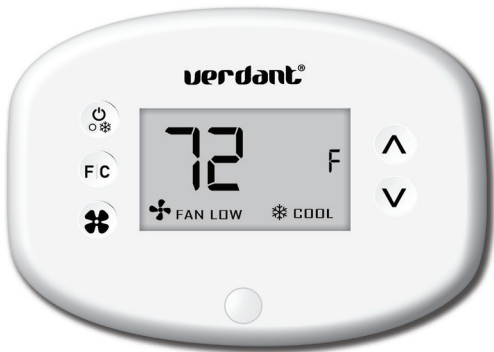# VX3-HW-KT-W

VX Series Wireless Energy Management Thermostat with an Occupancy Sensor and High Voltage HVAC Controller

INSTALLATION MANUAL
SEPTEMBER 2020

verdant

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Introduction

Verdant VX Series Energy Management Thermostats deliver unprecedented energy savings without compromising the comfort of occupants.

An Integrated occupancy sensor uses a combination of motion and thermal sensing technologies for accurate occupancy detection. Reliable occupancy detection allows for energy savings when rooms are unoccupied.

Energy saving presets eliminate the guesswork and make it easy to adjust the energy saving settings.

Fully configurable energy saving settings allow for customization of the thermostat energy saving settings to fit any situation.

Comprehensive configuration options ensure full compatibility with virtually any existing or emerging HVAC system with up to 2 heat and 1 cool stages.

Built-in wireless mesh-networking enables online management.
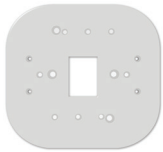
Before You Begin

Equipment Nomenclature

Before you begin installing Verdant equipment, we recommend you familiarize yourself with the various components that may be included in your shipment.

VX Thermostat

HVAC Controller

Verdant VX Wall Plate

Occupancy/Temperature Sensor
(Optional)
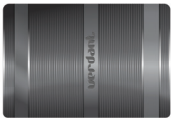
Online Connection Kit
(Optional)

Door/Window Sensor
(Optional)

Before You Begin

Installation Considerations

Selecting the appropriate installation location of the thermostat and any accessories is crucial to the proper operation of your Verdant energy management system. The following guidelines should be adhered to in all cases;

THE THERMOSTAT'S OCCUPANCY SENSOR SHOULD FACE THE BED AREA OF THE ROOM OR THE AREA WHERE THE OCCUPANT WILL SPEND THE MOST TIME.

THE THERMOSTAT MUST NOT BE INSTALLED IN THE VICINITY OF METAL STRUCTURES OR SURFACES INCLUDING METAL AIR DUCTING THAT MAY BE IN THE WALL. METAL STRUCTURES AND SURFACES SIGNIFICANTLY REDUCE THE RANGE OF THE WIRELESS SIGNAL.

THE THERMOSTAT SHOULD NOT BE INSTALLED DIRECTLY ABOVE OR BELOW THE HVAC SYSTEM AS IT MAY CAUSE FALSE TEMPERATURE READINGS.

PLEASE ENSURE THAT THE INSTALLATION RESPECTS THE LOCAL ELECTRICAL CODE. IF IN DOUBT, CONSULT A CERTIFIED ELECTRICIAN TO ENSURE YOUR INSTALLATION IS CODE COMPLIANT.

Before You Begin

Installation on a Bare Wall

➤ Select the appropriate installation location for the thermostat. Refer to installation considerations section of this manual;

➤ With the faceplate removed, place the thermostat on the wall in the installation location and mark location for drilling holes for the two (2) mounting screws;

➤ Drill two (2) 3/16" holes in the wall and insert the two (2) supplied wall anchors;

➤ Use the two (2) supplied screws to securely mount the thermostat to the wall;

➤ Insert two (2) AA-cell batteries (not supplied) into the thermostat battery compartment.

Before You Begin

Installation Using a Wallplate

➤ Select the appropriate installation location for the thermostat. Refer to installation considerations section of this manual;

➤ Place the wallplate over the hole in the wall left by the previous thermostat, and mark two locations for drilling holes;

➤ Drill two (2) 3/16" holes in the wall and insert the two (2) supplied wall anchors;

➤ Mount the wallplate to the wall using the two (2) supplied screws.

➤ With the faceplate removed, place the thermostat on the wallplate in the installation location and screw the thermostat onto the wallplate;

➤ Insert two (2) AA-cell batteries (not supplied) into the thermostat battery compartment.

TO ENABLE NETWORKING CAPABILITIES OF THE VX THERMOSTAT, REFER TO THE "NETWORK INSTALLATION" SECTION OF THIS MANUAL.

BEFORE STARTING THE INSTALLATION OF THE NETWORKED THERMOSTATS, ENSURE THAT THE ONLINE CONNECTION KIT IS CONNECTED TO THE INTERNET.

THE ONLINE CONNECTION KIT MUST BE PLUGGED INTO AN INTERNET PORT WITH A PRIVATE IP ADDRESS WITH DHCP ACTIVE. THE ONLINE CONNECTION KIT MUST BE WHITELISTED USINGS ITS MAC ADDRESS WITH UNRESTRICTED INTERNET ACCESS. PORTS 80,443, AND 22 MUST BE OPEN TO INBOUND/OUTBOUND COMMUNICATION.

PLEASE CONFIRM WITH A VERDANT TECHNICAL SUPPORT AGENT THAT THE ONLINE CONNECTION KIT IS COMMUNICATING PROPERLY WITH THE CLOUD SERVICE BY CALLING OUR TECHNICAL SUPPORT TEAM AT 1 877 318 1823.

Network Installation

Connecting the Antenna Module

➤ Screw the Antenna onto the Wireless Receiver;

➤ Connect the Wireless Receiver to the Server using the supplied USB cable;

➤ Affix the Wireless Receiver to the wall with double sided adhesive tape;

➤ Orient the antenna to be parallel to the closest room in which a Verdant thermostat will be installed.

THE WIRELESS RECEIVER AND THE ANTENNA MUST NOT BE INSTALLED NEAR METAL STRUCTURES OR SURFACES.

METAL STRUCTURES AND SURFACES SIGNIFICANTLY REDUCE THE RANGE OF THE WIRELESS SIGNAL.

Network Installation

Connecting the Ethernet Cable

➤ Connect the Server to the LAN port with the supplied RJ-45 cable.

Network Installation

Powering on the Server

➤ Plug the Server into an electrical outlet with the supplied power cord.

TO PREVENT POWER RELATED ISSUES, PLUG THE SERVER INTO A UPS (UNINTERRUPTED POWER SUPPLY) UNIT.

Network Installation

Configuring the Online Connection Kit

➤ Ensure the Online Connection Kit is receiving a Private or Static IP address via DHCP Server. A public IP will not work;

➤ Ensure that the MAC address is properly Whitelisted if it needs to bypass a login (splash) page to be able to reach the internet. The MAC address is printed on a white sticker on the bottom of the Online Connection Kit.

➤ The Online Connection Kit's open ports are 22, 80, and 443.

HVAC Controller Installation

High voltage HVAC Controller installation

The high voltage HVAC Controller can control HVAC units that would typically use line voltage controls.

The HVAC Controller outputs are the same voltage as the incoming power source.

THE HVAC CONTROLLER ANTENNA MUST BE FACING THE THERMOSTAT AND MUST _NOT_ BE TOUCHING OR ENCLOSED BY ANY METAL COMPONENTS IN THE HVAC UNIT.

THE HVAC CONTROLLER MUST BE MOUNTED OUTSIDE OF ANY EXISTING METAL ENCLOSURE BY USING THE THREADED HUB BUILT INTO THE HVAC CONTROLLER.

Insert the threaded hub through a knock-out hole of your enclosure. Use a standard locknut to secure the HVAC Controller to the enclosure.

The connections between the HVAC unit and the HVAC Controller will be terminated inside the enclosure. Please ensure the installation respects the prevalent local electrical code.

The occupancy output of the HVAC Controller (i.e. a relay output that energizes when the room is occupied) will also produce the same voltage as the incoming power source. If this signal needs to be used with other systems, please install a relay whose coil voltage requirements matches the incoming power source of the HVAC Controller.

Take note of the serial number on the HVAC Controller before closing the enclosure. This number is necessary to pair the HVAC Controller with the Verdant thermostat in the same room.

HVAC Controller Installation

High voltage HVAC Controller installation (cont'd)

The thermostat can control units using line voltage valves (heating and cooling) and 2 fan speeds.

➤ Connect cooling valve to terminal 2 and terminal 5 (black and yellow wires);
➤ Connect heating valve to terminal 2 and terminal 4 (black and white wires);
➤ Connect High Fan speed to terminal 2 and terminal 9 (black and green wires);
➤ Connect Low Fan speed to terminal 2 and terminal 8 (black and purple wires);

Terminal	Terminal Connection	Wire Color
1	Line Voltage	Red
2	Neutral	Black
3		
4	Heating	White
5	Cooling	Yellow
6	Aux (Occupancy Out)	Brown
7		
8	Fan Low	Purple
9	Fan High	Green

Thermostat Installation

Mounting the Thermostat to the Wall

➤ Select the appropriate installation location for the thermostat, taking into account the following;

THE THERMOSTAT'S OCCUPANCY SENSOR SHOULD FACE THE BED AREA OF THE ROOM OR THE AREA WHERE THE OCCUPANT WILL SPEND THE MOST TIME.

THE THERMOSTAT MUST NOT BE INSTALLED IN THE VICINITY OF METAL STRUCTURES OR SURFACES INCLUDING METAL AIR DUCTING THAT MAY BE IN THE WALL.

METAL STRUCTURES AND SURFACES SIGNIFICANTLY REDUCE THE RANGE OF THE WIRELESS SIGNAL.

➤ With the faceplate removed, place the thermostat on the wall in the installation location and mark location for drilling holes for the two (2) mounting screws;
➤ Drill two (2) 3/16" holes in the wall and insert the two (2) supplied wall anchors;

DO NOT OVER TIGHTEN THE BACK PLATE TO THE WALL. FOR UNEVEN SURFACES, CONSIDER INSTALLING A WALL PLATE.

➤ Use the two (2) supplied screws to securely mount the thermostat to the wall;
➤ Insert two (2) AA-cell batteries (not supplied) into the thermostat battery compartment.

Thermostat Configuration

Configuring the Thermostat

With the thermostat and HVAC unit powered, follow the configuration instructions to correctly configure the thermostat.

To ensure proper operation of the HVAC unit, complete the following steps.

➤ Pair the thermostat with the HVAC Controller
➤ Set the MESH ID;
➤ Enter the room number;
➤ Enter the equipment code;
➤ Configure the energy saving settings;
➤ Set the thermostat clock

Thermostat Configuration

Accessing the Configuration Screen

➤ Ensure the thermostat is powered and faceplate removed;
➤ Press the config button;


CONFIGURATION BUTTON
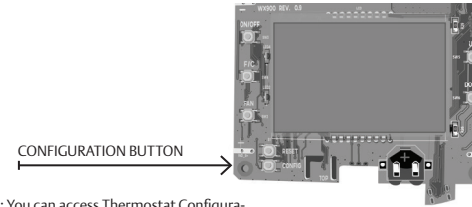
NOTE: You can access Thermostat Configuration settings at any time by pressing the "Configuration" button.

The thermostat configuration screens have a 30-second time-out. If no action is taken within (30) seconds, the thermostat will exit configuration settings.

NOTE: When the thermostat is connected to a network, the equipment and the energy saving settings configured on the thermostat will be overidden by settings configured online.

Thermostat Configuration

Pairing the Thermostat and HVAC Controller
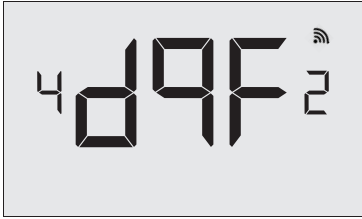
Each wireless thermostat must be paired with an individual HVAC Controller during installation. The thermostat will begin a 30 second countown as it searches for the closest HVAC Controller to it. The HVAC Controller ID is located on the case.

> **THE HVAC CONTROLLER MUST BE LINKED TO A THERMOSTAT IN THE SAME ROOM. ONLY INSTALL ONE ROOM AT A TIME.**

➤ Verify that the HVAC Controller found by the thermostat matches the HVAC Controller listed on the HVAC Controller in the same room;

➤ Press the F | C button to pair the thermostat with the HVAC Controller displayed on the screen. The screen will display "SUCC" when the HVAC Controller has been paired successfully. If the HVAC Controller ID displayed on the screen is incorrect, press the FAN button to reject it;

➤ Press the F | C button to advance to the next configuration menu.
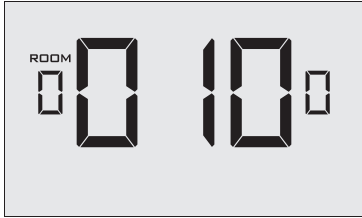
Thermostat Configuration

Setting the MESH ID
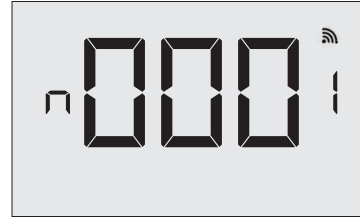
➤ Press the FAN button to advance to the next digit;

➤ Press the UP and DOWN buttons to increase or decrease the value;

➤ Press the F | C button to advance to the next menu.

Thermostat Configuration

Entering the Room Number

Enter the room number by changing the characters on the screen.
Available characters include digits 0-9 and letters A-F. To distinguish between two or more thermostats in the same unit, enter as follows:
Thermostat 1: 00100
Thermostat 2: 0100A

➤ Press the FAN button to advance to the next digit;
➤ Press the UP and DOWN buttons to increase or decrease the value;
➤ Press the F|C button to advance to the next menu.

Entering the room number correctly is crucial for proper operation of networked thermostats.

Thermostat Configuration

Configuring the Equipment Settings
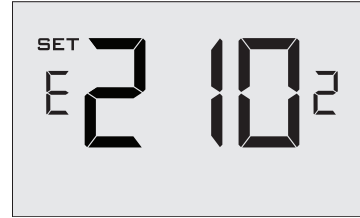
Enter the equipment code by changing the digits on the screen. Refer to the table below.

➤ Press the FAN button to advance to the next equipment setting.
➤ Press the UP and DOWN buttons to increase or decrease the value;
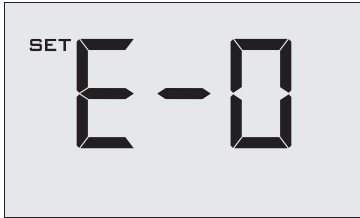➤ Press the F|C button to advance to the next menu.

Digit	Setting #1 Compressor Type	Setting #2 Electric Heat	Setting #3 Reversing Valve†	Setting #4 Fan Speed
0	No Compressor	No Electric Heat		N/A
1	Heat Pump	Electic Heat*		One Fan Speed*
2	Air Conditioner*			Two Fan Speeds

† Setting #3 can be ignored since the HVAC Controller has no outputs for reversing valves.
*Indicates default setting.

Thermostat Configuration

Configuring the Energy Saving Settings

➤ Press the UP and DOWN buttons to increase or decrease the energy savings preset.

➤ Press the F|C button to advance to the next menu.

Preset	Energy Savings Presets
E-0*	Energy Savings Off - No Temperature Setback
E-1	Lowest Energy Savings
E-2	Lower Energy Savings
E-3	Standard Energy Savings
E-4	Higher Energy Savings
E-5	Highest Energy Savings

*Indicates default setting.

Thermostat Configuration

Setting the thermostat clock

Set the thermostat clock to current time in 24h (Military Time) format.

➤ Press the FAN button to advance to the next digit;

➤ Press the UP and DOWN buttons to increase or decrease the digits

➤ Press the F|C button to advance to the next menu.

SETTING THE CORRECT TIME IS CRUCIAL FOR PROPERTY OPERATION OF THE THERMOSTAT.

Thermostat Configuration

Testing the Thermostat

Following the thermostat configuration, test if the thermostat is controlling the HVAC unit.

➤ Ensure the thermostat is powered and the faceplate is on.
➤ Press the DOWN button to change the temperature set point below the current room temperature to confirm that the thermostat initiates air conditioning;
➤ Press the UP button to change the temperature set point above the current room temperature to confirm that the thermostat initiates heating;
➤ Change the fan speed by touching the FAN button to test if the thermostat is controlling the fan speed.

Thermostat Maintenance

Replacing Thermostat Batteries

The low battery indicator will be displayed on the thermostat screen when it is necessary to replace batteries in the thermostat.

Under normal operating conditions, new brand-name alkaline batteries will last for a period of approximately eighteen (18) months.

Please replace batteries every sixteen (16) months to ensure continuous thermostat operation.

To replace thermostat batteries:

➤ Remove the thermostat cover;
➤ Replace the two (2) AA-cell batteries (not supplied);
➤ Re-affix the thermostat cover;
➤ Press the ON/OFF button to start using the thermostat.

NOTE: The thermostat maintains all the "Thermostat Configuration" settings in non-volatile memory. There is no need to configure the thermostat again after battery replacement.
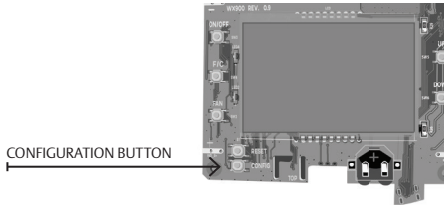
Configuring & Managing Accessories

Accessing the Sensor Setup Menu

With the thermostat and HVAC unit powered, follow the sensor configuration instructions to correctly configure the sensors.

➤ Remove the faceplate from the thermostat
➤ Press and hold the config button until SENS appears on the screen.

CONFIGURATION BUTTON

Configuring & Managing Accessories

Activating a Sensor

➤ Remove the cover of the sensor(s) to be paired in the room;
➤ Insert two (2) AAA-cell battery into each sensor (not supplied);
➤ Press the button inside the sensor to make the sensor discoverable;*
➤ Press the FAN button on the thermostat to initiate the pairing procedure. This will initiated a countdown that may take up to ten (10) seconds.

*The sensor(s) will remain discoverable for five (5) minutes after pressing the button inside the device. If the pairing process has not been completed within five (5) minutes of making sensor(s) discoverable, repeat this step.

Configuring & Managing Accessories

Discovering an Active Sensor
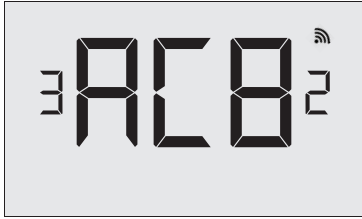
The thermostat will display the first sensor discovered in the pairing process. Ensure that the unique device number displayed on the screen matches the unique ID found on the sensor.

➤   Press the F | C button to configure the discovered sensor.

If the sensor displayed on the screen is not the correct sensor to pair with the HVAC Controller, use the UP or DOWN buttons to find other discovered sensors. To start over, press the ON/OFF button to exit and refer back to the Accessory Configuration section of this manual.

Configuring & Managing Accessories

Configuring the Functionality of a Sensor

The user must configure the type of sensor being paired with the HVAC Controller. Use the table below to configure the correct sensor functionality.

➤   Press the F | C button to advance to the next device type;
➤   Press the UP and DOWN buttons to increase or decrease the trailing digit;
➤   Hold the F | C to save sensor settings.

Sensor Type	0	1	2
OCC *Occupancy Sensor*	Disabled	Enabled*	
DS *Door Switch*	Disabled	N/C *Normally Closed*	N/O* *Normally Open*
RT *Temperature Sensor*	Master* *Temperature Reading From Sensor Overrides Thermostat*	Average *Average of Temperature Readings From All Sensors & Thermostat*	Average *Average of Temperature Readings From All Sensors & Thermostat*

*Indicates default setting.

Configuring & Managing Accessories

Completing the Sensor Setup
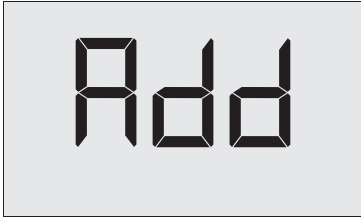
➤ Press the FAN button to pair the sensor with the thermostat.Press the ON/OFF button to exit the sensor setup screen.

The thermostat will countdown from thirty (30) seconds. If the sensor has successfully paired, the thermostat will display "SUCC". If the sensor did not pair successfully, the display will read "FAIL", and the process must be repeated.

If additional sensors need to be paired with the same thermostat, repeat the process with the additional sensor.

Troubleshooting

Error Codes

ERR 1   Thermostat Temperature Sensor Hardware Defect

ERR 2   Thermostat Radio Hardware Defect

ERR 3   Thermostat Radio Software Defect

ERR 4   No link with the HVAC Controller

ERR 5   Thermostat Memory Defect

Troubleshooting Guide

Restoring Factory Settings

If there are reported errors or configuration issues, the user may restore factory settings to return the thermostat to its default parameters.

Procedure

➤ Remove the faceplate of the thermostat;

➤ With the thermostat on, press the CONFIG button located on the control board inside the thermostat.

➤ Press the F|C button twice, or until you reach the equipment code configuration screen.

➤ Press and hold the CONFIG button. The screen wil display "RST"

➤ Press the F|C button.

➤ If the master reset was successful, the thermostat will display "VRD" and then "SETUP" on the screen. The thermostat must now be re-configured. Please refer to pages thermostat configuration section of this manual.

Contact Verdant technical support if the issues are not resolved.

APPENDIX 1 - Energy Saving Presets

	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Fan Control Mode	**AUTO**	AUTO	AUTO	AUTO	AUTO	AUTO
1st Stage Differential Heat	**0.5**	0.5	0.5	0.5	0.5	0.5
2nd Stage Differential Heat	**1**	1	1	2	2	2
1st Stage Differential Cool	**0.5**	0.5	0.5	0.5	0.5	0.5
Guest Occupancy Threshold	**0**	5	5	5	5	5
Night Occupancy Threshold	**1**	1	1	1	1	1
Force 2nd Stage Heating After	**30**	30	30	30	30	30
Night Occupancy Start	**18**	19	20	21	22	23
Night Occupancy End	**12**	11	10	9	8	7
Recovery Time	**0**	15	20	25	30	0
Recovery Temperature Heat	**70**	69	68	67	66	65
Setback Delay - Heat	**0**	30	25	20	15	10
Minimum Setback Temperature	**67**	66	65	64	63	62
Setback Delay - Cool	**0**	30	25	20	15	10
Maximum Setback Temperature	**72**	74	76	78	80	82
Recovery Temperature Cool	**71**	72	73	74	75	76
Minimum Set point	**64**	64	65	66	67	68
Maximum Set point	**82**	82	80	78	76	74
Temperature Control Mode	**AUTO**	AUTO	AUTO	AUTO	AUTO	AUTO
Auto Changeover Set Point Offset Dead Band)	**1**	1	1	1	1	1
Auto Restore	**OFF**	ON	ON	ON	ON	ON
Setback Set Points	**OFF**	ON	ON	ON	ON	ON
Automatic Humidity Control	**ON**	ON	ON	ON	ON	ON
Temperature Calibration	**0**	0	0	0	0	0

APPENDIX 2 - Glossary

"Automatic Fan Control Mode" - fan runs only when there is a demand for heating or cooling;

"Manual Fan Control Mode" - guest can select between automatic or continuous fan operation;

"Minimum Set point" - minimum temperature that a guest can request;

"Maximum Set point" - maximum temperature that a guest can request;

"Auto Changeover Set Point Offset" - the difference between the guest-selected set point and the heat and cool changeover temperatures;

"1st Stage Differential - Heat" - the temperature that the thermostat has to sense between the automatic changeover temperature for heat and the room temperature before a call for the 1st stage heating is initiated;

"2nd Stage Differential - Heat" - difference between 1st stage heating temperature and room temperature before the 2nd stage heating is initiated;

"1st Stage Differential - Cool" - the temperature that the thermostat has to sense between the automatic changeover temperature for cool and the room temperature before a call for the 1st stage cooling is initiated;

"Forced 2nd Stage Heating" - number of minutes 1st stage heating will run before 2nd stage heating is automatically initiated if the guest set point is not reached and the 2nd stage heating is not initiated through differential settings

"Temperature Recovery Time" - the maximum period of time allowed for restoring the "Recovery Temperature";

"Recovery Temperature" - the room temperature that needs to be restored within the "Temperature Recovery Time";

"Maximum Setback Temperature" - the highest room temperature allowed when thermostat is in the setback mode;

"Minimum Setback Temperature" - the lowest room temperature allowed when thermostat is in the setback mode;

"Temperature Setback Delay" - the length of time for which the room that is in the guest occupancy mode needs to be unoccupied before the temperature setback is initiated;

"Incidental Occupancy Threshold" - the minimum period of time (in minutes) for which occupancy needs to be

detected in order to enter the "Guest Occupancy" mode;

"Night Occupancy Threshold" - the minimum period of time during the "Night Occupancy" period for which occupancy needs to be detected in order to enter the "Night Occupancy" mode;

"Night Occupancy Period" - The period of time during the day during which the "Night Occupancy" mode can be activated if occupancy longer than the "Night Occupancy Threshold" is detected;

"Auto Restore On" - thermostat will restore the most recent guest settings when new occupancy is detected;

"Auto Restore Off" - thermostat will NOT restore the most recent guest and will remain turned off settings when new occupancy is detected;

"Setback Set points On" - thermostat will maintain setback temperatures when room is unoccupied;

"Setback Set points Off" - thermostat will NOT maintain setback temperatures when room is unoccupied;

"Incidental Occupancy" - occupancy shorter than the "Incidental Occupancy Threshold";

"Guest Occupancy" - occupancy longer than the "Incidental Occupancy Threshold";

"Temperature Setback" - thermostat maintains setback temperatures and not the guest set point temperature in order to save energy;

"Night Occupancy Mode" - thermostat status during which setback mode is disabled if occupancy longer than "Night Occupancy Threshold" is detected within the "Nigh Occupancy" period;

"Automatic Temperature Changeover" - thermostat automatically activates heating or cooling to maintain the desired room temperature;

"External Thermostat" (Class 2) mode - HVAC unit setting allowing it to be controlled by a remote thermostat;

Warranty Information

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Technical Specifications

	Thermostat	HVAC Controller
Case Dimensions (Imperial)	4.02 x 5.51" x 0.93"	4.84" x 2.76" x 1.02"
Case Dimensions (Metric)	102mm x 140mm x 23.5mm	98mm x 54mm x 19mm
Screen Dimensions (Imperial)	3.63" x 2.13"	N/A
Screen Dimensions (Metric)	92mm x 54mm	N/A
Operating Voltage	2 "AA" Cell Batteries/12VDC	120-277VAC
Control Outputs		Heating
		Cooling
		Fan Low
		Fan High
		Aux (Occupancy out)
Occupancy Sensor Beam Width (Angular degrees)	±47° (94°)	N/A
Wireless Frequency	902-928MHz	902-928MHz
Temperature Accuracy (Fahrenheit)	±1°F	N/A
FCC ID	XEYWX-DB	XEYZX-HV
IC	8410A-WXDB	8410A-ZXHV

TECHNICAL SUPPORT: support@verdant.info   1-877-318-1823