



TRANE ZN511 Tracer SC+ Building Automation System User Manual

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TRANE ZN511 Tracer SC+ Building Automation System



Introduction

- The Tracer ZN511 and ZN521 zone controllers provide digital control for several types of heating, ventilating, and air-conditioning (HVAC) equipment.
- The Tracer ZN511 controls:
 - Water-source heat pumps
 - Fan coils
 - Cabinet heaters
- The Tracer ZN521 controls:
 - Unit ventilators
 - Fan coils
 - Cabinet heaters
 - Blower coils
- Tracer zone controllers operate as standalone devices or as part of a Trane Integrated Comfort system (ICS). The controllers communicate with a Tracer Summit building automation system via a LonTalk communication link. LonTalk allows the controllers to operate in peer-to-peer configuration and to communicate with other compatible building control systems.
- Trane offers a variety of wall-mounted zone sensors for Tracer controllers. Zone sensors come with any of the following options:
 - Temperature setpoint thumbwheel
 - Fan speed switch
 - ON and CANCEL occupancy buttons
 - A communications jack for the Rover service tool

The Tracer ZN511 zone controller provides digital control of fan coils and water-source heat pumps. The Tracer ZN511 improves comfort control and provides stand-alone or networked building automation.

Inputs and outputs

- Tracer ZN511 inputs and outputs include:

- **Analog inputs:** zone temperature, entering or leaving water temperature, discharge air temperature, zone temperature setpoint, fan mode switch
- **Binary inputs:** occupancy, condensate overflow, low water temperature, low pressure protection, high pressure protection
- **Outputs:** water-source heat pump: compressor 1, compressor 2, twoposition outside air damper, reversing valve, fan on/off Fan coil: fan high, fan medium, fan low, 1 cool, 1 heat, two-position outside air damper
- **Generic points** for use with a Tracer Summit building automation system: binary input (shared with occupancy), binary output (shared with outside air damper)
- The generic inputs pass information to the building automation system. They do not affect the operation of the unit. The generic binary output is controlled by the building automation system and its state is not changed by unit operation, even under a diagnostic shutdown.

Features

Easy installation

The controller can be installed in existing Trane and competitive HVAC equipment without major wiring changes, and clearly labeled screw terminals ensure that wires are connected quickly and accurately. A compact enclosure design simplifies installation in minimal space.

Entering water temperature sampling

A traditional system using a two-way control valve on a fan coil might not sense the correct entering water temperature during long periods when the control valve is closed. The Tracer ZN511 solves this problem by opening the valve for three minutes to allow the water temperature to stabilize before the temperature is taken. This feature allows the use of two-way control valves to provide accurate two-pipe system [changeover for 1 heat/1 cool applications.

Automatic heat/cool mode determination

The Tracer ZN511 automatically determines whether heating or cooling is needed to maintain comfort levels, without the need to manually adjust unit controls. The controller measures the zone temperature and setpoint temperature, then uses a proportional/ integral algorithm to maintain zone temperature at the setpoint.

Occupied and unoccupied operation

The occupancy input works with a motion (occupancy) sensor or time clock. A communicated value from a building automation system through the LonTalk communication link can also be used. The input allows the controllers to use unoccupied (setback) temperature setpoints.

Random start

This feature randomly staggers multiple unit start-up to reduce electrical demand spikes.

Warm-up and cool-down

This feature is available with the installation of an outside air damper. If the room temperature drifts too far from the setpoint, the controller temporarily closes the damper to bring the temperature to the desired setpoint as quickly as possible.

Manual output test

Pressing the test button on the controller exercises all binary outputs in sequence. This feature is an invaluable troubleshooting tool.

Peer-to-peer communication

Multiple controllers can share data if they are bound together. Shared data can include setpoint, zone temperature,

mode, and fan status. Applications having more than one unit serving a single large space can benefit from this feature, which prevents multiple units from simultaneously heating and cooling.

Interoperability

The Tracer ZN511 conforms to the LonMark® Space Comfort Controller (SCC) profile and communicates via the LonTalk protocol. This allows it to work with other control systems that support LonTalk and the SCC profile.

Continuous fan or fan-cycling operation

Users can choose to have the fan run continuously at a given speed, or cycle on and off automatically by selecting the AUTO mode.

Equipment protection

The Tracer ZN511 includes inputs that allow for the following equipment protection:

- Refrigerant high- and low-pressure protection to prevent the unit from operating with high/low refrigeration pressure levels (heat pump only)
- Compressor minimum on and off timers to extend compressor life by preventing short cycling (heat pump only)
- A condensate overflow switch to prevent water damage to the building
- Low-temperature detection to prevent compressor operation during abnormal conditions (heat pump) or coil freeze-up (fan coil)

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.

Fan status

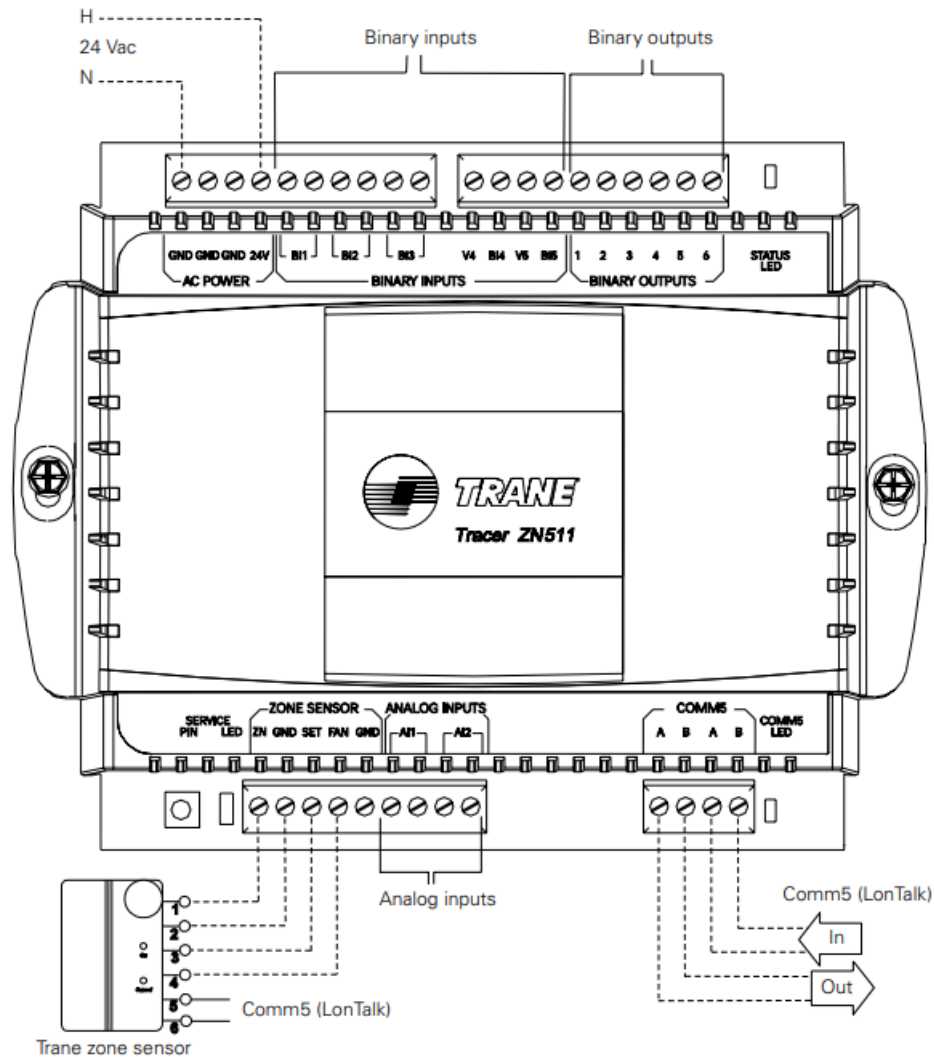
The controller monitors the fan output status as proof of airflow. This method is cost effective and commonly used on direct-drive fan applications.

Filter maintenance

Filter maintenance status is based on the cumulative hours of operation of the unit fan. The controller has timers that can be reset, and when the time limit expires, Tracer Summit software or the Rover service tool indicates that unit maintenance is recommended.

Wiring diagram for the ZN511 zone controller

Figure 1: Tracer ZN511 wiring diagram



Tracer ZN521 zone controller

The Tracer ZN521 zone controller provides digital control of fan coils, unit ventilators, and blower coils. The Tracer ZN521 improves comfort control and provides stand-alone or networked [building automation].

Inputs and outputs

- Tracer ZN511 inputs and outputs include:
 - **Analog inputs:** zone temperature, entering or leaving water temperature, discharge air temperature, zone temperature setpoint, fan mode switch
 - **Binary inputs:** occupancy, condensate overflow, low water temperature, low pressure protection, high pressure protection
 - **Outputs:** water-source heat pump: compressor 1, compressor 2, twoposition outside air damper, reversing valve, fan on/off Fan coil: fan high, fan medium, fan low, 1 cool, 1 heat, two-position outside air damper
 - **Generic points** for use with a Tracer Summit building automation system: binary input (shared with occupancy), binary output (shared with outside air damper)
- The generic inputs pass information to the building automation system. They do not affect the operation of the unit. The generic binary output is controlled by the building automation system and its state is not changed by unit operation, even under a diagnostic shutdown.

Features

Easy installation

The controller can be installed in existing Trane and competitive HVAC equipment without major wiring changes, and clearly labeled screw terminals ensure that wires are connected quickly and accurately. A compact enclosure design simplifies installation in minimal space.

Modulating control

The Tracer ZN521 provides exceptional comfort control through hydronic valve and damper tri-state modulation and a proportional-integral control algorithm.

Cascade control

Cascade control differs from zone temperature control in that the unit resets the discharge air temperature to control the zone. Cascade control manages zone temperature more effectively than zone temperature control, in which the discharge air temperature can exceed comfort levels.

Entering water temperature sampling

Traditional equipment using a two-way control valve might not sense the correct entering water temperature during long periods when the control valve is closed. The Tracer ZN521 solves this problem by opening the valve for three minutes to allow the water temperature to stabilize before the temperature is taken. This feature allows the use of two-way control valves to provide accurate two-pipe system changeover for 1 heat/1 cool applications.

Automatic heat/cool mode determination

The Tracer ZN521 automatically determines whether heating or cooling is needed to maintain comfort levels, without the need to manually adjust unit controls. The controller measures the zone temperature and setpoint temperature, then uses a proportional/ integral algorithm to maintain zone temperature at the setpoint.

Occupied and unoccupied operation

The occupancy input works with a motion (occupancy) sensor or time clock. A communicated value from a building automation system through the LonTalk communication link can also be used. The input allows the controllers to use unoccupied (setback) temperature setpoints.

Random start

This feature randomly staggers multiple unit start-up to reduce electrical demand spikes.

Warm-up and cool-down

This feature is available with the installation of an outside air damper. If the room temperature drifts too far from the setpoint, the controller temporarily closes the damper to bring the temperature to the desired setpoint as quickly as possible.

Manual output test

Pressing the test button on the controller exercises all binary outputs in sequence. This feature is an invaluable troubleshooting tool.

Peer-to-peer communication

Multiple controllers can share data if they are bound together. Shared data can include setpoint, zone temperature, mode, and fan status. Applications having more than one unit serving a single large space can benefit from this feature, which prevents multiple units from simultaneously heating and cooling.

Interoperability

The Tracer ZN521 conforms to the LonMark® Space Comfort Controller (SCC) profile and communicates via the LonTalk protocol. This allows it to work with other control systems that support LonTalk and the SCC profile.

Interoperability

The Tracer ZN521 conforms to the LonMark® Space Comfort Controller (SCC) profile and communicates via the LonTalk protocol. This allows it to work with other control systems that support cLonTalk and the SCC profile.

Equipment protection

The Tracer ZN521 includes inputs that allow for the following equipment protection:

- A condensate overflow switch to prevent water damage to the building
 - Low-temperature detection to help prevent coil freeze-up
 - Discharge air temperature limiting to help prevent the coil from freezing
- The Tracer ZN521 includes inputs that allow for the following equipment protection:
- A condensate overflow switch to prevent water damage to the building
 - Low-temperature detection to help prevent coil freeze-up
 - Discharge air temperature limiting to help prevent the coil from freezing

Automatic fan speed reset

Units set to AUTO operate at the default fan speeds (cooling and heating may have different default speeds). If the default fan speed is high, medium, or low, the unit operates accordingly. If the default fan speed is set to AUTO, the fan operates at low speed most of the time. If the temperature exceeds the setpoint by more than 2°F (1°C), the controller changes the fan speed to medium or high. This allows the unit to operate at low speed whenever possible.[]

Automatic ventilation reset

Because ensuring proper ventilation[] rates is so important for indoor air quality, the Tracer ZN521 is configured with two outside/fresh air damper minimum position setpoints for occupied operation. As the fan speed changes, the damper minimum position changes to maintain the correct ventilation rate.

Fan status

The Tracer ZN521 has two methods of monitoring fan status. The first method[] monitors the fan output status on the unit controller. This method is typically used with direct fan applications. The controller can also accept a binary []input from a fan proof switch for belt driven applications. When fan operation is expected by the controller but not confirmed by the proof switch, a diagnostic message is generated and unit operation is disabled.

Filter maintenance

Filter maintenance status is based on the cumulative hours of operation of the unit fan. The controller has timers that can be reset, and when the time limit expires, Tracer Summit software or the Rover service tool indicates that unit maintenance is recommended.

Water valve override

This function causes all of the water valves in every unit to open simultaneously at a command from Tracer Summit software or the Rover service tool. This function reduces the []time required for balancing the water distribution system.

Relative humidity input

An analog input can be configured as a relative humidity input. The controller can use this value to support the dehumidification function.

Active dehumidification

This feature keeps relative humidity levels within ASHRAE 62-89R guidelines []to maximize comfort and minimize the risk of microbial growth and damage to []the building or furnishings due to humidity. The controller can provide active dehumidification when the equipment includes a reheat coil and a humidity sensor.

CO2 input

An analog input can be configured to measure CO2. Tracer Summit can use [the input in a variety of applications. This input has no direct effect on the operation of the controller.[]

Two-stage electric heat

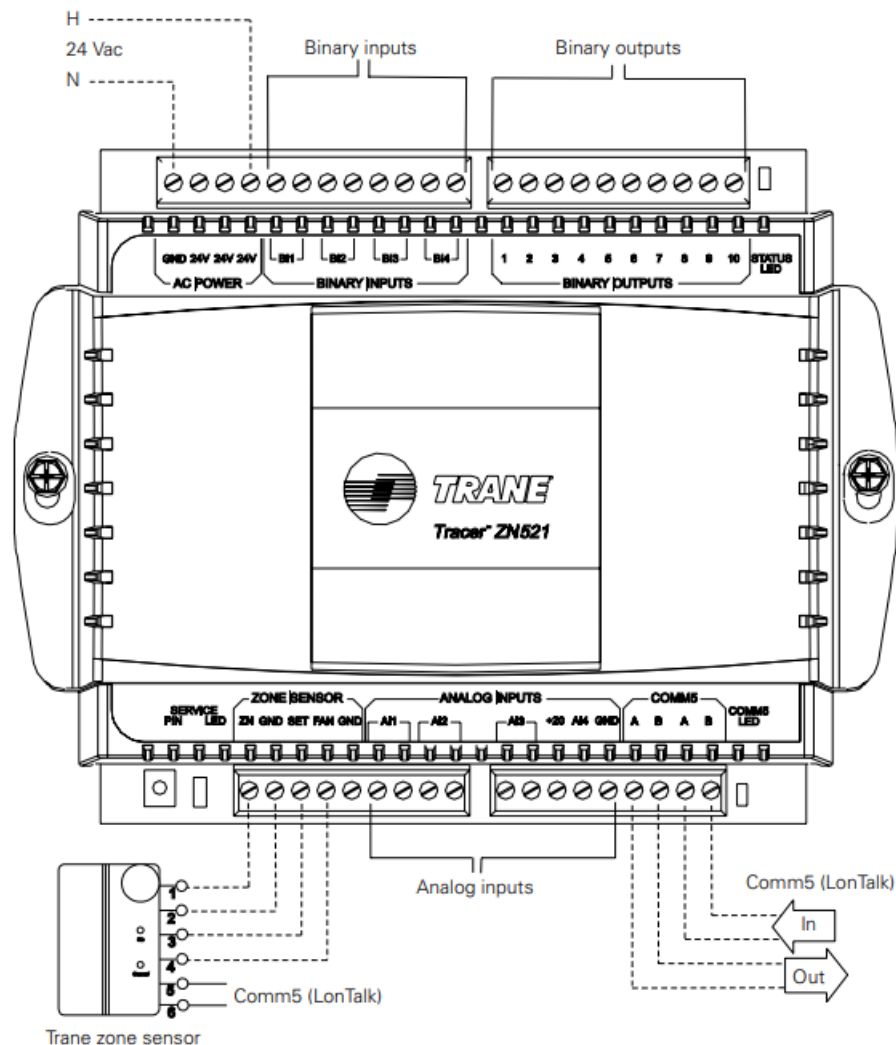
- The Tracer ZN521 supports 1- or 2-stage electric heat operation for heating. To control the zone temperature, electric heat is cycled to control the discharge air temperature. The rate of cycling is dependent on the load in the space and the temperature of any incoming freshair from the economizer.
- Two-pipe changeover units with electric heat use electric heat when hot water is not available.

Economizing control

When the Tracer ZN521 is configured for economizing control, it opens the outdoor damper to the calculate position to provide “free” cooling as required. If the damper is completely open and the setpoint is still not achieved, the cooling valve opens to satisfy load requirements. As cooling load requirements decrease, the valve closes until the setpoint is reached or the damper reaches its adjustable minimum position.

Wiring diagram for the ZN521 zone controller

Figure 6: Tracer ZN521 wiring diagram

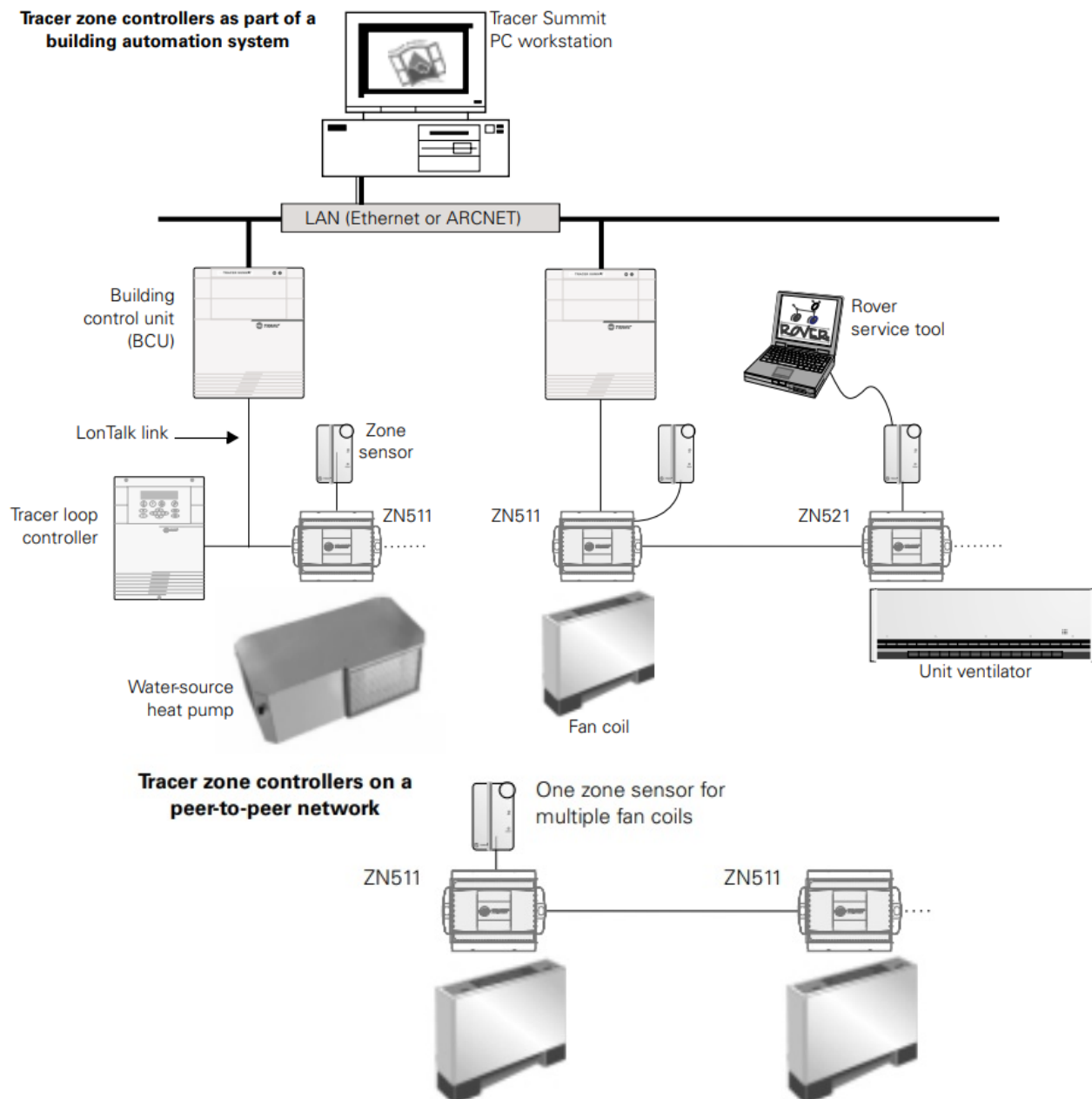


Network architecture

- Tracer zone controllers, shown in Figure 3, can operate on a Tracer Summit building automation system, on a peer-to-peer network, or as standalone devices.

- The Rover service tool can configure the controllers through the communication jack in a zone sensor or at any accessible location on the LonTalk communication link.

Figure 3: Tracer zone controllers network architecture



Zone sensor options

Zone sensors are available in a variety of configurations. Table 1 describes Trane zone sensors available for Tracer zone controllers. Figure 4 shows three types of zone sensors for the Tracer ZN511 and ZN521 zone controllers.

BAS order number	Use	Fan					Zone		Timed override buttons		Comm jack
		High	Med	Low	Auto	Off	Setpoint thumbwheel	Temperature sensor	On	Cancel	
4190 1087	Any							x			
4190 1088	Any							x	x	x	x
4190 1090	Heat pump						x	x	x	x	x
4190 1094	Heat pump						x	x			x
4190 1095	Unit vent	x		x		x	x	x	x	x	x
4190 1115	Fan coil	x	x	x	x	x	x	x	x	x	x
4190 1116	Unit vent	x		x	x	x	x	x	x	x	x
4190 1117	Any				x	x	x	x	x	x	x

Figure 4: Zone sensors compatible with Tracer zone controllers



Dimensions and specifications

Dimensions

(See Figure 2)

- **Height:** 5 3/8 in. (137 mm)
- **Width:** 6 7/8 in. (175 mm)
- **Depth:** 2 in. (51 mm)

Power

- **Supply:** 19–30 Vac (24 Vac nominal) at 50/60 Hz
- **Consumption:** 14 VA plus 12 VA (maximum) per binary output

Operating environment

- **Temperature:** From 32 to 140°F (0 to 60°C)
- **Relative humidity:** From 5 to 95% noncondensing

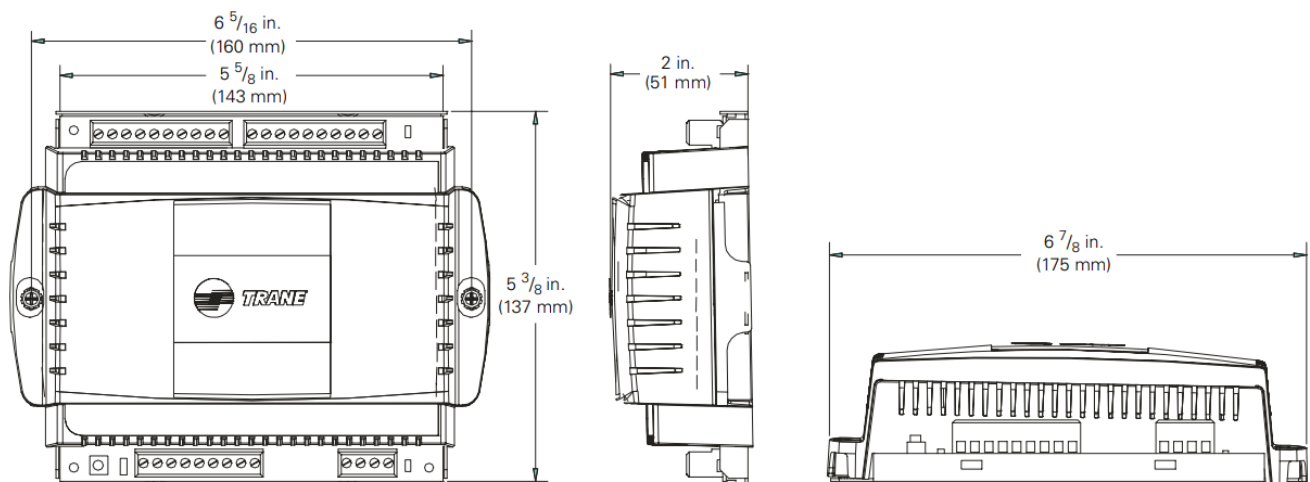
Storage environment

- **Temperature:** From –40 to 185°F (–40 to 85°C)
- **Relative humidity:** From 5 to 95% noncondensing

Agency listings/compliance

- **CE—Immunity:**
 - EN 50082-1:1997
 - EN 50082-2:1995
- **CE—Emissions:**
EN 50081-1:1992 (CISPR 22)
- **UL and C-UL listed:** Energy management system
- UL 94-5V (UL flammability rating for plenum use)
- FCC Part 15, Class A
- LonMark® Space Comfort Controller (SCC) profile

Figure 2: Tracer ZN511 and ZN521 dimensions



ABOUT COMPANY

- The Trane Company
- An American Standard Company www.trane.com



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

Since The Trane Company has a policy of continuous product and product data improvement, it reserves the right to change design and specifications without notice.

Documents / Resources

 <p>Tracer™ Controls Tracer ZN511 and ZN511 Tracer Controls</p> <p>Partners 800 888-TRANE © 2010 Trane Technologies Corporation</p>	<p>TRANE ZN511 Tracer SC+ Building Automation System [pdf] User Manual ZN511 Tracer SC Building Automation System, ZN511, Tracer SC Building Automation System, Building Automation System, Automation System</p>
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References

-  [Fire Alarm Resources | Download fire alarm documents](#)
-  [Trane Heating & Air Conditioning](#)

Manuals+.