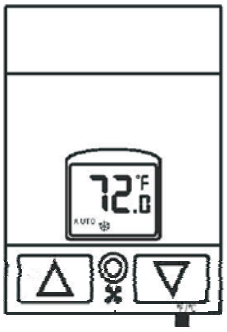
ERT-STAT SmartSuite Digital Thermostat



Operation and Installation Instructions

The SmartSuite thermostat is a 24VAC heating and cooling digital temperature control with wireless communication to EnOcean enabled sensors and switches. It is designed for use on PTHP/PTAC systems, but it can also be configured for use on either 4-pipe or 2-pipe fan coil systems. Switching of load circuits is through solid state circuit allowing the thermostat to switch electronic and relay loads of 1.5 amps. The SmartSuite thermostat has automatic changeover from heating to cooling using a single setpoint. The fan cycles on/off with calls for heating or cooling or can be on continuously in either low, medium or high speed. The thermostat can be placed in economy mode or off(stand-by) mode with 40° freeze protection.

Interfacing with other EnOcean enabled devices like key card switches, window/door switches, and remote temperature sensors, the thermostat selects operational mode based on occupancy and window/door status. When a guest enters the room and activates the key card switch, the thermostat enters normal operating mode. The thermostat will enter economy mode during periods of vacancy and be configured to operate in stand-by mode when a window or patio door has been left open. Remote temperature sensors can be assigned to the thermostat to work, in lieu of or in conjunction with, the internal temperature sensor of the thermostat. The thermostat can be configured to select operational temperature values using the highest differential from setpoint, lowest differential from setpoint, or averaging the values.

Installation Notice:

This high performance digital thermostat is designed to provide many years of superior comfort control when properly installed and maintained To achieve maximum performance, this device is designed to draw room air into itself continuously. Reasonable care must therefore be taken with regard to air quality at the time of installation as well as during periods of normal use, see operating conditions below.

Operating Conditions:

The electronic mechanisms incorporated within this unit **REQUIRE** operating conditions similar to other electronic devices intended for **INDOOR USE ONLY,** such as would be acceptable for TV and similar household appliances. Relative humidity must be less than 95% and the atmosphere must be non-condensing. Air quality must be maintained FREE of heavy dust or debris which may infiltrate the interior of this device. Installation in any space which is unfinished or undergoing repainting or general rehabilitation is also considered product abuse. This device should be removed from service during any local construction activity.

Cleaning:

This device incorporates a high impact polycarbonate enclosure which is easily cleaned with a dry cloth or vacuum brush. Occasional soiling may be cleaned with a soft cloth lightly dampened with water and/or mild cleaning solution. IN NO CASE should this device be directly sprayed with or exposed to free flowing liquids, including water, which could penetrate its interior.

FAILURE TO OBSERVE ANY OF THE ABOVE CONDITIONS OF USE WILL COMPLETELY VOID THE SUPPLIER WARRANTY.

**** CAUTION ****

MAKE SURE UNIT IS PROPERLY CONNECTED. DAMAGE TO THE DIGITAL CONTROL CAN BE CAUSED BY MISWIRING, WHICH WILL VOID THE WARRANTY. FOR SAFETY REASONS ALWAYS USE WIRE NUTS ON ALL WIRE CONNECTIONS!!!

HEAT PUMP CONFIGURATION

Specifications: *Refer to field programming instructions

Temperature Monitor Range: 32.0°F to 99.9°F (0.0°C to 37.7°C)
Setpoint Range: 60.0°F to 85.0°F (15.5°C to 29.5°C)
Setpoint*: 72.0°F (22.0°C)
Comfort Limits*: 65.0°F (18.5°C) cooling 85.0°F (29.5°C) heating
Display Format: Liquid Crystal Display (LCD)
Sampling Rate: Every 5 seconds
Accuracy: ± 1.0°F (0.5°C)
Power Source: 24VAC
Load Rating: 1.5 amps per circuit
Fan Control: Selectable: Auto cycle, Low, High, Economy, Off
Heat/Cool Control: 1 Compressor, 1 Auxiliary Heat
Economy Limits*: Maintains room temperature between 60.0°F and 85.0°F (15.5°C and 29.5°C) when thermostat is in economy mode
Fan Purge Timer*: 30 seconds
Anti-short Cycle: 3 minute hold in no call state at all times
Cycle Rate*: 6 cycles per hour

INSTALLATION

This device should be installed and serviced by a qualified technician. Junction box mounting is highly recommended.

1.) Caution: Make sure that power has been disconnected.

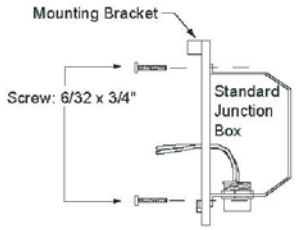
2.) All wiring must comply with applicable codes and ordinances.

3.) A thorough check-out of the system should be made after installation is complete.

4.) If retrofitting old thermostat, remove old thermostat from the junction box, carefully noting the wire connections on the old unit. Record wire color and terminal legends in spaces provided below.

Old thermostat wire function	**Thermostat wire color**
Control Feed	_____
Load Feed	_____
Common	_____
Auxiliary Heat	_____
Low Fan	_____
High Fan	_____
Reversing Valve	_____

Disconnect old thermostat and remove any existing backplate or mounting plate.



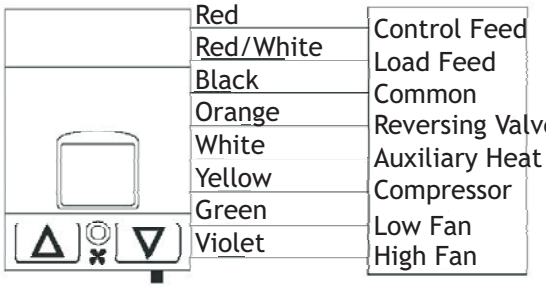
5.) Install the mounting bracket to the junction box with the two long mounting screws provided. See mounting detail at left

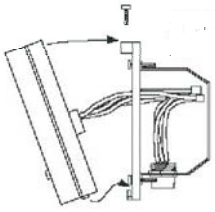
Note: If application involves a double ganged junction box, a backplate will be required for a complete installation.

User Note: The top of this unit will become warm to the touch. This is a normal operation. Internal heating is employed to continuously convect air upward through the thermostat, thereby improving room air temperature measurement. Direct conflict with a downward ceiling fan or system fan air flow may result in false temperature reading. Locate thermostat to avoid interference.

6.) From the wire chart found in step 4, assign, according to function, the cable wire colors to the thermostat wire legend provided below. If this is a new installation record the cable wire colors in the thermostat legend provided below.

New thermostat wire function	Thermostat wire color	Cable wire color
Control Feed	Red	_____
Load Feed	Red/White	_____
Common	Black	_____
Auxiliary Heat	White	_____
Compressor	Yellow	_____
Low Fan	Green	_____
High Fan	Violet	_____
Reversing Valve	Orange	_____



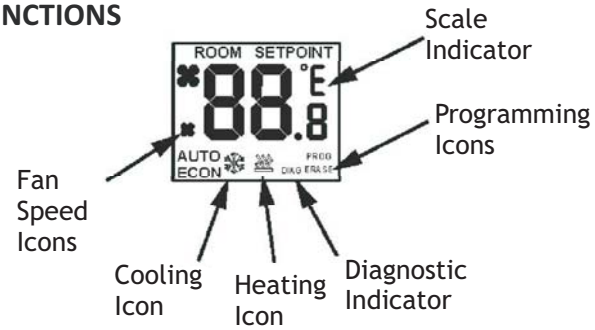


7.) Connect the thermostat wires to the cable wires recorded in Step 6.

8.) Push the wires into the junction box. Tilt the thermostat so that the bottom of the thermostat is resting on the mounting tabs of the mounting plate. Push the top of the thermostat towards the wall and secure into place with the self-tapping screw as shown to the left.

9.) Turn power on

BASIC FUNCTIONS



Adjust Temperature Setpoint:

Press up button ( ) to raise the temperature (warmer)

Press down button ( ) to lower the temperature (cooler)

Select Fan Operation:

Press fan button ( ) to select the following fan functions

AUTO - auto on/off with automatic speed change

Small fan icon - continuous LOW speed fan

Large fan icon - continuous HIGH speed fan

Eco ECON – directly to economy mode

OFf - heating and cooling controls are disabled and the fans are off

Change Scale Units:

Slide the °F/°C switch to the left to display °F

Slide the °F/°C switch to the right to display °C

When the °F/°C switch is invoked, the thermostat will reset and display the default setpoint in the selected scale.

Cycle Timing: (Anti-short cycle protection)

3 minute (minimum) dwell time in no-call states (both heat and cool).

1 minute (minimum) dwell time in call states (both heat and cool).

Temperature is sampled every 5 seconds.

SYSTEM CHECK:

Check Low Fan Function:

Fan should turn on immediately after power is applied.

Auto mode only: Low fan will turn off after the first initial 3 minutes or will remain on if the heat or cool symbol appears on the display.

Check High Fan Function:

Press and release the fan button until the fan indicator moves to the high fan position. High fan will turn on.

Check Heating:

Move the "°F/°C" slide switch to the opposite side and then back to the desired scale. The LCD will flash its legends and then the default setpoint. Use the "up" button to adjust the setpoint until the heat symbol appears on the display. The reversing valve will activate within 3 minutes after the heat symbol appears. The compressor will activate 10 seconds later.

Check Cooling:

Move the "°F/°C" slide switch to the opposite side and then back to the desired scale. The LCD will flash its legends and then the default setpoint. Press "down" button to adjust the setpoint until the cool symbol appears on the display. Within 3 minutes the compressor will turn on. Press “UP” or “DOWN” button to set temperature.

Cooling:

Compressor (see Reversing Valve) and low fan turn on automatically when temperature rises 0.4°F above setpoint. Fan will switch to high speed if temperature continues to rise to 4.0°F above setpoint. High fan will remain inactive for a minimum of 1.5 minutes on initial cool call from a no-call state. High fan will turn off when room temperature is within 2.0°F of setpoint. Compressor has a 15 second delay before activation. After first cooling call, compressor and low fan will turn on automatically when temperature rises above setpoint. Compressor will turn off when temperature drops below setpoint.

Heating:

Compressor (see Reversing Valve) and low fan turn on automatically when temperature drops 0.4°F below setpoint. Fan will switch to high speed if temperature continues to fall to 4.0°F below setpoint. High fan will remain inactive for a minimum of 1.5 minutes on initial heat call from a no-call state. High fan will turn off when room temperature is within 2.0°F of setpoint. Compressor will activate 15 seconds after fan turns on. Auxiliary heat will become active only after the first 3 minutes of compressor operation. When active, auxiliary heat will remain on until setpoint is satisfied or has operated for more than 3 minutes. Auxiliary heat will automatically turn on when temperature drops 4.0°F below setpoint. After first heating call, compressor and low fan will turn on automatically when temperature drops below setpoint. Compressor will turn off when temperature rises above setpoint.

Automatic Changeover:

When thermostat is currently in cooling mode and the temperature drops to 2.0°F plus the differential below the setpoint, the mode will automatically switch to heating. When thermostat is currently in heating mode and the temperature rises to 2.0°F plus the differential above the setpoint, the mode will automatically switch to cooling.

Reversing Valve:

Type O will energize in cooling. Reversing valve will turn on 15 seconds prior to heat/cool activity. Reversing valve will de-energize 3 minutes after compressor call.

TROUBLE SHOOTING TESTS

Voltage: When using a voltmeter across "Black" and "Red", the voltage must be 24VAC.

To Check Continuity: (Using a Voltmeter with all loads connected)

A) When thermostat is calling for compressor, meter should read 24VAC from "Black" to "Yellow". When compressor is deactivated, meter should read 0VAC from "Black" to "Yellow".

B) When thermostat is calling for reversing valve, meter should read 24VAC from "Black" to "Orange". When reversing valve is deactivated, meter should read 0VAC from "Black" to "Orange".

C) When thermostat is calling for high fan, meter should read 24VAC from "Black" to "Violet". When high fan is deactivated, meter should read 0VAC from "Black" to "Violet".

D) When thermostat is calling for low fan, meter should read 24VAC from "Black" to "Green". When low fan is deactivated, meter should read 0VAC from "Black" to "Green".

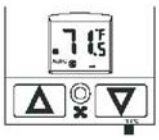
E) When thermostat is calling for auxiliary heat, meter should read 24VAC from "Black" to "White". When auxiliary heat is deactivated, meter should read 0VAC from "Black" to "White".

Diagnostic Mode:

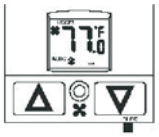
- Press and hold the "up" and "fan" buttons together until "DIAG" appears on the display.
- Release the buttons.
- Diagnostic mode can be deactivated by changing the °F/°C slide switch.

Diagnostic mode will alternately display setpoint and room temperature every 5 seconds.

The room temperature displays "ROOM". Both setpoint and room temperature displays will indicate the fan speed activity and "DIAG".



Setpoint Temperature Display



Room Temperature Display

4-PIPE FAN COIL CONFIGURATION

Specifications:

Temperature Monitor Range: 32.0°F to 99.9°F (0.0°C to 37.7°C)
Setpoint Range: 60.0°F to 85.0°F (15.5°C to 29.5°C)
Setpoint*: 72.0°F (22.0°C)
Comfort Limits*: 65.0°F (18.5°C) cooling 85.0°F (29.5°C) heating
Display Format: Liquid Crystal Display (LCD)
Sampling Rate: Every 5 seconds
Accuracy: ± 1.0°F (0.5°C)
Power Source: 24VAC
Load Rating: 1.5 amps per circuit
Fan Control: Selectable: Auto cycle, Low, Medium, High Economy, Off
Heat/Cool Control: 1 Heat and 1 cool circuit
Economy Limits*:Maintains room temperature between 60.0°F and 85.0°F (15.5°C and 29.5°C) when thermostat is in economy mode
Fan Purge Timer*: 30 seconds
Anti-short Cycle: 3 minute hold in no call state at all times
Cycle Rate*: 8 cycles per hour

*Refer to field programming instructions

Installation:

This device should be installed and serviced by a qualified technician.

Junction box mounting is highly recommended.

1.) Caution: Make sure that power has been disconnected.

2.) All wiring must comply with applicable codes and ordinances.

3.) A thorough check-out of the system should be made after installation is complete.

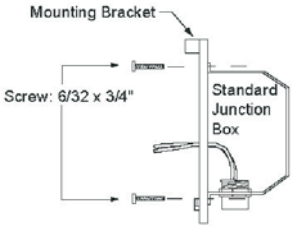
4.) If retrofitting old thermostat, remove old thermostat from the junction box, carefully noting the wire connections on the old unit. Record wire color and terminal legends in spaces provided below.

Old thermostat wire function	**Thermostat wire color**
Control Feed	_____
Load Feed	_____
Common	_____
Auxiliary Heat	_____
Low Fan	_____
High Fan	_____
Reversing Valve	_____

Disconnect old thermostat and remove any existing backplate or mounting plate.

5.) Install the mounting bracket to the junction box with the two long mounting screws provided. See mounting detail at right.

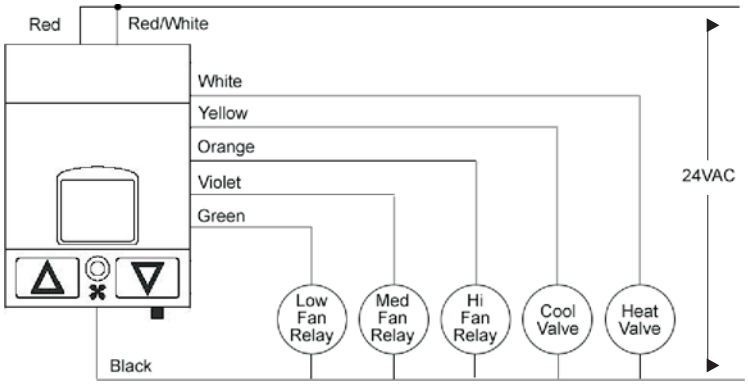
Note: If application involves a double ganged junction box, a backplate will be required for a complete installation. Please consult your supplier.



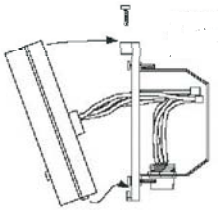
User Note: The top of this unit will become warm to the touch. This is a normal operation. Internal heating is employed to continuously convect air upward through the thermostat, thereby improving room air temperature measurement. Direct conflict with a downward ceiling fan or system fan air flow may result in false temperature reading. Locate thermostat to avoid interference.

6.) From the wire chart found in step 4, assign, according to function, the cable wire colors to the thermostat wire legend provided below. If this is a new installation record the cable wire colors in the thermostat legend provided below.

New thermostat wire function	**Thermostat wire color**	**Cable wire color**
Control Feed	Red	_____
Load Feed	Red/White	_____
Common	Black	_____
Auxiliary Heat	White	_____
Compressor	Yellow	_____
Low Fan	Green	_____
High Fan	Violet	_____
Reversing Valve	Orange	_____

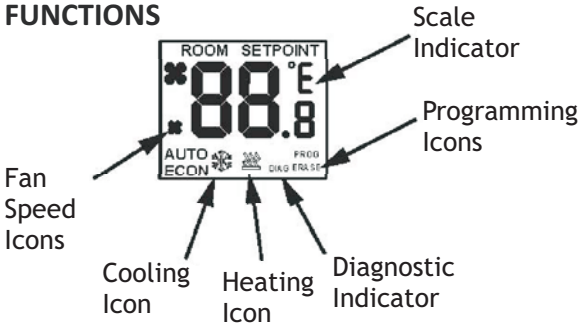


Note: Fan Coil Only
If the mechanical system has only two fan speeds
Green - low fan
Violet - high fan
Orange - not used



7.) Connect the thermostat wires to the cable wires recorded in Step 6.
8.) Push the wires into the junction box. Tilt the thermostat so that the bottom of the thermostat is resting on the mounting tabs of the mounting plate. Push the top of the thermostat towards the wall and secure into place with the self-tapping screw as shown to the right.
9.) Turn power on.

BASIC FUNCTIONS



Adjust Temperature Setpoint:
Press up button ( ) to raise the temperature (warmer)
Press down button ( ) to lower the temperature (cooler)

Select Fan Operation:
Press fan button ( ) to select the following fan functions
AUTO - auto on/off with automatic speed change
Small fan icon - continuous LOW speed fan
Medium fan icon - continuous MEDIUM speed fan
Large fan icon - continuous HIGH speed fan
Eco ECON – directly to economy mode
OFf - heating and cooling controls are disabled and the fans are off

Change Scale Units:
Slide the °F/°C switch to the left to display °F
Slide the °F/°C switch to the right to display °C
When the °F/°C switch is invoked, the thermostat will reset and display the default setpoint in the selected scale.

Cycle Timing: (Anti-short cycle protection)
3 minute (minimum) dwell time in no-call states (both heat and cool).
1 minute (minimum) dwell time in call states (both heat and cool).
Temperature is sampled every 5 seconds.

SYSTEM CHECK:

Check Low Fan Function:
Fan should turn on immediately after power is applied. Auto mode only: Low fan will turn off after the first initial 3 minutes or will remain on if the heat or cool symbol appears on the display.

Check Medium Fan Function:
Press and release the fan button until the fan indicator moves to the middle fan position. Medium fan will turn on.

Check High Fan Function:
Press and release the fan button until the fan indicator moves to the high fan position. High fan will turn on.

Check Heating:
Move the "°F/°C" slide switch to the opposite side and then back to the desired scale. The LCD will flash its legends and then the default setpoint. Use the "up" button to adjust the setpoint until the heat symbol appears on the display. Heating will activate within 3 minutes after the heat symbol
appears.

Check Cooling:
Move the "°F/°C" slide switch to the opposite side and then back to the desired scale. The LCD will flash its legends and then the default setpoint. Press "down" button to adjust the setpoint until the cool symbol appears on the display. Within 3 minutes cooling will turn on. Press “UP” or “DOWN” button to set temperature.

Cooling: Cooling and low fan turn on automatically when temperature rises 2.0°F above setpoint (see deadband). Fan will switch to medium speed if temperature continues to rise to 2.0°F above setpoint. Fan will switch to high speed if temperature continues to rise to 4.0°F above setpoint. High fan will turn off when temperature changes to 3.0°F above setpoint. Medium fan will turn off when temperature changes to 1.0°F above setpoint. Cooling will turn off when temperature drops 0.4°F below setpoint. After first cooling call, cooling and low fan will turn of automatically when temperature rises 0.4°F above setpoint. Cooling will turn off when temperature drops 0.4°F below setpoint.

Heating: Heating and low fan turn on automatically when temperature drops 2.0°F below setpoint (see deadband). Fan will switch to medium speed if temperature continues to drop to 2.0°F below setpoint. Fan will switch to high speed if temperature continues to drop to 4.0°F below setpoint. High fan will turn off when temperature changes to 3.0°F below setpoint. Medium fan will turn off when temperature changes to 1.0°F below setpoint. Heating will turn off when temperature rises 0.4°F above setpoint. After first heating call, heating and low fan will turn on automatically when temperature drops 0.4°F below setpoint. Heating will turn off when temperature rises 0.4°F above setpoint.

Automatic Changeover: When thermostat is currently in cooling mode and the temperature drops to 2.0°F plus the differential below the setpoint, the mode will automatically switch to heating. When thermostat is currently in heating mode and the temperature rises to 2.0°F plus the differential above the setpoint, the mode will automatically switch to cooling.

TROUBLE SHOOTING TESTS

Voltage: When using a voltmeter across "Black" and "Red", the voltage must be 24VAC.

To Check Continuity: (Using a Voltmeter with all loads connected)

A) When thermostat is calling for cooling, meter should read 24VAC from "Black" to "Yellow". When cooling is deactivated, meter should read 0VAC from "Black" to "Yellow".

B) When thermostat is calling for heating, meter should read 24VAC from "Black" to "White". When heating is deactivated, meter should read 0VAC from "Black" to "White".

C) When thermostat is calling for high fan, meter should read 24VAC from "Black" to "Orange". When high fan is deactivated, meter should read 0VAC from "Black" to "Orange".

D) When thermostat is calling for medium fan, meter should read 24VAC from "Black" to "Violet". When medium fan is deactivated, meter should read 0VAC from "Black" to “Violet".

E) When thermostat is calling for low fan, meter should read 24VAC from "Black" to "Green". When low fan is deactivated, meter should read 0VAC from "Black" to "Green”

2-PIPE FAN COIL CONFIGURATION

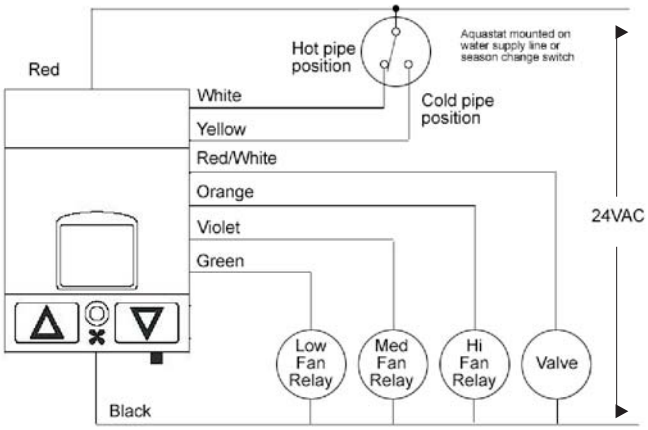
Follow the instructions for a 4-Pipe installation with the following exceptions -

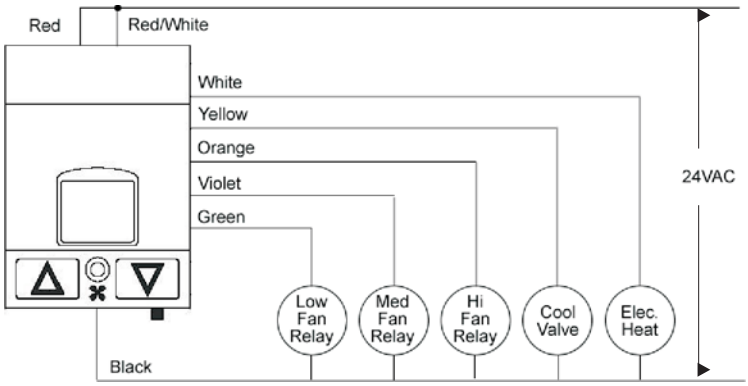
NOTE: Continuous fan is not available on 2-pipe with aquastat systems. Continuous fan is available on 2-pipe with electric heat systems

Old thermostat wire function	**Thermostat wire color**
Control Feed	_____
Load Feed	_____
Common	_____
Auxiliary Heat	_____
Low Fan	_____
High Fan	_____
Reversing Valve	_____

From the wire chart found above, assign, according to function, the cable wire colors to the thermostat wire legend provided below. If this is a new installation, record the cable wire colors in the thermostat legend provided below.

New thermostat wire function	**Thermostat wire color**	**Cable wire color**
Control Feed	Red	_____
Load Feed	Red/White	_____
Common	Black	_____
Auxiliary Heat	White	_____
Compressor	Yellow	_____
Low Fan	Green	_____
High Fan	Violet	_____
Reversing Valve	Orange	_____





Check Heating:

Move the "°F/°C" slide switch to the opposite side and then back to the desired scale. The LCD will flash its legends and then the default setpoint. Use the "up" button to adjust the setpoint until the heat symbol appears on the display. Heating valve will activate within 4 seconds after the heat symbol appears.

Check Cooling:

Move the "°F/°C" slide switch to the opposite side and then back to the desired scale. The LCD will flash its legends and then the default setpoint. Press "down" button to adjust the setpoint until the cool symbol appears on the display. Cooling valve will activate within 4 seconds after the heat symbol appears.

NOTE: To check heating/cooling will depend on the temperature or position of the season switch.

TROUBLE SHOOTING TESTS (2-Pipe System)

Voltage: When using a voltmeter across "Black" and "Red", the voltage must be 24VAC.

To Check Continuity: (Using a Voltmeter with all loads connected)

Cooling: supply pipe aquastat or season change switch to cool

A) When thermostat is calling for Cooling and Low Fan, meter should read 24VAC from "Black" to "Red/White" and from "Black" to "Green". When Cooling is deactivated, meter should read 0VAC from "Black" to "Red/White" and from "Black" to "Green".

B) When thermostat is calling for Cooling and Medium Fan, meter should read 24VAC from "Black" to "Red/White" and from "Black" to "Violet". When Cooling is deactivated, meter should read 0VAC.

C) When thermostat is calling for Cooling and High Fan, meter should read 24VAC from "Black" to "Red/White" and from "Black" to "Orange". When Cooling is deactivated, meter should read 0VAC from "Black" to "Red/White" and from "Black" to "Orange".

Heating: supply pipe aquastat or season change switch to heat

A) When thermostat is calling for Heating and Low Fan, meter should read 24VAC from "Black" to "Red/White" and from "Black" to "Green". When Heating is deactivated, meter should read 0VAC from "Black" to "Red/White" and from "Black" to "Green".

B) When thermostat is calling for Heating and Medium Fan, meter should read 24VAC from "Black" to "Red/White" and from "Black" to "Violet". When Heating is deactivated, meter should read 0VAC from "Black" to "Red/White" and from "Black" to "Violet".

C) When thermostat is calling for Heating and High Fan, meter should read 24VAC from "Black" to "Red/White" and from "Black" to "Orange". When Heating is deactivated, meter should read 0VAC from "Black" to "Red/White" and from "Black" to "Orange".

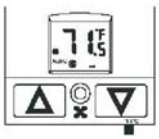
Diagnostic Mode:

Press and hold the "up" and "fan" buttons together until "DIAG" appears on the display. Release the buttons.

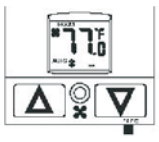
Diagnostic mode will alternately display setpoint and room temperature every 5 seconds. The room temperature is displayed "ROOM".

Both setpoint and room temperature displays will indicate the fan speed activity and "DIAG".

Diagnostic mode can be deactivated by changing the °F/°C slide switch. from "Black" to "Red/White" and from "Black" to "Violet".



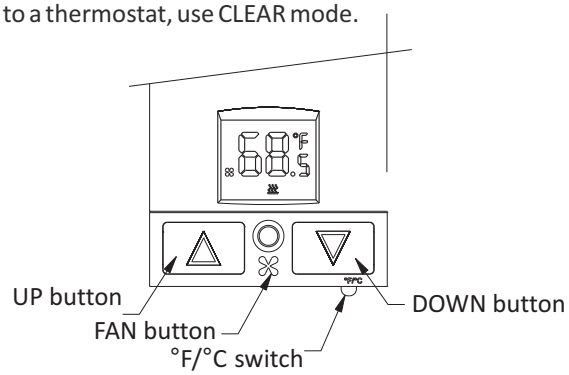
Setpoint Temperature Display



Room Temperature Display

Programming Guide ERT-STAT SmartSuite Thermostat

The SmartSuite thermostat connects directly to mechanical equipment via the wiring harness and wirelessly to EnOcean sensors and switches. The switches and sensors must be assigned to the thermostat using LEARN mode. To clear all switches and sensors assigned to a thermostat, use CLEAR mode.



Assignment of Sensors and Switches - LEARN Mode

The thermostat must be set to learn mode in order to assign the switches and sensors. Pushing the **UP** and **DOWN** buttons in together for 5 seconds will enter learn mode. The screen will alternate flashing **LRN** and **00.** Assign key card switches by activating 3 times with the card, wall switches by activating the ON side of the switch 3 times. Assign temperature sensors, occupancy sensors and door switches by pressing the devices **TEACH** button. The thermostat display will flash the codes in the table below 4 times while learning a device. During this short period, the thermostat disables learn mode. Do not attempt to learn another device during this period. Learning an already learned device will remove or un-learn the device from the thermostat.

Device Type	Display Flashes
Wall Switch	1x
Keycard Switch	2x
Entry Door Switch	3x
Window/Patio Door Switch	4x
Motion Sensor	5x
Temperature Sensor	6x
Entry Door with Temperature	7x
Window/Door Switch & Temperature	8x
Central Command	9x

x will increment counting the number of devices of that type learned

Other devices can be assigned when the display returns to displaying the **00** code. To exit from LINK mode, press any button on the thermostat key pad. The thermostat will automatically exit LINK mode after 30 seconds.

The thermostat can learn up to 9 of any device type with a maximum of 25 devices.

CLEAR Mode

To clear **ALL** devices assigned to the thermostat, press and hold the **FAN** and **DOWN** buttons together for 5 seconds; the display will flash **CLR** for 15 seconds. If any button on the thermostat is pressed during the first 12 seconds, the clear process will be cancelled.

Programming Mode

Programming mode is used to configure the thermostat to operate with the mechanical equipment.

NOTE: The programming mode has a time limit of 10 minutes. The timer is automatically activated when the programming is started. At the end of the 10 minutes the thermostat will resume normal operation. The programming parameters will remain unchanged unless the programming mode was ended properly by exiting through the "End" mode.

NOTE: The default values mentioned in the next column and back pages have been pre-programmed at the factory. However, if the thermostat has been custom programmed, the defaults may not apply.

Enter programming mode:

- Press and hold the up and down arrow buttons while sliding the°F/°C switch to the opposite side. **00** will appear on the display. Do not use the °F/°C switch again while in the programming mode, this will automatically return the thermostat to operating mode.
- Press either the up or down arrow button to find the access code.

Access code 43 - Configuration mode
Access code 79 - Field Programming
Access code 92 - Restoring Factory Settings (see below)

- Press the fan button upon reaching the desired code.

End and **prog** will appear on the display in codes 43 and 79
ALL will appear on the display in code 92.

- Press either the up or down arrow button to scroll through the menu to reach the desired parameter. The parameters are defined and factory set defaults listed in the next columns.
- Press the fan button to access the parameter.
- Press either the up or down arrow button to reach the desired change.
- Press the fan button to return to the program menu.
- Continue scrolling and changing as desired

Save your changes: changes will not be saved unless this process is followed

Press either the up or down arrow button until **End** and **prog** appear on the display.

- Press the fan button to save the changes and exit the program.

Note: When exiting from one access code you will need to re-enter programming mode to enter a different access code.

Restore factory presets (Access Code 92):

→To restore ALL factory presets, simply press the fan button when **ALL** appears on the display. The program will exit also.

→To restore individual parameters, press either the up or down arrow button until the parameter is reached. Press the fan button and the factory preset is restored.

→To exit, press the up or down arrow buttons until **End** and **ERASE** appear on the display. Press the fan button to exit.

Configuration Parameters (Access Code 43):

Some parameters will change depending on whether the equipment type is a heat pump or a fan coil.

Explanation of Codes:

E9P: Equipment Type - selects the type of equipment
- **tHP** - *Default,* Trane heat pump, type O reverse valve
- **tAC** - Trane AC with electric heat
- **FHP** - Friedrich heat pump, type B reverse valve
- **FAC** - Friedrich AC with electric heat
- **gHP** - GE heat pump, type B reverse valve
- **gAC** - GE AC with electric heat
- **AHP** - Amana heat pump, type B reverse valve
- **AAC** - Amana AC with electric heat
- **FC** - fan coil

typ: Reverse Valve Type - selects the valve type (heat pump + AC only)
- **O** type - *Default,* energizes in calls for cooling
- **B** type - energizes in calls for heating

Pt: Heat Pump or AC (heat pump+ AC only)
- **HP** - *Default,* 2 stage heat, single stage cool
- **Y** = compressor, W = 2nd stage heat
- **AC** - AC and electric heat
- **Y** = cool, W = heat

Fop: Fan Speed and Operation
- **1U** - single speed user selectable fan
- **1C** - single speed constant fan
- **1A** - single speed auto fan
- **2U** - *Default,* two speed user selectable fan
- **2C** - two speed constant fan
- **2A** - two speed auto fan

Three speed fan only available for fan coil equipment
- **3U** - three speed user selectable fan
- **3C** - three speed constant fan
- **3A** - three speed auto fan

FCp: Compressor Protection - selects the compressor protection and high or low speed fan in heating
- **CP** - *Default* heat pump, compressor protection and high fan is allowed in heating
- **NP** - *Default* fan coil, no compressor protection and high fan is allowed in heating
- **CP** - compressor protection and high fan is allowed in heating
- **nP** - no compressor protection and only low fan is allowed in heating
- **cP** - compressor protection and only low fan is allowed in heating

CFL: Continuous Fan Operation - selects continuous fan operation
- **Dis** - *Default,* normal fan operation
- **Ena** - continuous low fan in auto or economy modes

Field Programming Parameters (Access Code 79):

Explanation of Codes:

Unt: Temperature Scale - selects temperature scale parameter that will be shown
- **F** - *Default*,°F
- **C** - °C

dSP: Display Temperature - selects which temperature is shown on display
- **SP** - *Default,* display will show set-point only
- **rt** - display will show room temperature unless either up or down arrow button is pressed, then the display will show set -point.
- **Srt** - display will toggle between room temperature and set-point. Display will revert to set-point when either the up or down arrow button is pressed.

Hac: Temperature Control Mode
- **USr** - *Default,* switch selectable, heat only, auto changeover or cool only
- **AUt** - auto mode only
- **CL** - cool mode only
- **Ht** - heat mode only

OFf: Off Function Enabled - selects whether or not thermostat can be turned off by pressing the fan button
- **Ena** – *Default,* enabled, press fan button until OFf appears on display
- **dis** – disabled

ECo: Economy Function Enabled - selects whether or not thermostat can be manually placed in economy mode by pressing the fan button
- **Ena** – *Default,* enabled, press fan button until Eco and ECON appears on display
- **dis** – disabled

CS: Comfort Set-point - selects set-point default temperature when thermostat powers up or returns to comfort mode from economy mode
- 72.0°F (22.0°C) *Default*
- **Programmable Range**: 60.0°F to 85.0°F (15.5°C to 29.5°C)

LC: Cooling Limit - selects minimum room temperature in cooling mode
- 65.0°F (18.5°C) *Default*
- **Programmable Range**: 60.0°F to 85.0°F (15.5°C to 29.5°C)

LH: Heating Limit - selects maximum room temperature in heating mode
- 85.0°F (29.5°C) *Default*
- **Programmable Range:** 60.0°F to 85.0°F (15.5°C to 29.5°C)

FP: Freeze Protection - selects freeze protection enabled or disabled
- **Ena** – *Default,* enabled at 40.0°F
- **dis** – disabled

FPt: Fan Purge Timer - selects the amount of time the fan will continue to run after a heating or cooling call.
- 30 seconds *Default*
- **Programmable Range**: 0 (Off) to 180 seconds (3 minutes), in 10 second increments

Clr: Clear Logged Data - selects whether or not the logged run time data will be reset to 0's

no – *Default,* no reset

Yes – reset

Sbr: Setback Ramping - selects setback function to step back to economy set points or to go directly to economy set-points.

dis - *Default,* disabled, directly to economy set-point

Ena – enabled, ramps to economy set-point

OFf - directly to Off mode

rST: Ramping Setback Timer - after setback is initiated, selects the amount of time the set-point will be stepped back by the degrees per setback.

Example: if both parameters are defaulted, the thermostat will step back 1.0° per every 30 minutes until either the economy cooling limit (**EC**) or the economy heating limit (**EH**) is reached.

30 minutes *Default*

Programmable Range: 1 minute to 720 minutes (12 hours), in 15 minute increments

dPs: Degrees Per Setback - selects the number of degrees per time period that the set-point will be stepped back

1.0° *Default*

Programmable Range: 0.0°F to 3.0°F, in 0.5°F increments

EC: Economy Cooling Limit - when in economy or remote setback mode, selects the highest room temperature before cooling turns on. Cooling turns off when temperature falls below **EC** value.

85.0°F (29.5°C) *Default*

Programmable Range: 72.0°F to 99.0°F (22.0°C to 37.0°C), in 0.5°F increments

EH: Economy Heating Limit - when in economy or remote setback mode, selects the lowest room temperature before heating turns on. Heating turns off when temperature rises above **EH** value.

60.0°F (15.5°C) *Default*

Programmable Range: 41.0°F to 72.0°F (5.0°C to 22.0°C), in 0.5°F increments

FrF: Fan Refresh Frequency - selects how often the low fan will operate for a fan refresh

0 hours *Default,* disabled

Programmable Range: 0 hours to 24 hours

Frd: Fan Refresh Duration - selects the length of time the low fan will operate during a fan refresh

1 minute *Default*

Programmable Range: 1 minute to 45 minutes

crt: Cycle Rate Timer - limits the number of heat/cool cycles per hour

6 cycles per hour *Default,* heat pump

8 cycles per hour *Default,* fan coil

Programmable Range: 0 (Off) to 12 cycles per hour, heat pump

Programmable Range: 0 (Off) to 24 cycles per hour, fan coil

Dif: Differential - selects the minimum room temperature above or below set-point when heating or cooling will turn on or off.

0.4°F (0.2°C) *Default*

Programmable Range (°F): 0.2, 0.4, 0.6, 0.8, 1.0, 1.2

Programmable Range (°C): 0.1, 0.2, 0.3, 0.4, 0.5, 0.6

SH: Set-point Hold Timer - selects a time limit that the occupant's set-point will be saved, when in economy mode.

0 hours *Default,* disabled

Programmable Range: 0 hours to 24 hours

Hft: Fan Hold Timer - selects a time limit the high and low fans will operate before automatically returning to auto mode.

0 hours *Default,* disabled

Programmable Range: 0 hours to 24 hours

Sdd: Shutdown Delay - selects the amount of time delay between remote shutdown signal and the thermostat going into shutdown mode.

0 seconds *Default,* immediate

Programmable Range: 0 seconds to 200 minutes

RS: Remote Sensor - selects the temperature value used to determine control temperature when remote sensors have been assigned

1 Internal sensor only *Default*

2 Averaging all (remote and internal)

3 Least demand: ignores all values except closest to set-point (remote and internal)

4 Most Demand: ignores all values except furthest from set-point (remote and internal)

5 Remote Only: averaging (remote sensors only)

6 Remote Only, Least Demand: ignores all values except closest to set-point (remote sensors)

7 Remote Only, Most Demand: ignores all values except furthest from set-point (remote sensors)

PDT: Presence Delay Timer - selects the time period used for egress with a key card switch plus the wait-for-occupancy time period.

1 10 seconds

2 5 minutes

3 15 minutes *Default*

4 30 minutes

5 60 minutes

Thermostat Operation

The thermostat operates in normal mode when the room is occupied. The occupancy state of the room is defined by the remote devices linked to the thermostat. If any linked device transmits an occupied signal or triggers an occupancy event then the thermostat will assume the room is occupied and operate in normal mode. When the room is vacant or un-occupied, the room will enter economy mode. If a door/window switch is linked to the thermostat and is left in an open state for 60 minutes, the thermostat will enter shutdown mode.

Operating Mode Descriptions

Normal Mode: The thermostat provides conditioned air to the suite to meet the heating or cooling demands. There is a single set-point value that the thermostat uses to activate the equipment depending on current conditions. The temperature or temperature set-point can be displayed on the LCD screen or alternating between room temperature and set-point - see the field programming section. The user can adjust the active set-point by using the up or down arrow buttons. The facility may optionally limit the permissible set-point range available to the user.

Economy Mode: The thermostat provides conditioned air to the suite in economy mode however there are now two set-points - one heating and one cooling. This allows temperature to fluctuate in between the two set-points without activating the heating or cooling equipment. The set-point limits are adjustable by the facility. The thermostat screen will display "Eco".

NOTE: To ensure a comfortable temperature while the space is occupied, it is recommended to set the economy heating and cooling limits to setting which will allow the equipment to return the space to normal-mode temperature within approximately three minutes.

Shutdown Mode: In shutdown mode the thermostat does not provide conditioned air to the suite; the display will indicate "Shd". If freeze protection is enabled in the field programming menu, the heating will activate if the temperature falls below 40°F (4°C). The fan will purge on a timer depending on the field programming configuration. Shutdown mode has priority over normal or economy mode. While in shutdown mode, if any event occurs (other than the door/window switch that is causing the shutdown mode) that would place the thermostat into normal or economy mode will be overridden until the shutdown mode has been cleared.

Linked Devices Operation

In all cases of the following linked devices, the thermostat supports multiple instances of each type up to 9 instances per type to a total of 25 devices.

Wall Switches [1x]

The wall switch can be used as a master switch to indicate home/away status. When used with a entry door switch, an egress timer is used after a switch OFF event that ignores any motion or entry door events. The egress timer can be configured in the field programming section under the "Pdt" menu.

ON - sets room state to occupied

OFF - sets room state to vacant and starts the egress timer (when used with a entry door switch).

The wall switch does not hold state or broadcast again after the initial telegram. Any other device broadcasting an occupancy state will override the wall switch.

Keycard Switches [2x]

Card In - sets room state to occupied

Card Out - sets room state to vacant

The keycard switch does hold state but does not broadcast again after the initial telegram. The thermostat will save the state of each linked key card however not over a power cycle.

Entry Door Switches [3x]

The entry door is linked to the thermostat with the door in the closed state - the magnet in place next to the sensor.

Door Open

- if there is one or more linked occupancy sensors, reset to normal mode.
- if there is one or more linked wall switches and the egress timer has expired, reset to normal mode.
- if the door is left open, sets the thermostat into shutdown mode after a 60 minute time period elapses.

Door Closed

- if there is one or more linked occupancy sensors, starts the wait-for-occupancy timer. If the timer times out with no occupancy detected, the room state enters economy mode.

The entry door switch broadcasts on any immediate change to the door state. The entry door switch does hold state. Refer to the device manufactures literature for the heartbeat broadcast period.

Patio Door Switches [windows] [4x]

The patio door is linked to the thermostat with the door in the open state - the magnet not next to the sensor.

Door Open - if the door is left open, sets the thermostat into

standby mode after a 60 minute time period elapses.

Door Closed - resets the room state back from shutdown mode into either normal or economy mode depending on the current state of the other linked devices.

The patio door switch broadcasts on any immediate change to the door state. The patio door switch does hold state. Refer to the device manufactures literature for the heartbeat broadcast period.

Motion Sensor [5x]

The motion sensor can function as a independent device setting the thermostat room state to occupied or unoccupied based on motion detection. It can also function as an integrated device with the entry door switch. A door open/close event will start a wait-for-occupancy timer. If the motion sensor detects motion and transmits at minimum two times before this timer runs down, the room state will latch into an occupied state. This state will be latched until there is another door open/close event when this process is repeated. If the room is latched into an un-occupied or vacant state and there is other activity indicating occupancy (wall switch or motion sensor), the room state will immediately latch to the occupied state.

Motion Sensor as an independent device:

- Motion detected - sets room state to occupied
- No Motion detected - sets room state to vacant after wait-for-occupancy timer expires.

Motion Sensor integrated with a entry door switch (after entry door open/close event)

- Motion detected - latches room state to occupied
- No Motion detected - latches room state to vacant

Temperature Sensor [6x]

Sends Temperature Value - the sensor transmits the temperature value to the thermostat. The Echoflex temperature sensors will transmit if there is a 2% change in the temperature since the last transmission and on a 100 second heartbeat period.

The thermostat can be configured to use a room temperature value that is derived from the remote sensor and internal sensor. The options include:

1. **Internal sensor only**: The thermostat uses only the temperature measured by the thermostat's internal temperature sensor. Default setting.
2. **Averaging:** The thermostat calculates an average of the readings from all linked remote temperature sensors and the thermostat's internal temperature sensor.
3. **Least Demand:** Out of the values from all linked remote temperature sensors and from the thermostat's internal temperature sensor, the thermostat uses the value that has the least difference from the set-point.
4. **Most Demand:** Out of the values from all linked remote temperature sensors and from the thermostat's internal temperature sensor, the thermostat uses the value that has the greatest difference from the set-point.
5. **Remote Only Averaging:** The thermostat calculates an average of the readings from all linked remote temperature sensors, ignoring the thermostat's internal temperature sensor.
6. **Remote Only, Least Demand:** Out of the values from all linked remote temperature sensors, the thermostat uses the value that has the least difference from the set-point. The thermostat's internal temperature sensor is ignored.
7. **Remote Only, Most Demand:** Out of the values from all linked remote temperature sensors, the thermostat uses the value that has the greatest difference from the set-point. The thermostat's internal temperature sensor is ignored.

Entry Door with Temperature - Room Operating Panel [7x]

The entry door with temperature sends a single telegram per EnOcean's room operating panel EEP 07-10-0B. The thermostat separates the ROP's integrated functions using the temperature value and door state as is they were individual devices. Refer to the sections on the entry door linked device and temperature sensors for more information on their operation.

Patio Door with Temperature - Room Operating Panel [8x]

The patio door with temperature sends a single telegram per EnOcean's room operating panel EEP 07-10-0B. The thermostat separates the ROP's integrated functions using the temperature value and door state as is they were individual devices. Refer to the sections on the entry door linked device and temperature sensors for more information on their operation.

Central Gateway Command [9x]

The central command is any linked device that sends the thermostat a command telegram per EnOcean's pending central command. A common use of this command is with gateway products. See below for the definition of the proposed central command profile .

Central Command Profile (proposed)

Communication between gateway and actuator uses byte DB_3 to identify commands.
Commands 0h01 to 0h7F shall be common to all types belonging to this profile.
Commands 0h80 to 0hFE can be defined individually for each device type.
Command 0h03: Set-point shift. Used for changing set-pointby a specific amount.

DB_3: 0h03
DB_2:
DB_1: Set-point shift [-12,7K… 0… +12,8 K] 0…128… 255
DB_0.BIT_3: Learn bit 0: Teach-in
1: Data

Command 0h04: Basic Set-point, send a new set point value.
DB_3: 0h04
DB_2: 0
DB_1: Basic Set-point 0°C … 51,2°C 0…255
DB_0.BIT_3: Learn bit 0 = Teach-in telegram
1 = Data telegram
Command 0h05: Control variable - not supported
Command 0h06: Fan stage - not supported

Thermostat Telegrams

The thermostat integrates with other devices and systems by supporting the devices in the previous section and also through the transmission of three data telegrams.

1.) PTM Switch Telegram: When the thermostat enters economy mode, it will broadcast an OFF PTM telegram based on standardized EEP: 05-02-02. This can be used to automatically switch lights or other loads off when the thermostat enters into economy mode.

To teach the thermostat to a remote controller, follow the directions on entering learn mode on page 1. The thermostat will broadcast three PTM messages when entering learn mode that will link the thermostat to the other controller.

2.) Temperature Controller Status: The thermostat will broadcast a status telegram approximately every 120 seconds based on the proposed EEP: 07-11-02, see below for the definition of this profile. There is no teach-in method for this telegram.

Controller Status
Temperature Controller EEP: 07-11-02
DB_3: Control variable - not supported, always set to 0x00
DB_2: FanStage 0,1,2,3, 0xFF not available
DB_1: Actual Set-point 0… 51,2 °C --> 0…255
DB_0_DB0: Room occupancy 00: Normal mode
DB_0_DB1: 01: Economy mode
10: Shutdown mode
DB_0_DB2: Energy holdoff - not supported, always set to 0
DB_0_DB3: LRN Bit 0 = Teach-in telegram
1 = Data telegram
DB_0_DB4: Controller state - not supported, always set to 0
DB_0_DB5: Controller mode 01: Heating
DB_0_DB6: 10: Cooling
11: Off
DB_0_DB7: Alarm 0: No alarm
1: Alarm - set after thermostat has not received an update from a linked sensor in 1 hour. Cleared if the sensor updates the thermostat.

3.) Temperature and Set-point: The thermostat will broadcast a telegram approximately every 120 seconds based on the standardized room operating panel EEP: 07-10-03. See below for the definition of this profile. There is no teach-in method for this telegram.
DB_2: Set point Min. - … Max. +, linear n=0...255
DB_1: Temperature 0...40°C, linear n=255...0
DB_0.BIT_3: Learn button 0 = Teach-in telegram
1 = Data telegram

Telegram Radio Id's - each Echoflex thermostat has three radio ID to support the telegrams.
1.) PTM telegram = base ID
2.) Status telegram = base ID + 1
3.) Temperature and Set-point = base ID + 2

FCC and IC Licensing
Contains FCC ID: SZV-TCM2XXC
The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(I.) this device may not cause harmful interference and
(ii.) this device must accept any interference received, including interference that may cause undesired operation.
Contains IC: 5713A-TCM2XXC