

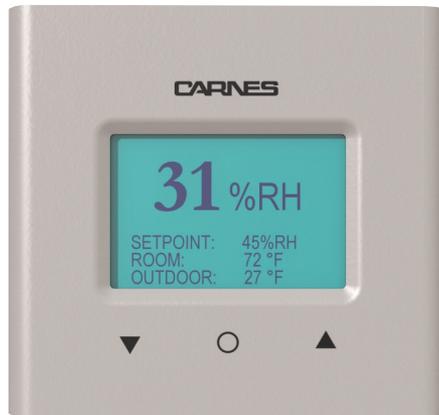
READ AND SAVE  
THESE INSTRUCTIONS

**CARNES**<sup>®</sup>

RESIDENTIAL HUMIDISTAT

# OWNERS MANUAL AND QUICK REFERENCE GUIDE

## MODEL HXHAF



FORM 16763  
ISSUED: 07-31-20

## Safety Cautions | RESIDENTIAL HUMIDISTAT



### **CAUTION:**

Follow all recommendations, instructions and precautions in this Installation, Operation and Maintenance Manual to maximize performance, maintain efficiency and to provide a safe operational environment. Do not install, use or operate this equipment until this manual has been completely read and understood.

**Important Note:** Disconnect electrical power to the furnace and humidifier before servicing or starting installation.

### **Liability:**

Carnes does not accept any liability for installations of humidifier equipment installed by unqualified personnel, or the use of parts, components, equipment, or alterations of Carnes manufactured equipment that is not authorized or approved by Carnes.

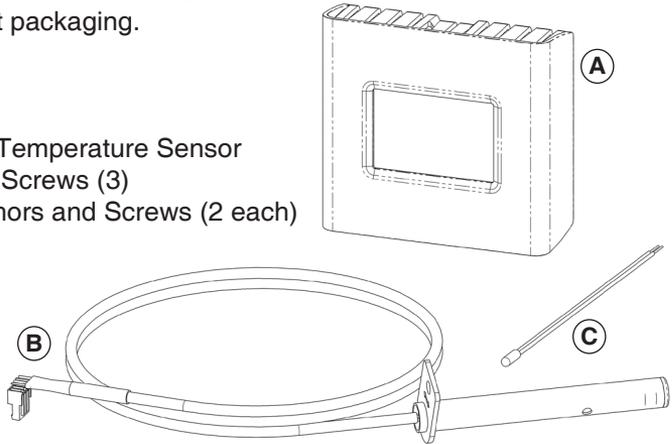
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## Packing List | RESIDENTIAL HUMIDISTAT

Verify all components were included in the humidistat packaging.

- A. Humidistat
- B. Duct Sensor
- C. Outdoor Air Temperature Sensor
- D. Sheet Metal Screws (3)
- E. Drywall Anchors and Screws (2 each)



*Humidistat Package Components*

### Humidistat Function

A humidistat is a device that measures relative humidity and works with a home's heating and cooling system to automatically control a humidifier to maintain a desired humidity level throughout the home.

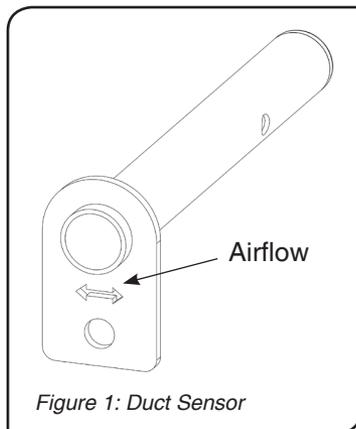
The CARNES HXHAF residential humidistat is capable of controlling a humidifier by ON/OFF or modulating 0-10 VDC control signals. The humidistat offers four modes of operation to fit any humidification need. The four modes include Performance, Eco, Basic and Heat-Only Mode.

**The humidistat is preset to Heat-Only Mode and ON/OFF control.** These settings are the basic setup for most homes and no adjustment is needed to function with your Carnes humidifier out of the box.

**In winter climates it is highly recommended to install the provided outdoor air temperature sensor.** This minimizes condensation on windows and in the structure when temperatures are cold. If the sensor is not installed in winter climates the user will be required to manually adjust the humidistat setpoint based on Table 1 or risk damage due to excess humidity and condensation.

## Humidistat Option 1 — Return Duct

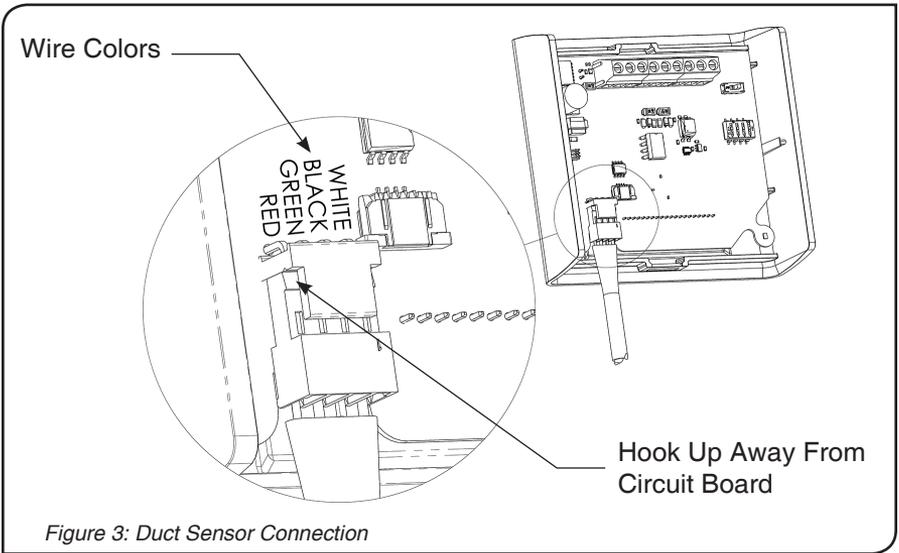
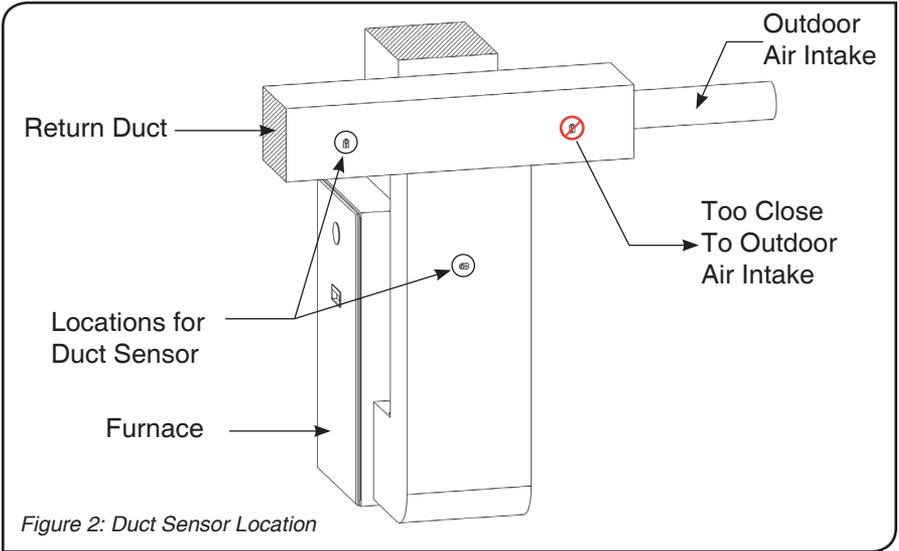
1. Choose a location on the return air duct to mount the duct sensor. See *Figure 2* for location options. Make sure the humidistat mounting location is close enough to plug in the sensor. **Install the sensor a minimum 6 inches ahead of or a minimum 15 inches after a change in airflow direction or obstruction in the duct. Do not install duct sensor near outdoor air intake.**



*Figure 1: Duct Sensor*

2. Drill a  $\frac{1}{2}$  inch hole in the duct to place the sensor. Use a sheet metal screw (D) to attach sensor to the duct. Arrows in duct mount sensor indicate the direction the airflow should pass over the sensor for optimal readings (*Figure 1*).
3. Mount the humidistat to a wall or duct in a convenient location that allows easy adjustment to the settings. To mount the humidistat, remove the back plate and install with screws (D or E) through the mounting holes.
4. Plug the duct sensor into the humidistat. **Pay close attention to the orientation of the plug or permanent damage will occur to the sensor.** See *Figure 3* for proper orientation of the duct sensor plug. Place the hook of the red plug up away from the circuit board and push onto the white connector in the bottom left corner. The wire colors are also marked on the circuit board and match the correct orientation of the plug wires.

# Installation | RESIDENTIAL HUMIDISTAT



### Humidistat Option 2 — Wall Mount

1. Select a location in the living area of the residence. Typically the humidistat will be placed on the wall near the main thermostat.
2. The humidistat should be placed in an area of sufficient air movement and out of the way of any other temperature or humidity affects. For example, do not place the humidistat in direct sunlight, near windows, or near an air register.
3. Once the location is selected, attach the humidistat back cover to the wall using 2 screws/anchors (E).

**Note:** The duct sensor is not needed for this installation option.

### Outdoor Temperature Sensor

When outdoor air temperature is very low condensation can occur on windows and other surfaces which may cause damage to the house. To minimize this risk the outdoor air temperature sensor should be installed, which lowers the humidity setpoint to a safe level where the indoor relative humidity is too low to condense. The outdoor temperature compensation controls adjusts humidity according to the values in Table 1. The humidistat will automatically detect if the outdoor air temperature sensor is connected and control the relative humidity setpoint accordingly.

## Installation | RESIDENTIAL HUMIDISTAT

**Table 1: Maximum setpoint based on outdoor air temperature**

Outdoor Air Temperature (°F)	Outdoor Air Temperature (°C)	Adjusted Maximum Humidity Setpoint (RH%)
-30	-34.4	10
-20	-28.9	15
-10	-23.3	20
0	-17.8	25
10	-12.2	30
20	-6.7	35
30	-1.1	40
40	4.4	45
45	7.2	47.5
>45	>7.2	Unadjusted

### Outdoor Temperature Sensor Option 1 — Outdoors

To mount the Outdoor Temperature Sensor outdoors the signal wire will need to penetrate an exterior wall. Use the following guidelines for proper operation of the sensor:

**Mount the sensor where:**

- there is good air circulation
- wire distance between sensor and humidistat is less than 200 feet
- it can measure true outdoor ambient air temperature
- it is above the expected snow line

**Do NOT mount the sensor:**

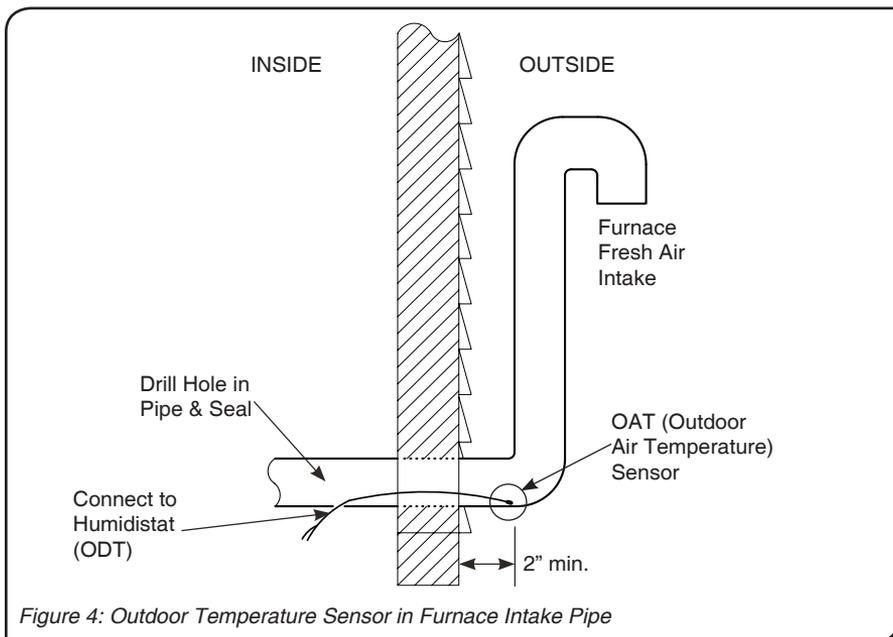
- in direct sunlight
- where it may be covered by debris, snow, or ice

## Outdoor Temperature Sensor Option 2 — Outdoor Air Intake

Mount the sensor in the outdoor air intake by drilling a 1/4 inch hole within 12" of outside. Angle the hole towards the outside. Insert the temperature sensor into the intake pipe until the sensor is at least 2" outside the wall of the house. Seal the hole and secure the wire so it cannot be accidentally pulled out. See *Figure 4* for example installation.

**CAUTION: electrical interference can cause erratic system operation.**

- Do not route temperature sensor wiring with building power wiring, next to control contactors, near light dimming circuits, or electric motors.
- Use shielded cable to reduce interference when rerouting is not possible.
- Be sure wires have a cable separate from the humidistat cable.
- See *Figure 5* for wiring diagram.



### Wiring

**\*\*TURN POWER OFF TO ALL HVAC EQUIPMENT BEFORE WIRING\*\***

#### Power Connection Wiring (R, C)

- The humidistat controller is powered from the R and C connections from the furnace and needs continuous power to operate properly. Proper R and C wiring is shown in *Figure 5*.

#### Outdoor Temperature Sensor Wiring (ODT)

- The outdoor temperature sensor wires will connect into the ODT terminals on the humidistat terminal block as shown in *Figure 5*.

#### Heat Signal Wiring (W)

- The W terminal is the heat signal from the thermostat. Wire the W terminal from the furnace control panel to the W terminal on the humidistat terminal block as shown in *Figure 5*.

#### Automatic External Fan Control Wiring (G, GF)

- Fan control wiring should be completed when possible. If the fan control wiring is not possible then the humidistat should only be ran in Heat-Only Mode as described in the Operation section of this document.
- The wire running from the G terminal on the furnace control board to the G terminal on the thermostat will need to be disconnected. The G terminal from the thermostat will then need to be wired directly to the G terminal on the humidistat terminal block. The G terminal on the furnace control panel will then need to be wired directly to the GF terminal on the humidistat terminal block. See *Figure 5*.

#### Humidifier Control Wiring (H1+, H2-)

- The humidifier control terminals are labeled on the humidistat as H1+ and H2-. These terminals will need to be wired directly to the humidifier as shown in *Figure 5*. H1+ on the humidistat terminal connects to the HUM terminal on the humidifier control panel and H2- on the humidistat terminal connects to the GND terminal on the humidifier control panel.

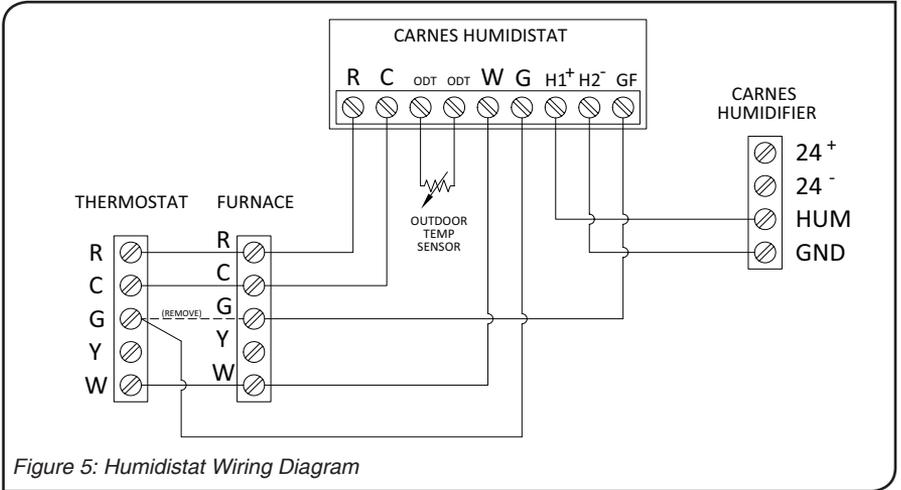


Figure 5: Humidistat Wiring Diagram

## Wiring Notes/ Cautions

- Do not connect duct sensor backwards. Always verify the correct placement of the duct sensor terminal to the main humidistat board.
- Verify the wiring before powering on.
- Verify that the humidistat output matches the humidifier input type (Figure 6).
  - o ON/OFF
  - o Modulating (0-10V<sub>DC</sub>)

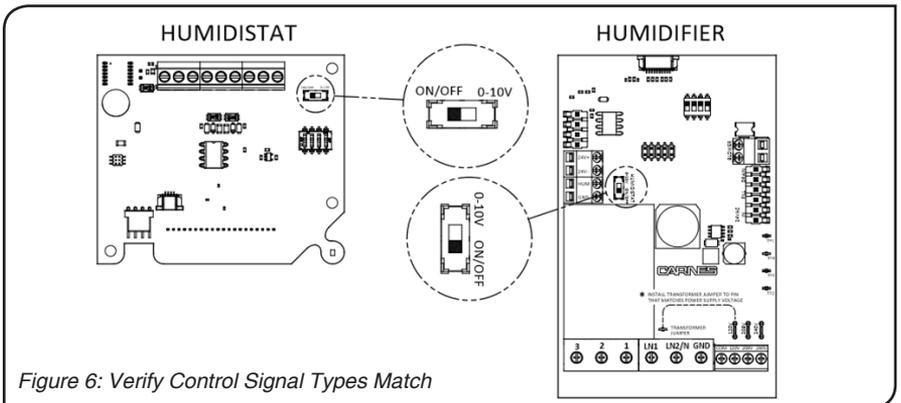


Figure 6: Verify Control Signal Types Match

## Screens and Menu

### Home Screen

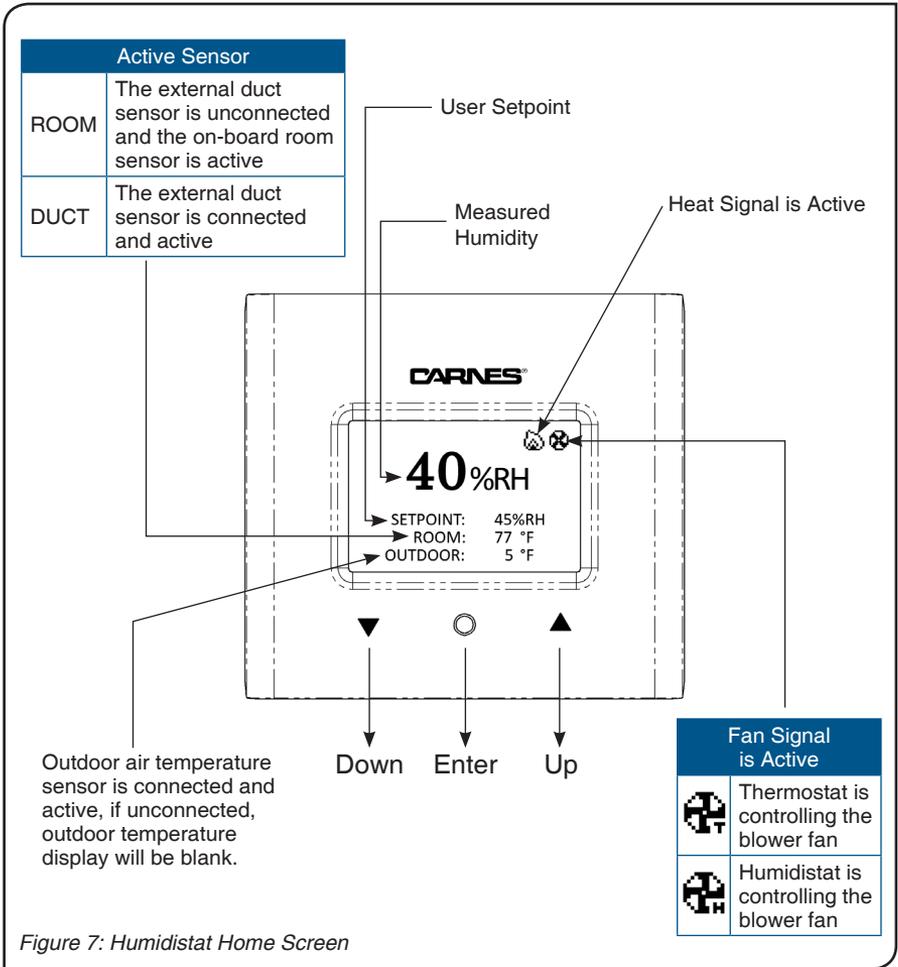


Figure 7: Humidistat Home Screen

## RESIDENTIAL HUMIDISTAT | Operation

The humidistat is controlled using touch-sensitive buttons located beneath the main screen.

The home screen shows measured humidity, user setpoint, and duct or room temperature. When the duct humidity sensor is installed, the measured temperature will display “DUCT:” and show the temperature of the duct sensor. Alternatively, when no duct sensor is plugged into the humidistat the temperature will display “ROOM:” and display the temperature at the humidistat.

The outdoor temperature will be displayed when the outdoor temperature sensor is installed. External fan and heat signals will also be displayed in the top right-hand corner of the screen when active.

### Fan/Heat Signal Indicators

The residential humidistat accepts heat and fan input signals from the thermostat. When the heat signal is active a moving flame symbol will be shown in the top right corner of the display screen. When the fan signal is active a spinning fan icon will appear. A small ‘T’ in the bottom right hand corner of the fan icon signifies that the thermostat is currently in control of the fan as shown in *Figure 7*. If the humidistat has activated the fan the icon will have a small ‘H’ in the bottom right hand corner as shown in *Figure 7*.

# Operation | RESIDENTIAL HUMIDISTAT

## Settings Page

From the Settings page (*Figure 8*) the user can select and adjust how they would like their humidistat to operate. Pressing Enter while on the BACK selection will take the user back to the previous page.

Pressing the Enter button once will bring up a Settings screen with user selectable options. Use the Up/Down buttons to navigate the menu and the Enter button to select and confirm an option.

- The Setpoint Adjustment option on the Settings screen, shown in *Figure 7*, allows the user to adjust the desired relative humidity setpoint. Choosing this option will allow the user to enter the setpoint adjustment screen.
- The Mode option controls what mode the humidistat will operate in. Pressing the Enter button while on Mode will take you to the Mode Selection Page.
- The Units option allows the user to select temperature display units in Fahrenheit or Celsius. Fahrenheit is the default.

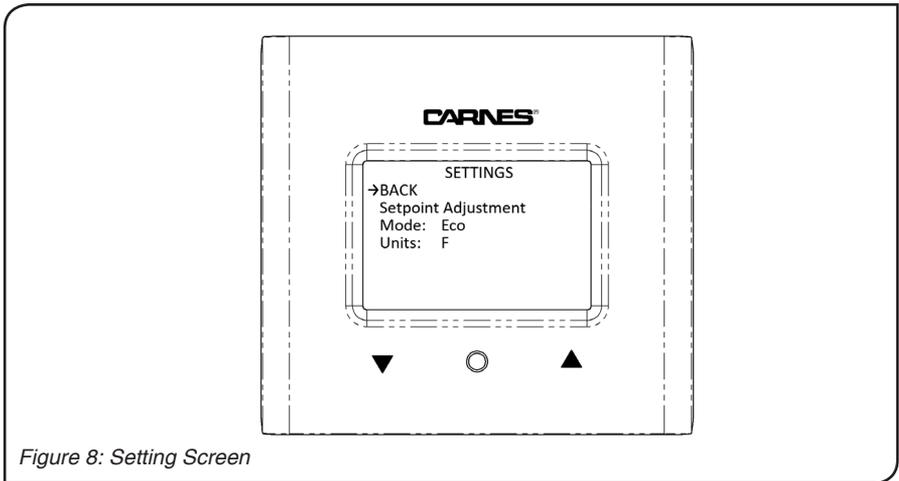
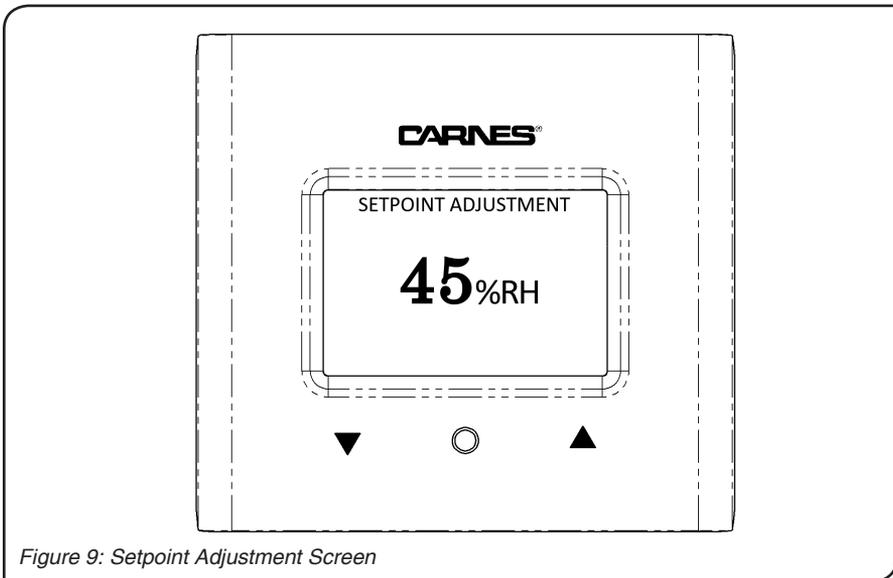


Figure 8: Setting Screen

### Setpoint Adjustment Page

While on this Setpoint Adjustment Page the user can adjust the desired relative humidity setpoint for the humidified space (shown in *Figure 9*). The factory default value of this setting is 45%RH and can be adjusted up or down depending on user preference. To save the value press the enter button again. The new humidity setpoint should now be shown on the main screen (*Figure 7*).



*Figure 9: Setpoint Adjustment Screen*

### Mode Selection Page

While on the Mode Selection Page, pressing Enter on any option, besides the BACK selection, will set the humidistat mode to the selected mode, save the selection, and bring you back to the Settings Page. Pressing the BACK selection will keep the previously saved mode and bring you back to the Settings Page.

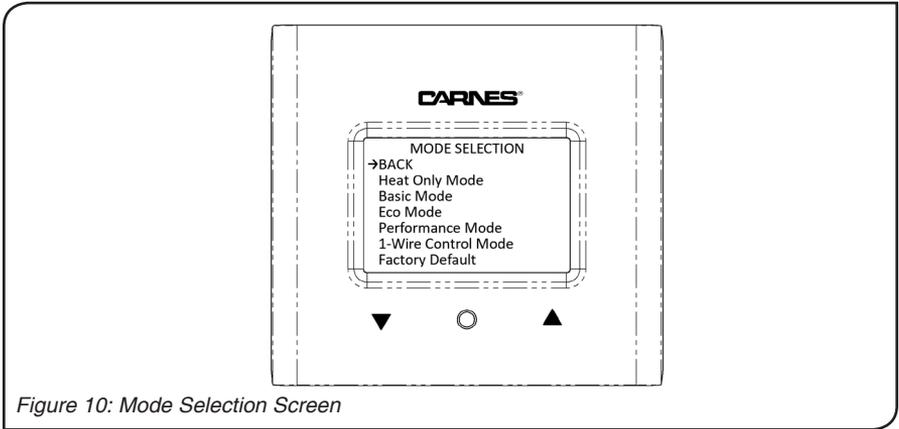


Figure 10: Mode Selection Screen

## Modes of Operation

### General Function

The residential humidistat will run the humidifier when the duct/room humidity level is below the humidity setpoint and any one of the following is true:

- Heat signal from thermostat is on
- Fan signal from thermostat is on
- Fan signal from humidistat is on

When the humidistat receives an on signal it will control the humidifier to maintain the desired humidity level by ON/OFF or modulating control. ON/OFF control turns the humidifier on when the humidity level drops 10% below setpoint and turns the humidifier off 10% above setpoint. Modulating control sends a 0-10 VDC signal to the humidifier to proportionally control the steam output of the humidifier.

When the humidifier output changes from ON to OFF, the humidistat will keep the fan running for 90 seconds to prevent excess steam from condensing in the duct.

There are four selectable modes the humidistat can operate in to provide the best humidity control for any household. These modes can be selected in the humidistat MODE SELECTION screen (Figure 10) and determine how the humidistat reacts to the fan and heat signals.

## RESIDENTIAL HUMIDISTAT | Modes of Operation

### **Heat-Only Mode**

In Heat-Only Mode the humidistat will only turn on the humidifier when the heat signal from the thermostat is on. This mode works well in winter climates when humidity is only wanted during the heating season.

### **Basic Mode (Fan Wiring Required For This Mode, G, GF)**

In Basic Mode the humidistat will turn on the humidifier when either a fan or heat signal from the thermostat is on. This mode works well in any climates that require humidity and in situations where humidity will be needed when the heat is not running.

\*It is recommended that Heat-Only Mode is activated during the summer months in northern climates to prevent the humidifier from running during the cooling season.

### **Eco Mode (Fan Wiring Required For This Mode, G, GF)**

In Eco Mode the humidistat will turn on the humidifier when either a fan or heat signal from the thermostat is on just like Basic Mode. Eco Mode also adds the humidistat fan on signal. This will turn on if there has been 2 hours of no heat or fan signals from the thermostat. The humidistat fan signal will turn on the furnace fan for three minutes to check the humidity level. If below the setpoint, the humidistat fan signal will stay on and humidify the space for a maximum of 1 hour or until a heat or fan signal turns on from the thermostat. A heat or fan signal from the thermostat will reset the 2 hour timer. If the humidifier cannot meet the humidity needs via the humidifier fan signal the humidistat will revert to Basic Mode to keep the fan from cycling unnecessarily.

### **Performance Mode (Fan Wiring Required For This Mode, G, GF)**

Performance Mode is for households that desire the most consistent humidity levels. The humidistat will turn on the humidifier when either a fan or heat signal from the thermostat is on. When the heat or fan signal from the thermostat turns off, the humidistat will check humidity levels. If the humidity level is below setpoint, the humidistat fan signal will turn on and humidify the space for a maximum of 1 hour or until a heat or fan signal turns on from the thermostat. Performance Mode also incorporates the 2 hour no activity timer described in Eco Mode. If the humidifier cannot meet the humidity needs via the humidifier fan signal the humidistat will revert to Eco Mode to keep the fan from cycling unnecessarily.

# 1-Wire Control | RESIDENTIAL HUMIDISTAT

## Factory Default

Selecting Factory Default will revert the humidistat back to factory settings. The humidistat will set back to Heat-Only Mode, with a 45%RH setpoint, and temperature units of Fahrenheit.

## 1-Wire Control

**1-Wire Control requires that the humidistat to be wired correctly to a smart thermostat or HVAC controller.** 1-Wire Control mode allows the user to utilize the humidistat as a control bypass from a smart thermostat. This function gives control of the humidifier to a smart thermostat that has a one wire humidifier control output. When the humidistat operates in this mode, it discards any internal setpoint settings and only displays measured humidity and temperature. If the thermostat sends a signal out for the humidifier to run, the humidistat will accept the signal and turn the humidifier on at maximum output. The humidifier will then run until the smart thermostat sends an off signal to the humidistat.





*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

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