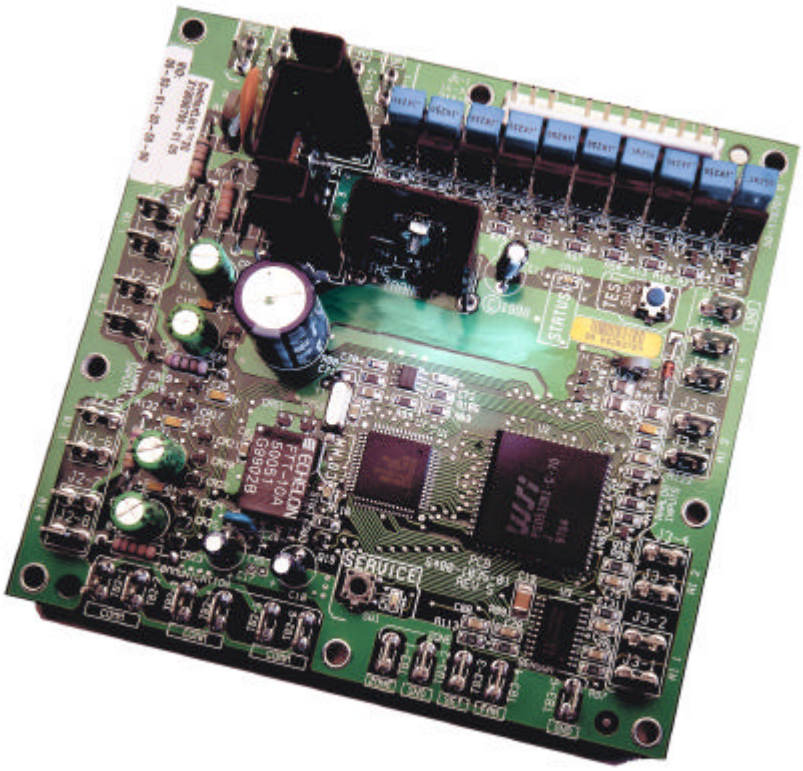
Tracer® Controls

Tracer ZN.520:
Unit Controller for Terminal Products



TD-PRM001-EN

General

Tracer® ZN.520 unit controller is a microprocessor-based direct digital controller that controls a range of equipment including:

- ❑ Classroom unit ventilators

Figure 1: Classroom Unit Ventilator

- ❑ UniTrane® fan-coils

Figure 2: UnitTrane fan-coil

- ❑ ForceFlo™ cabinet heaters

The unit controller is designed to provide improved comfort with a minimal amount of energy consumption through the use of custom proportional integral derivative (PID) control algorithms. Based on the equipment type, the controller is factory installed and commissioned, resulting in a highly integrated product. Factory installation and commissioning helps to ensure the highest level of quality and customer satisfaction.

Figure 3: Tracer ZN.520 Unit Controller

Applications

The ZN.520 unit controller may be applied as part of a Trane Tracer Summit® system, as a standalone device, or as an interoperable controller. In addition, the unit controller may be applied in a peer-to-peer communication environment, where data can be exchanged between similar controllers without requiring a master controller.

The following Trane products are available with the Tracer ZN.520:

Model	Unit Ventilator	Fan-coils
	VUV	FC
	HUV	FF

Inputs/Outputs

The Tracer ZN.520 unit controller is factory configured to control the unit fan, outside/fresh air damper, heating and cooling capacity, and a variety of optional features and safeties. These standard and optional inputs and outputs are listed in *Table 1: Input and Output Summary*.

Table 1: Input and Output Summary

Type	Description
Binary Inputs	Occupancy[1]
	Low Temperature Detection[3]
	Service Pin
	Manual Test
	Fan Status[2, 3]
	Condensate Overflow Detection[3, 5]
	Generic[1, 2, 3]
Binary Outputs	Fan
	Exhaust Fan Enable[3, 5]
	Cooling Coil Control
	Heating Coil Control
	Face and Bypass Damper[5]
	outside/fresh air damper
	Generic[1, 2]
	Auxiliary Heat[1, 3]
Analog Inputs	Space Temperature
	Space Setpoint
	Fan Speed
	Entering Water Temperature[4]
	Discharge Air Temperature
	Outside Air Temperature[4]
	Space Relative Humidity[1, 3]
	Generic[1, 2, 3]

1 Indicates that two or more features can be associated with this point (Only one may be used).
2 Indicates Tracer Summit is required.
3 Indicates optional feature.
4 Indicates standalone feature.
5 Indicates option not available on all products.

Tracer® ZN.520 Unit Controller Features and Benefits

Integrated Comfort™ System Quality Assurance Program

The Tracer ZN.520 unit controller is a part of the Tracer controller product family and a part of the Trane Integrated Comfort System (ICS).

As a part of the ICS initiative, the Tracer ZN.520 unit controller is factory mounted, addressed, and commissioned in order to provide the highest level of quality on every piece of equipment. The controller is configured with the correct program for the application and then tested before it leaves the manufacturing line. (*See Figure 4: "Fan-coil During End-of-Line Testing"*) Only after a unit passes all of its test parameters will the shipping labels and data-plates be printed by the automated test system.

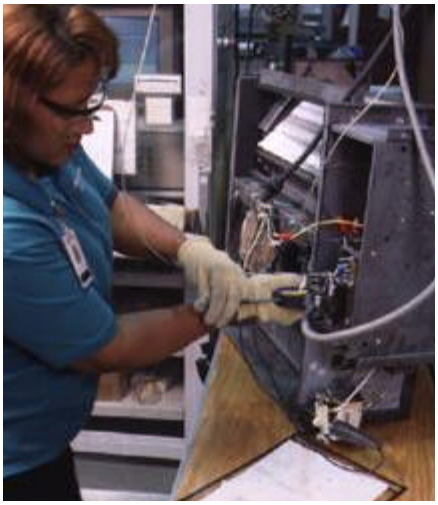


Figure 4: Fan-coil During End-of-Line Testing

Automatic Fan Speed Reset

The AUTO position allows the unit to operate at the default fan speeds (cooling and heating may have different default fan speeds).

Figure 5: AUTO position on zone sensor for unit ventilator

If the default fan speed is HIGH, MEDIUM, or LOW, the unit will operate accordingly. If the default fan speed is configured as AUTO, the unit fan will operate at LOW speed the majority of the time. If space temperature exceeds the setpoint by more than 2 degrees F, the Tracer ZN.520 unit controller will change the fan speed to MEDIUM or HIGH. This feature allows the unit to operate at LOW speed whenever possible, providing maximum acoustic and latent cooling benefits.

If the fan speed switch is set at HIGH, MEDIUM, or LOW, the unit will operate accordingly regardless of the default setpoints.

Note: The unit ventilator (models HUV and VUV) do NOT have a MEDIUM fan speed option.

Automatic Ventilation Reset

Because ensuring proper ventilation rates is so important for indoor air quality, Tracer ZN.520 unit controller is configured with two outside/fresh air damper minimum position setpoints for occupied operation. As the fan speed changes, the damper is modulated to the appropriate position to maintain the correct ventilation rate to the space. On fan-coil (models FC and FF) units with three-speed fans, the damper will not move on a change to MEDIUM fan speed.

Manual Output Test

The manual test feature allows field service personnel to verify the operation of each Tracer ZN.520 unit controller output. By simply depressing the TEST button on the controller, the user can exercise each binary output in consecutive order (i.e. unit fan, valves, and outside/fresh air damper). This feature allows a service technician to quickly check all of the hardware in the unit for proper operation.

Fan Status

Tracer ZN.520 unit controller provides two methods of monitoring fan status. The first method monitors the fan output status on the Tracer ZN.520 unit controller. This method is not considered positive proof of airflow, but is typically acceptable on direct drive fan applications due to its low cost.

Tracer ZN.520 unit controller also has the ability to accept a binary input from a fan proof switch for belt driven applications or when proof of flow is required by the customer. When fan operation is expected by the controller, but not confirmed by the proof switch, unit operation is disabled.

Filter Maintenance

Filter maintenance status for the Tracer ZN.520 unit controller is based on the cumulative run hours of the unit fan. An adjustable and re-settable timer exists in the controller that, when expired, indicates to the user through Tracer Summit or Rover service tool, that maintenance is recommended for that unit.

The unit controller complies to ASHRAE 62-89R Filtration Section.

Peer-to-Peer Strategy

The Tracer ZN.520 unit controller has the ability to share information with one or several units on the same communication link. A BAS front end is not required for this type of data sharing; however, the units wanting to share information must be tied via a twisted pair wire and configured via the Rover service tool. This type of application would most commonly be used for large spaces that may require more than one unit. Multiple units within one zone may need to share the same zone sensor for aesthetics and to prevent units from simultaneously heating and cooling in the same space.

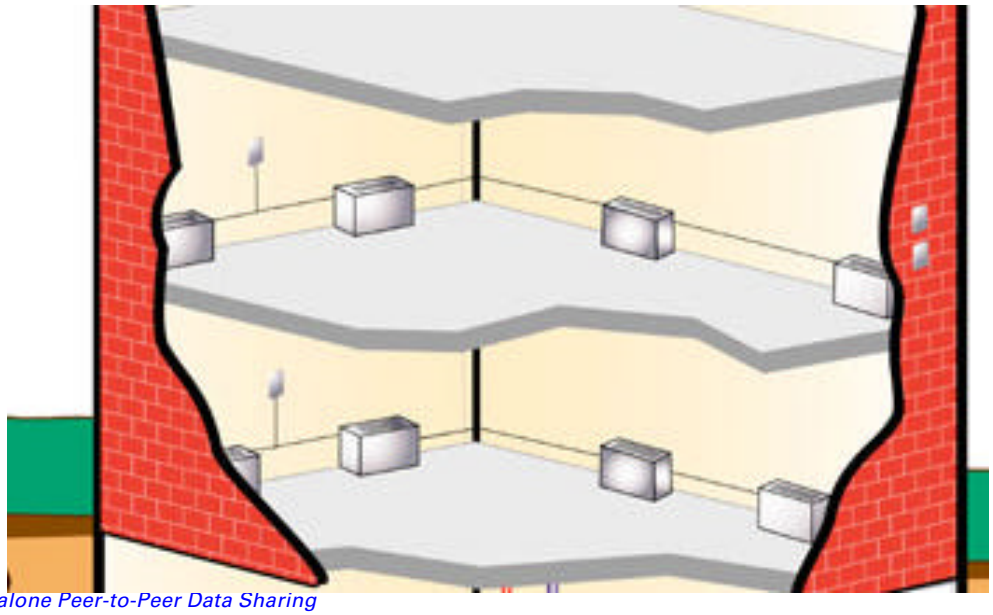


Figure 6: Standalone Peer-to-Peer Data Sharing

Active Dehumidification

The Tracer ZN.520 unit controller supports active dehumidification through the use of a reheat coil and humidity sensor.

This feature allows the user to keep space RH levels within ASHRAE 62-89R guidelines to provide comfort as well as minimizing the risk of microbial growth and damage to the building or its furnishings.

Water Valve Override

Tracer ZN.520 unit controller has a water valve override function that is accessible from Tracer Summit or the Rover service tool. This function allows all of the water valves in every unit to be driven fully open simultaneously. The advantage of this function is that it reduces the time required for balancing the waterside of the system, thus saving money and time at the job site.

Freeze Avoidance

The Tracer ZN.520 unit controller addresses freeze avoidance as a low ambient temperature protection in the unoccupied mode when there is no call for capacity. A common problem is coils freezing during the unoccupied mode when the valves are all closed and the unit fans are OFF. The Tracer ZN.520 monitors the outside air temperature, and when the outside air temperature falls below the freeze avoidance setpoint, the controller drives all of the valves open to help prevent the coil from freezing.

Reliable Two-Pipe Changeover

When using a 2-pipe changeover system, the Tracer ZN.520 unit controller must check the entering water temperature to determine if it can heat or cool. In units with 2-way valves, the entering water temperature may approach ambient temperature after long periods of no flow. The entering water temperature sampling function opens the valve to 100% and then waits for a period of time before checking the water temperature. This ensures that the Tracer ZN.520 unit controller will get an accurate reading of the entering water temperature. If the water temperature is not suitable for the requested mode after the sampling function is complete, the unit will wait 1 hour before checking the water temperature again.

Discharge Air Temperature

Tracer ZN.520 unit controller uses a cascade control algorithm to maintain space temperature control. The controller uses the difference between space temperature and setpoint to calculate the discharge air temperature required to satisfy the zone. Tracer ZN.520 unit controller then modulates capacity to achieve this discharge air temperature.

Interoperability

Trane has lead the industry with BACnet interoperability and is now expanding the realm of interoperable solutions by offering LonMark certified unit controllers. The Tracer ZN.520 controller is certified to the LonMark Space Comfort Controller profile. This allows the ZN.520 to be used as a unit controller on other control systems that support LonTalk and the SCC profile. Now building owners have more choices and, design engineers have more flexibility to meet the challenges of building automation.

Generic I/O

Tracer ZN.520 unit controller comes equipped with three generic points for use with a Tracer Summit system:

- ❑ Binary Input (Shared with occupancy)
- ❑ Binary Output (Shared with baseboard heat)
- ❑ Analog Input (4-20mA Shared with humidity sensor and often used with the optional carbon dioxide sensor)

The two generic inputs are only for passing information to the BAS system. They do not have any affect on the operation of the unit. The generic binary output is controlled from the BAS system and its state is not affected by unit operation, even under a diagnostic shutdown.

Zone Sensor Options

Unit Ventilator Zone Sensors

In addition to the standard zone sensor offering for DDC controls on classroon unit ventilators, the following shows zone sensor options available.

Wall and Unit Mounted

- ❑ AUTO/OFF fan speed switch
- ❑ External adjustable thumbwheel
- ❑ TIMED OVERRIDE/CANCEL buttons

- ❑ HIGH/LOW/AUTO/OFF fan speed switch
- ❑ External adjustable thumbwheel
- ❑ TIMED OVERRIDE/CANCEL buttons

Wall Mounted

- ❑ AUTO/OFF fan speed switch
- ❑ Internal adjustable thumbwheel

- ❑ HIGH/LOW/AUTO/OFF fan speed switch
- ❑ Internal adjustable thumbwheel
- ❑ TIMED OVERRIDE/CANCEL buttons

- HIGH/LOW/AUTO/OFF fan speed switch
- External adjustable thumbwheel

Humidity/CO2 Sensor

All zone sensors come with a communications jack for easy connection of the Rover Service tool.

Fan-coil Zone Sensors

Split Mounted

- Wall mounted: external adjustable thumbwheel
- TIMED OVERRIDE/CANCEL buttons
- Unit mounted: HI/MED/LOW/ AUTO/OFF fan speed switch

Wall mounted

- HI/MED/LOW/AUTO/OFF FAN SPEED SWITCH
- External adjustable thumbwheel
- TIMED OVERRIDE/CANCEL buttons

Unit mounted

- HI/MED/LOW/AUTO/OFF fan speed switch
- external adjustable thumbwheel
- TIMED OVERRIDE/CANCEL buttons

All zone sensors come with a communications jack for easy connection of the Rover Service tool.

Specifications

Power

18 to 32 VAC (24 VAC Nominal)
50 or 60 Hz
300 mA AC

Dimensions

5.25" x 5.50" x 2.25"

Operating Environment

32 to 140 (0 to 60 C)
5% to 95% non-condensing

Storage Environment

-40 to 185 F (-40 to 85 C)
5% to 95% non-condensing

Agency Listings

UL 916 Energy Management System

Agency Compliance

IEC 1000-4-2 (ESD), IEC 1000-4-4 (EFT), IEC 1000-4-5 (Surge)
FCC Part 15, Class A

Data Lists

Table 2 provides an input/output listing for the Tracer ZN.520 unit controller. Table 2 provides the configuration properties for the unit controller. The content of the lists conforms to both the LonMark Space Comfort Controller Functional Profile 85.00 and the LonMark node object.

Table 2: Input/output listing[1]

Input	SNVT type	Output	SNVT type
nviRequest	SNVT_obj_request	nvoStatus	SNVT_obj_status
nviSpaceTemp	SNVT_temp_p	nvoFileDirectory	SNVT_address
nviSetpoint	SNVT_temp_p	nvoSpaceTemp	SNVT_temp_p
nviSetptOffset	SNVT_temp_p	nvoUnitStatus	SNVT_hvac_status
nviOccSchedule	SNVT_tod_event	nvoEffectSetpt	SNVT_temp_p
nviOccManCmd	SNVT_occupancy	nvoEffectOccup	SNVT_occupancy
nviOccSensor	SNVT_occupancy	nvoHeatCool	SNVT_hvac_mode
nviApplicMode	SNVT_hvac_mode	nvoSetpoint	SNVT_temp_p
nviHeatCool	SNVT_hvac_mode	nvoDischAirTemp	SNVT_temp_p
nviFanSpeedCmd	SNVT_switch	nvoTerminalLoad	SNVT_lev_percent
nviComprEnable	SNVT_switch	nvoSpaceRH	SNVT_lev_percent
nviAuxHeatEnable	SNVT_switch	nvoOutdoorTemp	SNVT_temp_p
nviValveOverride	SNVT_hvac_overid	nvoSpaceCO2	SNVT_ppm
nviEmergOverride	SNVT_hvac_emerg	nvoEnterWaterTemp	SNVT_temp_p
nviSourceTemp	SNVT_temp_p		
nviSpaceRH	SNVT_lev_percent		

[1] LonMark certification pending

Table 3: Configuration properties[1]

Configuration property	SNVT type	SCPT reference	Description
nciSndHrtBt	SNVT_time_sec	SCPTmaxSendTime (49)	Send heartbeat
nciSetpoints	SNVT_temp_setpt	SCPTsetPnts (60)	Occupancy temperature setpoints
nciUnitType	SNVT_hvac_type	SCPThvacUnitType (169)	Unit type
nciMinOutTm	SNVT_time_sec	SCPTminSendTime (52)	Minimum send time
nciRcvHrtBt	SNVT_time_sec	SCPTmaxRcvTime (48)	Receive heartbeat
nciLocation	SNVT_str_asc	SCPTlocation (17)	Location label
nciBypassTime	SNVT_time_min	SCPTbypassTime (34)	Local bypass time
nciSpaceRHSetpt	SNVT_lev_percent		Space RH Setpoint
nciOAMinPos	SNVT_lev_percent		Minimum outside air position during occupied mode

[1] LonMark certification pending

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Supersedes	New
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