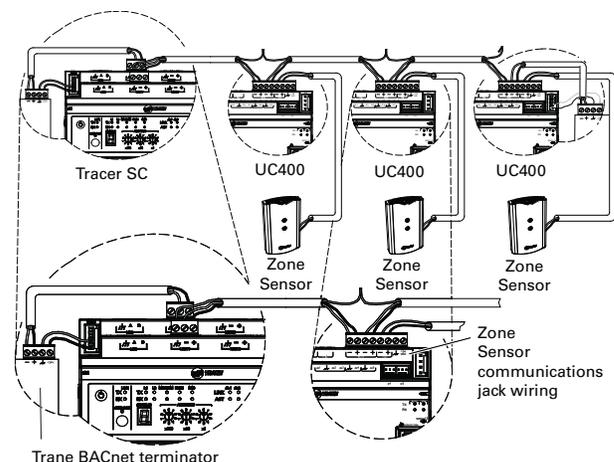
### VRRF DDC controller Power Wiring

In VRRF unit connect line voltage wires to optional transformer or Connect 24 Vac to TB1-1 (+) and TB1-2 (-) Proper polarity must be maintained. TB1-1 is the hot side (+) and TB1-2 is the ground side (-) of the 24 Vac input. The UCM cannot be powered from a common 24 Vac transformer that is supplying power to a device containing a full wave rectifier bridge in its power supply. The acceptable voltage is 20 to 28 Vac (24 Vac cataloged). However, voltages at either extreme may result in increased system instability.

### Communication Link Wiring Symbio™ 210/210e, Symbio™ 500, UC400, and UC210

- Use 18 AWG Trane purple-shielded communication wire for BACnet® installations.
- Link limit of 4,000 ft and 60 devices maximum (without a repeater).
- Use a Trane BACnet® termination on each end of the link.
- Use daisy chain topology. (See Figure 9, p. 23.)
- Maintain polarity.

**Figure 9. BACnet® MS/TP link wiring**



To ensure proper network communication, follow the recommended wiring and best practices below when installing communication wire:

- All wiring must comply with the National Electrical Code™ (NEC) and local codes.
- Ensure that 24 Vac power supplies are consistent in regards to grounding. Avoid sharing 24 Vac between controllers.



## Installation

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- Avoid over tightening cable ties and other forms of cable wraps. This can damage the wires inside the cable.
- Do not run communication cable alongside or in the same conduit as 24 Vac power. This includes the conductors running from TRIAC-type inputs.
- In open plenums, avoid running wire near lighting ballasts, especially those using 277 Vac.
- Use same communication wire type, without terminators, for the zone sensor communication stubs from controller IMC terminals to the zone sensor communication module.
- Zone Sensor communication wiring length limits of 300 feet (100m).

**Note:** For more details, refer to the *Unit Controller Wiring for the Tracer<sup>®</sup> SC<sup>™</sup> System Controller Wiring Guide (BAS-SVN03\*-EN)*.

### Pneumatic Units: Single Duct Electric Heat

Remove Power and Lock and Tag out unit if it hasn't been done already.

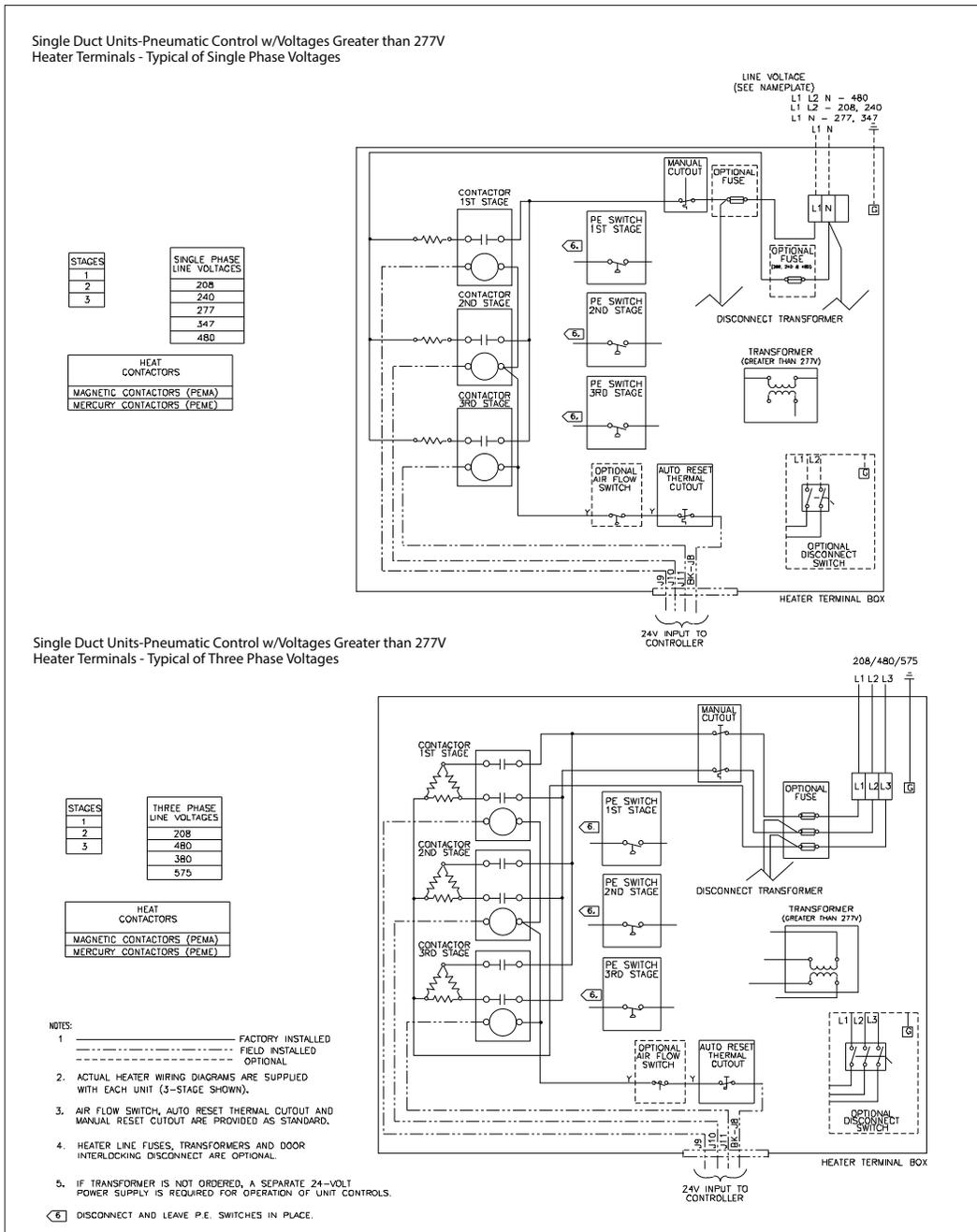
#### **⚠ WARNING**

##### **Hazardous Voltage!**

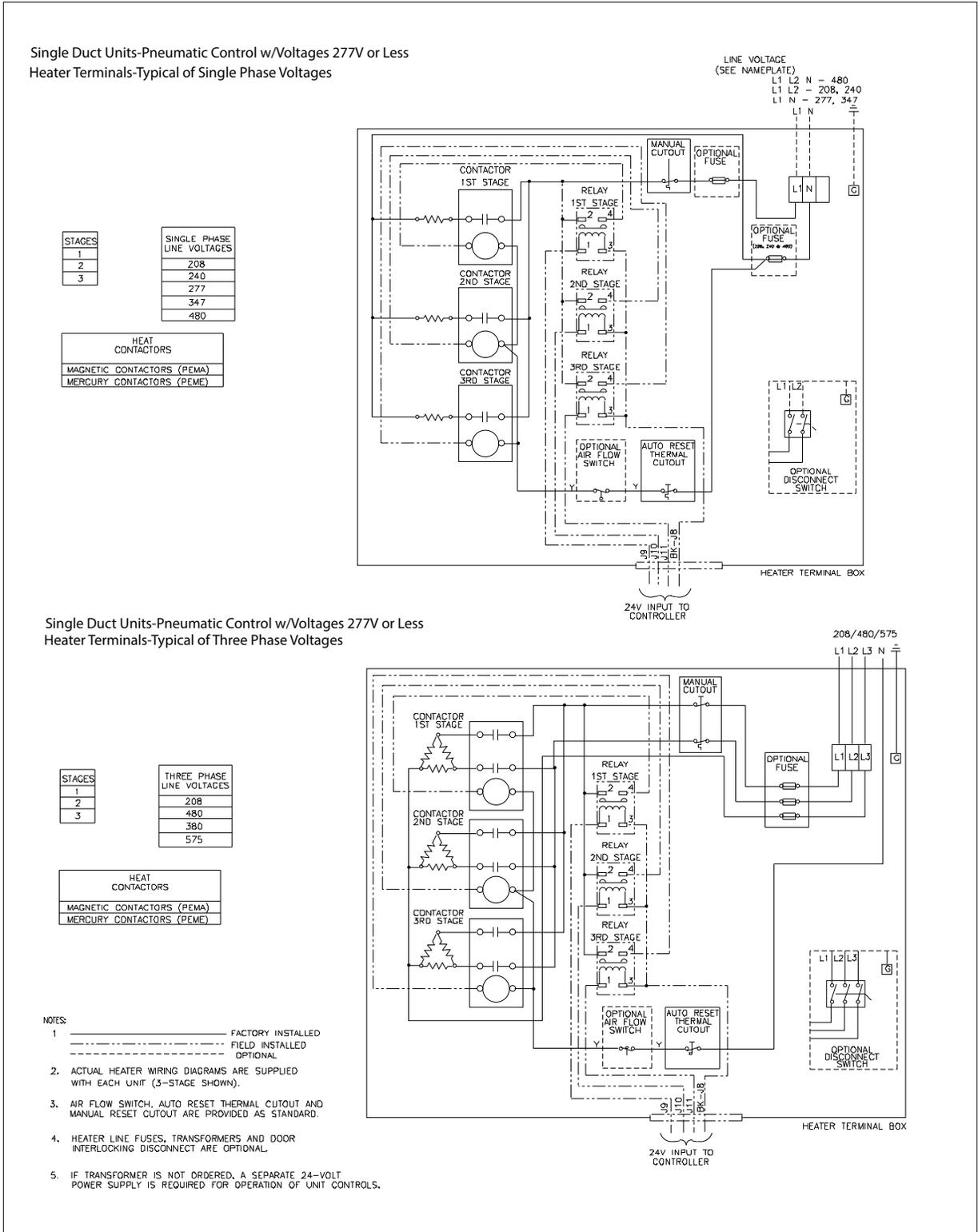
**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

1. Disconnect PE switch(es) for each stage of heat from electric heat control enclosure and replace them with relay(s) from kit.
2. Connect line voltage wires to relay(s) Normally Open contacts using existing wires that were connected to PE switch(es) if possible. See [Figure 10, p. 25](#) or [Figure 11, p. 26](#) for correct diagram connections.
3. Control voltage will be field wired from relay coil(s) to VRRF DDC controller binary output connections using cable. See Control Diagrams in "[Wiring](#)," p. 52.

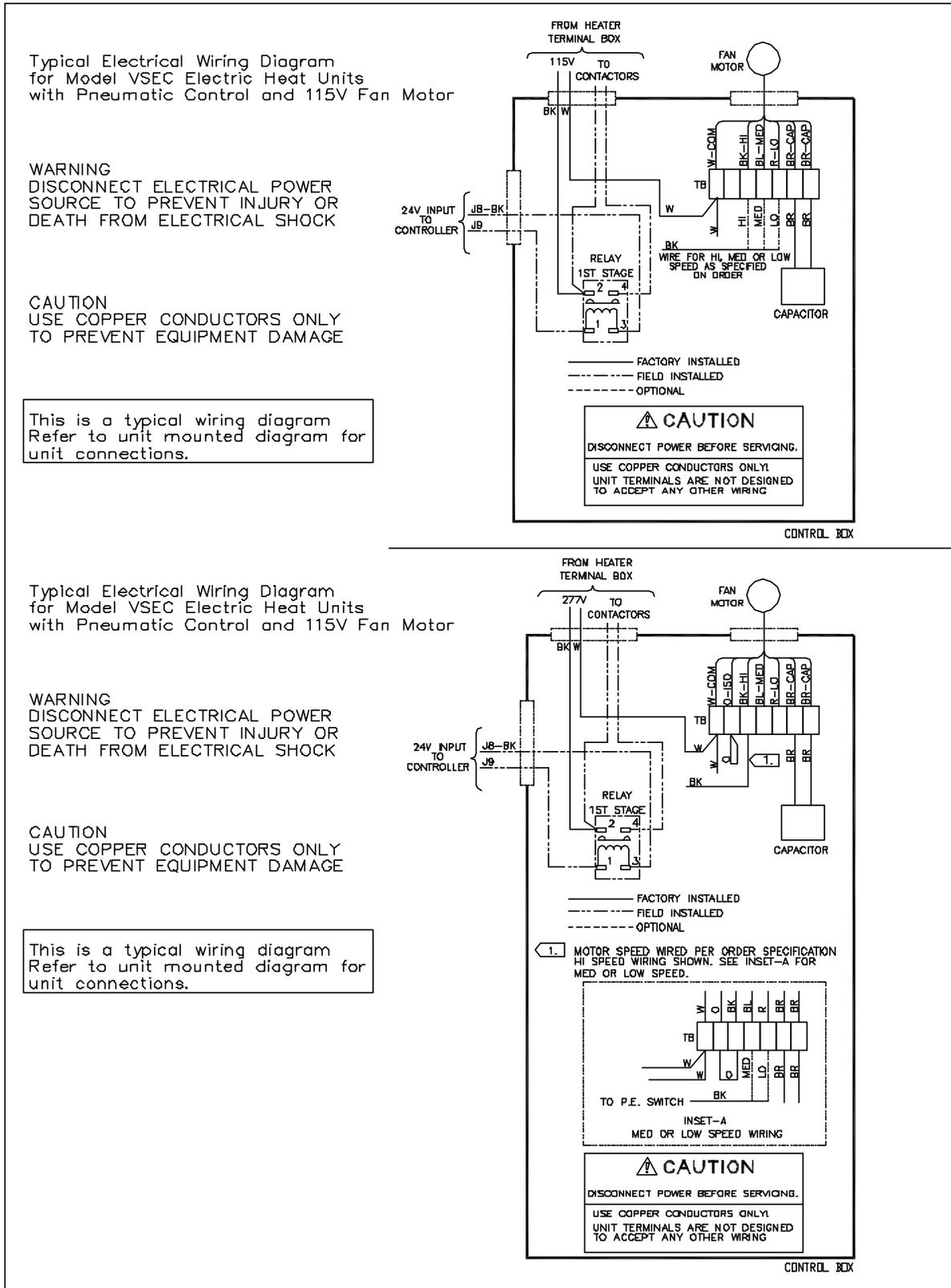
**Figure 10. Existing unit with 24-Volt AC coils for electric heat stage**



**Figure 11. Existing unit with line-voltage coils for electric heat stages**



**Figure 12. Pneumatic fan-powered**



### Pneumatic Units: Single Duct Hot Water

1. Isolate pneumatic hot water valve and remove valve from system.
2. Install Proportional or Two-Position hot water valve. Ensure that piping is correct to the new style of valve.
3. Field wire actuator 24 Vac control voltage to VRRF DDC controller. See Control Diagrams in "Wiring," p. 52.

### Pneumatic Fan-Powered: Duct Pressure Switch Only Fan Control

1. Remove Power and Lock and Tag out unit if it hasn't been done already.

#### **⚠ WARNING**

##### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

2. Disconnect duct pressure switch for fan Control in fan control enclosure and replace it with relay from kit.
3. Connect line voltage wires to relay Normally Open contacts using existing wires that were connected to duct pressure switch if possible. See [Figure 12, p. 27](#) for correct diagram connections.
4. Control voltage will be field wired from relay coil to VRRF DDC controller binary output connections using cable. See Control Diagrams in "Wiring," p. 52.

### Pneumatic Fan-Powered: PE Switch Fan Control

1. Remove Power and Lock and Tag out unit if it hasn't been done already.

#### **⚠ WARNING**

##### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

2. Disconnect PE switch and optional duct pressure switch for fan control in fan control enclosure and replace PE switch with relay from kit.
3. Connect line voltage wires to relay Normally Open contacts using existing wires that were connected to duct pressure switch if possible.
4. Control voltage will be field wired from relay coil to VRRF DDC controller binary output connections using cable from

kit. See [Figure 12, p. 27](#) and Control Diagrams in "Wiring," p. 52.

### Pneumatic Fan-Powered: Electric Heat

1. Remove Power and Lock and Tag out unit if it hasn't been done already.

#### **⚠ WARNING**

##### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

2. Disconnect PE switch(es) for each stage of heat from electric heat control enclosure and replace them with relay(s) from kit.
3. Connect line voltage wires to relay(s) Normally Open contacts using existing wires that were connected to PE switch(es) if possible.
4. Control voltage will be field wired from relay coil(s) to VRRF DDC controller binary output connections using cable. [Figure 12, p. 27](#) and Control Diagrams in "Wiring," p. 52.

**Note:** *VRRF Fan Powered unit's UCM and VV550 can only support two stages of electric heat and your existing unit may have up to three stages. Contact VAV Technical Support for field wiring the third stage of electric heat.*

### Pneumatic Fan Powered: Hot Water

1. Isolate pneumatic hot water valve and remove valve from system.
2. Install Proportional or Two-Position hot water valve. Ensure that the piping is correct to the new style valve.
3. Field wire actuator 24 Vac control voltage to VRRF DDC controller. See Control Diagrams in "Wiring," p. 52.

### Analog and DDC Units: Single Duct Electric Heat

1. Remove Power and Lock and Tag out unit if it hasn't been done already.

#### **⚠ WARNING**

##### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

2. Disconnect control wiring from heat relay(s) and field wire cable(s) from kit by connecting heat relay coil(s) to VRRF DDC controller binary output connections using cable. See [Figure 16, p. 33](#) and Control Diagrams in "Wiring," p. 52.

### Analog and DDC Units: Single Duct Hot Water

**Note:** *Original hot water valve actuator may be compatible with new VRRF DDC controller. If this is true, skip the next two steps.*

1. Isolate hot water valve and remove valve from system, if necessary.
2. Install Proportional or Two-Position hot water valve. Ensure that the piping is correct to the new style valve.
3. Field wire actuator 24 Vac control wiring to VRRF DDC controller. See Control Diagrams in "Wiring," p. 52.

### Analog and DDC Fan Powered: Fan Control

1. Remove Power and Lock and Tag out unit if it hasn't been done already.

#### WARNING

##### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

2. Disconnect control wiring from fan relay(s) and field wire cable(s) from kit by connecting fan relay coil(s) to VRRF DDC controller binary output connections using cable. See [Figure 13, p. 30](#), [Figure 14, p. 31](#) and Control Diagrams in "Wiring," p. 52.

**Note:** *Some Analog units used a duct pressure switch to enable/disable fan. See below for change out to retrofit using VRRF DDC controller.*

### Analog Fan-Powered: Duct Pressure Switch Only Fan Control

1. Remove Power and Lock and Tag out unit if it hasn't been done already.

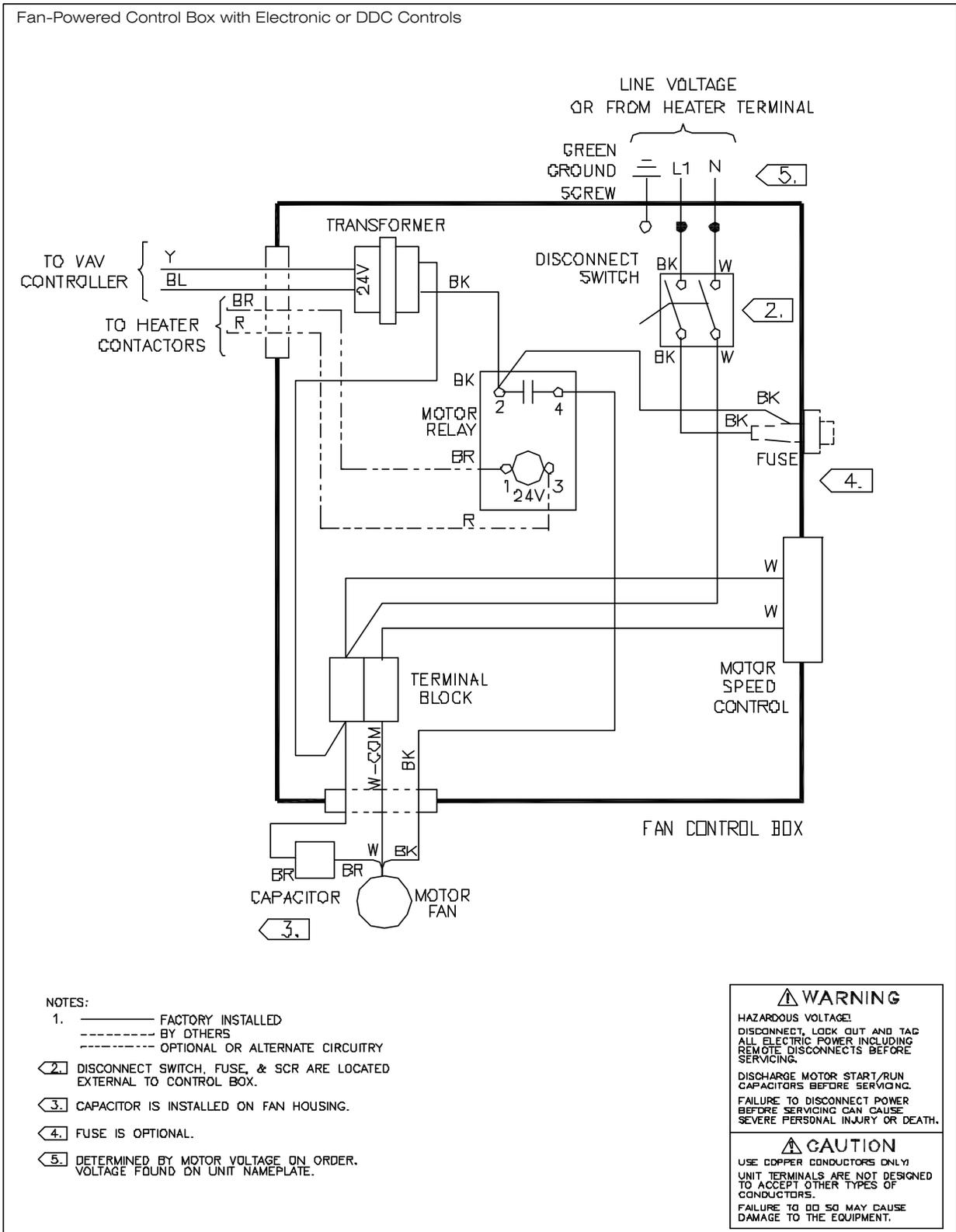
#### WARNING

##### **Hazardous Voltage!**

**Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.**

2. Disconnect duct pressure switch for fan Control in fan control enclosure and replace it with relay from kit.
3. Connect line voltage wires to relay Normally Open contacts using existing wires that were connected to duct pressure switch, if possible.
4. Control voltage will be field wired from relay coil to VRRF DDC controller binary output connections using cable. See [Figure 15, p. 32](#) and Control Diagrams in "Wiring," p. 52.

Figure 13. SCR motor speed control



### Analog and DDC Fan-Powered: Fan-Powered Electric Heat

1. Remove Power and Lock and Tag out unit if it hasn't been done already.

**⚠ WARNING**  
**Hazardous Voltage!**  
 Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

2. Disconnect control wiring from heat relay(s) and field wire cable(s) from kit by connecting heat relay coil(s) to VRRF DDC controller binary output connections using cable. See [Figure 16, p. 33](#) and Control Diagrams in "Wiring," p. 52.

### Analog and DDC Fan Powered: Hot Water

1. Isolate hot water valve and remove valve from system, if necessary.
2. Install Proportional or Two-Position hot water valve. Ensure that the piping is correct to the new style valve.
3. Field wire actuator 24 Vac control voltage to VRRF DDC controller. See Control Diagrams in "Wiring," p. 52.

Figure 14. ECM motor speed control

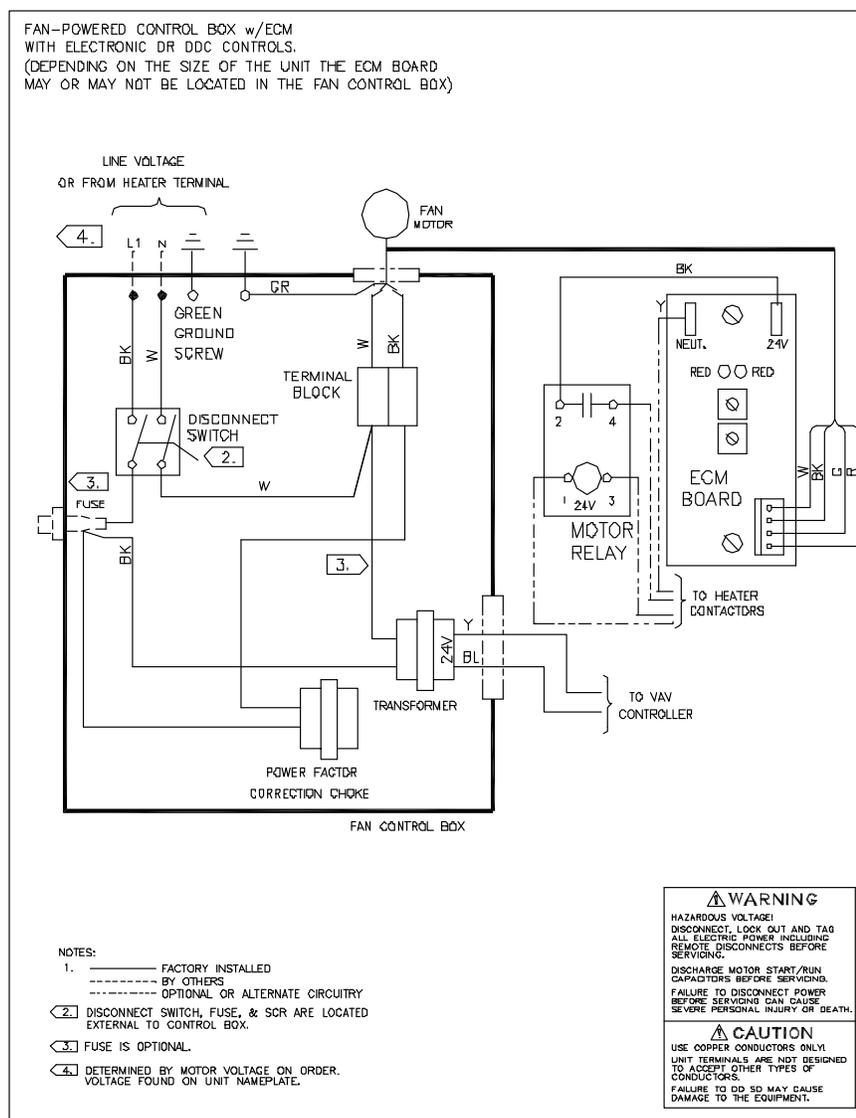


Figure 15. Analog duct pressure switch fan control

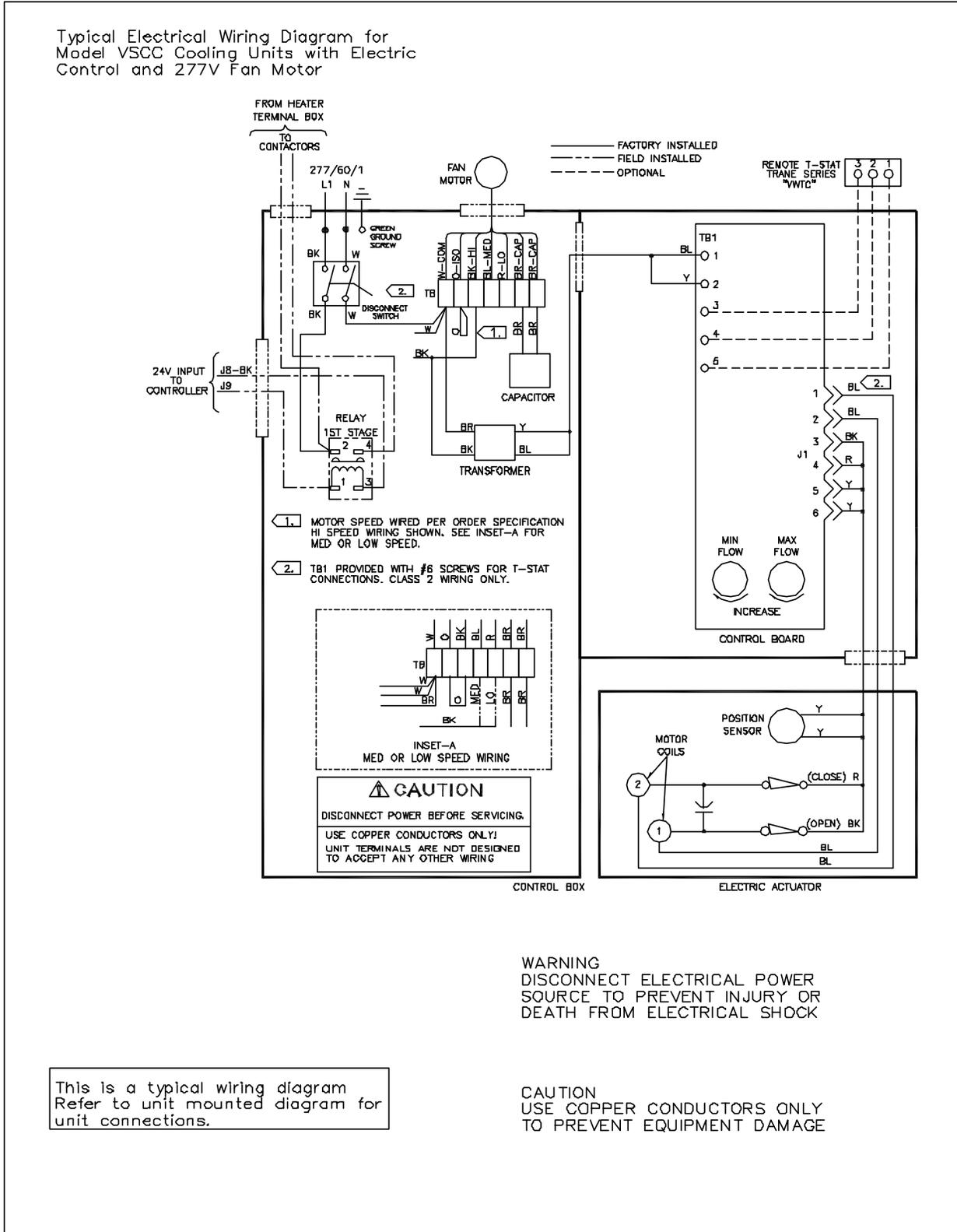
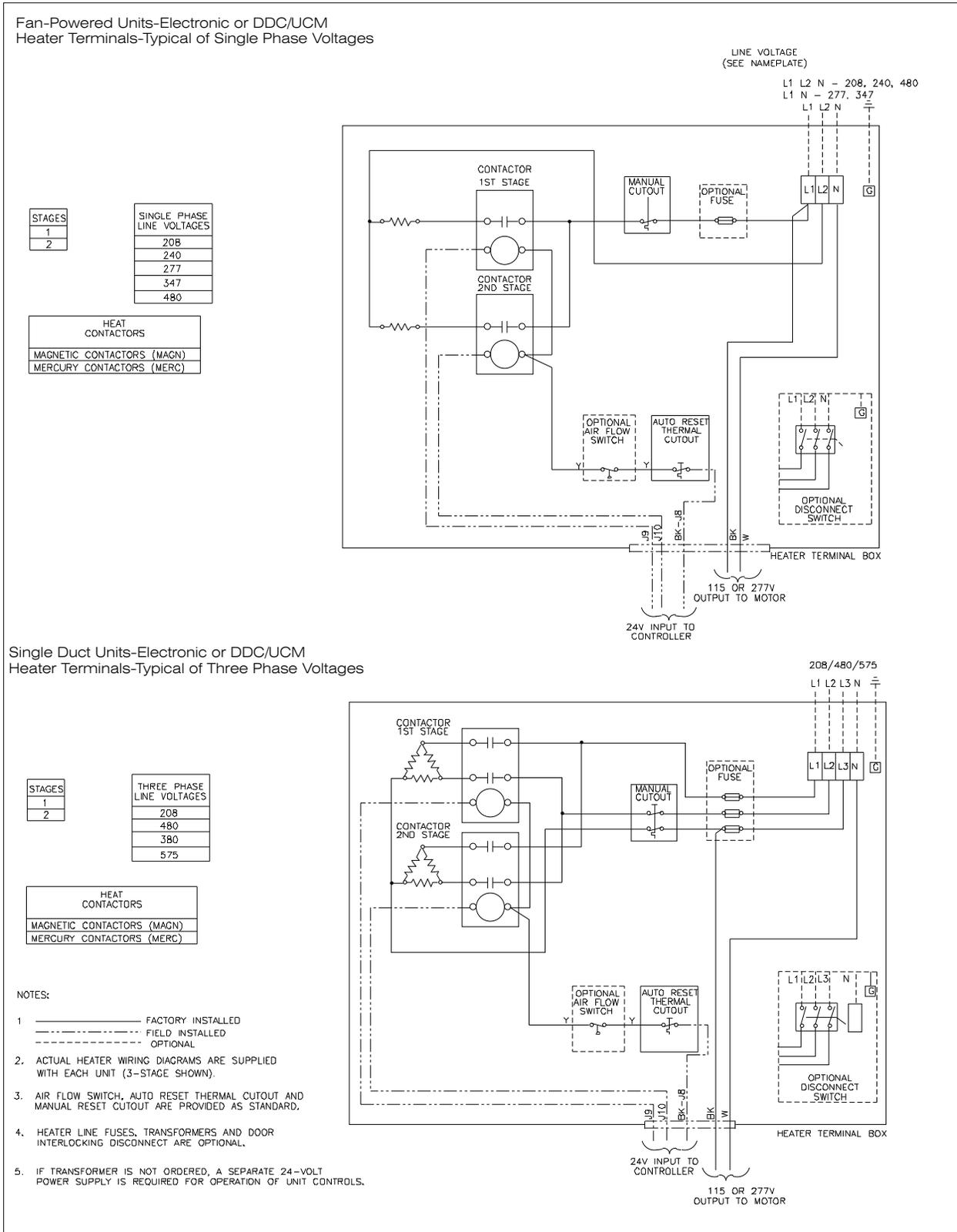


Figure 16. Analog and DDC fan-powered with electric heat



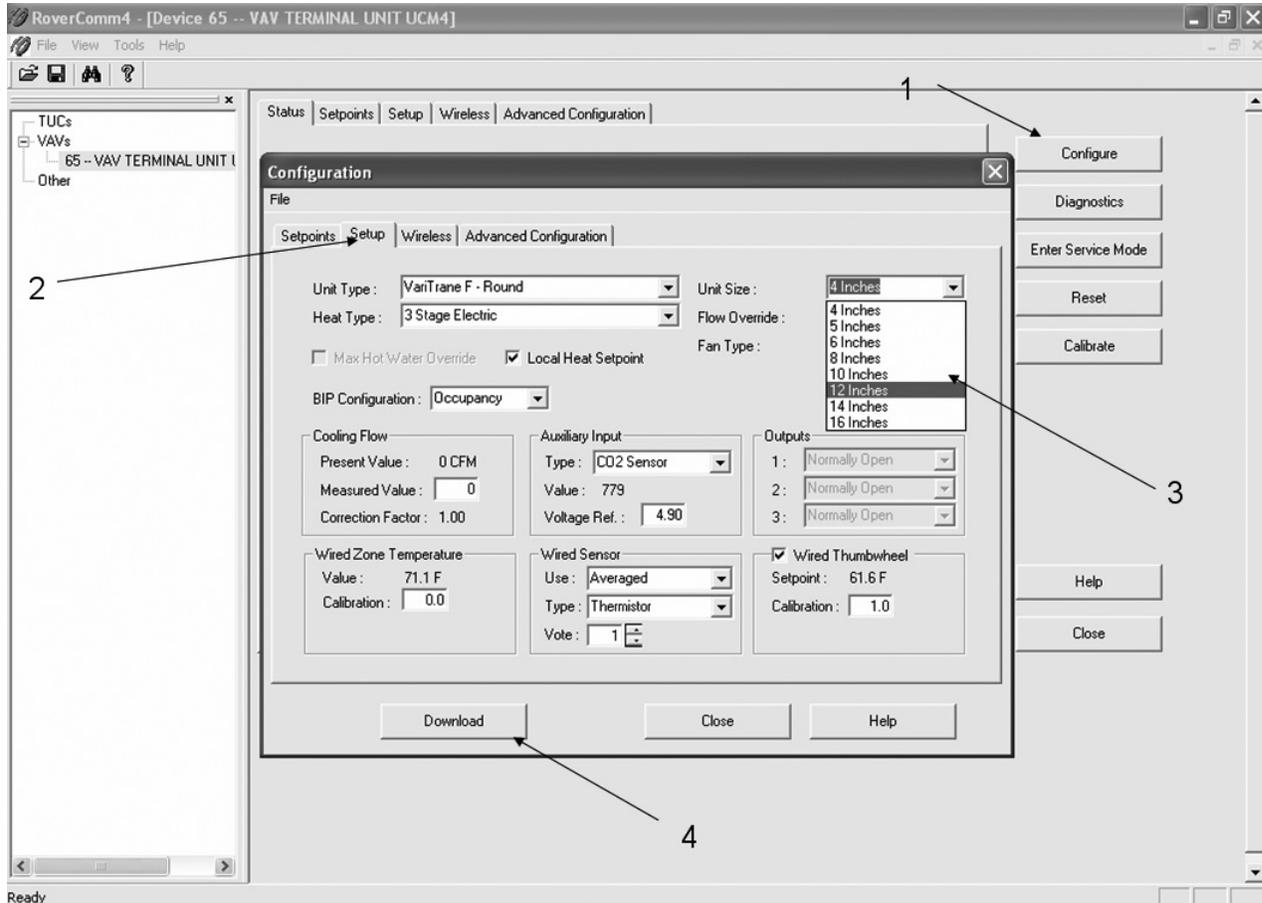
## UCM Programming (UCM 4.2)

The UCM 4.2 can be programmed using Tracer<sup>®</sup> Summit<sup>™</sup>, CCP computer software, and Trane's service tool, Rover<sup>™</sup>. When using Summit or CCP software, refer to programming guides. When using Rover see, EMTX-SVX01\*-EN for overall

use. When setting up VRRF UCM, see below for basic menu's using Rover.

When using Rover, connect into UCM using proper cable. Initiate Rover software and search for unit using VRRF address.

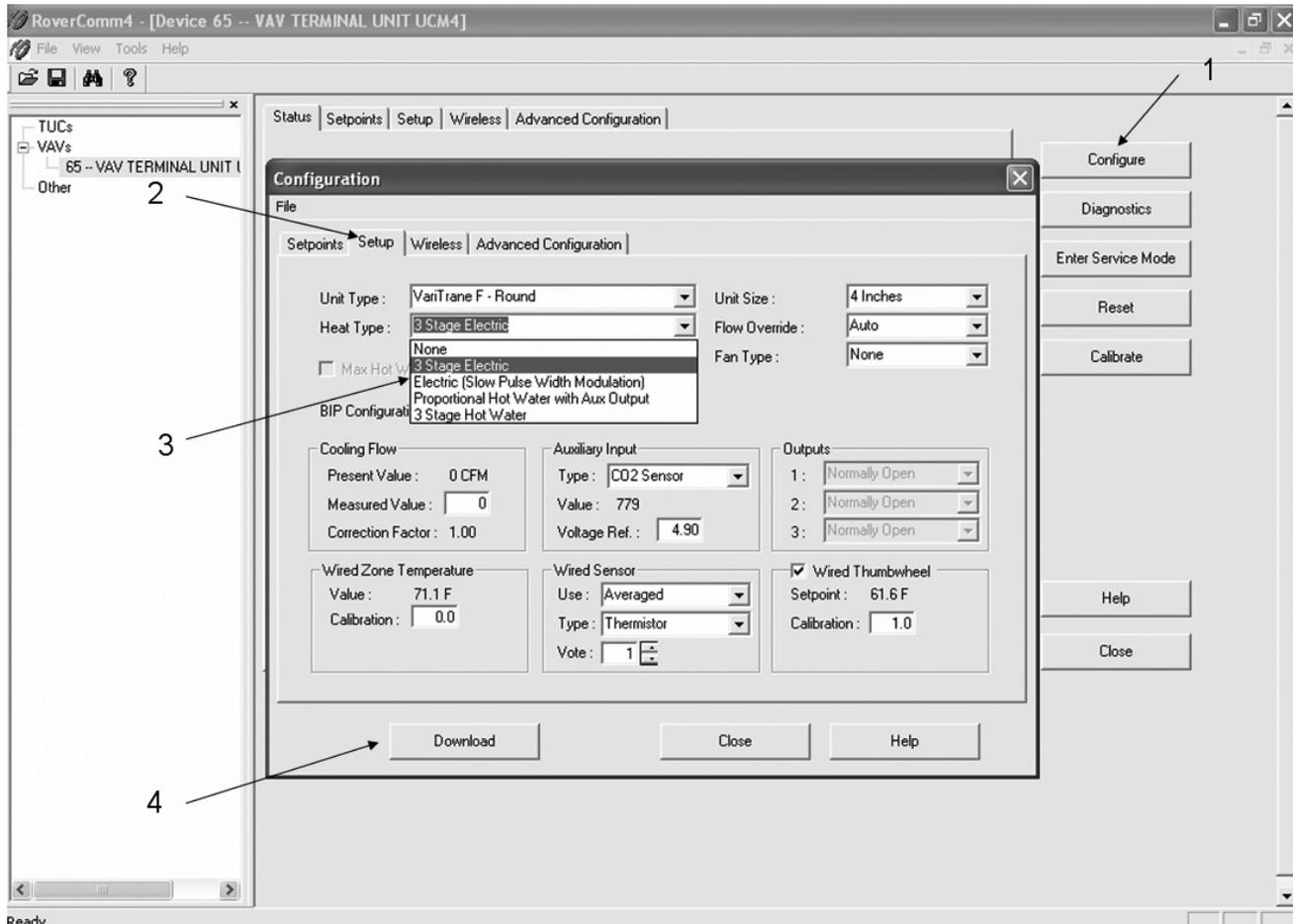
**Figure 17. UCM 4.2 configuration: setup inlet size**



To Setup the Inlet Size:

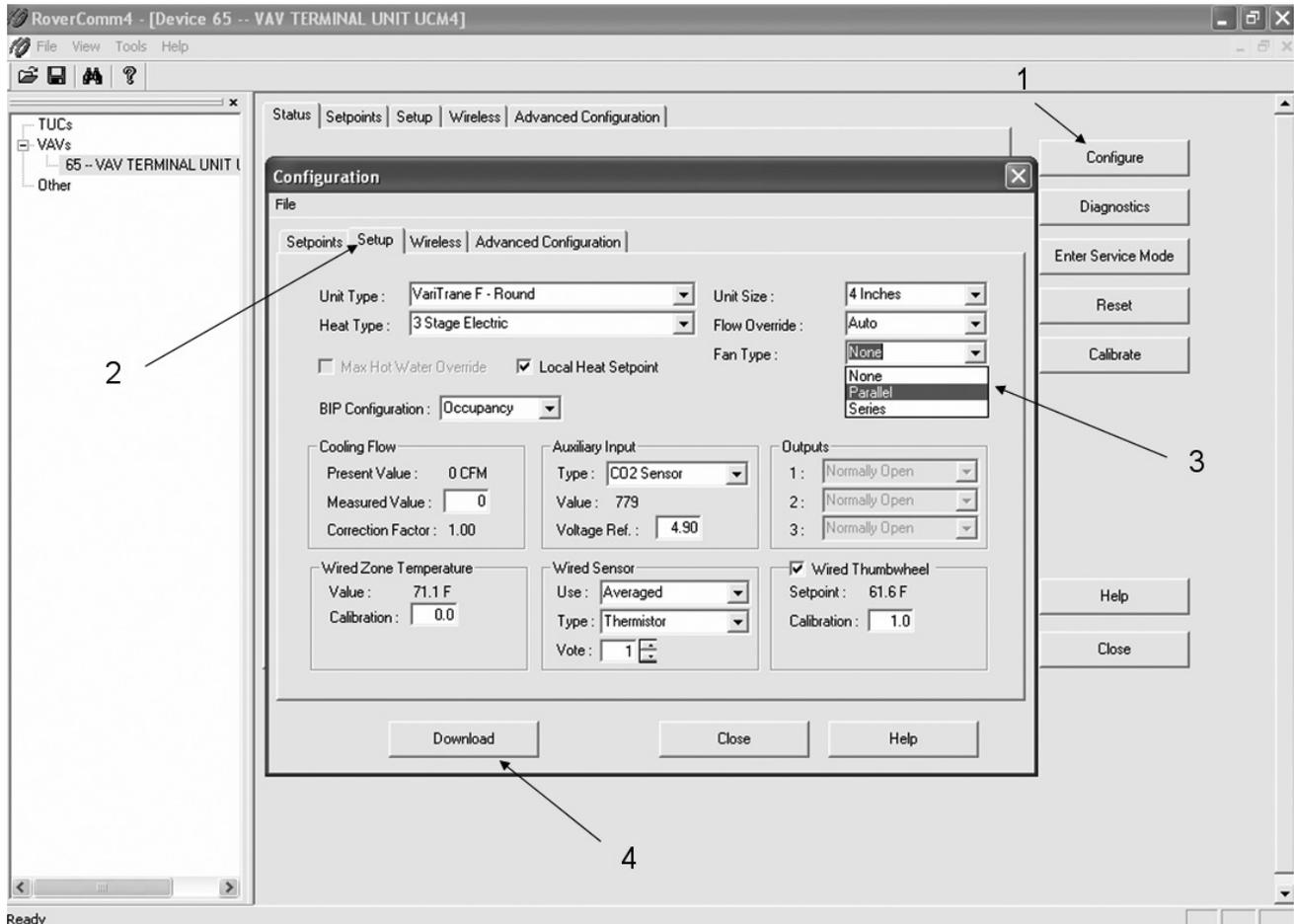
1. Click the 'Configure' button.
2. Click the 'Setup' tab.
3. Click the 'Unit Size' drop-down button and select the desired unit size.
4. Click the 'Download' button.

**Figure 18. UCM 4.2 configuration: reheat setup**



To Set the Reheat Setup

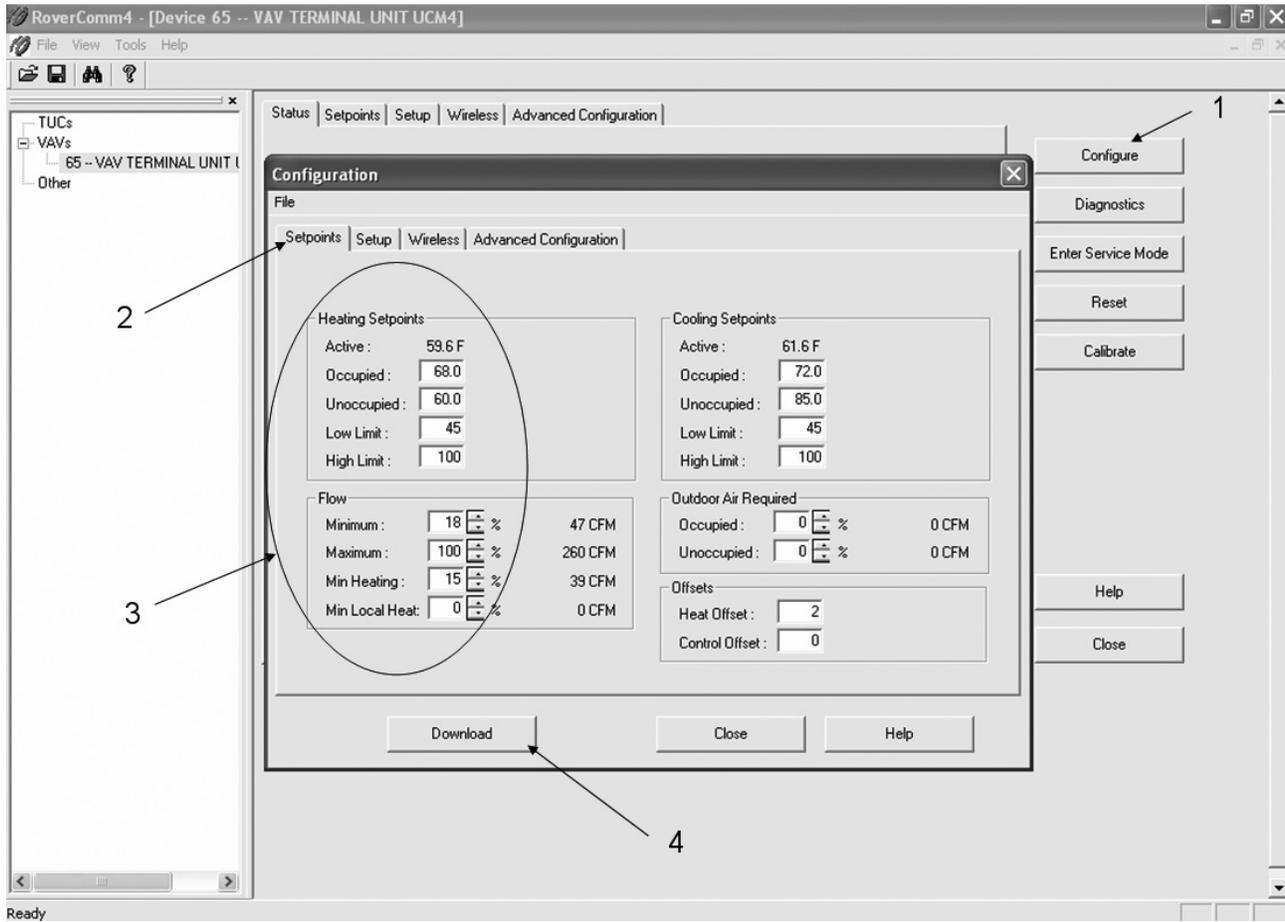
1. Click the 'Configure' button.
2. Click the 'Setup' tab.
3. Click the 'Heat Type' drop-down button and select the desired type.
4. Click the 'Download' button.

**Figure 19. UCM 4.2 configuration: fan-powered setup**


To Set the Fan-Powered Setup

1. Click the 'Configure' button.
2. Click the 'Setup' tab.
3. Click the 'Fan Type' drop-down button and select the desired type.
4. Click the 'Download' button.

**Figure 20. UCM 4.2 configuration: setpoints**



**To Set the Set Points**

1. Click the 'Configure' button.
2. Click the 'Setpoints' tab.
3. Enter the desired settings in the 'Heating Setpoints' and 'Flow' portions of the screen.
4. Click the 'Download' button.



## Installation

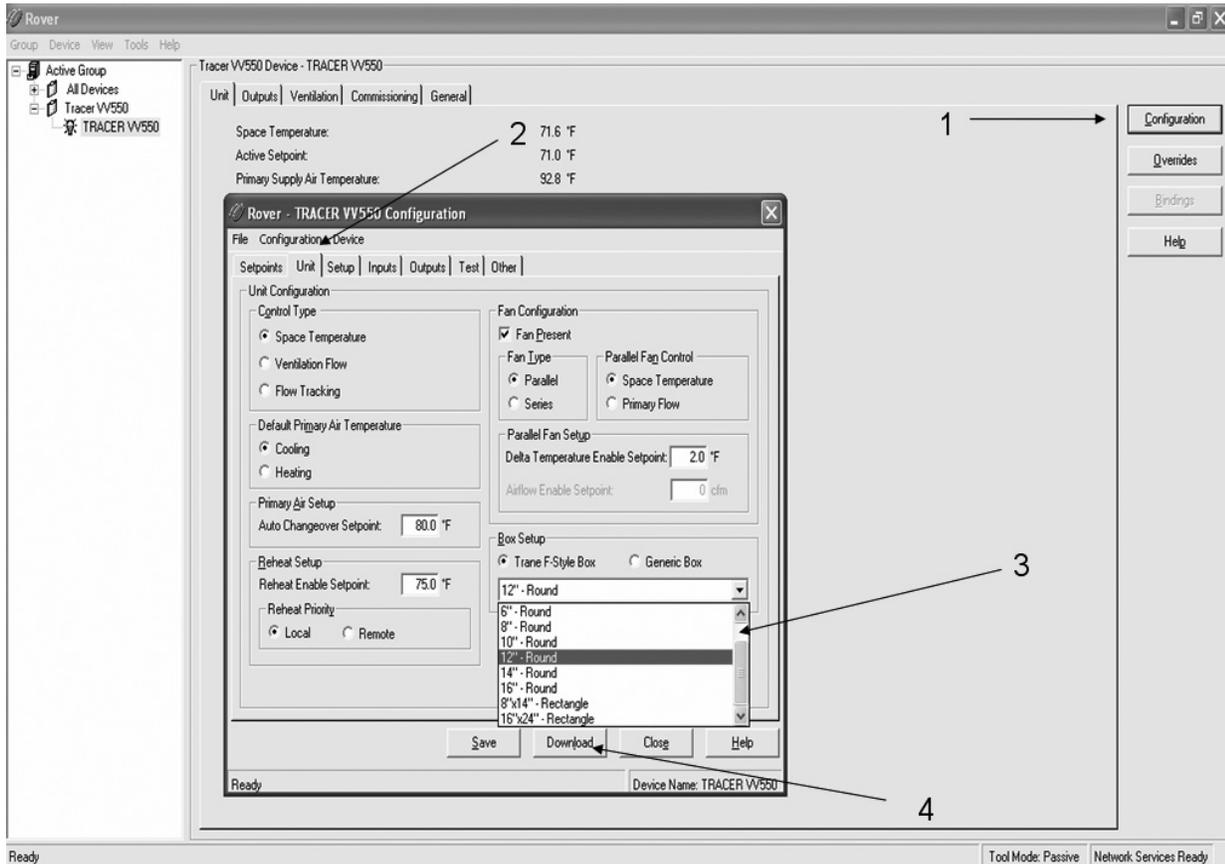
### UCM VV550

The UCM VV550 can be programmed using Tracer<sup>®</sup> Summit<sup>™</sup> computer software, and Trane's service tool, Rover<sup>™</sup>. When using Summit software, use Summit's programming guide. When using Rover see EMTX-SVX01\*-EN for overall use.

When setting up RIRO UCM, see next page for basic menu's using Rover.

When using Rover, connect into UCM using proper cable. Initiate Rover software and search for unit using RIRO Neuron ID. (Sample Neuron ID Number: 01-00-3A-52-3B-00.)

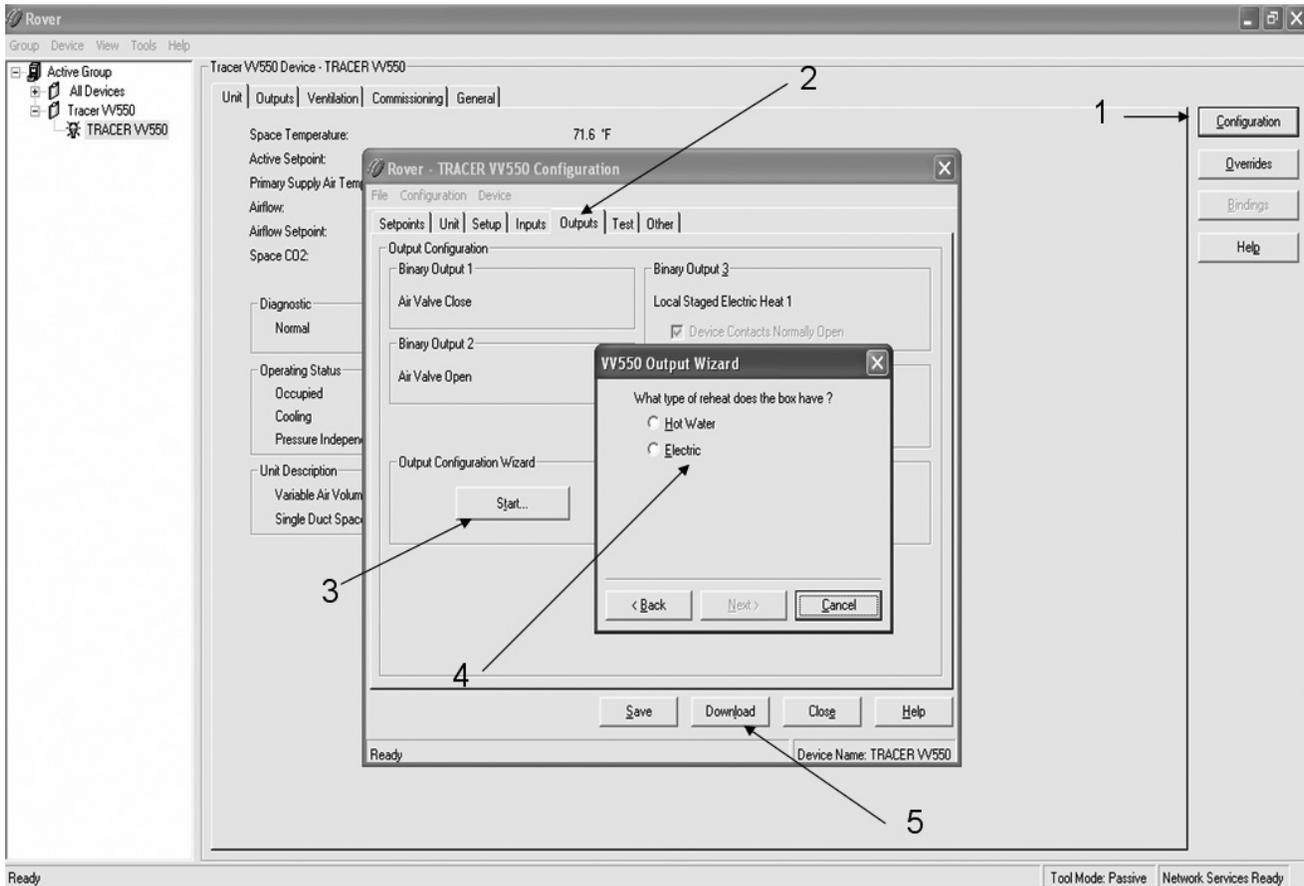
**Figure 21. VV550 configuration: setup inlet size**



#### To Set the Inlet Size

1. Click the 'Configure' button.
2. Click the 'Unit' tab.
3. Click the 'Drop Down Box' in the 'Box Setup' portion of the screen and select the desired setting.
4. Click the 'Download' button.

**Figure 22. VV550 configuration: reheat setup**



**To Set the Reheat Setup**

1. Click the 'Configure' button.
2. Click the 'Outputs' tab.
3. Click the 'Start' button.
4. Choose the desired settings in the VV550 Output Wizard.
5. Once the wizard is complete, click the 'Download' button.

Figure 23. VV550 configuration: fan-powered setup

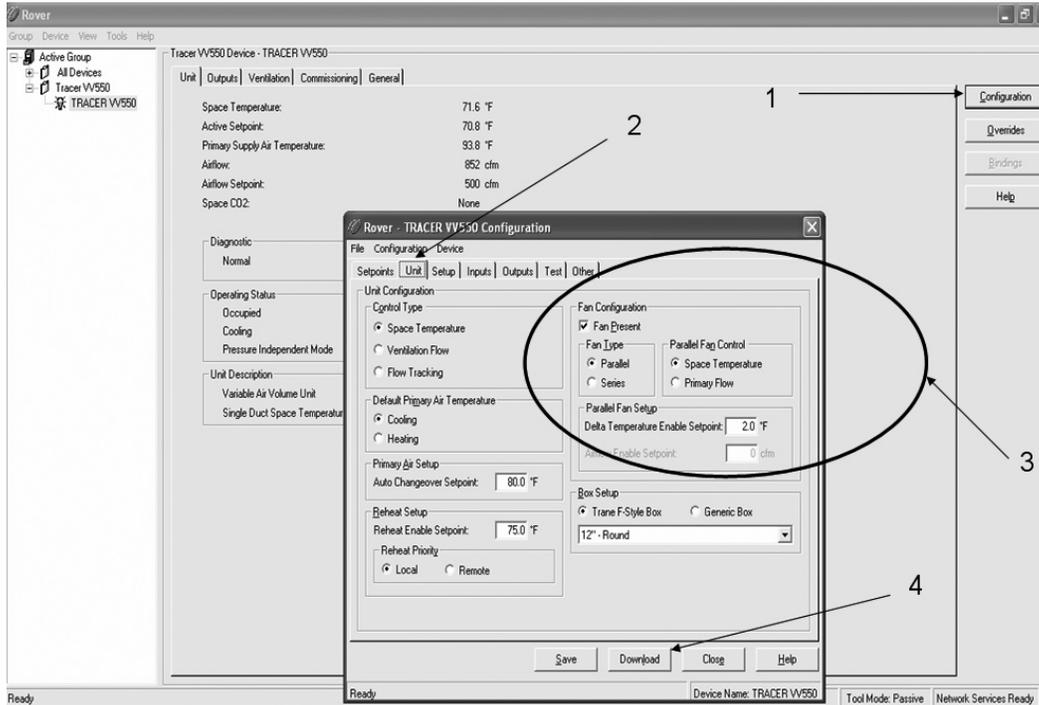
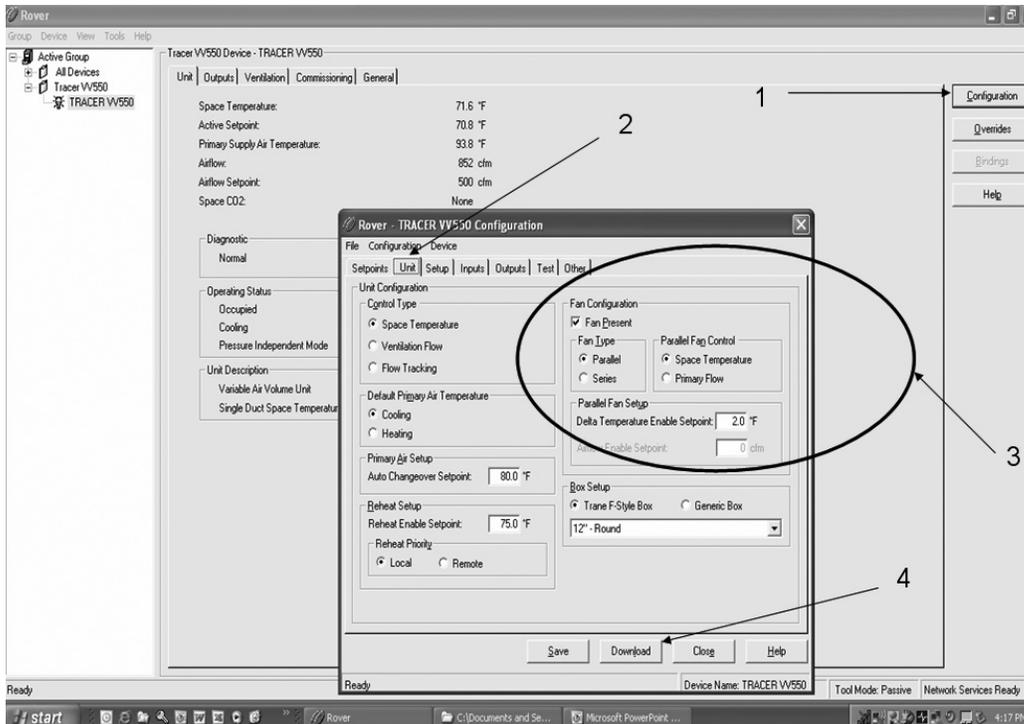


Figure 24. VV550 configuration: temperature setpoints



To Set the Fan-Powered Setup

1. Click the 'Configure' button.
2. Click the 'Unit' tab.

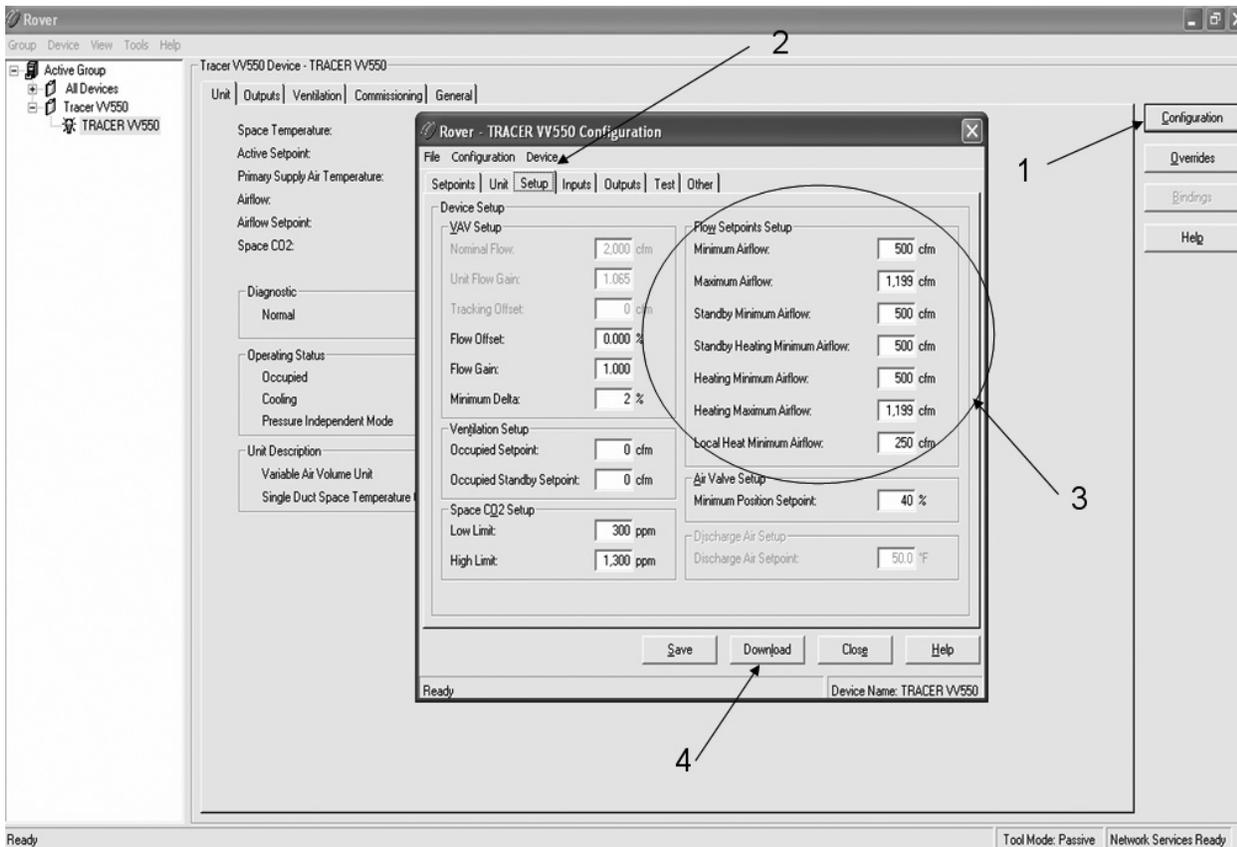
3. Choose the desired settings from the 'Fan Configuration' portion of the screen.
4. Click the 'Download' button.

To Set the Temperature Setpoints

1. Click the 'Configure' button.
2. Click the 'Unit' tab.

3. Choose the desired settings from the 'Setpoints' portion of the screen.
4. Click the 'Download' button.

**Figure 25. VV550 configuration: flow setpoints**

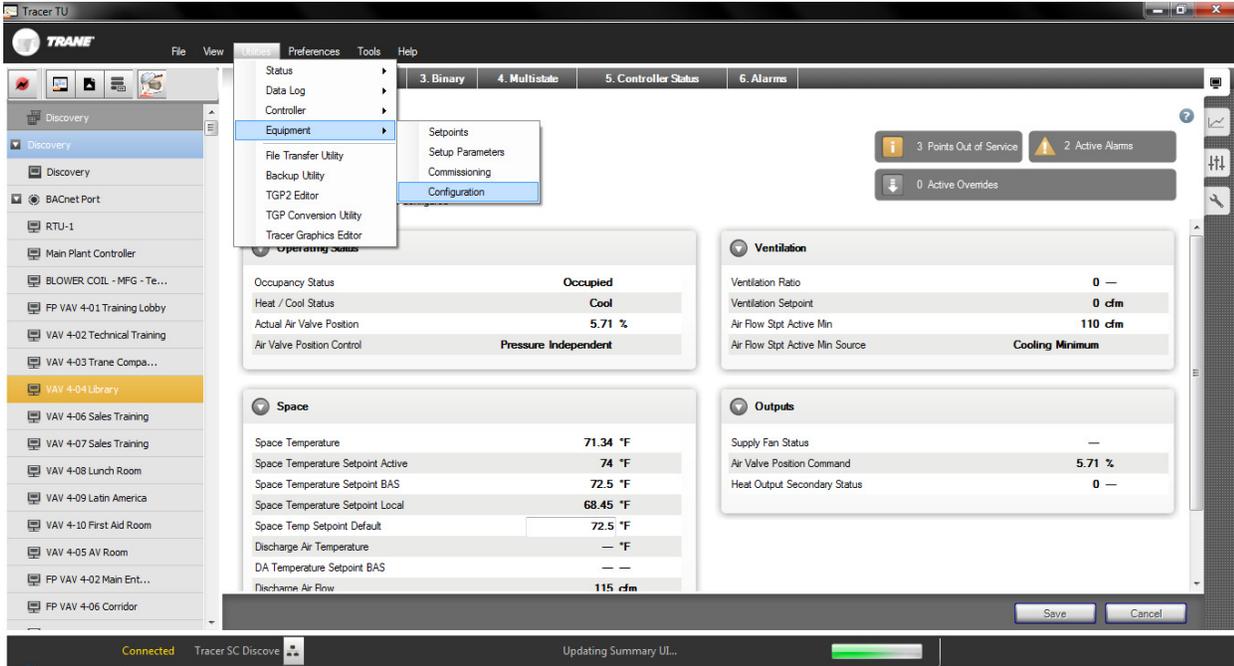


To Set the Flow Setpoints

1. Click the 'Configure' button.
2. Click the 'Setup' tab.
3. Choose the desired settings from the 'Flow Setpoints Setup' portion of the screen.
4. Click the 'Download' button.

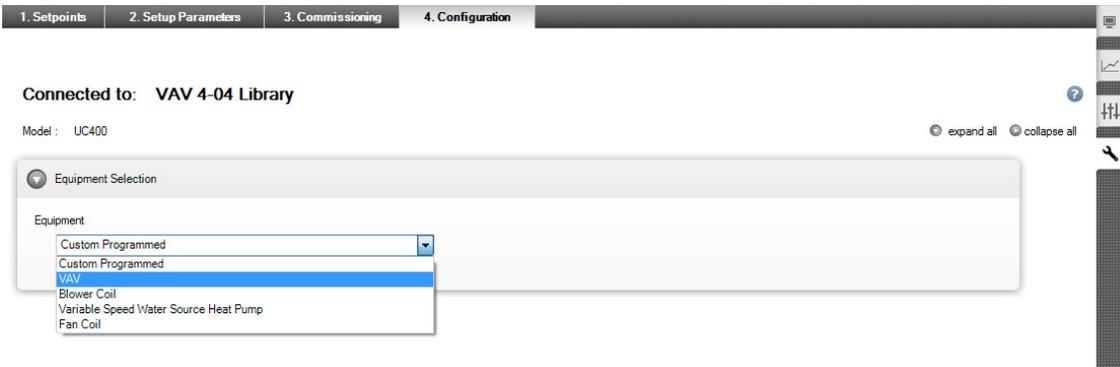
## Symbio™ 210, Symbio™ 500, UC400, and UC210

Figure 26. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: navigation to configuration



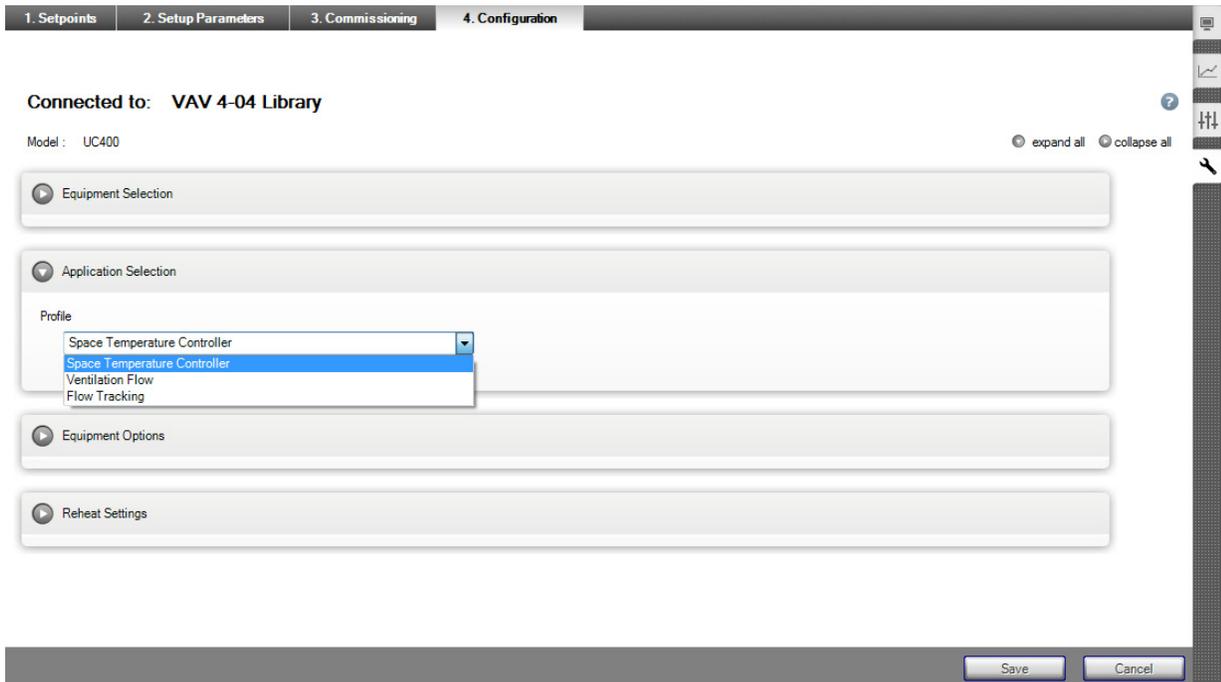
1. Select Utilities in the tool bar.
2. Select Equipment.
3. Select Configuration.

Figure 27. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: equipment selection



1. Click the 'Equipment' drop down box in the 'Equipment Selection' group and select the desired setting.

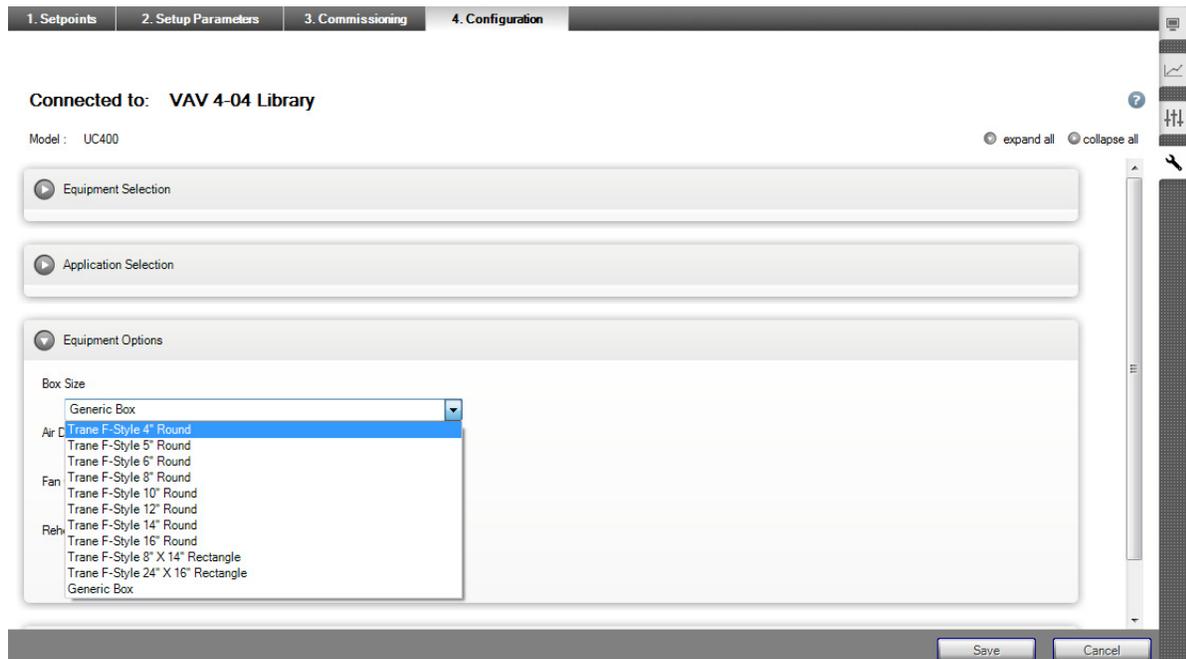
**Figure 28. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: application selection**



Select VAV Control.

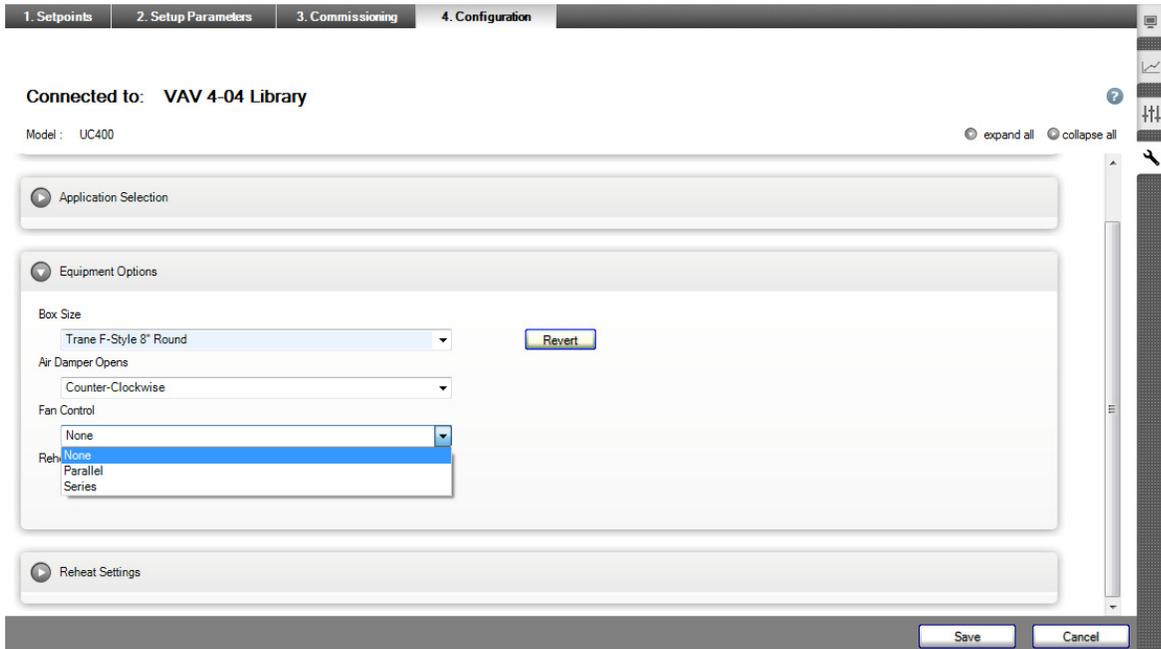
1. Click the 'Profile' drop down box in the 'Application Selection' group and select the desired setting.

**Figure 29. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: inlet size selection**



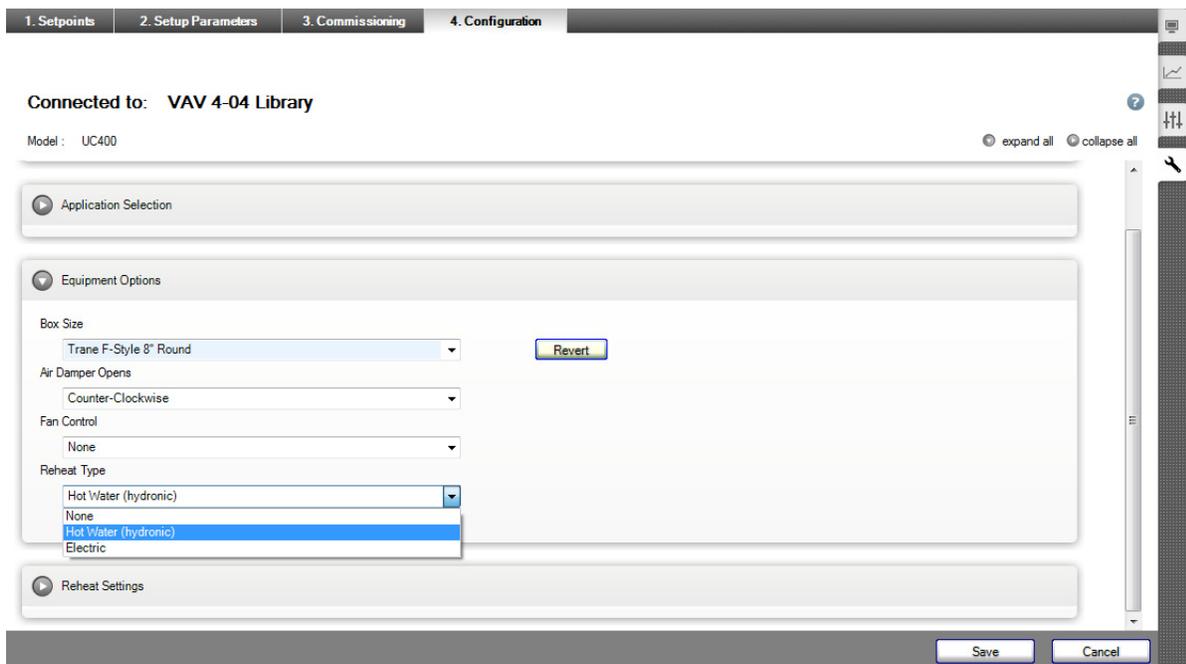
To Set the Inlet Size

1. Click the 'Box Size' drop down box in the 'Equipment Options' group and select the desired setting.

**Figure 30. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: fan control settings**


To Set the Fan-Powered Setup

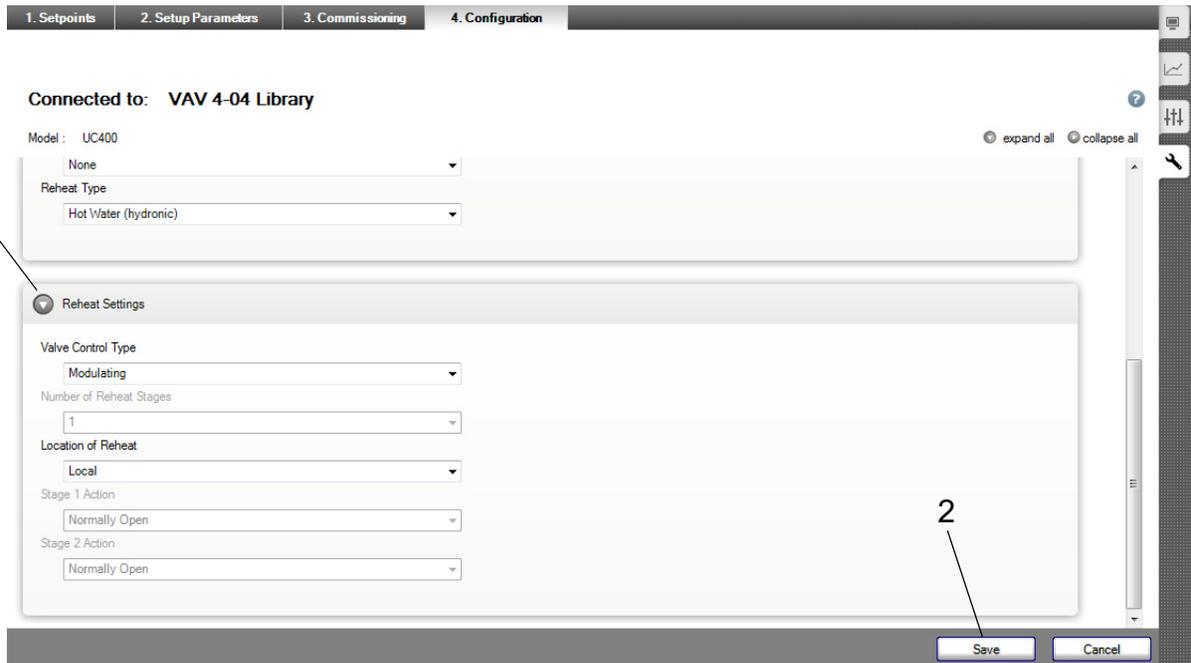
1. Click the 'Fan Control' drop down box in the 'Equipment Selection' group and select the desired setting.

**Figure 31. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: reheat type selection**


To Select Reheat Type

1. Click the 'Reheat Type' drop down box in the 'Equipment Selection' group and select the desired setting.

**Figure 32. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: reheat setup**

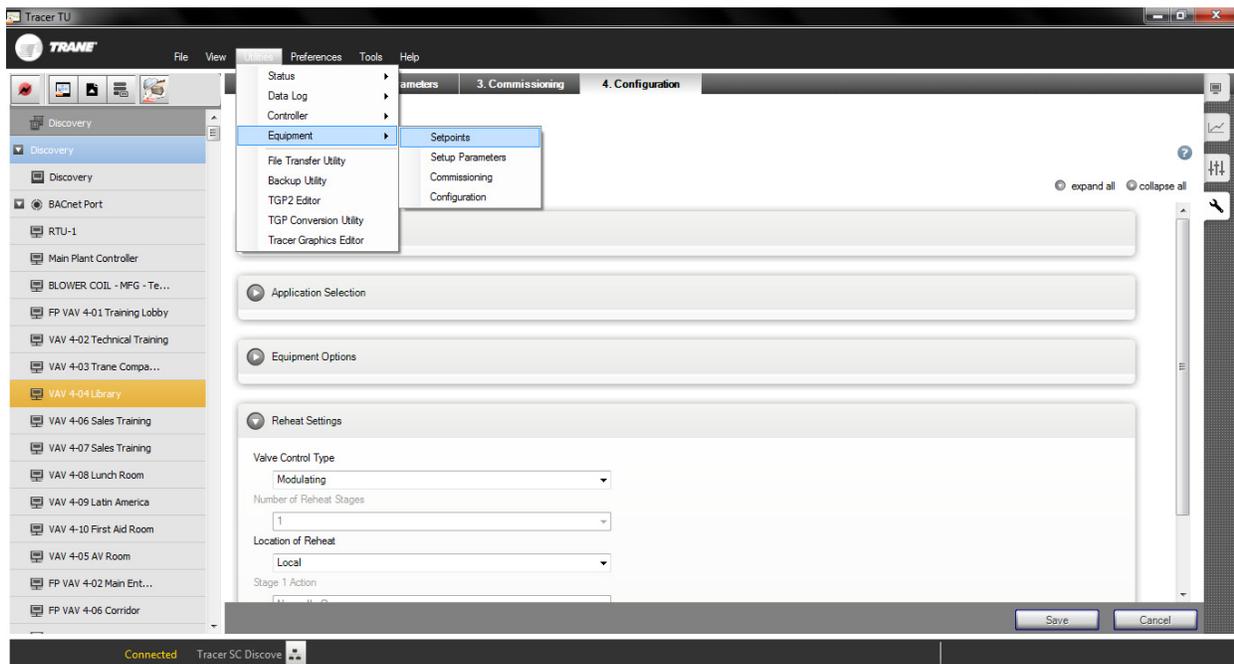


To Set the Reheat Setup

2. Click the 'Save' button.

1. Use the drop down menus in the 'Reheat Settings' group to choose the desired reheat settings.

**Figure 33. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: navigate to setpoints**



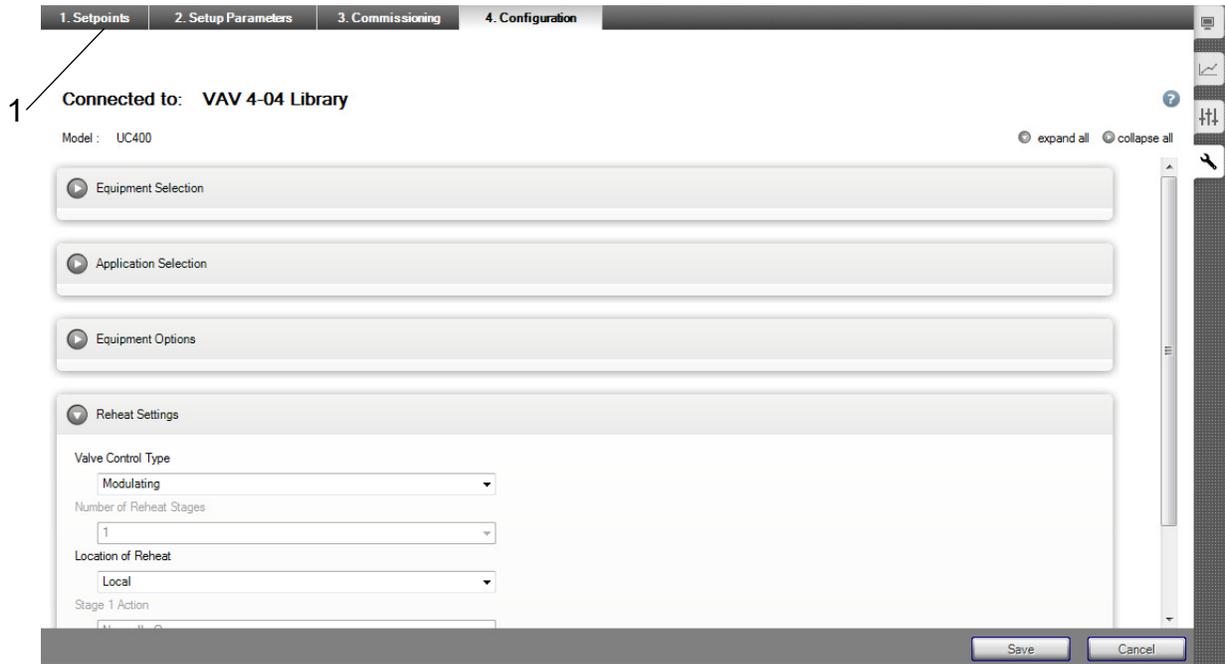
To Setpoints

3. Select Setpoints.

1. Select Utilities in the tool bar.

2. Select Equipment.

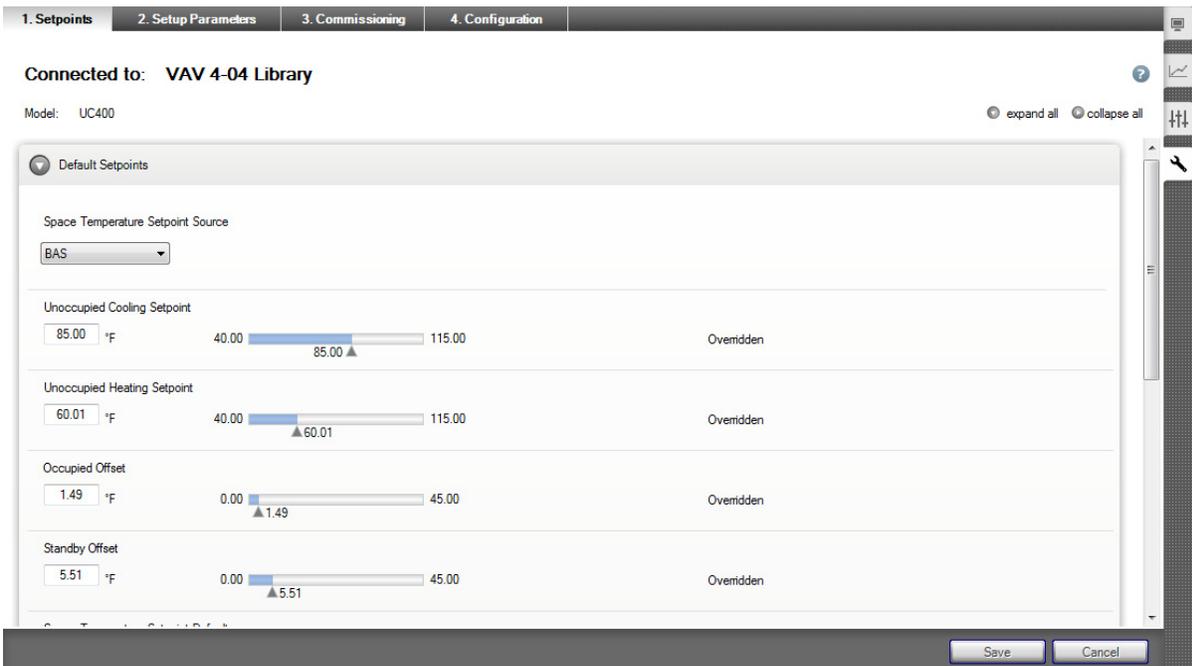
**Figure 34. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: navigate to setpoints using tabs**



To Setpoints from Configuration

1. Click the 'Setpoints' tab on the toolbar.

**Figure 35. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: temperature setpoints**

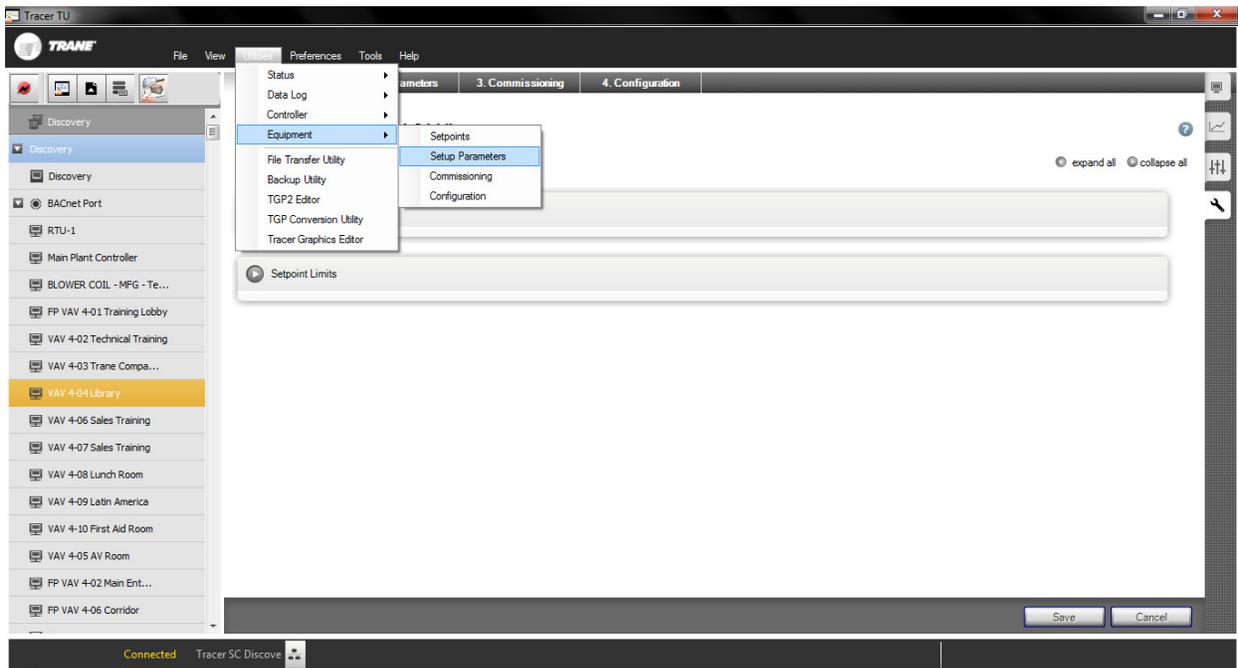


To Set the Temperature Setpoints

1. Choose the desired settings from the 'Default Setpoints' group.

2. Click the 'Save' button.

**Figure 36. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: setup parameters**



**To Setup Parameters**

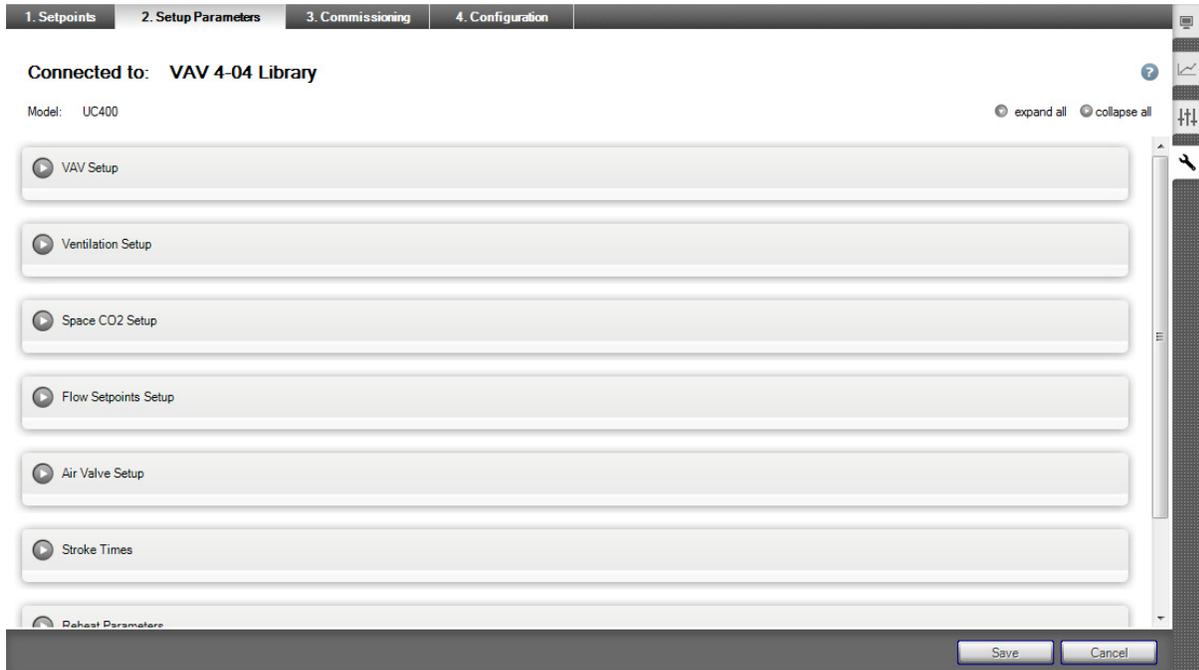
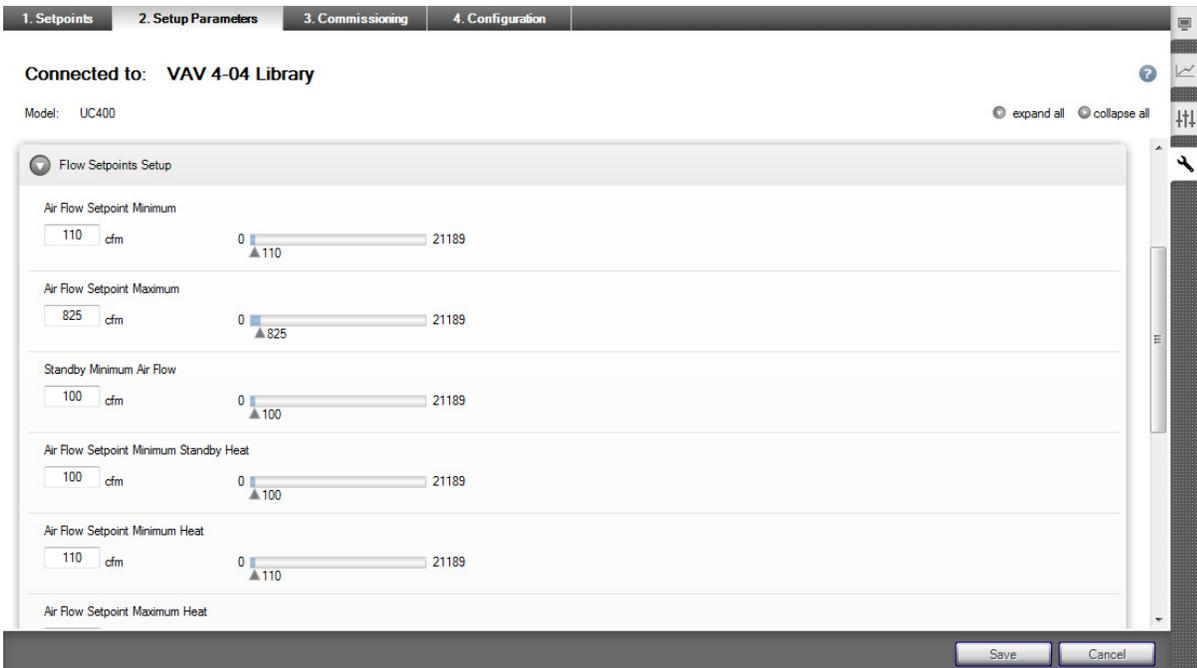
1. Select Utilities in the tool bar.
2. Select Equipment.
3. Select Setup Parameters.

**Figure 37. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: navigate to setpoints using tabs**



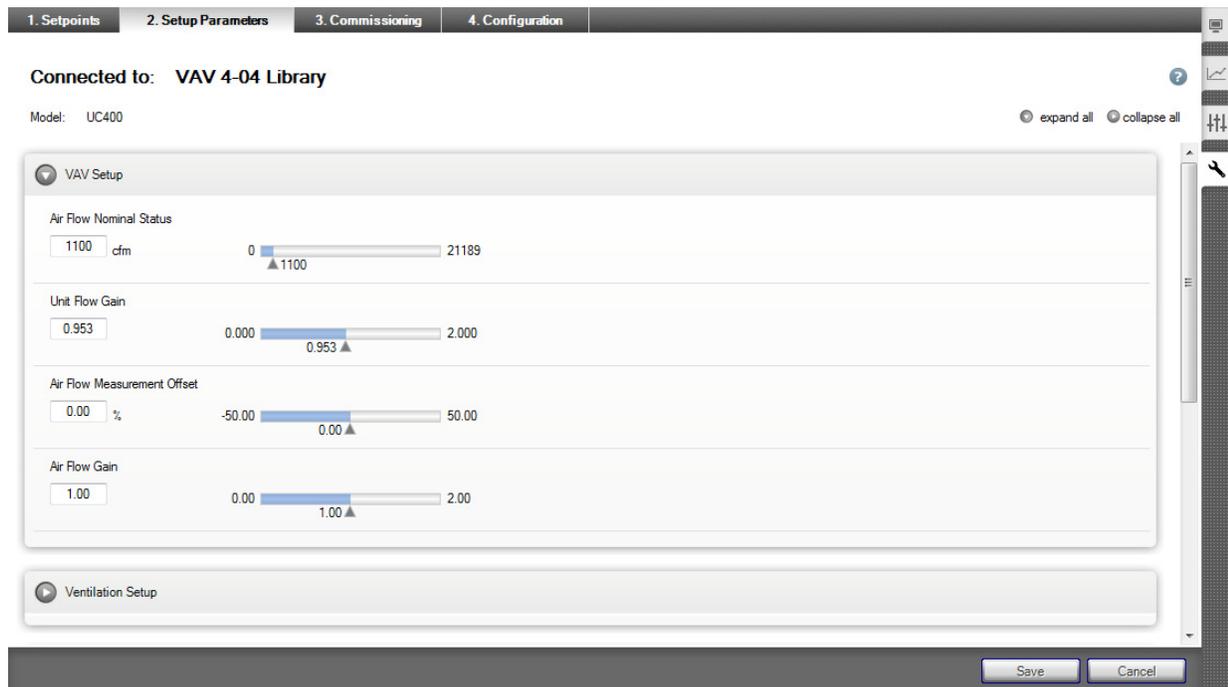
**To Setup Parameters from Setpoints or Configuration**

1. Click the 'Setup Parameters' tab on the toolbar.

**Figure 38. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: setup parameters**

**Figure 39. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: flow setpoints**

**To Set the Flow Setpoints**

1. Expand the 'Flow Setpoints Setup' group.
2. Choose the desired settings from the 'Flow Setpoints Setup' group.
3. Click the 'Save' button.

Figure 40. Symbio™ 210, Symbio™ 500, UC400, and UC210 configuration: set measure value for airflow



To Set the Measured Value for Airflow

1. Expand the 'VAV Setup' group.
2. Choose the desired settings from the 'VAV Setup' group.
3. Click the 'Save' button.

## Actuator Mounting

Trane offers a factory-mounted actuator with a 90-second drive time. The actuator drives 1 degree per second. A field-installed actuator may be used if desired. Actuator shaft is 1/2" diameter and designed to travel clockwise to close damper and counter-clockwise to open damper. The indicator on the end of actuator shaft can be used to determine position of damper.

### NOTICE

#### Equipment Damage!

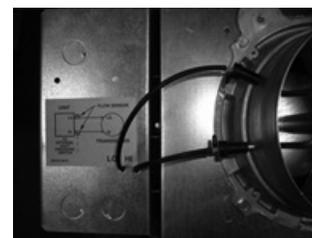
Failure to follow the manufacturer's specifications may result in unit malfunction. When installing or replacing the actuator, tighten the actuator set screw per the manufacturer's instructions.

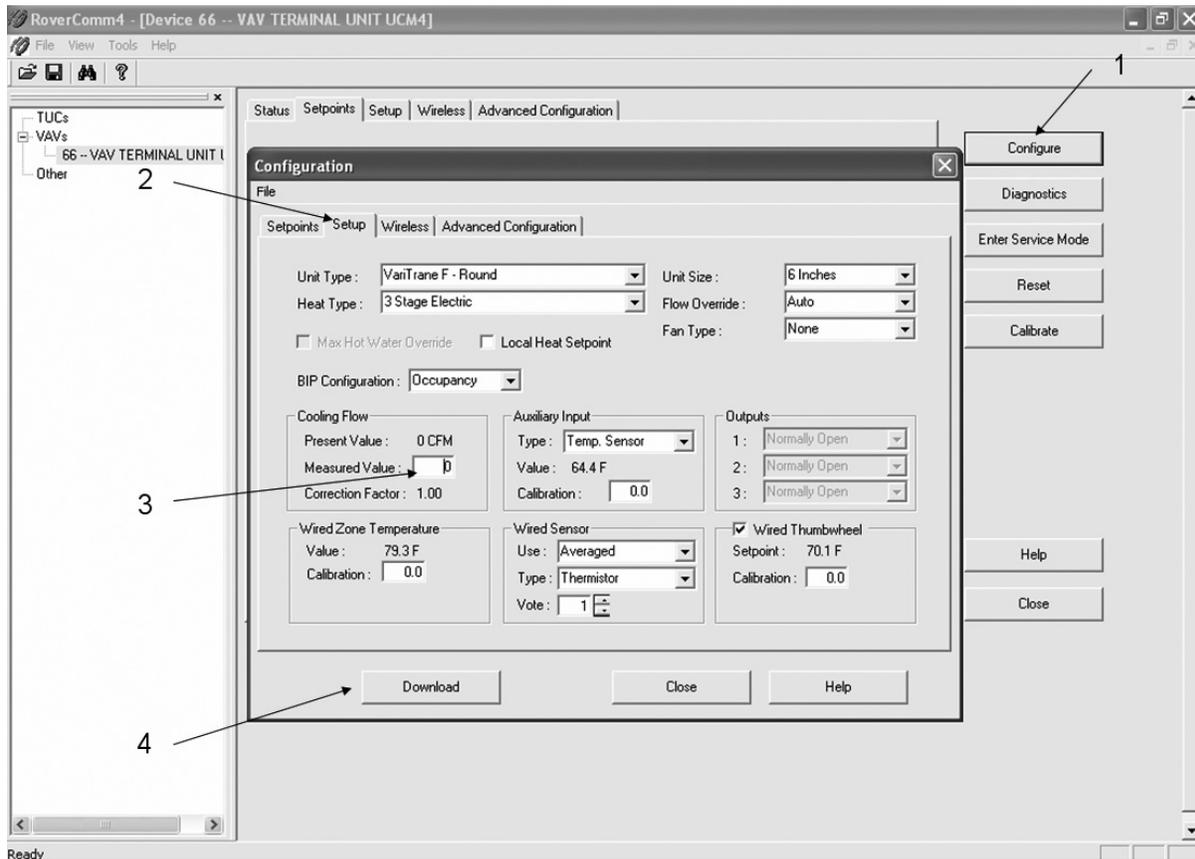
## Control Airflow Setup

1. Connect Magnahelic to "T" ports on pneumatic tubing connected from Flow Rings to Transducer.
2. Connect to controller with Rover™ or TU service tool.
3. Recalibrate VAV unit.
4. Open up VAV damper to Maximum Flow and measure the airflow across the magnahelic.

5. Take the reading and compare it to chart on side of VRRF unit to get CFM value.
6. Now that you have the CFM, compare the CFM value of the chart on the unit to the Flow Value on the controller that is shown in Rover or TU on the VAV Status menu. If they are different adjust the controller to the correct value.

Figure 41. Unit chart

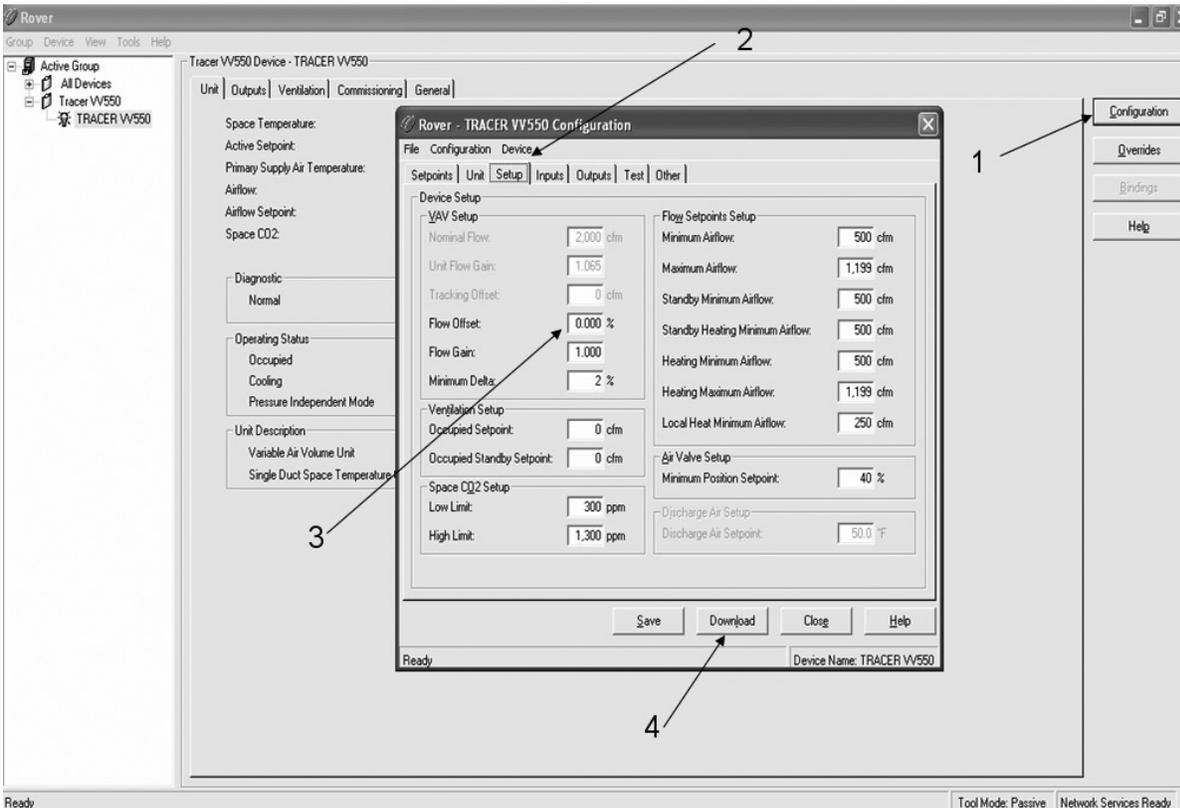


**Figure 42. UCM 4.2 configuration: flow setup**


To Set the Measured Value for Airflow

1. Click the 'Configure' button.
2. Click the 'Setup' tab.
3. Choose the measured value and adjust as desired.
4. Click the 'Download' button.

Figure 43. VV550 configuration: flow setup



To Set the Measured Value for Airflow

1. Click the 'Configure' button.
2. Click the 'Setup' tab.
3. Choose the flow offset and adjust as desired.
4. Click the 'Download' button.

**Symbio™ 210/210e Flow Setup:** See BAS-SVX084\*-EN for Symbio™ 210 flow setup information.

**Symbio™ 500 Flow Setup:** See BAS-SVX091\*-EN for Symbio™ 500 flow setup information.

**UC400 Flow Setup:** See VAV-SVX07\*-EN for UC400 flow setup information.

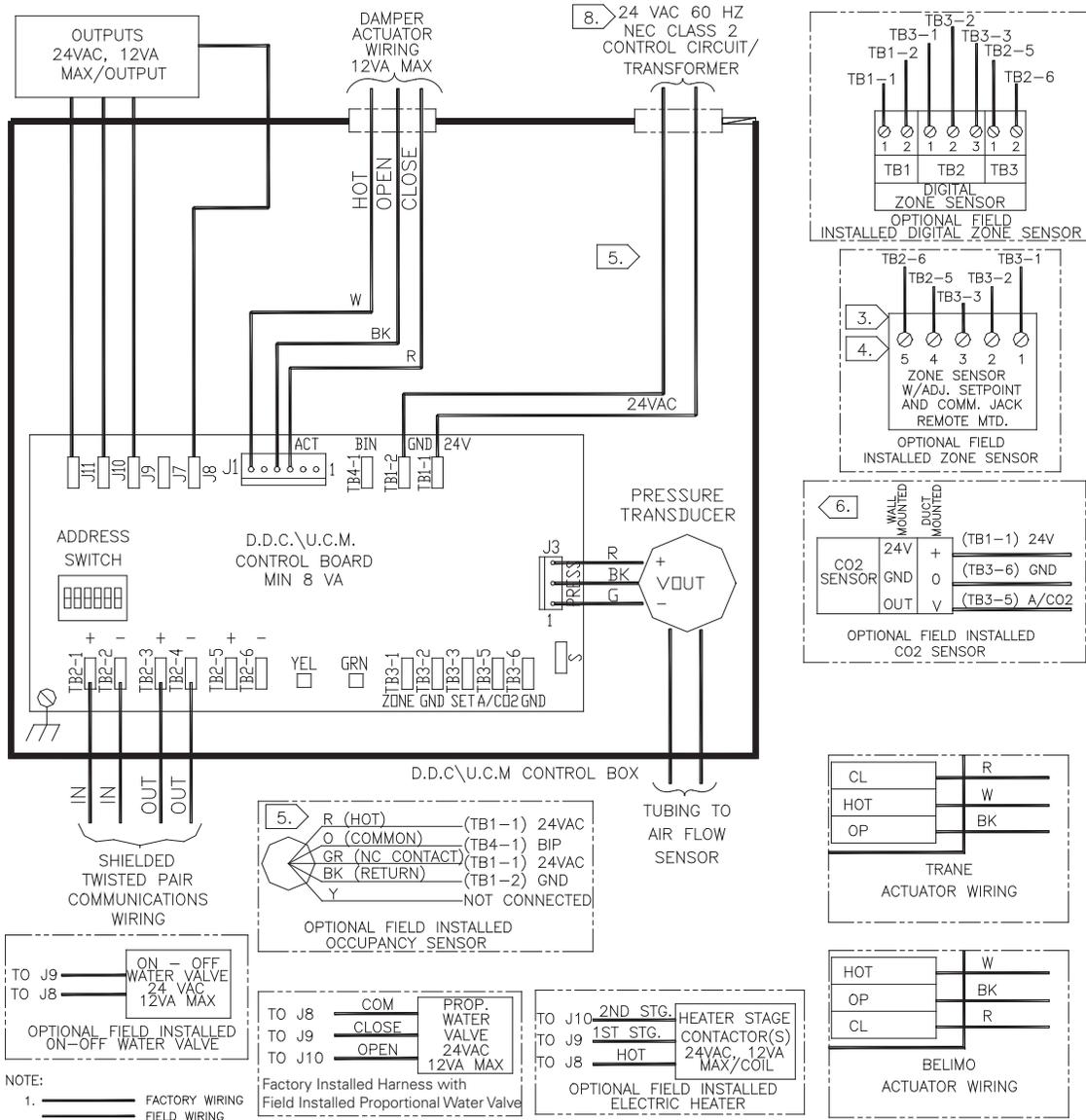
**UC210 Flow Setup:** See BAS-SVX62\*-EN for UC210 flow setup information.

**VV550 Flow Setup:** See CNT-SVX17\*-EN for VV550 flow setup information.

**UCM 4.2 Flow Setup:** See VAV-SVX01\*-EN for UCM4.2 flow setup information.

# Wiring

Figure 44. UCM 4.2 single duct control diagram

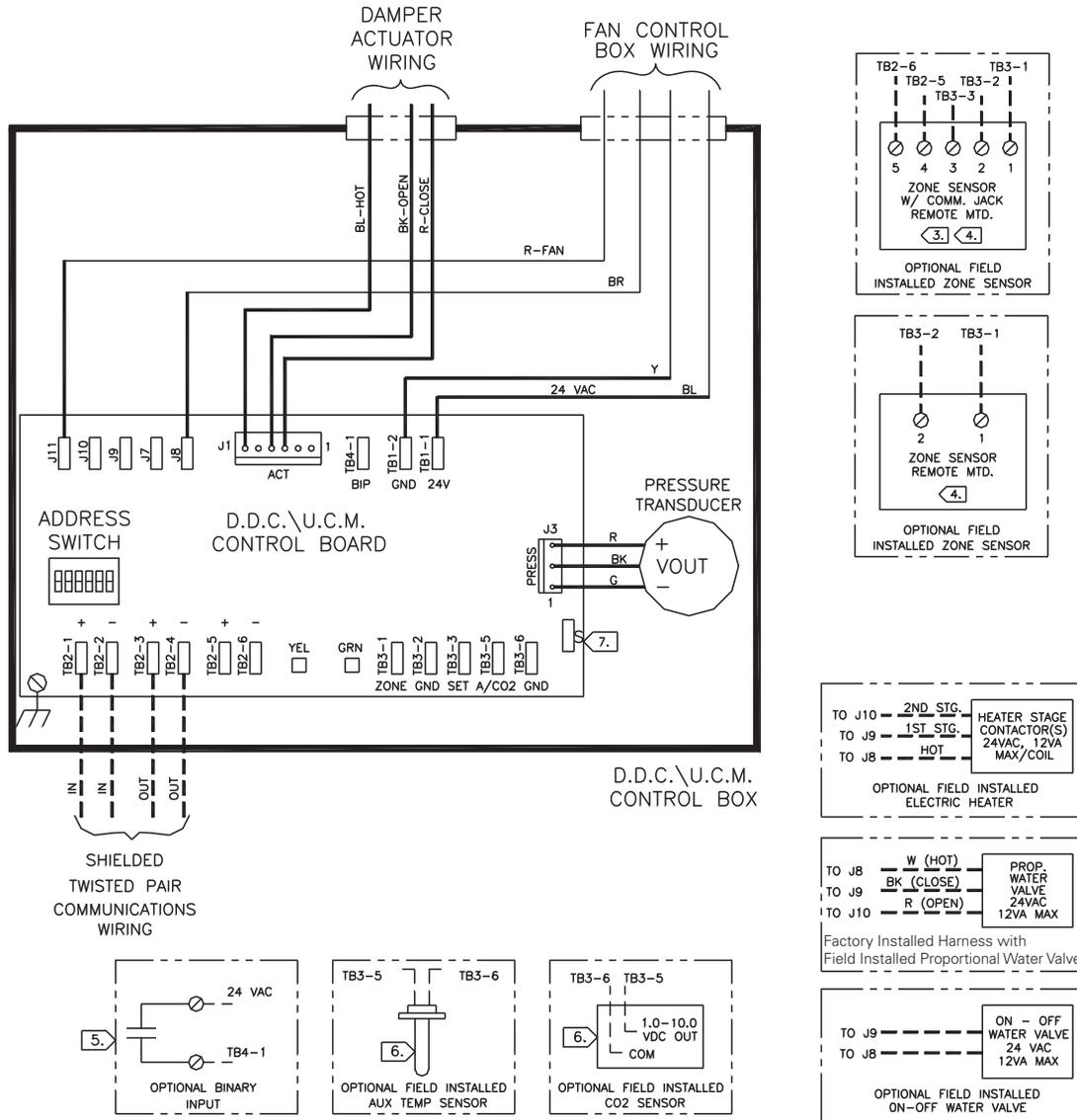


**WARNING**  
HAZARDOUS VOLTAGE!  
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.  
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

**CAUTION**  
USE COPPER CONDUCTORS ONLY!  
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.  
FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

502301140000A

Figure 45. UCM 4.2 fan-powered control diagram



NOTE:

1. FACTORY WIRING  
 FIELD WIRING  
 OPTIONAL OR ALTERNATE WIRING
2. 1/4" QUICK CONNECT REQUIRED FOR ALL FIELD CONNECTIONS.
3. ZONE SENSOR TERMINALS 4 AND 5 REQUIRE SHIELDED TWISTED PAIR WIRING FOR COMMUNICATIONS JACK EQUIPPED ZONE SENSOR OPTION.
4. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
5. THE OPTIONAL BINARY INPUT CONNECTS BETWEEN TB4-1 (BIP) AND 24VAC (HOT) FROM TRANSFORMER. THE BINARY INPUT CAN BE RECONFIGURED AS AN OCCUPANCY INPUT VIA THE COMMUNICATIONS INTERFACE.
6. AS SHIPPED, THE AUX INPUT IS CONFIGURED AS AN AUX TEMP INPUT. THE AUX INPUT CAN BE RECONFIGURED AS A CO2 SENSOR INPUT VIA THE COMMUNICATIONS INTERFACE.
7. S TERMINAL NOT TO BE USED WITH VARITRANE.

**WARNING**

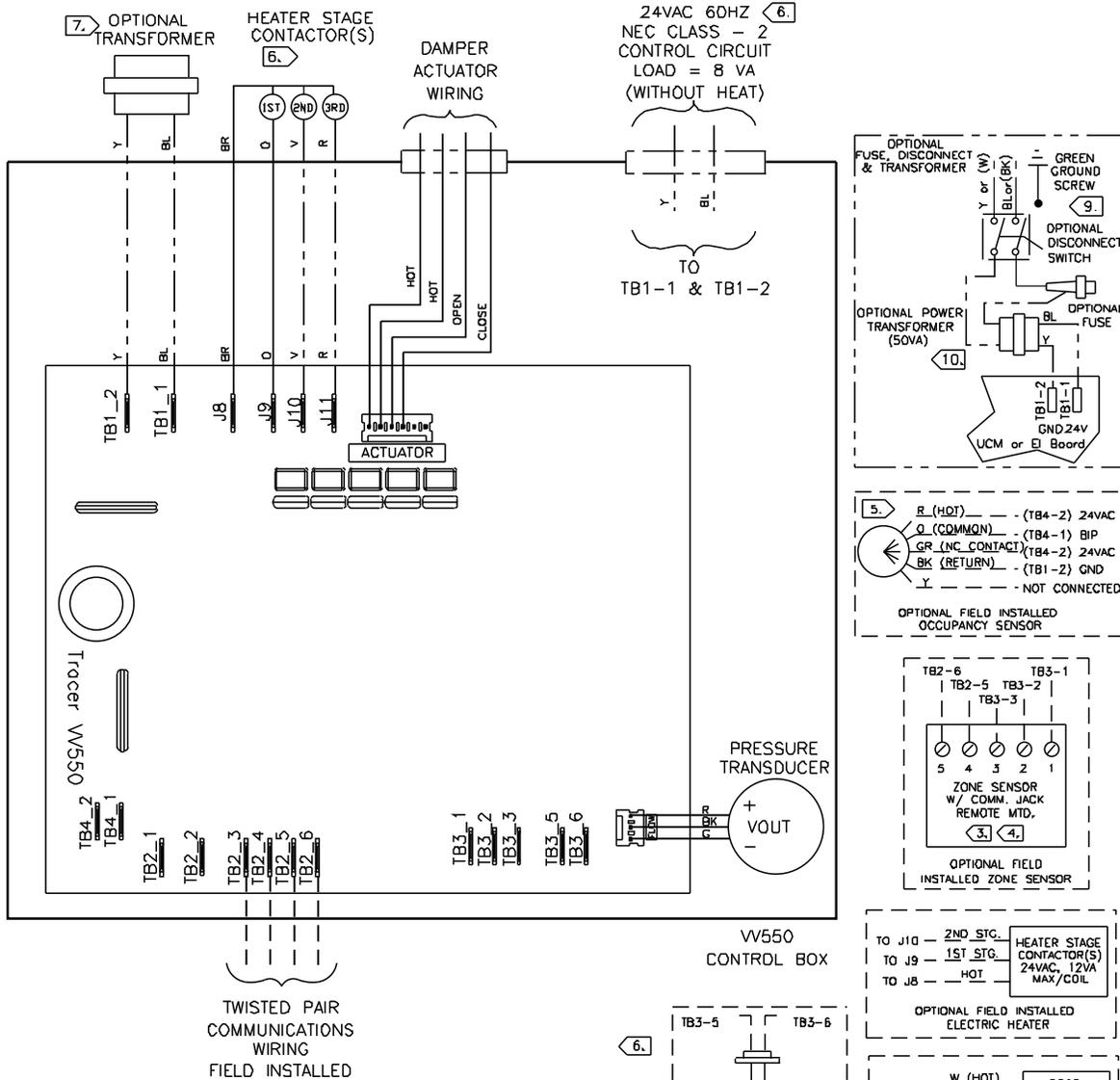
HAZARDOUS VOLTAGE!  
 DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.  
 FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

**CAUTION**

USE COPPER CONDUCTORS ONLY!  
 UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.  
 FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

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 Printed in the U.S.A.

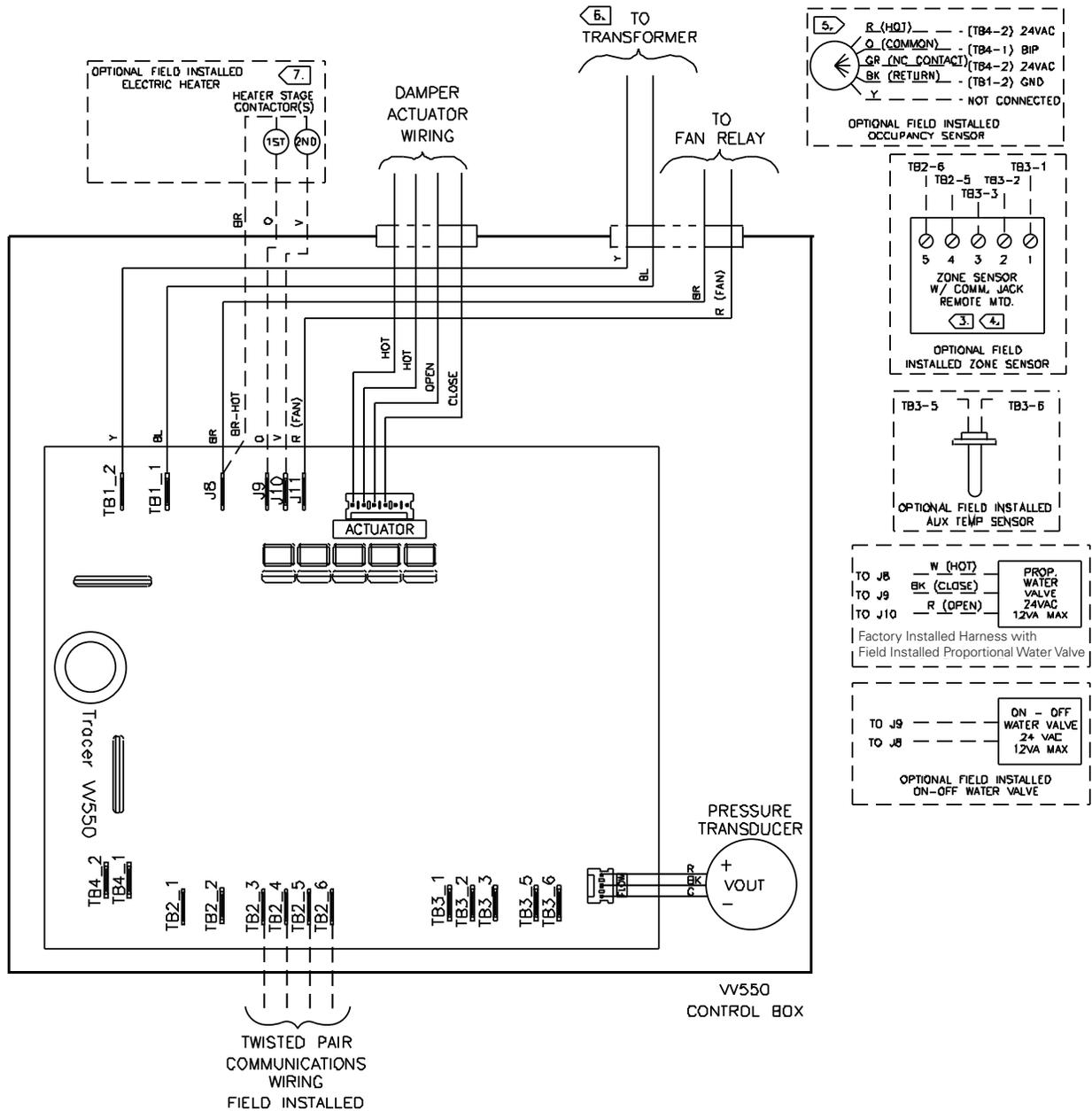
Figure 46. VV550 single duct control diagram



NOTE:

- 1. \_\_\_\_\_ FACTORY WIRING
  - FIELD WIRING
  - OPTIONAL OR ALTERNATE WIRING
2. 1/4" QUICK CONNECT REQUIRED FOR ALL FIELD CONNECTIONS.
  3. ZONE SENSOR TERMINALS 4 AND 5 REQUIRE TWISTED PAIR WIRING FOR COMMUNICATIONS
  4. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
  5. THE OPTIONAL BINARY INPUT CONNECTS BETWEEN TB4-1 (BIP) AND 24VAC (HOT) FROM TRANSFORMER. THE BINARY INPUT CAN BE RECONFIGURED AS AN OCCUPANCY INPUT VIA THE COMMUNICATIONS INTERFACE.
  6. IF UNIT MOUNTED TRANSFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUNDED, THEN GROUND LEG MUST BE CONNECTED TO TB1-2.
  7. CONTACTORS ARE 24 VAC: 12VA MAX/COIL (MERCURY CONTACTORS). 10VA MAX/COIL (MAGNETIC CONTACTORS).
  8. OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER WIRING. WIRING GOES THRU TO NEXT COMPONENT WHEN OPTIONS ARE NOT CHOSEN.
  9. TRANSFORMER WIRE COLORS: 120V - W, 208V - R, 240V - O, 277V - BR, 480V - R/BK, 575V - R, 190V - R, 220V - R, 347V - R
  10. UNITS WITH ELECTRIC HEAT HAVE OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER LOCATED IN HEATER.

Figure 47. VV550 fan-powered control diagram



NOTE:

1. \_\_\_\_\_ FACTORY WIRING
  - - - - - FIELD WIRING
  - · - · - · OPTIONAL OR ALTERNATE WIRING
2. 1/4" QUICK CONNECT REQUIRED FOR ALL FIELD CONNECTIONS.
  3. ZONE SENSOR TERMINALS 4 AND 5 REQUIRE TWISTED PAIR WIRING FOR COMMUNICATIONS JACK EQUIPPED ZONE SENSOR OPTION.
  4. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (DN/CANCEL).
  5. THE OPTIONAL BINARY INPUT CONNECTS BETWEEN TB4-1 (BIP) AND 24VAC (HOT) FROM TRANSFORMER. THE BINARY INPUT CAN BE RECONFIGURED AS AN OCCUPANCY INPUT VIA THE COMMUNICATIONS INTERFACE.
  6. TRANSFORMER PROVIDED IN ALL UNITS.
  7. UNITS WITH ELECTRIC HEAT HAVE OPTIONAL FUSE, DISCONNECT SWITCH AND TRANSFORMER IN HEATER.

Figure 48. Symbio™ 500/UC400 single duct control diagram

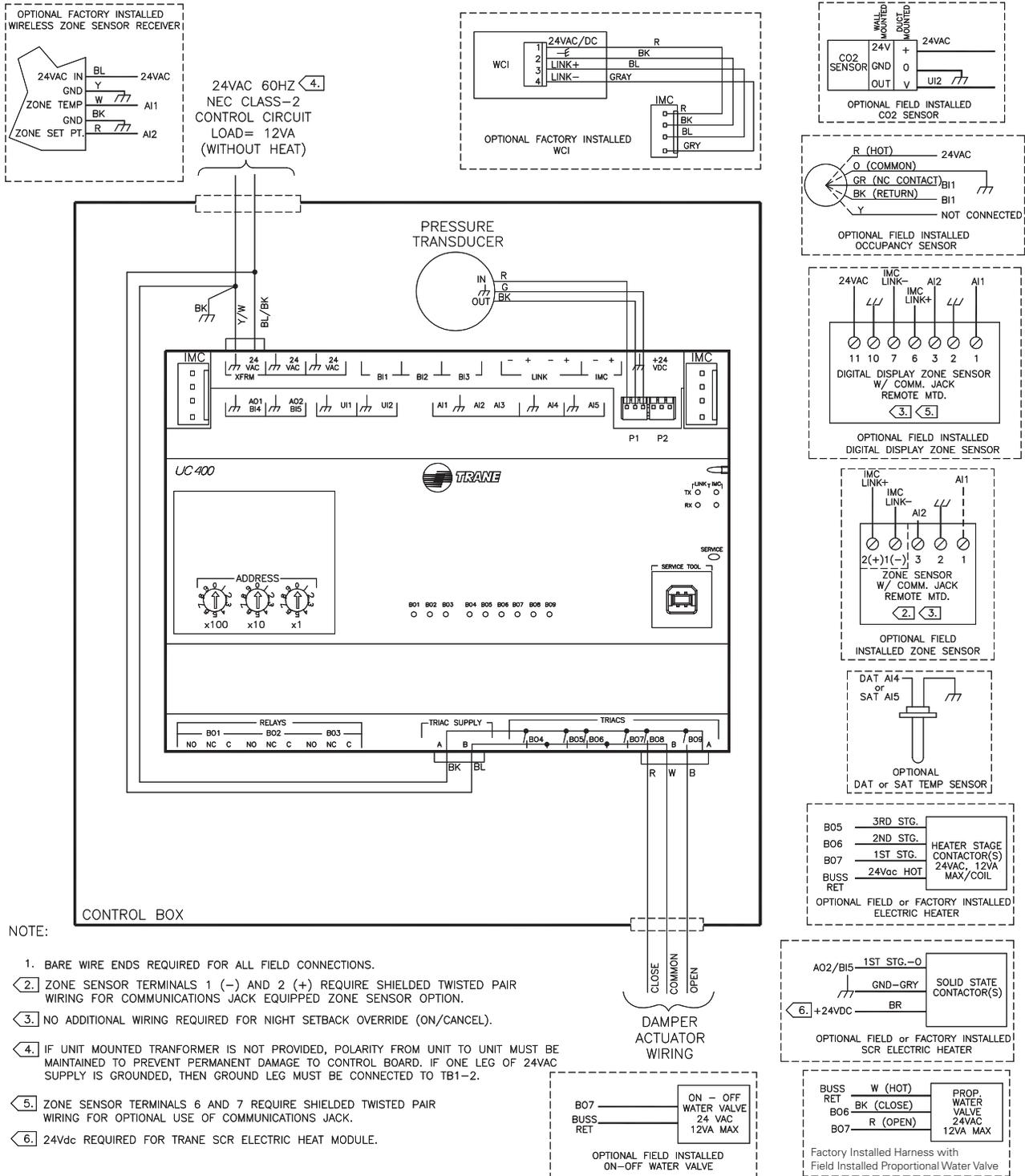
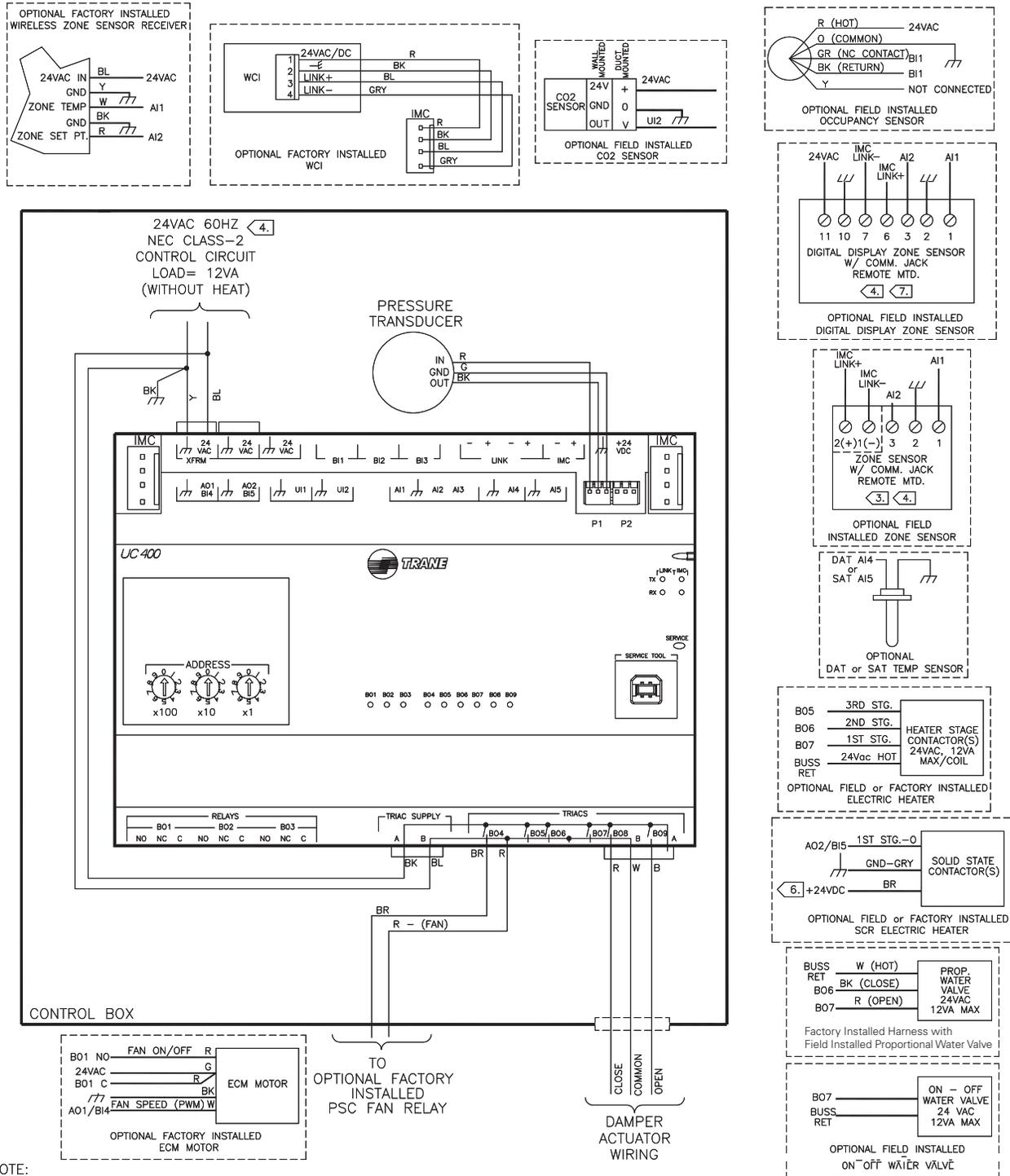


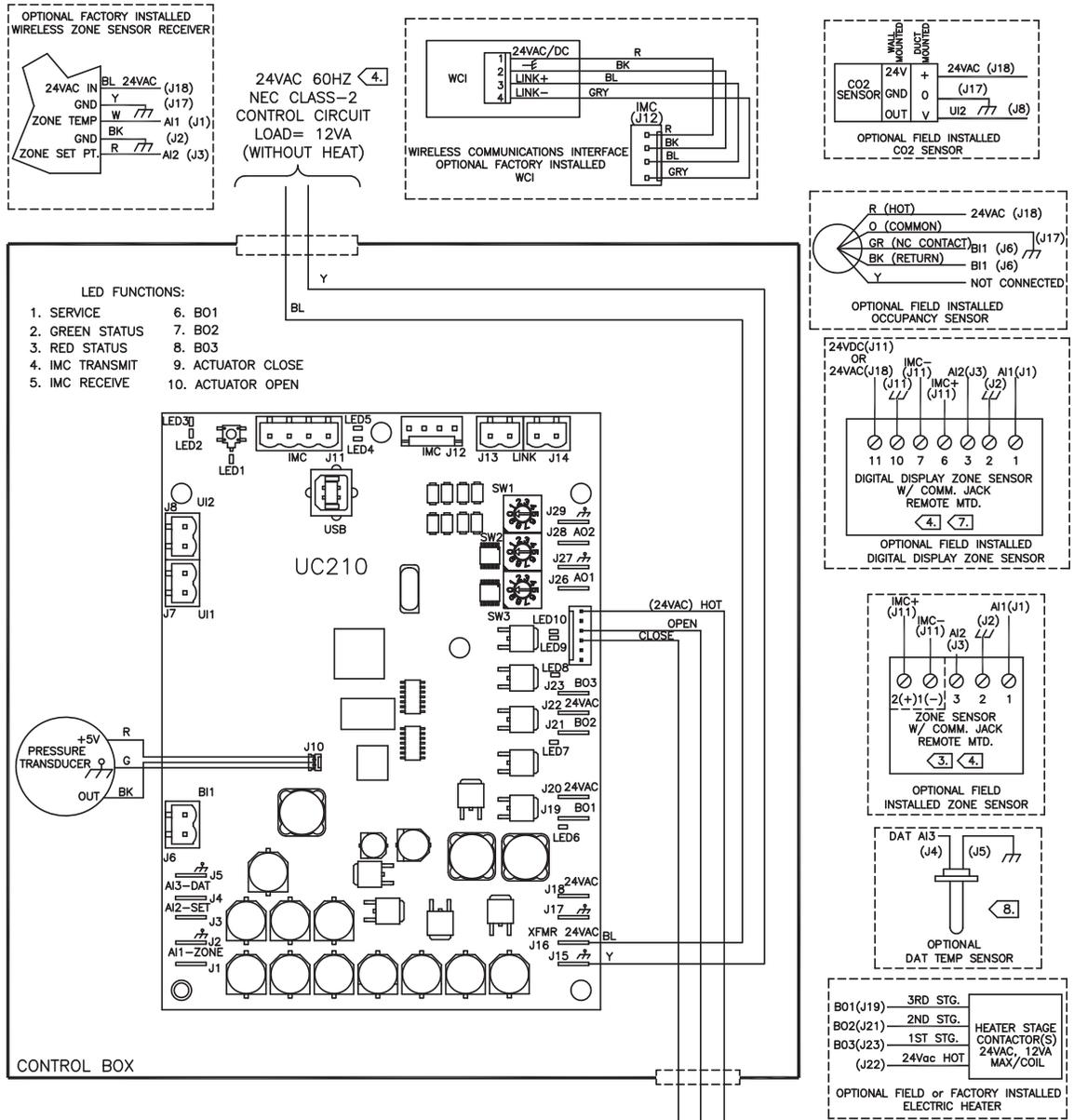
Figure 49. Symbio™ 500/UC400 fan-powered control diagram



NOTE:

1. BARE WIRE ENDS REQUIRED FOR ALL FIELD CONNECTIONS.
2. ZONE SENSOR TERMINALS 1 (-) AND 2 (+) REQUIRE SHIELDED TWISTED PAIR WIRING FOR COMMUNICATIONS JACK EQUIPPED ZONE SENSOR OPTION.
3. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
4. IF UNIT MOUNTED TRANSFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUND, THEN GROUND LEG MUST BE CONNECTED TO TB1-2.
5. ZONE SENSOR TERMINALS 6 AND 7 REQUIRE SHIELDED TWISTED PAIR WIRING FOR OPTIONAL USE OF COMMUNICATIONS JACK.
6. 24Vdc REQUIRED FOR TRANE SCR ELECTRIC HEAT MODULE.

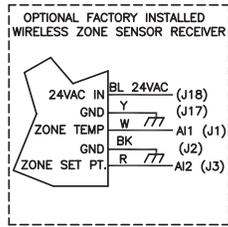
Figure 50. Symbio™ 210/210e and UC210 single duct control diagram



NOTE:

1. BARE WIRE ENDS OR 1/4" QUICK CONNECT TERMINALS REQUIRED FOR ALL FIELD CONNECTIONS.
2. ZONE SENSOR TERMINALS 1 (-) AND 2 (+) REQUIRE SHIELDED TWISTED PAIR WIRING FOR COMMUNICATIONS JACK EQUIPPED ZONE SENSOR OPTION.
3. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
4. IF UNIT MOUNTED TRANSFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUNDED, THEN GROUND LEG MUST BE CONNECTED TO J15.
5. ZONE SENSOR TERMINALS 6 AND 7 REQUIRE SHIELDED TWISTED PAIR WIRING FOR OPTIONAL USE OF COMMUNICATIONS JACK.
6. 24Vdc REQUIRED FOR TRANE SCR ELECTRIC HEAT MODULE.
7. SCREW TERMINAL ADAPTERS REQUIRED FOR BI1, UI1, UI2, IMC & LINK.
8. TO USE AI3 WITH A SUPPLY AIR SENSOR FOR AUTO-CHANGEOVER, REASSIGNMENT OF AI3 TO SAT WITH TU IS REQUIRED.

LED FUNCTIONS:  
 1. SERVICE  
 2. GREEN STATUS  
 3. RED STATUS  
 4. IMC TRANSMIT  
 5. IMC RECEIVE  
 6. BO1  
 7. BO2  
 8. BO3  
 9. ACTUATOR CLOSE  
 10. ACTUATOR OPEN



24VAC 60HZ ← 4.  
 NEC CLASS-2  
 CONTROL CIRCUIT  
 LOAD= 12VA  
 (WITHOUT HEAT)

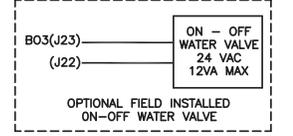
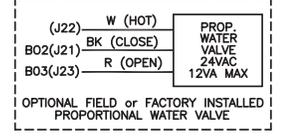
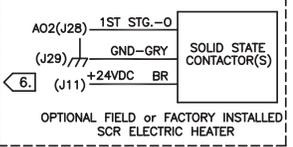
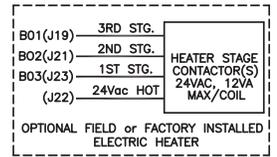
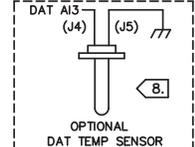
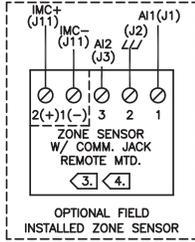
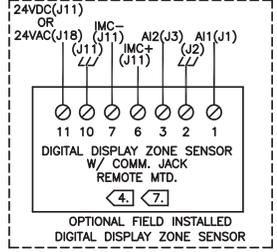
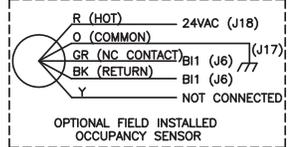
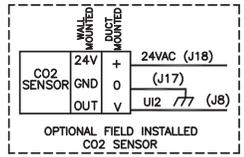
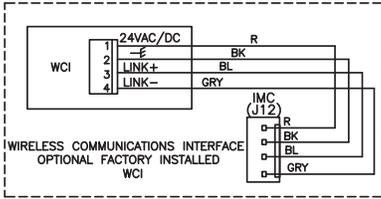
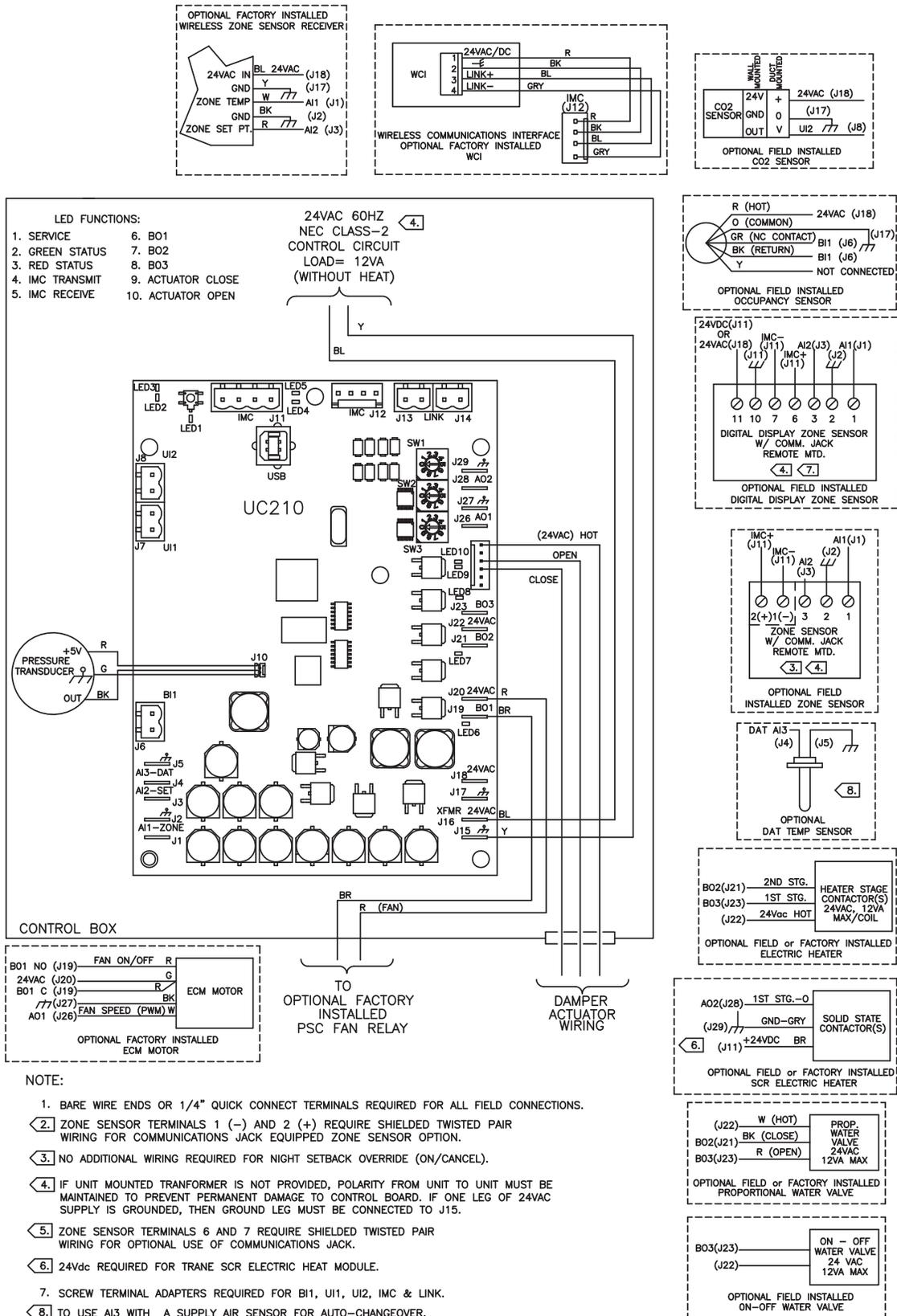


Figure 51. Symbio™ 210/210e and UC210 fan-powered control diagram



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