**Introduction**
The RH/T transmitter incorporates two sensors in one attractive wall mount enclosure for the most efficient environmental monitoring and control system. It uses a field-proven RH sensor to monitor relative humidity and a curve-matched thermistor to measure temperature. Two setpoint controls are also available for temperature and RH adjustment. The device may also include an occupancy override button and an external communication jack. Both measurements and setpoint signals are available on separate outputs as linear 4-20 mA, 0-5 or 0-10 Vdc signals.
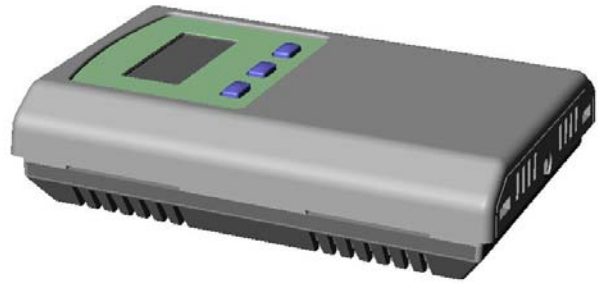
Several configurations of the device are available with one to four outputs as required. An LCD is included for configuration and local indication of all parameters. Several operating parameters can be programmed using a keypad for specific applications including four temperature ranges and C/F display.

Before Installation
Read these instructions carefully before installing and commissioning the device. Failure to follow these instructions may result in product damage. Do not use in an explosive or hazardous environment, with combustible or flammable gases, as a safety or emergency stop device or in any other application where failure of the product could result in personal injury. Take electrostatic discharge precautions during installation and do not exceed the device ratings.

Mounting
The room type sensor installs directly on a standard electrical box and should be mounted about five feet from the floor of the area to be controlled. Do not mount the sensor near doors, opening windows, supply air diffusers or other known air disturbances.

The cover is hooked to the base at the top edge and must be removed from the bottom edge first. Use a small screwdriver to carefully pry each bottom corner if necessary. If a security screw is installed on the bottom edge, then it may have to be loosened or removed also. Tip the cover away from the base and sit it aside.

The pcb must be removed from the base to access the mounting holes. Follow usual anti-static procedures when handling the pcb and be careful not to touch or bend the sensors. The pcb is removed by pressing the tab on the enclosure base to unsnap the latch near the bottom edge, then the pcb can be lifted out of the base. Sit the pcb aside until the base is mounted on the wall.

After the base is screwed to an electrical box or the wall using the appropriate holes, pull the wires through the wiring hole in the center of the pcb and then gently reinstall it in the enclosure base. Ensure the pcb is snapped into the base securely and correctly. The mounting hole locations are shown in the following drawing.

Remove cover from base

Un-snap pcb

2.3"
58 mm

3.25"
83 mm
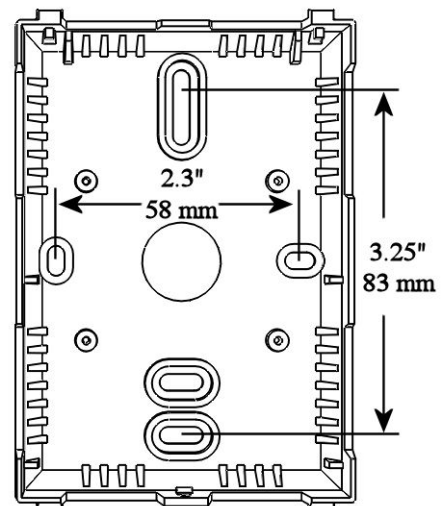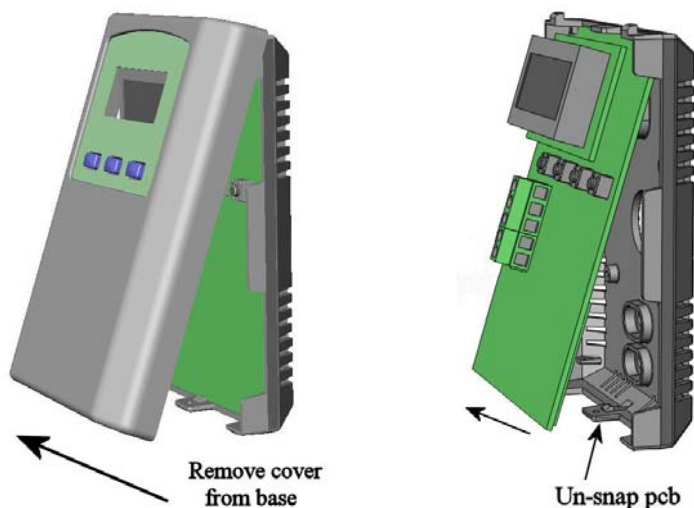
Wiring

Deactivate the 24 Vac/dc power supply until all connections are made to the device to prevent electrical shock or equipment damage. Follow proper electrostatic discharge (ESD) handling procedures when installing the device or equipment damage may occur.

Use 22 AWG shielded wiring for all connections and do not locate the device wires in the same conduit with wiring used to supply inductive loads such as motors. Connect the cable shield to ground at the controller only. Make all connections in accordance with national and local codes.

This is a sourcing device and requires from 3 to 14 wires to implement all the features. Connect the plus dc or the ac voltage hot side to the **POWER** terminal. The power supply common is connected to the **COMMON** terminal. The device is reverse voltage protected and will not operate if connected backwards. It has a half-wave power supply so the supply common is the same as the signal common. Several devices may be connected to one power supply and the output signals all share the same common. Use caution when grounding the secondary of a transformer or when wiring multiple devices to ensure the ground point is the same on all devices and the controller.

The analog outputs are available on the **RH OUT**, **TEMP OUT**, **TEMP SET** and **RH SET** terminals. For 4-20 mA output type, all outputs operate in the Active mode and do not require a loop power supply. This means **the signal current is generated by the transmitter and must not be connected to a powered input or device damage will result.** Check the controller Analog Input to determine the proper connection before applying power. All output signals are referenced to the **COMMON** terminal. The analog output signals are typically connected directly to the Building Automation System and used as control parameters or for logging purposes.

The device is also available with field-selectable 0-5 or 0-10 Vdc voltage signal outputs which connect directly to a high impedance analog input. In either case the terminal designations are the same and the signals are referenced to **COMMON.**

The **OCC IN** terminal is a digital input that controls the OCC segment on the LCD to indicate an occupied condition. It can be connected to a 0/5V digital signal or a dry contact signal. This is usually an active low input signal and requires that the OCC IN terminal be shorted to COMMON to activate the input.

The override switch output is a dry-contact and is available on the **SWITCH +** and **SWITCH –** terminals. It is typically connected to a low-voltage digital input on the controller to indicate room occupancy or override when the button is activated.

The resistive fan speed output signal is available on the **FAN +** and **FAN –** terminals and has five positions.

The external jack is internally connected to a three-pin terminal block labeled **RING**, **MID** and **TIP** to accept a stereo phono plug for remote communication with the controller.

Start-up

Verify that the transmitter is properly wired and connections are tight. Apply power and note that the LCD will begin displaying the RH and temperature levels (if configured for both). The display normally toggles between the two values on a 2 second interval. All the output signals will also be available immediately after start-up.

LCD Display

If the device has both RH and temperature signals, then the multi-function display is factory set to display both measurement values at two second intervals. The RH will be displayed as 0 - 100 %RH for two seconds and then the temperature will be displayed as 0.0 - 35.0 °C for two seconds. This cycle will repeat constantly.

If the device is only configured for one parameter, RH or T, then only one parameter will be displayed continuously. The Setup Menu can be used to modify the displayed information. For RH and T devices, the installer can select to only display RH or temperature continuously. The device supports four temperature ranges that may also be selected in the menu. The default is 0-35 °C but this may be changed to 32-95 °C and the output signal will stay the same. Also, the temperature range may be changed to 32-122 °F or 0-50 °C and the output signal scaling will change to match the display.

Outputs **(Available outputs depend on the configuration)**
The RH output is scaled such that 4-20 mA (or 0-5 or 0-10 Vdc) equals 0-100 %RH and is temperature compensated over the full 0-50 °C temperature range. The temperature output is scaled such that 4-20 mA (or 0-5 or 0-10 Vdc) equals either 0-35 °C, 32-95 °F, 0-50 °C or 32-122 °F depending on which range is selected in the menu. The factory default range is 0-35 °C.

In addition, there may also be one or two setpoint output signals. These outputs are also 4-20 mA (or 0-5 or 0-10 Vdc). Scaling is determined by parameters set in the Setup Menu. If available, the temperature setpoint signal factory defaults to 22 ± 5 °C. In this case, a setpoint equal to 22 °C would cause an output signal of 12 mA or 50% of the range (4-20 mA). Each step up or down will cause a proportional change in the output to either 20 mA or 4 mA. Both the midpoint and the range can be configured in the menu. The midpoint may be changed from 18-27 °C or 65-80 °F and the range can be changed from ± 2 to ± 10 °C or ± 5 to ± 20 °F. The display and output scaling will change to match the selected range.

The following table shows the changes that would result from ± 5 ° range on the setpoint control with a midpoint of 22 °C:

	Setpoint Temperature	**4-20 mA Device**	**0-5 Vdc Device**	**0-10 Vdc Device**
-5	17 °C	4.0 mA	0.0 Vdc	0 Vdc
-4	18 °C	5.6 mA	0.5 Vdc	1 Vdc
-3	19 °C	7.2 mA	1.0 Vdc	2 Vdc
-2	20 °C	8.8 mA	1.5 Vdc	3 Vdc
-1	21 °C	10.4 mA	2.0 Vdc	4 Vdc
Midpoint	22 °C	12.0 mA	2.5 Vdc	5 Vdc
+1	23 °C	13.6 mA	3.0 Vdc	6 Vdc
+2	24 °C	15.2 mA	3.5 Vdc	7 Vdc
+3	25 °C	16.8 mA	4.0 Vdc	8 Vdc
+4	26 °C	18.4 mA	4.5 Vdc	9 Vdc
+5	27 °C	20.0 mA	5.0 Vdc	10 Vdc

The RH setpoint operates in a similar manner. The factory default midpoint is 45 %RH and the range is ± 10 %RH to result in a control of 35, 36, 37 .... 53, 54 and 55 %RH. The output signal is scaled the same as shown above. Again, the midpoint may be change in the menu from 20-70 %RH and the range can be either ± 5, ± 10 or ± 20 %RH.

Note that all programmed parameters and the actual setpoint values are saved in non-volatile memory so the device will remember the settings after a power-outage.

Setpoint Operation **(Depends on the hardware configuration)**
The device may have 0, 1 or 2 setpoint controls. If the device has no setpoint control, then the UP and DOWN buttons will not be available to the user and the device will only display RH or T or both and will only have the corresponding outputs.

If the device has a setpoint control, RH or T or both, then the unit will have two buttons labeled UP and DOWN for setpoint adjustment. During normal operation, the LCD displays either RH or T or both depending on the hardware configuration and program settings. When either the UP or DOWN buttons are pressed the display will change to setpoint mode (indicated by a flashing display). The display will show the previous setpoint setting such as 22.0 °C or 72.0 °F for temperature setpoint or 45 %RH for humidity setpoint. If no other action is taken for 5 seconds then the device will reset to normal operation. While the display is still flashing the setpoint can be modified by pressing the UP or DOWN buttons to increase or decrease the setpoint value. The LCD will update to show the new setpoint and the output signal will update accordingly. When the desired setpoint is shown on the LCD, leave the unit for 5 seconds to reset to normal operation and save the new setting. Note that the setpoint can only be set around the programmed midpoint and within the programmed range as set in the menu.

If the device has two setpoint controls, for both RH and T, then the UP and DOWN buttons have two functions. Operation is the same as described above except the device will show the main (default is temperature) setpoint first when either UP or DOWN is pressed. The main setpoint may be modified at this time by using the UP or DOWN buttons as before. To access the secondary (default is RH) setpoint, press and hold either the UP or DOWN buttons for 5 seconds and the device will enter the secondary setpoint mode. Then the second setpoint may be modified with the UP or DOWN buttons. All setpoint changes are saved on exit after 5 seconds. The main and secondary setpoints can be assigned in the menu.

Setup Menu
The menu has several items as shown below and the device cover must be removed to access the menu. To enter the menu, press and release the <MENU> key while in normal operation. This will enter the Setup Menu step 1, pressing the <MENU> key a second time advances to step 2. Each press of the <MENU> key advances the menu item. No values are changed by using the <MENU> key but the previous value is saved, so any changes made will be saved by pressing the <MENU> key. The <UP> and <DOWN> keys are used to make changes to program variables by scrolling through the available options. When a value is changed, use the <MENU> key to save it to memory and advance to the next menu item.

Setup Menu operation is explained below and the factory default values are shown. Note that some items that are not applicable to the hardware configuration are skipped in the menu so the menu may skip from item 4 to item 6 for example.

<MENU>   Press and release the <MENU> key to enter the Setup Menu
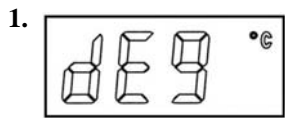
**1.**   C/F   The temperature scale defaults to Celsius (°C). It can be changed to Fahrenheit (°F) by using the <UP> or <DOWN> keys. This item is not shown for RH + RH Setpoint models. This setting will effect other parameters.

<MENU>
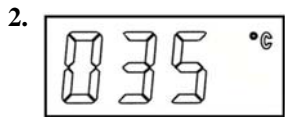
2.   Temperature Range
               Two temperature ranges are available for both °C and °F, 0-35 °C (32-95 °F) or 0-50 °C (32-122 °F). This can be changed with <UP> or <DOWN>. This item is not shown for RH + RH Setpoint models and depends on the C/F setting.
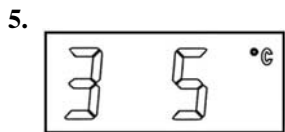
<MENU>
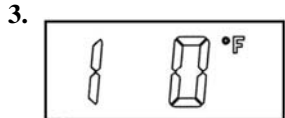
3.   Temperature Offset
               Use <UP> or <DOWN> to add or subtract an offset to the temperature output signal and display. The default is 0 but can be changed from –9 to +9 °F for temperature calibration. Not shown for RH + RH Setpoint models.

<MENU>
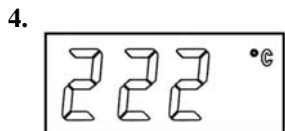
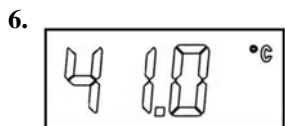**4.**   Temperature Setpoint Midpoint
               The default temperature setpoint midpoint is 22 for °C or 72 for °F. This can be changed using <UP> or <DOWN> to 18-27 °C or 65-80°F. The display and values depend on the C/F setting. Only shown for T Setpoint models.

<MENU>

5.   Temperature Setpoint Range
               The default temperature setpoint range is ± 5 for °C and ± 10 for °F. This can be changed using <UP> or <DOWN> to ± 2 to ± 10 for °C or ± 5 to ± 20 for °F. Values and display depend on C/F setting. Only shown for T Setpoint models.

<MENU>

6.   Temperature Setpoint Resolution
               The default temperature setpoint resolution is 1.0 °C or 1.0 °F. This can be changed using <UP> or <DOWN> to 0.5 °C or 2.0 °F. Values and display depend on the C/F setting. Only shown for T Setpoint models.
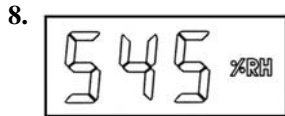
<MENU>

7.

`0 %RH`

<MENU>
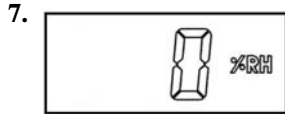
RH Offset
Use <UP> or <DOWN> to add or subtract an offset to the RH output signal and display. The default is 0 but can be changed from –20 to +20 %RH for humidity calibration. Not shown for T + T Setpoint model.
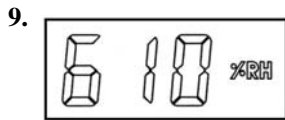
8.

`545 %RH`

<MENU>

RH Setpoint Midpoint
The default RH setpoint midpoint is 45 %RH. This can be changed using <UP> or <DOWN> from 20-70 %RH. Only shown for RH Setpoint models.
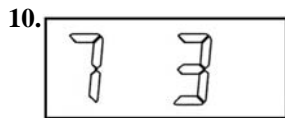
9.

`610 %RH`

<MENU>

RH Setpoint Range
The default RH setpoint range is ± 10 %RH. This can be changed using <UP> or <DOWN> to ± 5 or ± 20 %RH. Only shown for RH Setpoint models.

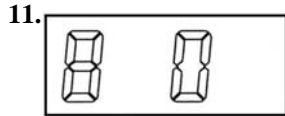**10.**

`7 3`

<MENU>

Display Mode
Select parameters to display on the LCD. 1 = Temperature only, 2 = RH only and 3 = T + RH alternately every 2 seconds. Change with <UP> or <DOWN>. Default is 3 for RH and T. Only shown for models with RH and T.

11.

`8 0`

<MENU>

Default Setpoint
Default is 0 for main setpoint = Temperature, secondary setpoint = RH. Change with <UP> or <DOWN> to 1 to reverse the two setpoints. This only applies for models with two setpoints.

12.

`9 5`

<MENU>
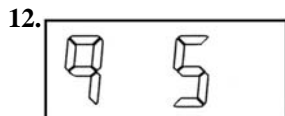
Output Signal
Default is 5 for 0-5 Vdc output signal. Can change with <UP> or <DOWN> to 10 for 0-10 Vdc outputs. This only applies for models with voltage outputs.

13.

`Lo occ`

<MENU>
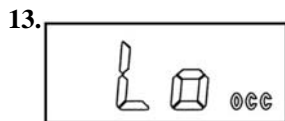
OCC Reverse
The default OCC signal type is active low (Lo). Can change with <UP> or <DOWN> to active high (HI) to reverse the OCC action. By default, shorting the OCC input to common will turn on the OCC LCD segment.

14.

`bL1`

<MENU>
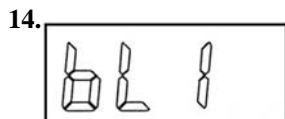
Backlight Enable
Use the <UP> or <DOWN> keys to enable or disable the LCD backlight. bL1 = backlight on, bL0 = backlight off.

<MENU>   Exits the Setup Menu and returns to normal operation.

Specifications

|		
Temperature	Sensor	10K Ohm Type 7 Curve matched thermistor
	Accuracy	±0.1 °C (±0.18 °C)
	Range	0 to 35 °C (32 to 95 °F) or 0 to 50 °C (32 to 122 °F) programmable
	Offset	±9 °F programmable
	Display Units	°C or °F programmable
	Display Resolution	0.5° < 100°, 1° > 100°
RH	Sensor	Thermoset polymer based capacitive
	Accuracy	±1% (30 to 70% RH) or ±2% (5 to 95% RH)
	Range	0 to 100 %RH
	Temperature Compensation . .	0 to 50 °C (32 to 122 °F)
	Hysteresis	±3 %RH
	Response Time	15 seconds typical
	Stability	±1.2 %RH typical @ 50 %RH in 5 years
	Offset	±20 %RH programmable
Temp Setpoint	Midpoint	18 to 27 °C or 65 to 80 °F programmable
	Range	±2 to ±10 °C or ±5 to ±20 °F of the midpoint programmable
	Resolution	0.5 or 1.0 °C and 1.0 or 2.0 °F programmable
RH Setpoint	Midpoint	20 to 70 %RH programmable
	Range	±5, ±10 or ±20 %RH of the midpoint programmable
	Resolution	1 %RH
Override	Front panel push-button available as dry-contact two-wire output	
	N.O., 50 mA @ 12 Vdc	
Communication	3.5 mm phono jack	Connects to 3-pin terminal block (Ring, Tip, Mid)
Fan Speed Switch	Range	Off, Auto, Low, Medium, High
	Signal	0, 2, 4, 6 and 8K standard, two-wire output (other values available)
Occupied Input	Signal Type	Digital input, 0/5 Vdc or dry contact to common
	Logic	Active low or active high programmable
	Action	Causes "OCC" segment to light on LCD
LCD Display	Display Size	38.1 x 16.5 mm (1.5" w x 0.65" h)
	Digit Height	11.43 mm (0.45")
	Symbols	°F, °C, %RH, OCC
	Backlight	Enable or disable via menu
General	Power Supply	24 Vac/dc ± 10% (non-isolated half-wave rectified)
	Consumption	20 mA + (20 mA x number of outputs) max @ 24 Vdc
	Input Voltage Effect	Negligible over specified operating range
	Protection Circuitry	Reverse voltage and MOV protected, output limited
	Output Signals	4-20 mA active (sourcing) or 0-5/0-10 Vdc (specify when ordering)
	Output Resolution	10 bit for all signals
	Output Drive Capability	550 ohm max for 4-20 mA, 10 Kohm min for voltage
	Programming and Selection . .	Via pushbuttons and on-screen menu
	Operating Conditions	0 to 50 °C (32 to 122 °F), 0 to 95 %RH non-condensing
	Wiring Connections	Screw terminal block (14 to 22 AWG)
	Enclosure	Wall mount, 84 x 117 x 29 mm (3.3"w x 4.6"h x 1.15"d)
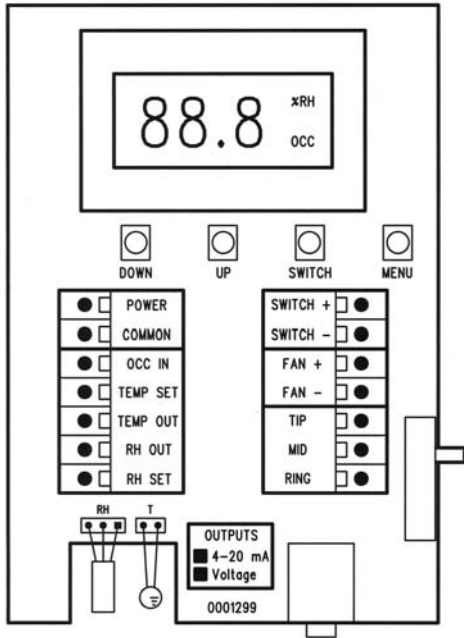
Terminal	Function
POWER	From +24 Vac/dc of controller or power supply
COMMON	To GND or COMMON of controller
OCC IN	From digital output of controller
TEMP SET	Temperature setpoint to analog input of controller 4-20 mA or 0-5/0-10 Vdc
TEMP OUT	Temperature output to analog input of controller 4-20 mA or 0-5/0-10 Vdc
RH OUT	RH output to analog input of controller 4-20 mA or 0-5/0-10 Vdc
RH SET	RH setpoint to analog input of controller 4-20 mA or 0-5/0-10 Vdc
SWITCH +	Override switch + to digital input of controller
SWITCH -	Override switch - to COMMON of controller
FAN +	Fan speed switch + to analog input of controller
FAN -	Fan speed switch - to COMMON of controller
TIP	External jack TIP (tip of plug) connection
MID	External jack MID (middle of plug) connection
RING	External jack RING (base of plug) connection