

Description

This full-featured thermostat is designed for cooling and heating systems in residential and commercial buildings. The thermostat can be configured for use with air handlers, fan coils, VAV, modulating valves and practically any HVAC application. All models support bacnet and modbus protocol which allows easy integration with the big name control systems like Niagara, Siemens, Honeywell, Johnson Controls, Delta, Reliable and Kreuter to name a few.

There are five relay outputs. These outputs can be configured using the free software. There are more than 300 settings with many options for each of the settings so it's possible to configure these devices for most any application. Once the unit is configured, save the config file for copying to other controllers and backing up project settings.

Options are available for occupancy sensor, wifi, and humidity/enthalpy. Tstat 9 derivative products have light sensor function by default except for basic Tstat9.



Highlights

Modbus TCP/IP protocols over WIFI.

Well documented register list for easy integration with other systems.

5 relay outputs, each rated at 100~220V, 5 amps.

Color LCD display

Easily configure the thermostat for practically any application.

Clock with infinite life supercap battery backup.

Uses 32 bit Arm CPU with 12 bit analog readings.

Fits in regular 3in*3in*1.4in(88mm*88mm*35mm) electrical box



Typical Application



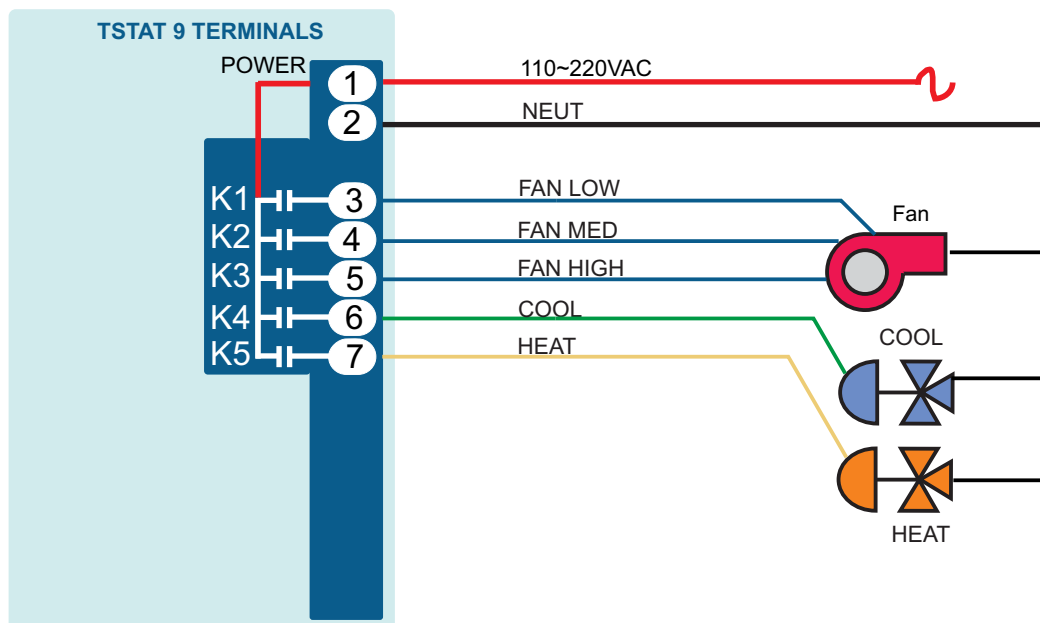
Specifications

Outputs	5 relay outputs
Operating range	-30~70°C(-22~158°F) / 0 to 99% RH
Supply voltage	100~220VAC, 50-60Hz
Power consumption	200mA
Relay contacts	5 relays, 5A @ 220VAC
Plastic Housing	Flammability rating UL 94 file E56070
Enclosure rating	IP31
Protocols	Modbus TCP/IP
Temperature sensor	10K thermistor $\pm 0.5^{\circ}\text{C}$
Setup Software	Free, no licensing, open source

Size



Wiring Diagram



Approvals

Plastic Enclosure	PA66 UL 94 V0 file E56070
PCB	FR-4 Epoxy Glass Cloth UL E479892
Terminal Block	PA66 UL 94V-0

Software

5 digital outputs
Industry standard Modbus protocols
User screen displays
Day at home, work time, night at home, sleep, holiday
3 PID controllers

Bacnet Objects

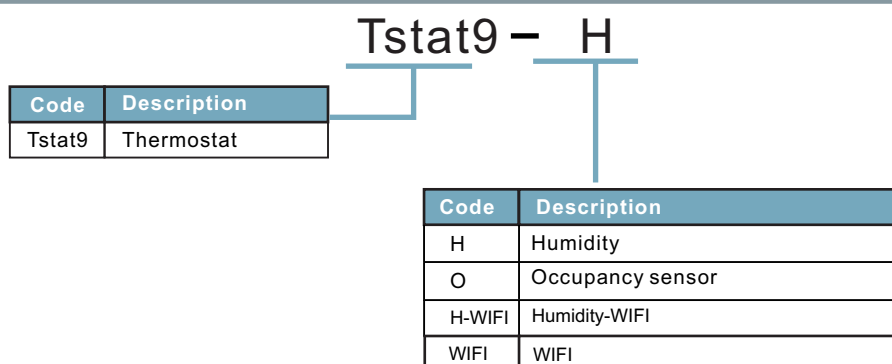
Variable	variable and Description
0	Baudrate 96 =9600 192=19200 384=38400 576=57600 1152=115200 unit:bps
1	Station Number
2	Protocol switch. 0 = MODBUS,1=MSTP.
3	Instance Number
4	Schedule enable/disable 1:enable 0:disable
5	Occupied/Home/Day setpoint
6	Unoccupied/Work/Night setpoint
7	Fan mode setting 0:unoccupied mode,1:user mode1,2:user mode2,3:user mode3,4:occupied mode
8	Firmware Version
9	Current Mode of Operation 0:coast mode 1:cool mode 2:heat mode
10	Temperature Unit 0:degree C 1:degree F
11	System Mode 0:auto 1:heat 2:cool, if set to 0, system will control by PID, if set to 1, system will be in heat only mode,and 2 will be cool only mode
12	spare
13	Override Timer Unit:minute
14	Pid loop2 occupied setpoint
15	Pid loop2 unoccupied setpoint
16	Output Manual/Auto, each bit indicate each output 0:auto 1>manual

AI	description
AI1	Analog input 1
AI2	Analog input 2
AI3	Analog input 3
AI4	Analog input 4
AI5	Analog input 5
AI6	Analog input 6
AI7	Analog input 7
AI8	Analog input 8
AI9	Internal temperature value
AI10	Humidity value
AI11	CO2 value if it has CO2 sensor present

DI	description
DI1	Digital output1 state 1: on 2:off
DI2	Digital output2 state 1: on 2:off
DI3	Digital output3 state 1: on 2:off
DI4	Digital output4 state 1: on 2:off
DI5	Digital output5 state 1: on 2:off

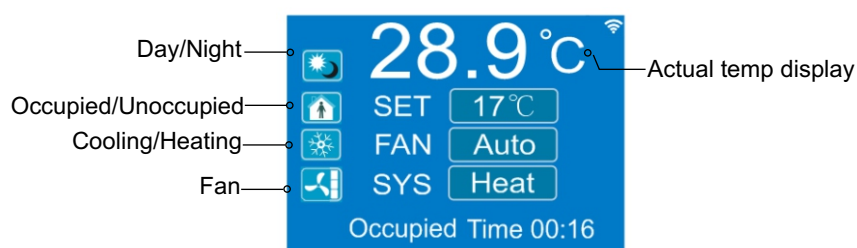
AO	description
AO1	Analog output1 value
AO2	Analog output2 value

Part Number Scheme





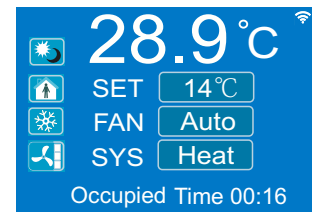
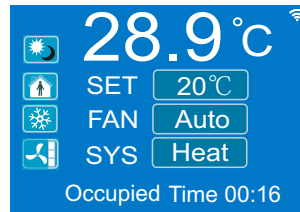
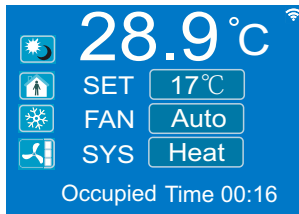
Advanced Menu Item Details









They have several advanced menu items which can be adjusted in the field to suit the application and tune the operation of the thermostat. Generally speaking, all the parameters are set up at the factory on an order-by-order basis and will give satisfactory results out of the box.

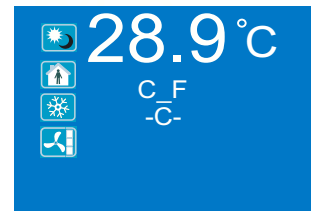
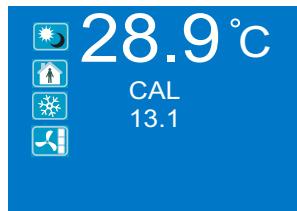
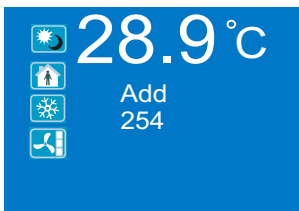


LCD Screen Display

1. When you press  or  , it will decrease or increase the set point value. The value will flash two times, then it will confirm the setting automatically.

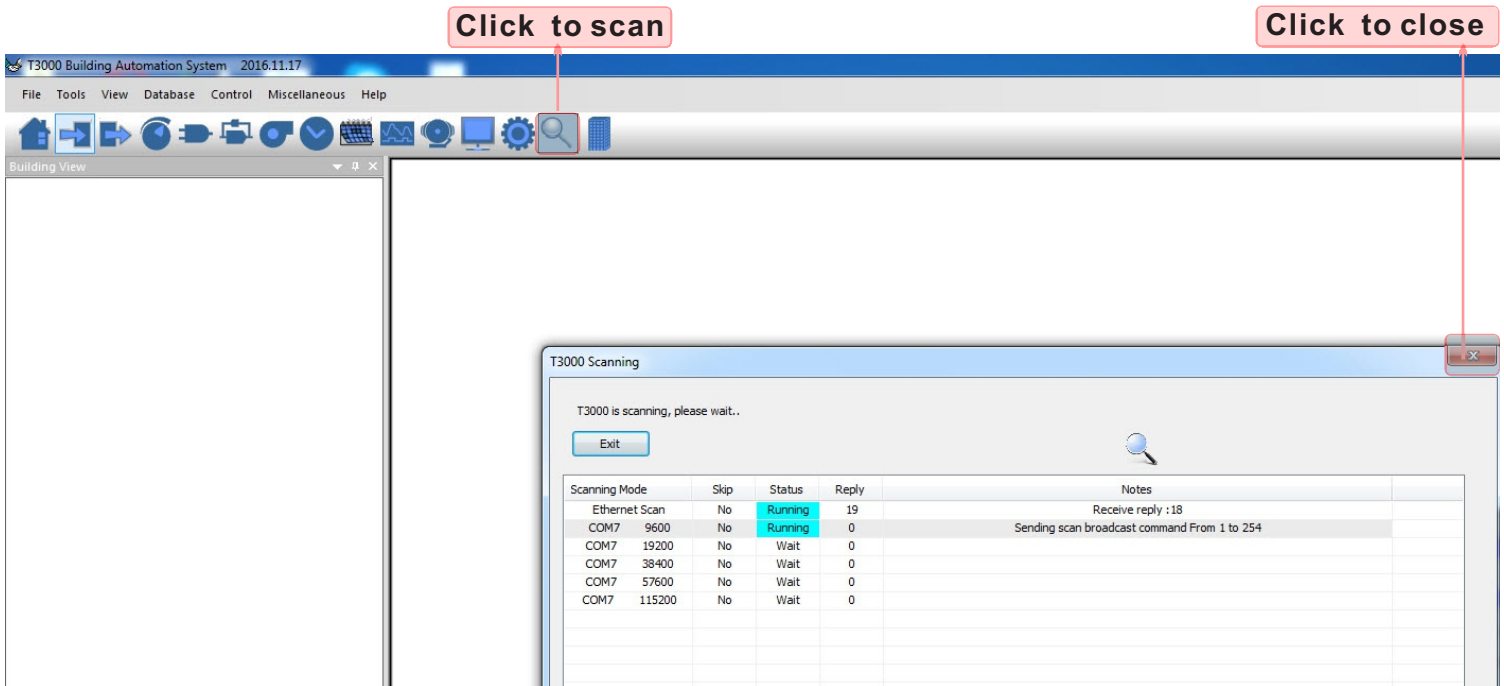



2. In the normal mode, press both  and  at the same time. Hold for several seconds, it will switch to the menu mode. Press  or  to scroll through the menu options such as 'Add', 'CAL', 'bAU', 'UNITS' and many others. To change the values at a particular menu, press  or , the chosen value will be stored automatically. To change the unit's address, scroll through the menu until you reach 'Add'. Press  or  to increase or decrease the unit's address from 1 to 254.

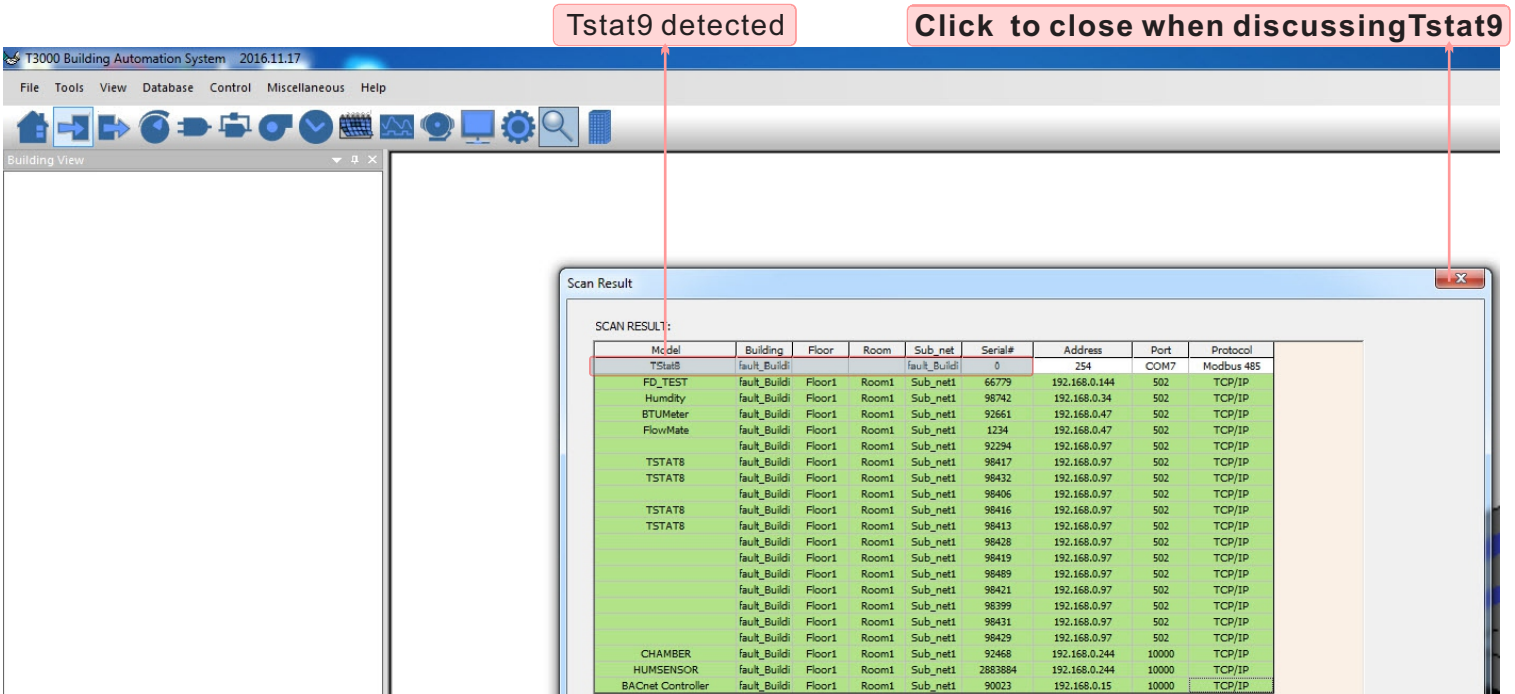


T3000 Operation

1. Connect Tstat9 to PC by RS485, start T3000 software



2. Click the button  to scan, the following view will appear and close it as the picture indicates. When discussing Tstat9, close the view.



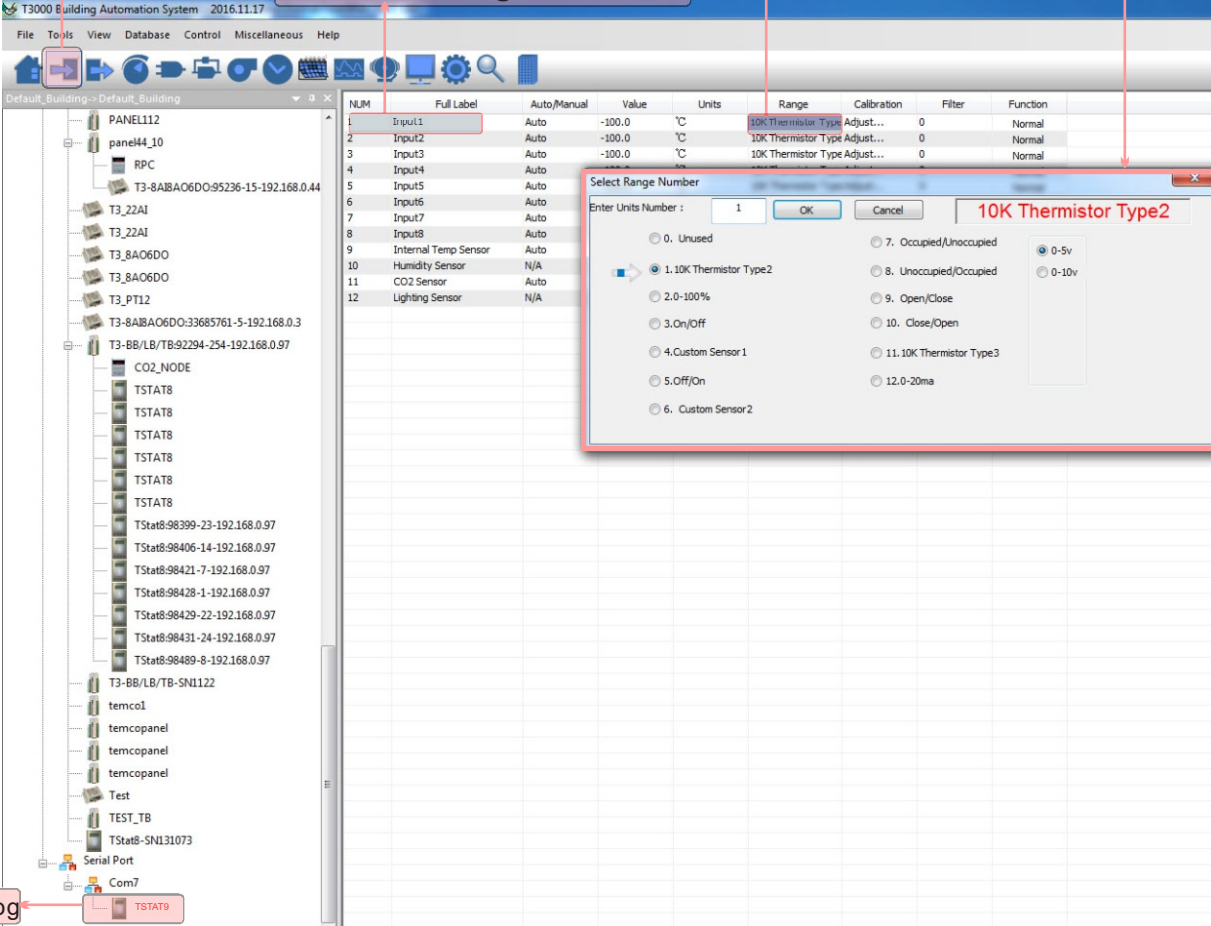
T3000 Operation

3. Click Tstat9 log, then click "input" , the T3000 will show all the information of it. To change name or choices, click as below.

Click to show input information

Click to change the name

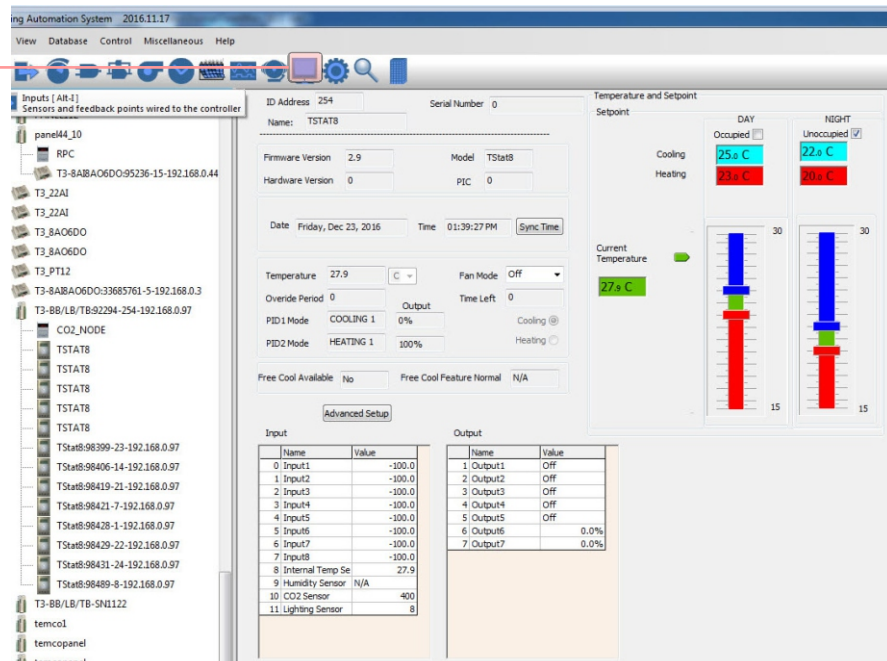
Press range to different choices



The screenshot shows the T3000 Building Automation System interface. The left sidebar displays a tree view of the system hierarchy, including 'Tstat9' under 'Com7'. The main window shows the 'Input' tab, which lists various inputs with columns for NUM, Full Label, Auto/Manual, Value, Units, Range, Calibration, Filter, and Function. A 'Select Range Number' dialog box is open, allowing the user to select a range for the input. The dialog box shows 'Enter Units Number: 1' and '10K Thermistor Type2' as the selected range. The dialog box also includes a list of range options: 0. Unused, 1. 10K Thermistor Type2, 2. 0-100%, 3. On/Off, 4. Custom Sensor 1, 5. Off/On, 6. Custom Sensor 2, 7. Occupied/Unoccupied, 8. Unoccupied/Occupied, 9. Open/Close, 10. Close/Open, 11. 10K Thermistor Type3, and 12. 0-20ma. The '10K Thermistor Type2' option is selected.


4. Click  to do settings, you can see a tab below about setpoint and temperature.

Click to do settings

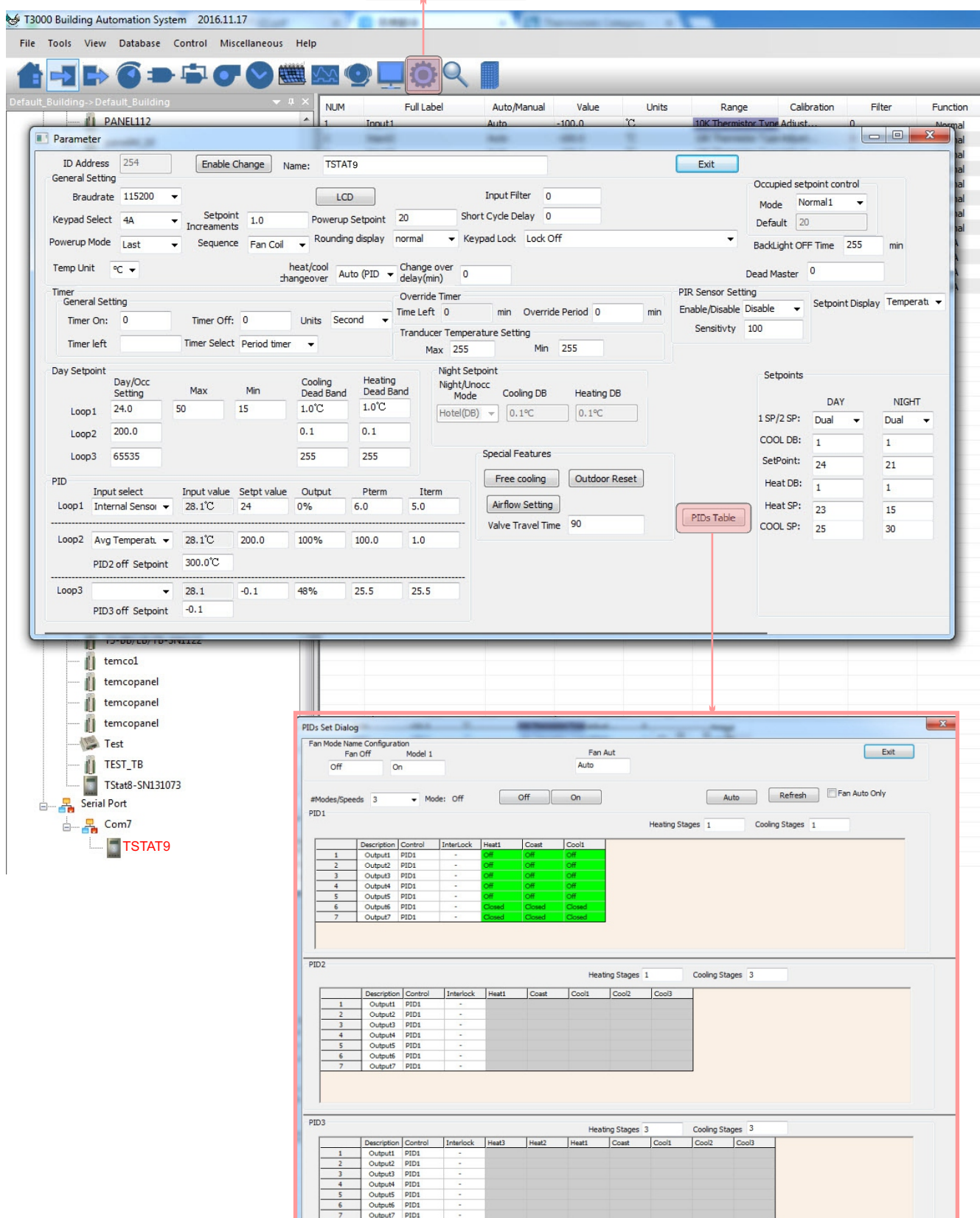


The screenshot shows the T3000 Building Automation System interface with the 'Setpoint' tab selected. The left sidebar shows the same tree view. The main window displays the 'Setpoint' tab, which shows the current temperature (27.9 C) and the setpoint (25.0 C). The 'Setpoint' tab also includes a 'Temperature and Setpoint' section with a graph showing the temperature and setpoint over time. The graph shows the temperature (green line) and the setpoint (red line) over a period of time. The temperature is currently 27.9 C, and the setpoint is 25.0 C. The graph also shows the temperature and setpoint for the previous day (Dec 23, 2016) and the next day (Dec 24, 2016). The temperature and setpoint for the previous day are 25.0 C and 22.0 C, respectively. The temperature and setpoint for the next day are 25.0 C and 20.0 C, respectively.

T3000 Operation

5. Click  to do settings, you can see a tab below about parameter. Click PIDs tables, you can find PIDs set Dialog.

Click to do settings



The 'Parameter' dialog for TSTAT9 includes the following sections:

- General Setting:** ID Address 254, Name: TSTAT9, Braudrate 115200, KeyPad Select 4A, Powerup Mode Last, Temp Unit °C, Input Filter 0, Powerup Setpoint 20, Short Cycle Delay 0, Rounding display normal, Keypad Lock Lock Off, Occupied setpoint control Mode Normal1, Default 20, BackLight OFF Time 255 min, Dead Master 0.
- Timer General Setting:** Timer On: 0, Timer Off: 0, Units Second, Timer left, Timer Select Period timer, Override Timer Time Left 0 min, Override Period 0 min, Transducer Temperature Setting Max 255, Min 255.
- Day Setpoint:** Loop1: 24.0, 50, 15, 1.0°C, 1.0°C; Loop2: 200.0, 0.1, 0.1, 255, 255; Loop3: 65535, 255, 255.
- Night Setpoint:** Night/Unocc Mode Hotel(DB), Cooling DB 0.1°C, Heating DB 0.1°C.
- PID Table:**

Loop	Input select	Input value	Setpt value	Output	Pterm	Iterm
Loop1	Internal Sensor	28.1°C	24	0%	6.0	5.0
Loop2	Avg Temperatu	28.1°C	200.0	100%	100.0	1.0
Loop3		28.1	-0.1	48%	25.5	25.5
- Special Features:** Free cooling, Outdoor Reset, Airflow Setting, Valve Travel Time 90.
- Setpoints:**

	DAY	NIGHT
1 SP/2 SP:	Dual	Dual
COOL DB:	1	1
SetPoint:	24	21
Heat DB:	1	1
Heat SP:	23	15
COOL SP:	25	30

The 'PIDs Set Dialog' window shows the configuration for PIDs 1, 2, and 3. It includes a table for PID1 with 7 outputs and 3 stages for heating and cooling.

PID1						
Description	Control	InterLock	Heat1	Coast	Cool1	
1	Output1	PID1	-	Off	Off	Off
2	Output2	PID1	-	Off	Off	Off
3	Output3	PID1	-	Off	Off	Off
4	Output4	PID1	-	Off	Off	Off
5	Output5	PID1	-	Off	Off	Off
6	Output6	PID1	-	Closed	Closed	Closed
7	Output7	PID1	-	Closed	Closed	Closed

PID2							
Description	Control	Interlock	Heat1	Coast	Cool1	Cool2	Cool3
1	Output1	PID1	-				
2	Output2	PID1	-				
3	Output3	PID1	-				
4	Output4	PID1	-				
5	Output5	PID1	-				
6	Output6	PID1	-				
7	Output7	PID1	-				

PID3									
Description	Control	Interlock	Heat3	Heat2	Heat1	Coast	Cool1	Cool2	Cool3
1	Output1	PID1	-						
2	Output2	PID1	-						
3	Output3	PID1	-						
4	Output4	PID1	-						
5	Output5	PID1	-						
6	Output6	PID1	-						
7	Output7	PID1	-						