



# Tracer™ Controls

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## Tracer VV550/551 VAV Controllers



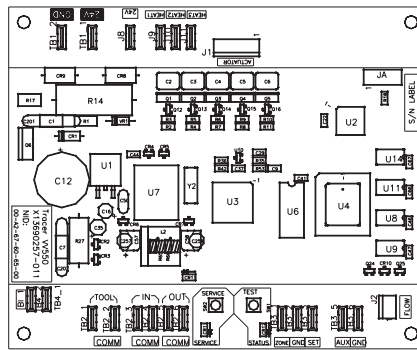
# Introduction

Tracer VV550 and Tracer VV551 variable air volume (VAV) controllers provide single-duct digital control for VAV boxes. They support the following VAV control sequences:

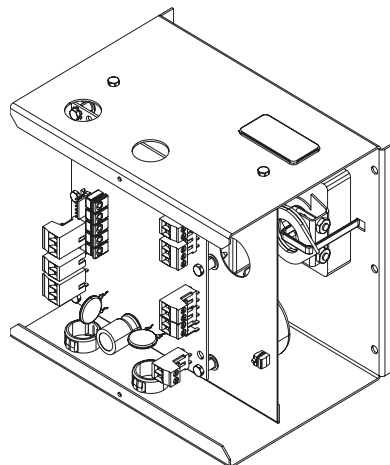
- Space temperature control
- Flow tracking
- Ventilation flow control

The Tracer VV550 VAV controller is available factory-installed on Trane VariTrane VAV boxes (Figure 1). The Tracer VV551 VAV controller is available for field installation for a variety of VAV applications (Figure 2).

**Figure 1. Tracer VV550 controller**



**Figure 2. Tracer VV551 controller (uses same board as Tracer VV550)**



Because the Tracer VV550 and Tracer VV551 VAV controllers use the same logic controller, both offer the same wide range of application and control flexibility. The Tracer VV551 VAV controller includes additional labor-saving packaging features for field-installed applications.

Tracer VV550/551 VAV controllers can operate as part of a Trane Integrated Comfort™ system (ICS), as part of a building management system from another manufacturer, or as a standalone device.

When it is part of a Trane ICS, a Tracer VV550/551 VAV controller enables the building automation system (BAS) to perform functions such as scheduling, trending, alarming, remote communications, and VAV air system (VAS) coordination. The controller communicates with a Tracer Summit BAS over the LonTalk® communications link. The controller can also communicate with other building control systems that are compliant with the LonMark® Space Comfort Controller (SCC) profile.

Tracer VV550/551 VAV controllers can be configured using the Rover™ service tool. They have the following inputs and outputs (Figure 3 on page 6):

Analog inputs:

- Space temperature (10 kΩ thermistor)
- Space setpoint (1 kΩ potentiometer)
- Primary/discharge air temperature (10 kΩ thermistor)
- Primary air flow

Binary inputs:

- Occupancy or generic

Binary outputs:

- Air valve close
- Air valve open
- Heat 1
- Heat 2
- Heat 3 or fan On/Off

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## Features and benefits

### Automatic calibration

Tracer VV550/551 VAV controllers automatically calibrate the flow transducer each time the box transitions to the unoccupied state. This eliminates the need to initiate/schedule calibration for most installations. The exception is 24/7 sites, in which case the Tracer Summit building automation system can be used to initiate/schedule calibration.

### Ventilation flexibility

Tracer VV550/551 VAV controllers can manage ventilation in the following ways:

- Fixed occupancy ventilation setpoint
- Scheduled (or otherwise calculated) ventilation setpoint
- Occupancy sensor to switch between normal and reduced ventilation
- CO<sub>2</sub> sensor for demand-controlled ventilation

This flexibility gives owners and facility managers an option to simply select one of several effective solutions for managing ventilation.

### Flow tracking

Tracer VV550/551 VAV controllers can easily be applied in flow tracking applications. In a flow tracking application, supply and exhaust boxes are paired together for the purpose of maintaining either positive or negative space static pressure. This feature allows the installer to quickly define the relationship of the supply and exhaust air boxes without the need for custom programming.

### Ventilation flow control with tempering

Tracer VV550/551 VAV controllers have been designed for ventilation flow control applications. These applications pair a fresh air unit or self-contained unit with ventilation boxes to provide fresh (tempered) air to a floor/area. With this feature, the installer can quickly configure the flow control boxes and set up the system without the need for custom programming.

### Local versus remote reheat flexibility

Tracer VV550/551 VAV controllers can be configured to have local and/or remote heat. This configuration flexibility enables the controllers to be applied across a broad range of VAV applications.

### Occupied and unoccupied operation

The occupancy input on a Tracer VV550/551 VAV controller works with a motion (occupancy) sensor or a time clock to determine the occupancy mode. An occupancy request can also be communicated from a building automation system to determine the mode of the controller. Whether stand-alone or combined with a communicated occupancy request, a Tracer VV550/551 controller can be used with an occupancy sensor to save energy whenever a space is vacant.

### Timed override

The timed override function for after-hours operation allows users to request unit operation by the touch of a button on the unit zone sensor. Additionally, users can press the CANCEL button at any time to place the unit back into unoccupied mode. This occupancy feature minimizes energy use by running the system only as scheduled or as demanded after hours.

### Service pin from the Trane zone sensor

Certain installation scenarios require access to the SERVICE button on the controller. Access to this button typically requires a ladder or a lift. The Tracer VV550/551 VAV controller allows a technician to replicate pressing the SERVICE button by pressing the zone sensor ON button. This feature eliminates the need for accessing the SERVICE button, saving the technician time and energy.

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### **Auto-commissioning sequence**

Tracer VV550/551 VAV controllers provide an automatic commissioning sequence. With a discharge air temperature sensor installed, this feature exercises the air valve, fan, and heat in the box and records the discharge air temperature before and after the action. This allows the installer to easily checkout the operation of the box and commission by exception. The data from this test is retained in the controller for immediate reports or retrieval at a later date (for comparison purposes).

### **Manual test function**

A Tracer VV550/551 VAV controller includes a manual test button, which enables a technician to easily exercise the outputs of the controller. On consecutive button presses, the controller steps through a predefined sequence that exercises all of the controller outputs.

### **Drive minimum and maximum from zone sensor**

When applied with a Trane zone sensor module that includes a thumbwheel setpoint, a Tracer VAV VV550/551 controller can easily be overridden to minimum and maximum flow. By simply turning the thumbwheel to \*, the controller drives the air valve to the minimum cooling flow setpoint. Similarly, turning the thumbwheel to \*\* drives the air valve to the maximum cooling flow setpoint. This simple override feature is most useful during the checkout and balancing phases of a project.

### **Trane controller compatibility**

Tracer VV550/551 VAV controllers are compatible with the latest generation of Trane control products. The controllers communicate over a LonTalk<sup>®</sup> communications link. This allows Tracer VV550/551 VAV controllers to exist on the same communication wire as other Trane controllers and to share data with them as required.

### **Interoperability**

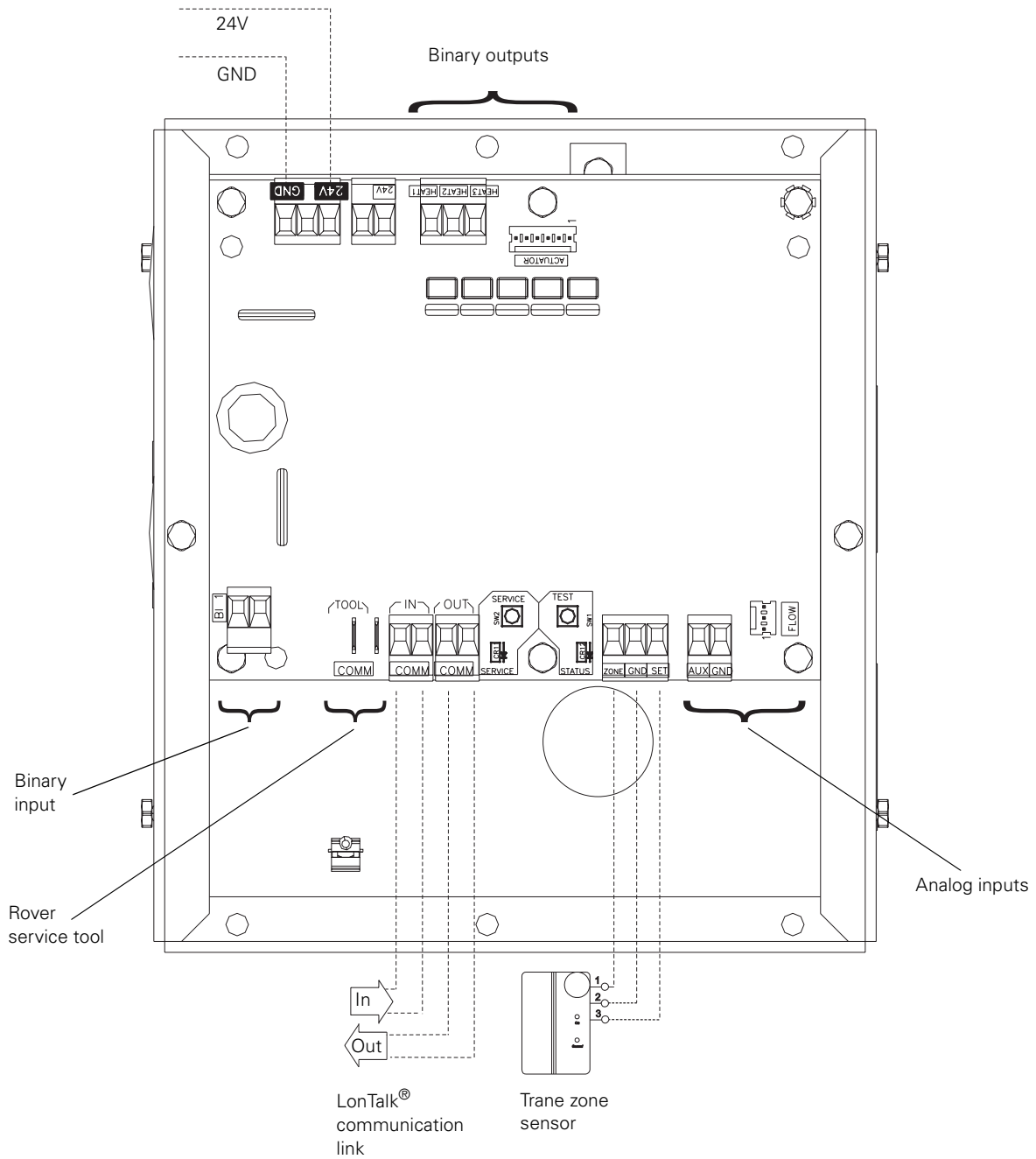
Tracer VV550/551 VAV controllers are designed with LonWorks<sup>®</sup> technology and are LonMark<sup>®</sup> certified. They follow the guidelines of the LonMark<sup>®</sup> Space Comfort Controller (SCC) profile. As such, the Tracer VV550/551 controllers enable control system integration flexibility.

### **Wiring diagram**

See Figure 3 on page 6.

# Wiring diagram for Tracer VV550/551 VAV controllers

Figure 3. Tracer VV550/551 wiring diagram

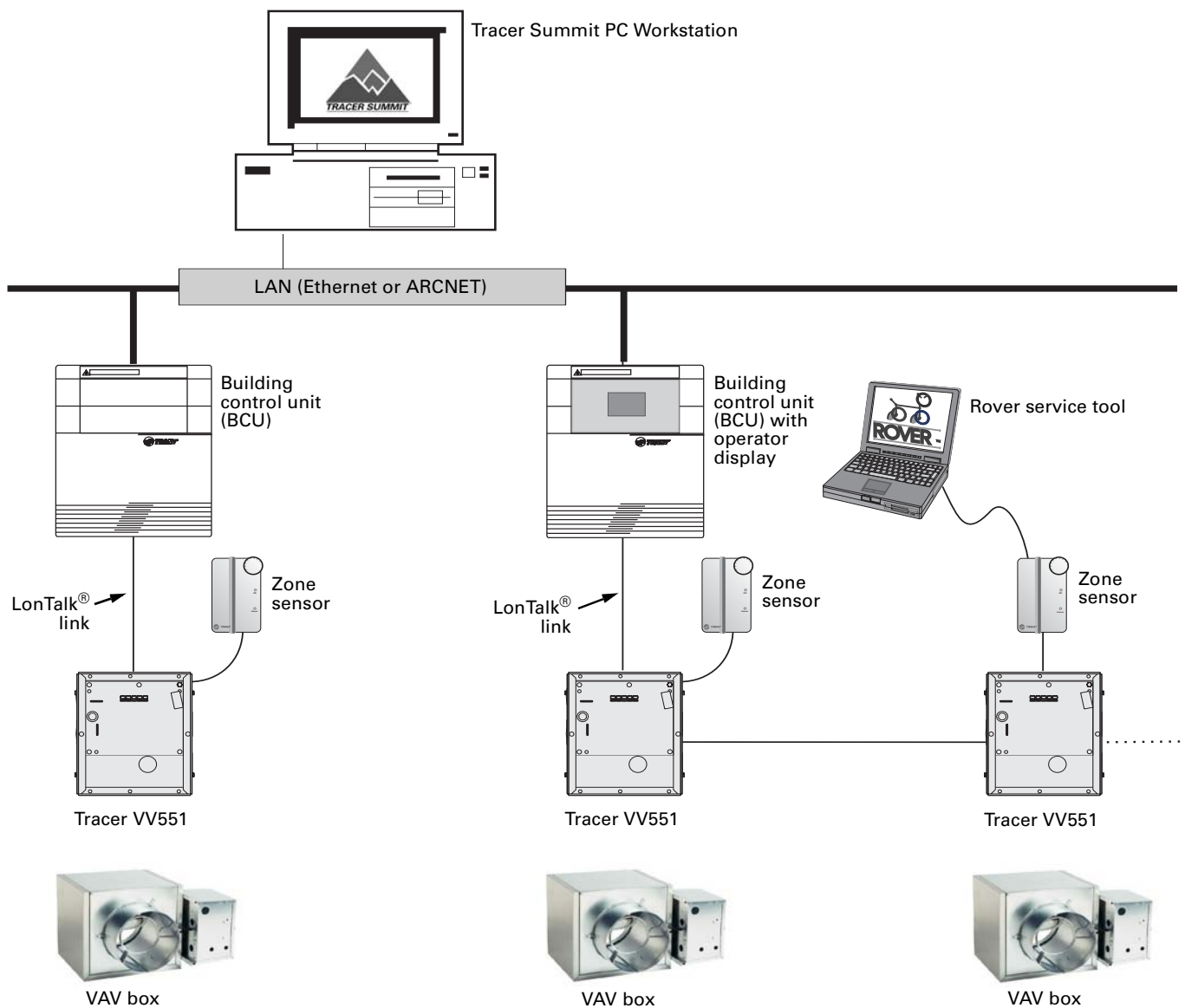


# Network architecture

Tracer VV550/551 VAV controllers can operate on a Tracer Summit BAS, on a building management system from another manufacturer, on a peer-to-peer network, or as stand-alone devices. The Rover service tool can configure the

controllers at any accessible location on the LonTalk® communication link (Figure 4).

**Figure 4. Network architecture with Tracer VV551 VAV controllers**



## Zone sensor options

Zone sensors are available in a variety of configurations. Table 1 describes the features of the five Trane zone sensors that are available for use with Tracer VV550/551 VAV controllers. The same five sensors are shown in Figure 5. Contact your Trane sales office about other compatible zone sensors.

**Table 1. Zone sensors for use with Tracer VV550/551**

GCC order number	Zone		Timed override buttons		LCD	Comm jack
	Setpoint thumbwheel	Temperature sensor	ON	CANCEL		
4190 1087		x				x
4190 1088		x	x	x		x
4190 1090	x	x	x	x		x
4190 1094	x	x				x
4190 1120	x	x	x	x	x	x

**Figure 5. Zone sensors for use with Tracer VV550/551**





# Dimensions and specifications

## Power requirements

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

## Operating environment

Temperature:  
32 to 140°F (0 to 60°C)

Relative humidity:  
From 5 to 95% non-condensing

## Storage environment

Temperature:  
-40 to 185°F (-40 to 85°C)

Relative humidity:  
From 5 to 95% non-condensing

## Dimensions

(See Figure 6 on page 10.)

### Board only

Height: 4.5 in. (11.4 cm)  
Width: 5.5 in. (13.8 cm)  
Depth: 2 in. (5.1 cm)

### With enclosure (VV551)

Height: 7.5 in. (13.7 cm)  
Width: 6.5 in. (16.7 cm)  
Depth: 5.5 in. (14.0 cm)

## Weight with enclosure (Tracer VV551)

With no actuator: 3.9 lb (1.77 kg)  
With Belimo actuator: 5.0 lb (2.27 kg)  
With Trane actuator: 5.2 lb (2.36 kg)

## Analog inputs

Space temperature; thermistor:  
10 k $\Omega$ @ 77°F (25°C)  
From 14 to 122°F (-10 to 50°C)

Space setpoint; potentiometer:  
1 k $\Omega$   
From 50 to 90°F (-10 to 32.2°C)

Primary/discharge air temperature; thermistor:  
10 k $\Omega$ @ 77°F (25°C)  
From -40 to 212°F (-40 to 100°C)

Primary air flow; pressure transducer:  
From 0 to 2 in. water (0 to 498 Pa)

## Binary input

Occupancy or generic (dry contact)

## Binary outputs

Air valve close:  
maximum output rating: 12 VA

Air valve open:  
maximum output rating: 12 VA

Heat stage 1:  
maximum output rating: 12 VA

Heat stage 2:  
maximum output rating: 12 VA

Heat stage 3/Fan on/off:  
maximum output rating: 12 VA

## Agency listings/compliance

Tracer VV550:

UL 873 and CSA C22.2 No. 24-93:  
Temperature Indicating and Regulating  
Equipment

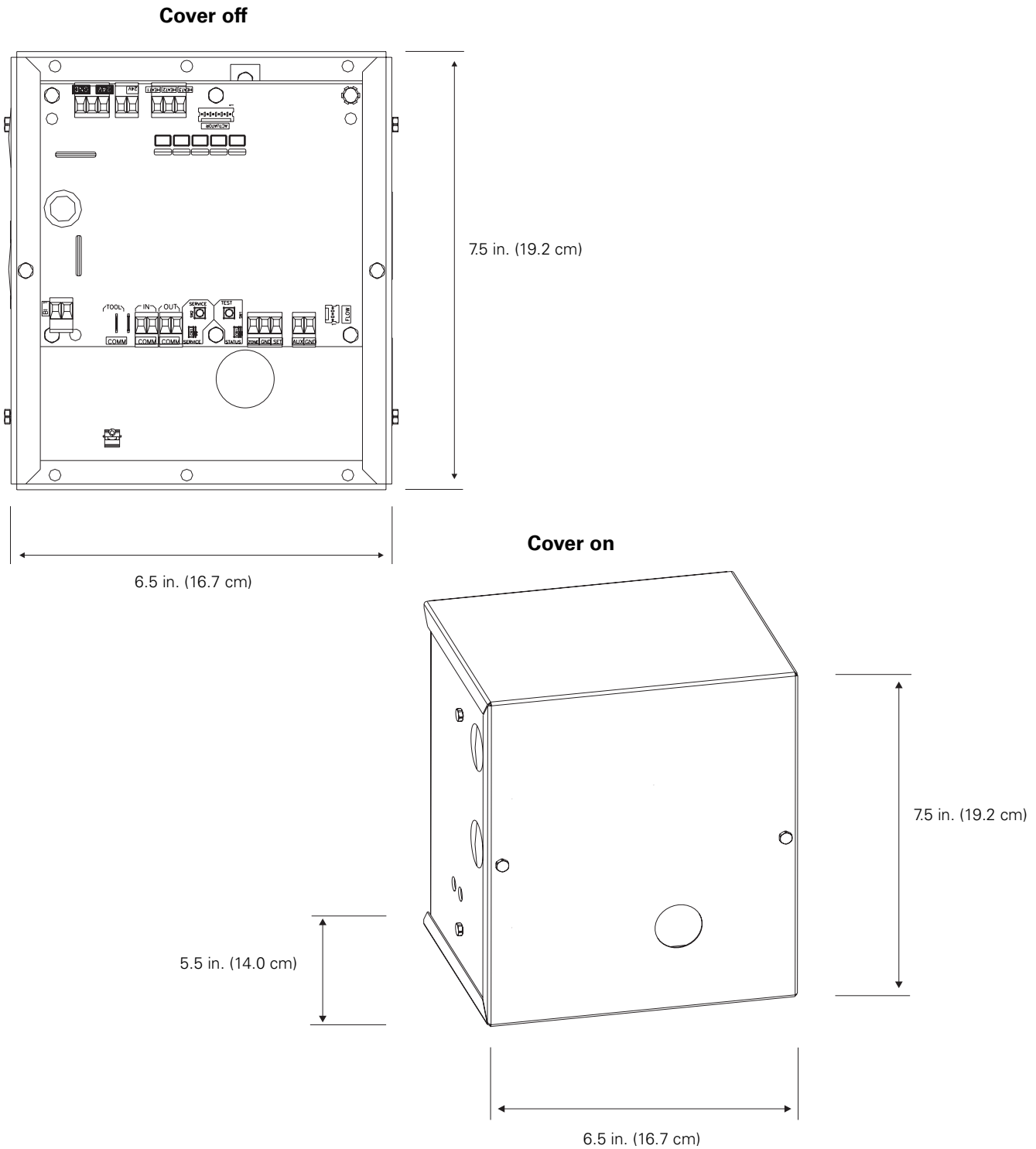
Tracer VV551:

UL and C-UL 916, Energy  
management equipment

UL 94-5V (UL flammability rating for  
plenum use)

FCC Part 15, Class A

**Figure 6. Tracer VV551 dimensions**



# Data lists

Table 2 provides an input/output listing for Tracer VV550/551 VAV controllers. Table 3 provides the configuration properties for the controller. The content of the lists conforms to both the

LonMark<sup>®</sup> SCC functional profile 8500 and the LonMark<sup>®</sup> node object.

**Table 2. Input/output listing**

Input description	Input	SNVT type
Space temperature	nviSpaceTemp	SNVT_temp_p
Setpoint	nviSetpoint	SNVT_temp_p
Occupancy, schedule	nviOccSchedule	SNVT_tod_event
Occupancy, manual command	nviOccManCmd	SNVT_occupancy
Occupancy sensor	nviOccSensor	SNVT_occupancy
Application mode	nviApplicMode	SNVT_hvac_mode
Heat/cool mode input	nviHeatCool	SNVT_hvac_mode
Fan speed command	nviFanSpeedCmd	SNVT_switch
Auxiliary heat enable	nviAuxHeatEnable	SNVT_switch
Valve override	nviValveOverride	SNVT_hvac_overid
Flow override	nviFlowOverride	SNVT_hvac_overid
Emergency override	nviEmergOverride	SNVT_hvac_emerg
Source temperature	nviSourceTemp	SNVT_temp_p
Space CO <sub>2</sub>	nviSpaceCO2	SNVT_ppm
Clear alarms/ diagnostics	nviRequest*	SNVT_obj_request
Air flow setpoint input	nviAirFlowSetpt	SNVT_flow
Ventilation ratio limit	nviVentRatioLim	SNVT_temp_p
Ventilation for the zone input	nviVentSetpt	SNVT_flow
* Part of the node object.		

Output description	Output	SNVT type
Space temperature	nvoSpaceTemp	SNVT_temp_p
Unit status, mode	nvoUnitStatus	SNVT_hvac_status
Effective setpoint	nvoEffectSetpt	SNVT_temp_p
Effective occupancy	nvoEffectOccup	SNVT_occupancy
Heat cool mode	nvoHeatCool	SNVT_hvac_mode
Setpoint	nvoSetpoint	SNVT_temp_p
Discharge air temperature	nvoDischAirTemp	SNVT_temp_p
Terminal load	nvoTerminalLoad	SNVT_lev_percent
Space CO <sub>2</sub>	nvoSpaceCO2	SNVT_ppm
Effective air flow setpoint	nvoEffectFlowSP	SNVT_flow
Air flow	nvoAirFlow	SNVT_flow
File table address	nvoFileDirectory*	SNVT_address
Object status	nvoStatus*	SNVT_obj_status
Alarm message	nvoAlarmMessage	SNVT_str_asc
* Part of the node object.		

**Table 3. Configuration properties**

Configuration property description	Configuration property	SNVT type	SCPT reference
Send heartbeat	nciSndHrtBt	SNVT_time_sec	SCPTmaxSendTime (49)
Occ temperature setpoints	nciSetpoints	SNVT_temp_setpt	SCPTsetPnts (60)
Minimum send time	nciMinOutTm	SNVT_time_sec	SCPTminSendTime (52)
Receive heartbeat	nciRecHrtBt	SNVT_time_sec	SCPTmaxRcvTime (48)
Location label	nciLocation	SNVT_str_asc	SCPTlocation (17)
Local bypass time	nciBypassTime	SNVT_time_min	SCPTbypassTime (34)
Manual override time	nciManualTime	SNVT_time_min	SCPTmanOverTime (35)
Space CO <sub>2</sub> limit	nciSpaceCO2Lim	SNVT_ppm	SCPTlimitCO2 (42)
Nominal air flow	nciNomFlow	SNVT_flow	SCPTnomAirFlow (57)
Air flow measurement gain	nciFlowGain	SNVT_multiplier	SCPTsensConstVAV (67)
Minimum air flow	nciMinFlow	SNVT_flow	SCPTminFlow (54)
Maximum air flow	nciMaxFlow	SNVT_flow	SCPTmaxFlow (51)
Minimum air flow for heat	nciMinFlowHeat	SNVT_flow	SCPTminFlowHeat (55)
Maximum air flow for heat	nciMaxFlowHeat	SNVT_flow	SCPTmaxFlowHeat (37)
Minimum flow for standby	nciMinFlowStdby	SNVT_flow	SCPTminFlowStby (56)
Firmware major version	nciDevMajVer*	n/a	SCPTdevMajVer (165)
Firmware minor version	nciDevMinVer*	n/a	SCPTdevMinVer (166)
Flow offset for tracking applications	nciFlowOffset	SNVT_flow_f	SCPToffsetFlow (265)
Local heating minimum air flow	nciMinFlowUnitHt	SNVT_flow	SCPTminFlowUnitHeat (270)
* Part of the node object.			



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Literature Order Number	CNT-PRC003-EN
File Number	PLES-CNT-000-PRC003-0404
Supersedes	New
Stocking Location	Inland

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