Introduction
The Tracer ZN.511 and ZN.521 zone controllers are digital controllers for HVAC equipment.

This marketing guide:
- Provides a product overview
- Describes strategic sales opportunities
- Compares the Tracer ZN.511 and ZN.521 to the competition
- Lists zone sensors available for the controllers
™ ® The following are trademarks or registered trademarks of their respective companies: Tracer, UniTrane, ForceFlow, and Integrated Comfort system from Trane; LonMark and LonTalk from Echelon Corporation.
## Contents

### Introduction ............................................ 1

### Product overview ....................................... 4

### Strategic opportunities .............................. 5
- School buildings with fan coils or unit ventilators and pneumatic controls ........................................ 5
- Office buildings with water-source heat pumps and electromechanical thermostats .............................. 5
- Plan and spec opportunities .......................... 7
- Where to begin ........................................ 7

### Competition ............................................. 8

### Competitive advantages .............................. 9
- Interoperability ....................................... 9
- Entering water temperature sampling function .... 9
- Smart reset ............................................ 9
- Peer-to-peer communications ........................ 9
- Random start ......................................... 10
- Automatic heat/cool mode determination .......... 10
- Manual output test mode ............................ 10
- Water valve override .................................... 10
- Auto default fan speed setting .................... 10
- Automatic ventilation reset ......................... 10
- Active dehumidification ............................. 10

### Zone sensors ........................................... 11
Product overview

The Tracer ZN.511 and ZN.521 zone controllers are field-installed, digital controllers for HVAC equipment.

The Tracer ZN.511 controls:
- Water-source heat pumps
- Two-pipe hydronic fan coils
- Four-pipe hydronic fan coils
- Cabinet heaters with hydronic or single-stage electric heat

The Tracer ZN.521 controls:
- Unit ventilators
- Fan coils
- Cabinet heaters
- Blower coils

Tracer zone controllers operate as stand-alone devices or as part of a Trane Integrated Comfort system (ICS). The controllers communicate with a Tracer Summit building automation system via a Comm5 communications link. Comm5 allows the controllers to operate in peer-to-peer configuration and to communicate with other compatible building control systems.
Strategic opportunities
This section identifies several opportunities to sell the Tracer ZN.511 and ZN.521 zone controllers in both existing building and new construction markets.

Existing school buildings with fan coils or unit ventilators and pneumatic controls
Many existing buildings have fan coils and unit ventilators with outdated or failing control systems. You may find the most success when targeting schools with older, first generation pneumatic control systems. Over 20,000 schools were built in North America between 1950 and the 1980s. A majority of these buildings included pneumatic controls provided on the HVAC equipment. Although many of these buildings have added energy management systems, the temperature controls on the fan coils or unit ventilators may still be the original pneumatics.

Pneumatic control systems are often the cause of routine comfort complaints due to the age of the components, inherent drift problems, and the large amount of calibration and maintenance required for proper operation. The Tracer ZN.511 and ZN.521 offer a solution to these problems by being more advanced, more reliable, and maintenance free.

To replace the pneumatic controls on a fan coil or a unit ventilator, you will need to replace the thermostat with a zone temperature sensor. You will also probably need to add one relay to switch line voltage for each controlled fan speed. For Tracer ZN.521 applications, you will also need a discharge air sensor. The decision must be made whether to keep or replace the valve, valve actuator, and the damper actuator. If the decision is to keep these items, use transducers to convert the signal from electric to pneumatic. If the decision is to replace these items, certain pneumatic valve actuators can be replaced with electric actuators without replacing the valve. Check with the actuator manufacturer for more information on this option.

Office buildings with water-source heat pumps and electromechanical thermostats
In the 1980s, thousands of office buildings using water-source heat pumps were constructed. Many of these office buildings have electromechanical thermostats controlling the heat pumps. Inefficiencies in these applications (such as constant operation of the water-loop pump and nuisance service calls) make them an ideal target for upgrading to the Tracer ZN.511 and the Tracer loop controller sold by the Waco business unit. These controllers provide a more efficient direct digital control (DDC) system.
The Tracer loop controller has a scheduling feature to allow the system to run in occupied and unoccupied mode. In the unoccupied mode, the system pump and all water-source heat pumps are turned off and remain off unless enough heat pumps send a request to the loop controller for cooling or heating. The system pump runs constantly on systems without this scheduling option. You can calculate the pump energy savings by estimating the time the pump will be disabled with the scheduling feature in place and the amount of energy normally used by the system pump during this time period.

The Tracer ZN.511 uses a smart reset feature when the water-source heat pump experiences a shutdown diagnostic such as a high-pressure cutout. With standard electromechanical thermostat controls, a manual reset is required if the heat pump operation is locked out. The smart reset feature of the Tracer ZN.511 waits 30 minutes after a shutdown diagnostic and then attempts to restart the unit. This helps to eliminate the need for human intervention when units shut down and the fault situation is corrected as conditions change. To take advantage of the smart reset feature, you must make an additional connection from the controller to the compressor contactor or a field-supplied current-sensing switch in order to monitor compressor status. Additionally, using the Tracer loop controller or Tracer Summit building automation system allows for any diagnostic to be reset from a central location through the user interface.

To replace an electromechanical thermostat on a water-source heat pump with a Tracer ZN.511, mount a zone temperature sensor in place of the thermostat and wire it back to the Tracer ZN.511 located at the heat pump. The rest of the connections can be made to the standard thermostat connections (R, Y, G, W, and so on) that already exist on the unit. No additional relays are required under normal circumstances.

For more information on the advantages of the Tracer loop controller and specific information on competing with the McQuay Mark IV system, please refer to the *ComfortLink 10 and ComfortLink Loop Controller Marketing Guide (WSHP-MG-3).*
Plan and spec opportunities

Outside of the owner direct sales channel, look for other opportunities in the plan and spec market. Tracer zone controllers are ideal when:

- A customer with an existing building puts a controls upgrade out for bid.
- The equipment and controls are bid separately on a new construction job and the equipment order is lost.
- The equipment and controls are bid separately and the equipment order is shipped before the control order is secured (so that factory controls cannot be installed).
- On new speculative office buildings or shopping malls where only the HVAC equipment is installed and the controls are installed later as part of the tenant finish.

The Tracer ZN.511 and ZN.521 can meet the need for a field-installed controller in any of these cases.

Where to begin

For existing buildings, the ability of Tracer zone controllers to operate as stand-alone devices allows you to upgrade a single room where comfort complaints have originated or the existing controls have been a maintenance problem. If there is a large room that fits these criteria, take advantage of the peer-to-peer communication feature, which allows several units to share the functions of a single zone sensor. Begin by targeting customers with whom you have a good relationship, even if you currently only maintain HVAC equipment such as chillers.

In the new construction market, unit price is not an issue because the Tracer ZN.511 and ZN.521 are competitively priced. Discuss these products with design engineers with whom you have a good relationship and encourage them to specify these products on renovation projects.

The BAS/Microelectronic Controls Specification Manual (BAS-PRM001-EN) and the Trane Spec Wizard include sequences of operations for the Tracer ZN.510 and ZN.520 that you can use as the basis for Tracer ZN.511 and ZN.521 specifications. You will need to modify the language (and feature set) based on the extent of your planned existing control modifications.
Competition

Several competitors offer products similar to the Tracer ZN.511 and ZN.521 zone controllers. Table 1 is a summary of the competitive offering. These products have contractor sell prices from $120 to $200.

**Table 1: Unit controller comparison**

<table>
<thead>
<tr>
<th>Competitor</th>
<th>Product</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Applications</th>
<th>Interoperability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alerton</td>
<td>TX-450</td>
<td>4</td>
<td>5</td>
<td>FC/HP</td>
<td>No</td>
</tr>
<tr>
<td>Alerton</td>
<td>TX-653P</td>
<td>6</td>
<td>8</td>
<td>AHU/UV</td>
<td>No</td>
</tr>
<tr>
<td>Alerton</td>
<td>VLC-550C3</td>
<td>5</td>
<td>5</td>
<td>FC/HP</td>
<td>Yes—BACnet</td>
</tr>
<tr>
<td>Alerton</td>
<td>VLC-651RC3</td>
<td>6</td>
<td>6</td>
<td>UV/FC</td>
<td>Yes—BACnet</td>
</tr>
<tr>
<td>Andover</td>
<td>TCX 850</td>
<td>4</td>
<td>4</td>
<td>FC/HP/UV</td>
<td>No</td>
</tr>
<tr>
<td>Andover</td>
<td>TCX 867</td>
<td>4</td>
<td>6</td>
<td>FC/HP/UV</td>
<td>No</td>
</tr>
<tr>
<td>Andover</td>
<td>TCX 870</td>
<td>4</td>
<td>5</td>
<td>FC/HP/UV</td>
<td>No</td>
</tr>
<tr>
<td>Andover</td>
<td>LCX 800</td>
<td>8</td>
<td>8</td>
<td>FC/HP/UV</td>
<td>No</td>
</tr>
<tr>
<td>Auto. Logic</td>
<td>U253</td>
<td>5</td>
<td>5</td>
<td>UV</td>
<td>Yes—BACnet</td>
</tr>
<tr>
<td>Auto. Logic</td>
<td>U551</td>
<td>5</td>
<td>6</td>
<td>FC/HP</td>
<td>Yes—BACnet</td>
</tr>
<tr>
<td>CSI</td>
<td>NP-506R</td>
<td>4</td>
<td>6</td>
<td>FC/HP/UV</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>ESUSA</td>
<td>NXA-FCU</td>
<td>6</td>
<td>6</td>
<td>FC</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>ESUSA</td>
<td>NXA-HPU</td>
<td>6</td>
<td>6</td>
<td>HP</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>ESUSA</td>
<td>NXA-PEC</td>
<td>6</td>
<td>6</td>
<td>UV</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>Honeywell</td>
<td>W7752G</td>
<td>4</td>
<td>7</td>
<td>FC</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>Honeywell</td>
<td>W7753A</td>
<td>10</td>
<td>8</td>
<td>UV</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>Invensys</td>
<td>MNL-100</td>
<td>3</td>
<td>4</td>
<td>FC/HP/UV</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>Invensys</td>
<td>MNL-200</td>
<td>5</td>
<td>8</td>
<td>FC/HP/UV</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>Johnson</td>
<td>TCU</td>
<td>7</td>
<td>3</td>
<td>FC</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>Siemens</td>
<td>540-110</td>
<td>5</td>
<td>6</td>
<td>FC</td>
<td>No</td>
</tr>
<tr>
<td>Siemens</td>
<td>540-505</td>
<td>6</td>
<td>8</td>
<td>HP</td>
<td>No</td>
</tr>
<tr>
<td>Siemens</td>
<td>540-509</td>
<td>6</td>
<td>9</td>
<td>UV</td>
<td>No</td>
</tr>
<tr>
<td>Trane</td>
<td>ZN.511</td>
<td>10</td>
<td>6</td>
<td>FC/HP</td>
<td>Yes—LonTalk</td>
</tr>
<tr>
<td>Trane</td>
<td>ZN.521</td>
<td>11</td>
<td>10</td>
<td>FC/UV</td>
<td>Yes—LonTalk</td>
</tr>
</tbody>
</table>

**Key:** FC = fan coil, HP = heat pump, AHU = air-handling unit, UV = unit ventilator
Competitive advantages

This section describes competitive advantages of the Tracer ZN.511 and ZN.521 zone controllers. For a complete list of product features, refer to Tracer Controls: Tracer ZN.511 and ZN.521 Zone Controllers (BAS-PRC006-EN).

Interoperability

The controllers conform to the LonMark Space Comfort Controller (SCC) profile for interoperability. This feature may reassure customers who have felt tied to certain vendors in the past.

Entering water temperature sampling function

A disadvantage of traditional changeover fan coil or unit ventilator applications using two-way valves is the method of testing the entering water temperature. When heating or cooling is called for, the entering water temperature is read to determine if the water is the correct temperature for normal heating or cooling operation. If the valve has been closed for an extended period of time, the water in the pipe may be close to room temperature, providing an incorrect changeover temperature reading. This can cause a delay in unit operation, leading to comfort problems.

The Tracer ZN.511 and ZN.521 use a sampling function that prevents inaccurate readings of the entering water temperature. When the entering water temperature reading indicates that the water is an unsuitable temperature to begin either normal heating or cooling operation, the controller opens the valve and waits 3 minutes for the water temperature to stabilize. If the water temperature is acceptable after 3 minutes with the valve open, normal operation begins. If the water temperature is still unacceptable, another attempt is made after 60 minutes.

Smart reset

The controllers have a smart reset feature for certain shutdown diagnostics. Other controllers may require a manual reset of all shutdown diagnostics. This is common in heat pump applications where the unit may experience a high/low pressure diagnostic due to temporary fluctuations in water loop temperatures.

The smart reset feature of the Tracer ZN.511 and ZN.521 attempts to restart the unit 30 minutes after a shutdown diagnostic. This helps to eliminate the need for human intervention when units shut down and the fault is corrected as conditions change.

Peer-to-peer communications

Competing controllers may have trouble with spaces where multiple HVAC units serve a single large zone. Such applications can result in some units in cooling mode and other units in heating mode. This wastes energy and may result in comfort complaints.

Using peer-to-peer communications, Tracer ZN.511 and ZN.521 zone controllers can share data—with or without a building automation system. Several slave controllers can be bound to a
single master controller and zone sensor. As a result, multiple units serving a large space operate more efficiently, sharing properties such as heating/cooling mode and setpoint.

**Random start**
This feature randomly staggers multiple-unit start-ups to reduce electrical demand spikes.

**Automatic heat/cool mode determination**
Some competitive units require manual adjustment of unit controls to change their heat/cool mode. The Tracer ZN.511 and ZN.521 utilize a proportional-integral control algorithm to determine the heat/cool mode and control the zone temperature.

**Manual output test**
The controllers include a test button that allows sequencing of all of the outputs for test purposes. This allows technicians to verify unit operation without the use of a PC-based service tool.

**Water valve override (Tracer ZN.521 only)**
This function allows every unit with a Tracer ZN.521 to be driven open simultaneously. This reduces the time it takes to balance the waterside of the system, which saves project startup time and money.

**Automatic fan speed reset (Tracer ZN.521 only)**
When the default fan speed is set to AUTO, the fan runs at low speed most of the time, switching to medium or high speed only when the zone temperature deviates from the active setpoint by more than 2°F [1.1°C]. This allows for fan energy savings as well as acoustic and latent benefits. Competitive units without this feature may have only a single fan speed in auto mode.

**Automatic ventilation reset (Tracer ZN.521 only)**
For units with a Tracer ZN.521 and an outside air damper, this feature helps maintain indoor air quality. The controller has two damper minimum position setpoints for occupied operation, which allow the damper position to change with the fan speed. This action ensures proper zone ventilation. Competitive controllers without this feature may not have adequate ventilation control, which could lead to poor indoor air quality and comfort complaints.

**Active dehumidification (Tracer ZN.521 only)**
This feature keeps relative humidity levels within ASHRAE 62-89R guidelines. Competitive controllers without this capability may not have adequate control of relative humidity levels, which could lead to comfort complaints and damaging microbial growth. To take advantage of this feature, a reheat coil and zone relative humidity value (hard wired or communicated) must be present.
Zone sensors

Zone sensors are available in a variety of configurations with any of the following features:

- Temperature setpoint thumbwheel
- Temperature detection
- ON and CANCEL occupancy buttons
- Fan speed switch
- Communications jack for the Rover service tool

Table 2 lists the features of the zone sensors available for Tracer zone controllers. Figure 1 shows three types of zone sensors that are compatible with the Tracer ZN.511 and ZN.521 zone controllers.

### Table 2: Zone sensor options

<table>
<thead>
<tr>
<th>BAS order number</th>
<th>Use</th>
<th>Fan</th>
<th>Zone</th>
<th>Timed override buttons</th>
<th>Comm jack</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>Med</td>
<td>Low</td>
</tr>
<tr>
<td>4190 1087</td>
<td>Any</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4190 1088</td>
<td>Any</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4190 1090</td>
<td>Heat pump</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4190 1094</td>
<td>Heat pump</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4190 1095</td>
<td>Unit vent</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4190 1115</td>
<td>Fan coil</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4190 1116</td>
<td>Unit vent</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4190 1117</td>
<td>Any</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Figure 1: Zone sensors

![Zone sensors images]
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.