**Instruction Manual**

# TH330B TEMPERATURE AND HUMIDITY CONTROLLER INSTRUCTION MANUAL

*Version 0.9 (April, 2024)*

## 1. Overview

This plug-n-play temperature and humidity controller is designed for high relative humidity (>85%) and condensing environments, where slight temperature drop may cause condensation and could damage the sensor. This controller equipped with one of the most robust humidity sensors on the market. It can be fully recovered even immersed in water. Ideal for curing Fridge. The controller can control both temperature (heating or cooling) and humidity (humidifying or dehumidifying) at the same time.

## 2. Specifications

| | |
|---|---|
| Temperature Control Range | - 40°C ~ 80°C, - 40°F ~ 176°F |
| Temperature Resolution | 0.1°C (between -9.9°C ~ 80°C)<br>1°C (between -40°C ~ 10°C)<br>0.1°F (between -9.9°F ~ 99.9°F)<br>1°F (between -40°F ~ 10°F,100°F ~176°F) |
| Temperature Accuracy | 0.5°C |
| Temperature Control Mode | On/Off Control. Heating or Cooling |
| Temperature Control Output | 15 A, 120 V or 240 V AC * |
| Humidity Control Range | 0 ~ 99.9% RH |
| Humidity Resolution | 0.1% RH |
| Humidity Accuracy | 4% RH |
| Humidity Control Mode | On/off control.<br>Humidifying or dehumidifying |
| Humidity Control Output | 15 A, 120 V or 240 V AC * |
| Operating Temperature | 0°C ~ 50°C |
| Dimension | 91 x 140 x 46 mm |
| Input Power | 85 ~242 V AC, 50 Hz / 60 Hz |
| Sensor Cable Length | 6 ft (2 m) |
| Power Cable Length | 3 ft (1 m) |

** **Please note**: Although both temperature and humidity output can handle up to 15A, the combined total power of the two channels are limited to 15A due to the limitation of input power cord.*

## 3. Front Panel

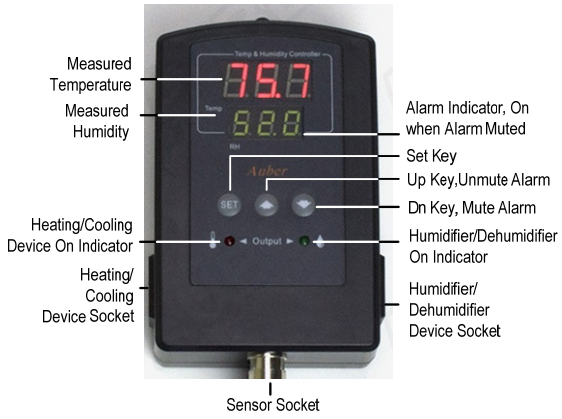



Figure 1. Front Panel.

**Measured temperature window:** In normal operating mode, this window shows measured temperature. In parameter setting mode, this window shows parameter name.
**Measured humidity window:** In normal operating mode, this window shows measured humidity. In parameter setting mode, this window shows parameter value.
**Alarm indicator:** When the alarm is muted, the alarm indicator (the small dot on the last digit) will be on.
**SET key**: Access the program settings and parameter settings.
**UP key (Unmute)**: Increase the value. Press down momentarily to unmute the alarm.
**DOWN key (Mute)**: Decrease the value. Press down momentarily to mute the alarm.
**Temperature socket**: Supply power to heater/cooler.
**Temperature indicator**: Red LED indicator; it is on when the temperature socket is energized.
**Humidity socket**: Supply power to the humidifier/dehumidifier.
**Humidity indicator**: Green LED indicator; it is on when the humidity socket is energized.

## 4. Getting Started

### 4.1 Power up the controller and connect the sensor

To power up the controller, simply plug its power plug to a wall outlet. Then connect the 4-pin connector from the humidity sensor to the sensor input port on the bottom of the controller. Please align the notch on the sensor plug with the key on the sensor socket. You can refer to the Section 6 in the manual for details.

### 4.2 Displayed Information

The top LED window displays the measured temperature, and the bottom LED window displays the relative humidity reading. If sensor is not connected or defective, the controller will show "Err" in its display window.

There is one LED indicator on each side of the controller to show the output status of each output socket. The red LED on the left is for the temperature-control socket, and the green LED on the right is for the humidity-control socket.

### 4.3 Decide the Control Mode for Each Output Socket

The temperature-control socket can be set either to drive a heating device or to drive a cooling device. This temperature-control mode is determined by the parameter **tCM** (tCn), which can be set to "Ht" for heating, or "CL" for cooling.

Similarly, the humidity-control socket can be set either to drive a humidifying device or to drive a dehumidifying device. This humidity-control mode is determined by the parameter **hCM** (HCn), which can be set to "H" for humidifying, or "dEH" for dehumidifying.

The user should decide the appropriate configuration for each output socket based on the user's particular application. Please refer to section 4.5 and second 5 for details.

**4.4 Change the Setpoints**

The setpoint for temperature is **TSP** (tSP) and the setpoint for humidity is **HSP** (HSP). To access the setpoints, simply short-press the SET key, and then the top window will show tSP and the bottom window will show its value. Use UP or DOWN arrow keys to adjust the value, and short-press the SET key again to save the new value and go to the HSP setting. The way to adjust and save the setting is the same as for temperature setpoint. Once you press the SET key again, the controller will return to its normal operation mode. Please see Figure 2 for how to access the setpoints.

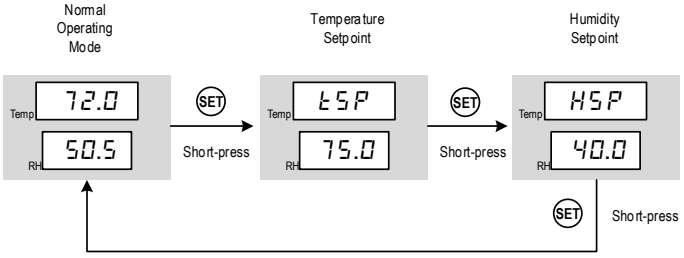



Figure 2. How to access setpoints.

**4.5 Adjust Parameters**

Other control parameters are grouped into three sub-menus: temperature (tE), humidity (Hu), and system (SYS)*. To access these parameters, long-press SET key for 3 seconds, the top window will show **EDT** (Edt). Then use UP or DOWN arrow key to select the sub-menu item (tE, Hu, or SYS) in the bottom window, then press SET key again to confirm the selection. Please see Figure 3 for how to access these parameters. The details for each parameter are explained in section 5.

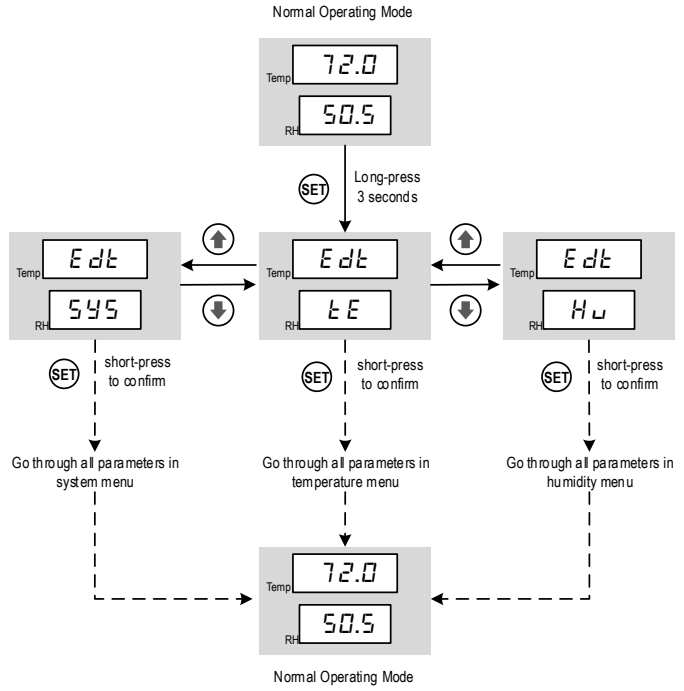



Figure 3. How to access parameter menus.

**5. Parameter Settings**

All parameters are listed in Table 1. When a parameter is displayed in the top window, its value is displayed in the bottom window. The user can use the UP or DOWN arrow key to adjust the value in the bottom window, then press the SEK key to save the new value and go to the next parameter. If no key is pressed for 10 seconds, the controller will exit to its normal operating mode.

Table 1. Parameters.

| Code | | Description | Setting Range | Initial | Note |
|---|---|---|---|---|---|
| **Short-Press SET Key** | | | | | |
| tSP | tSP | Temp. Setpoint | -40ºF ~ 176ºF<br>-40ºC ~ 80ºC | 75.0 | 1 |
| HSP | HSP | Humidity Setpoint | 0 ~ 99.9% RH | 40.0 | 1 |
| **Long-Press SEK Key** | | | | | |
| Edt | Edt | Edit parameters | **tE**: temperature menu<br>**Hu**: humidity menu<br>**SYS***: system menu | tE | 6 |
| **Temp. Control Settings (tE)** | | | | | |
| C-F | C-F | Temp. Unit | C: Celsius<br>F: Fahrenheit | F | 7 |
| tCM | tCn | Temp. Control Mode | Ht: heating mode<br>CL: cooling mode | CL | 1 |
| tdF | tdF | Temp. Control Differential | 0 ~ 50.0 | 3.0 | 1 |
| toF | toF | Temp. Calibration Offset | -10.0 ~ 10.0 | 0 | 2 |
| tAH | tAH | Temp. High Limit Alarm | -40ºF ~ 176ºF<br>-40ºC ~ 80ºC | 95.0 | 3 |
| tAL | tAL | Temp. Low Limit Alarm | -40°F ~ 176ºF<br>-40°C ~ 80ºC | 32.0 | |
| tAS | tAS | Temp. Anti-short Cycle Delay (only for cooling) | 0 ~ 12 min | 0 | 4 |
| tSF | tSF | Temp. Sensor Failure Operation | on: output energized<br>oFF: output de-energized | OFF | 5 |
| **Humidity Control Settings (Hu)** | | | | | |
| HCM | HCn | Humidity Control Mode | dEH: dehumidifying<br>H: humidifying | H | 1 |
| HdF | HdF | Humidity Control Differential | 0% ~ 50.0% | 3.0% | 1 |
| HoF | HoF | Humidity Calibration Offset | -10.0% ~ 10.0% | 0% | 2 |
| HAH | HAH | Humidity High Limit Alarm | 0% ~ 99.9% | 90.0% | 3 |
| HAL | HAL | Humidity Low Limit Alarm | 0% ~ 99.9% | 10.0% | |
| HAS | HAS | Humidity Anti-short Cycle Delay (only for dehumidifying) | 0 ~ 12 min | 0 | 4 |
| HSF | HSF | Humidity Sensor Failure Operation | on: output energized<br>oFF: output de-energized | OFF | 5 |
| HdM | HdN | Humidity Output Delay Mode | 0, 1, 2 | 0 | 8 |
| HdT | HdE | Humidity Delay Timer | 0 ~ 999 min | 5 | 9 |

| | | | | | |
|---|---|---|---|---|---|
| HoS | HoS | Humidity Operating Setpoint | -40°F ~ 176°F | 36 | 10 |
| Hob | Hob | Humidity Operating Band | 0°F ~ 200°F | 2 | 10 |
| **System Setting (SYS)** | | | | | |
| RLY[1] | rLY | Relay Configuration | T-H. TH-, -TH, A-A | T-H | 11 |
| VER[1] | uEr | Firmware Version | | 2.0.9 | 12 |
| RST | rSt | Factory Reset | N, Y | N | 13 |

***Note 1**: The parameter RLY and VER are only available in TH330B or in firmware version later than 2.0.9.*

***Details About Each Parameter***

**Note 1. tSP** and **HSP** are the setpoints for temperature-control and humidity-control respectively. **tdF** and **HdF** are the control-differential (i.e., control hysteresis band) to prevent the load being turned on and off frequently. These hysteresis bands are one-sided. **tCM** is the temperature control mode, which can be set to heating (HtE) or cooling (CtL). **HCM** is humidity control mode, which can be set to humidifying (H) or dehumidifying (dEH).

In the heating mode of the temperature-control channel, the controller will energize the output socket till the temperature rise to the setpoint tSP; the output socket will be energized again when the temperature drops below (**tSP** - **tDF**). In contrast, in the cooling mode of the temperature-control channel, the controller will energize the output socket till the temperature drops to the setpoint **tSP**; the output socket will be energized again when the temperature rises above (**tSP** + **tDF**). Please refer to the Figure 4 below when the output relay will be turned on.

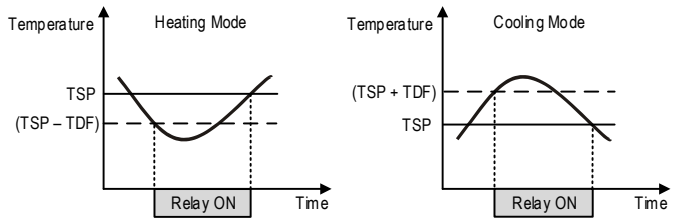



Figure 4. Temperature output is decided by **tSP** and **tDF**.

Similarly, in the humidifying mode of the humidity-control channel, the controller will energize the output socket till the temperature rise to the setpoint HSP; the output socket will be energized again when the temperature drops below (**HSP** - **HDF**). In contrast, in the dehumidifying mode of the humidity-control channel, the controller will energize the output socket till the humidity drops to the setpoint **HSP**; the output socket will be energized again when the humidity rises above (**HSP** + **HDF**). Please refer to the Figure 5 below when the output relay will be turned on.

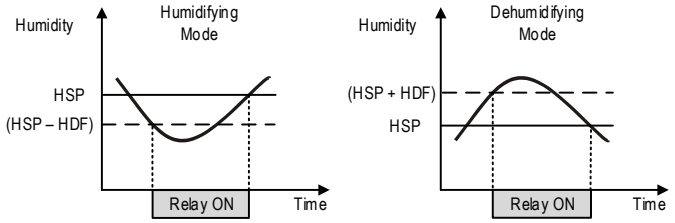



Figure 5. Humidity output is decided by **HSP** and H**DF**.

Small differential gives tight control. Large differential reduces the frequency of cycle on and off, and it will extend the life of relay and compressor.

**Note 2. toF** and **HoF** are the sensor calibration offset for temperature and humidity readings respectively. The offset is used to set an input offset to compensate the error produced by the sensor or input signal itself.

For example, for temperature reading, if the unit displays 37ºF when the actual temperature is 32ºF, setting parameter **toF** = - 5 will make the controller display 32ºF.

**Note 3.** The low limit alarm should be always lower than the high limit alarm. When the measured temperature is higher than **tAH**, the temperature high limit alarm will be on; when the measured temperature is lower than **tAL**, the temperature low limit alarm will be on.

Similarly, for humidity readings, when the measured humidity is higher than **HAH**, the humidity high limit alarm will be on; when the measured humidity is lower than **HAL**, the humidity low limit alarm will be on.

When an alarm is on, the display will be flashing between the measured value and the alarm type. To mute the alarm, press the DOWN key momentarily. When the alarm is muted, the alarm indicator (see Figure 1, the small dot on the last digit) will be lit. If the measured value gets out of the alarm zone then gets back to the alarm zone again, the alarm will be on again. To resume the alarm, press the UP key, the alarm indicator should turn off.

To disable the alarm, set High Limit Alarm = Low Limit Alarm. For example, you can set both **tAH** and **tAL** to 32°F, so the temperature alarm will be disabled.

**Note 4.** The parameter **tAS** and **HAS** are Anti-Short Cycle Delay for cooling and dehumidifying respectively. The controller is used for cooling or dehumidifying control, and the load is a compressor, use the parameter **tAS** or **HAS** to prevent the compressor being turned on again when it is at high pressure (i.e., just after it is turned off). Otherwise, it may shorten the life of compressor. The Anti-Short Cycle Delay function is used to prevent the rapid cycling of the compressor. It establishes the minimum time that the output contact remains open (after reaching cutout) before closing again. The delay overrides any load demand and does not allow the output contact to close until the set time-delay value has elapsed. It gives time to release the refrigerant pressure through evaporator. It is typically set to 4 - 6 minutes.

**Note 5.** Parameter **tSF** and **HSF** are the Sensor Failure Operation for temperature and humidity control respective, they can be set to ON or OFF.

When it is set to ON, the output will always be on when the sensor fails; when it is set to OFF, the output will always be off when the sensor fails.

For example, when the unit controls a refrigerator for food, you may want to set the **tSF** to ON if the sensor fails to keep the food cold. When it controls a heater, you may want to set the **tSF** to OFF for safety purpose.

**Note 6. EDT** is the menu-editing parameter. Select **tE** menu for temperature control settings; select **Hu** menu is for humidity control settings, and select **SYS** is for system settings.

**Note 7. C-F** is the parameter to set the temperature unit: **C** is for Celsius, and **F** is for Fahrenheit.

**Note 8.** The parameter **HdM** sets the mode for delaying or constraint the humidity output. It has three available modes, which are listed and explained in the table below.

Table 2. Humidity output delay mode.

| HdM | Mode | Details |
|---|---|---|
| 0 | No delay | Default value. No delay or constraint on the humidity output. |
| 1 | Time-delay | Delay the humidity output by a timer set by **HdT**. |
| 2 | Temperature-range | Allow humidity output only when the temperature is within a range defined by parameter **HoS** and **HoD**. |

In situations such as controlling a curing chamber converted from a fridge, there is usually a big decrease in the relative humidity (RH%) whenever the compressor of the fridge is working. Also, there can be big increase in the relative humidity when the user opens the door of the fridge. This kind of change in RH% can gradually recover. However, if the controller's humidity control kicks in right away, it creates in a big swing in the RH%.

Using time-delay (**HdM** = 1) or temperature-range constraint (**HdM** = 2) can help users to reduce the RH% swing.

**Note 9.** The parameter **HdT** sets the delay timer for humidity output, it can be set from 0 to 999 minutes. When **HdM** is set to "1", the output to the humidity control will be delayed for a time period set by **HdT**.

Please note, the **HdT** is effective in both humidifying and dehumidifying mode. In dehumidifying mode, the actual delay time of the humidity output is decided either by either **HAS** or **HdF**, whichever is longer.

**Note 10.** The parameter **HoS** and **Hob** set up a temperature range within which the humidity output is enabled. **HoS** defines a temperature setpoint for enabling humidity output, i.e., a lower boundary; and **Hob** defines the temperature band. Please see the diagram in Figure 6 for how these two parameters affect the humidity output.

For example, when HdM = 2, HoS = 36°F, and HoB = 2°F, that means when the temperature is below 36°F or above 38°F the humidity output won't be activated even when the controller calls for output to the humidity channel.

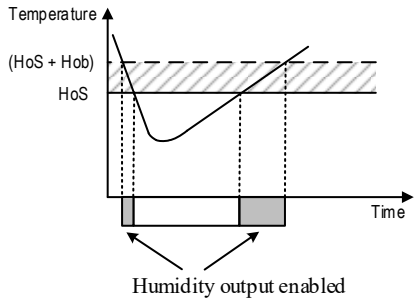



Figure 6. When the humidity output delay mode is **HdM** = 2, the humidity output is allowed only when the temperature is within the range set by **HoS** and **HoD**.

**Note 11. RLY** is the parameter that allows a user to reconfigure the output relays. The available settings and the corresponding functions are described in Table 3.

By the factory default, the socket on the left is for temperature controlling and the socket on the right is for humidity controlling. This configuration works well for situations where a user uses one device on each output channel, for example, plugging in a small heater to the temperature control channel and a small humidifier to the humidity control channel. However, in some situations a user may want to have both output channels to drive the same device. For example, a user may want to start the same ventilation fan either when the temperature reading or when the relative humidity meets certain threshold.

By changing the setting of **RLY**, a user can determine how the temperature control output and the humidity control output are assigned to these output sockets. The table below listed the available settings and the corresponding output configurations. Setting **RLY** to "TH-" means assign both channels' output to the left socket; the left socket will be energized when either one of the channels is calling for an action. Similarly, setting **RLY** to "-TH" means assign both channels' output to the right socket; the right socket will be energized when either one of the channels is calling for an action. Setting **RLY** to "A-A" means both sockets will be energized when either one of the channels is calling for an action.

Table 3. Relay/Sockets Configuration.

| RLY Setting | Symbol | Description |
|---|---|---|
| T-H | E-H | The temperature output will energize the left socket.<br>The humidity output will energize the right socket.<br>This is the factory default setting. |
| TH- | EH- | Either the temperature output or the humidity output will energize the left socket.<br>No power to the right socket. |
| -TH | -EH | No power to the left socket.<br>Either the temperature output or the humidity output will energize the right socket. |
| A-A | A-A | Either the temperature output or the humidity output will energize both sockets. |

**Note 12. VER** is a display only parameter, which shows the current firmware version number.

**Note 13**. **RST** is the parameter that allow a user to reset all parameters to the factory default values. Choose “n” to take no action. Chose “y” to reset all parameters back to factory settings.

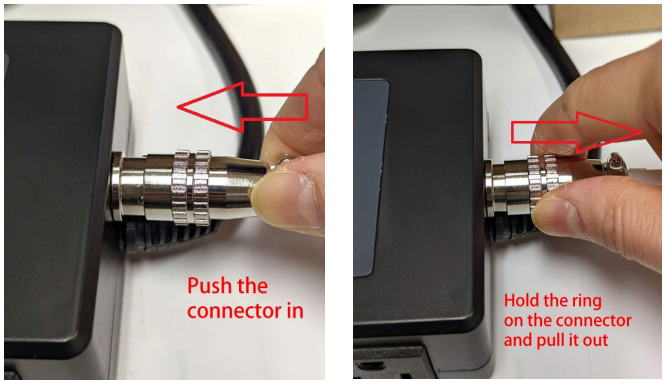
**6. Connecting a Sensor to the Controller**

The controller has a 4-pin male connector installed on its bottom, just above the power cord. A pairing female 4-pin connector is installed on one end of the sensor cable.

A pair of sensor connectors has a key on the male connector (Figure 7(a)) and the notch on the female connector (Figure 7(b)) to help align the connectors. The female connector also has a spring lock mechanism that helps to prevent accidental disconnections.

(a) (b)

*Figure 7. (a) The key on the male connector on the controller. (b)The notch on the female connector on the sensor cable.*




(a) (b)

*Figure 8. (a) To plug in the sensor connector, push from the connector behind the ring. (b) To unplug a sensor connector, hold the ring on the connector and pull it out.*

To install the sensor to the controller: 1) identify the key on the male connector (Figure 7(a)) and the notch on the female connector (Figure 7(b)); 2) hold the tail of the female connector, align the notch and the key, and push the female connector forward (Figure 8(a)). To remove the connector, hold the spring-loaded collar on the female connector and pull it back. Please see Figure 8(b).

(END)

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