



**WARNING**



**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

**Failure to follow these instructions can result in death, serious injury or equipment damage.**

This product is intended for use in HVAC and building environmental control applications. It is not intended for direct medical monitoring of patients. It is not intended for life-safety applications. Read and understand these instructions before installing this product. The installer is responsible for all applicable codes. If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired. No responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

## CW2 Analog Series

### Wall Mount Air Quality Sensors

### Product Overview

The CW2 Series of air quality sensors for living space is a flexible multi-sensor platform for use with BAS controllers designed to accept 4 to 20mA, 0 to 5Vdc or 0 to 10Vdc outputs. CW2 Series sensors are available with three user interface options: touchscreen, LCD with three buttons and blank. CO2 and temperature sensors are included with all CW2 Series air quality sensors. Models with VOC sensors and relative humidity sensors are also available.

### Product Identification

User Interface	Output	RH Accuracy <sup>1</sup>	Temperature	VOC Sensor
CW2 <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T = Color touchscreen L = 3-button LCD display X = None <sup>2</sup>	A = Analog output	2 = 2% X = None <sup>2</sup>	A = Transmitter C = 1000 PT RTD D = 10K T2 thermistor H = 10K T3 thermistor K = 10K curve G/11K shunt M = 20K NTC thermistor N = 1.8K TAC thermistor	V = NDIR CO <sub>2</sub> /VOC <sup>3</sup> = None

1. Replaceable RH module available to be ordered separately per table below.
2. For analog non-display, non-RH models with RTD/thermistor, order from the CWE2 line.
3. VOC only available with temperature transmitter option.

### Replaceable RH Elements

Model	Description	Temp. Calibration	RH Calibration
HS1N	Replaceable RH sensor, 1% with NIST certificate	N/A	2-point calibration
HS2N	Replaceable RH sensor, 2% with NIST certificate	N/A	2-point calibration
HS2X	Replaceable RH sensor, 2%	N/A	2-point calibration

### Specifications

OPERATING ENVIRONMENT	
Input Power	Class 2; 20 to 30 Vdc, 24 Vac, 50 to 60 Hz
Analog Output	Selectable 4 to 20 mA, 0 to 5 V, 0 to 10 V
Operating Temp. Range	0 to 50 °C (32 to 122 °F)
Operating Humidity Range	0 to 95% RH non-condensing
Housing Material	High-impact ABS plastic
Terminal Block Torque	0.5 to 0.6 N-m (0.37 to 0.44 in-lbf)
IP Rating	IP 30
Mounting Location	For indoor use only. Not suitable for wet locations.
Surface Mount	The device can be surface mounted on Single Gang J-Box, British Standard and CE60 wall boxes

## Specifications (cont.)

CO <sub>2</sub> TRANSMITTER			
Sensor Type	Non-dispersive infrared (NDIR), diffusion sampling		
Output Range	0 to 2000/5000 ppm (selectable)		
Accuracy	±30 ppm ±3% of measured value		
Repeatability	±20 ppm ±1% of measured value		
Response Time	<60 seconds for 90% step change		
VOC TRANSMITTER OPTION			
Sensor Type	Solid state		
Output Range	0 to 100% AQI for VOC		
Accuracy	±15% of measured value		
Output Scale	0 to 1,000 ppb of total VOC (TVOC)		
	Level	Ventilation Recommendation	TVOC (ppb)
AQI Table*	>61%	Greatly increased	>610
	20 to 61%	Significantly increased	200 to 610
	10 to 20%	Slightly increased	100 to 200
	5 to 10%	Average	50 to 100
	0 to 5%	Target value	0 to 50
RH TRANSMITTER OPTION			
HS Sensor	Solid state capacitive, replaceable		
Accuracy (Includes Hysteresis)**	±3.8% RH from 10 to 60% RH @ 25°C (77 °F) ±4.8% RH from 60 to 80% RH @ 25°C (77 °F) ±5.8% RH from 80 to 100% RH @ 25°C (77 °F)		
Hysteresis	1.5% typical		
Stability	±1% @ 20°C (68 °F) annually for 2 years		
Output Range	0 to 100% RH		
Temperature Coefficient	±0.1% RH/°C above or below 25 °C (77 °F) typical		
TEMPERATURE TRANSMITTER OPTION			
Sensor Type	Solid state, integrated circuit		
Accuracy	±0.2 °C (±0.4 °F) typical		
Resolution	0.1 °C (0.1 °F)		
Range	0 to 50 °C (32 to 122 °F)		
DISPLAY MODELS			
Touchscreen	61 mm (2.4 in), color, backlit, capacitive, 240x300 px Setpoint: 0-10Vdc. Temperature, humidity or fan speed selectable Timeout override: Display timeout*** Lockout override: Touchscreen/button lockout***		
LCD	52mm (2.05 in), segmented with 3 buttons Setpoint: 0-10Vdc. Temperature, humidity or fan speed selectable Timeout override: Display timeout*** Lockout override: Touchscreen/button lockout***		
SETPOINTS****			
Temperature Setpoint	0 to 10V output Scale: 10 to 35 °C (50 to 95 °F) / 0 to 50 °C (32 to 122 °F)		
Humidity Setpoint	0 to 10V output Scale: 0 to 100% RH		
Fan Speed Setpoint	0 to 10V output Off 0V, Auto 1.5V, Low 3.3V, Med. 6.7V, High 10.0V		

Specifications (cont.)

OVERRIDE	
Override Button	Display models feature a momentary-to-ground override button
WIRING TERMINALS	
Terminal Blocks	Screw terminals, 18-24 AWG
Screw Terminal Torque	0.2 N-m (2.0 in-lbF) max.
WARRANTY	
Limited Warranty	5 years
COMPLIANCE INFORMATION	
Agency Approvals	UL 916 European Conformance CE: EN 60730-1, EN 60730-2-9, EN 60730-2-13, EN 61000-6-2, EN 61000-6-3, EN 61000 Series - Industrial Immunity, EN 61326-1 FCC Part 15 Class B, REACH, RoHS, RCM (Australia), ICES-003 (Canada), UKCA (UK)

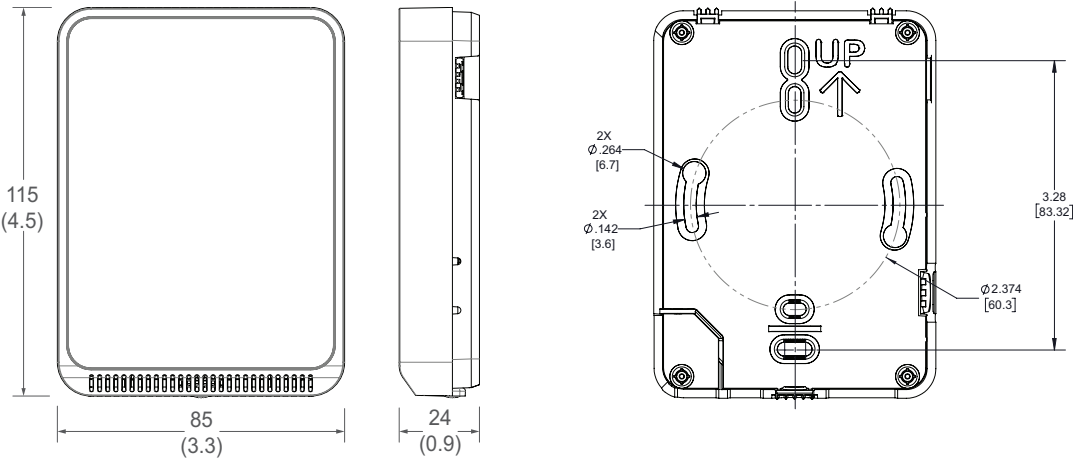
\* Air Quality Index for VOC aligns with TVOC levels for IAQ as specified by the WHO (World Health Organization).

\*\* Humidity sensor overall accuracy should include: accuracy, temperature coefficient and stability. Humidity accuracy is shown as an absolute value, so if testing accuracy with a hand-held device, you must check for deviation in its readings instead of calculating the percentual deviation. Additionally, you must consider the overall accuracy of the hand-held device in the comparison.

\*\*\* DIP switch selectable.

\*\*\*\* One setpoint type is selectable via DIP switch on display models only.

Dimensions



Functions

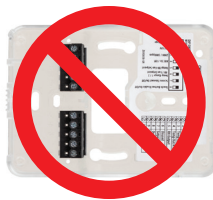
The CW2 Series sensor measures CO2, VOC (if equipped), RH (if equipped) and temperature in a room and provides analog outputs to a controller.

## Installation

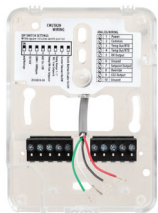
1. Remove the cover from the base at the bottom of the device.



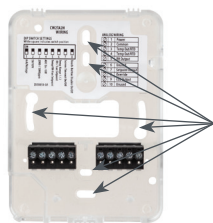
2. Position the sensor base vertically on the wall 1.35 m (4.5 ft.) above the floor with the “UP” arrow facing upward. Locate away from windows, vents and other sources of draft. If possible, do not mount on an external wall, as this may cause inaccurate temperature readings.



3. Pull 18 or 22 AWG cable(s) through the hole in the backplate.

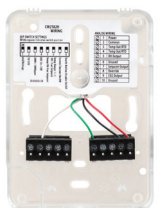


4. Mount the backplate onto the wall using the screws provided.



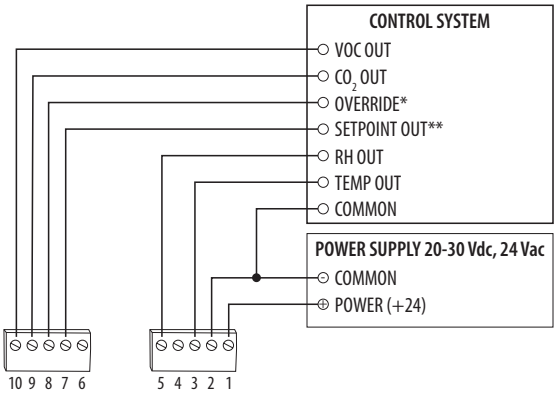
Six screw holes available. Use a minimum of two for secure mounting.

5. Connect the wires to the screw terminals. Do not over-tighten the screws.

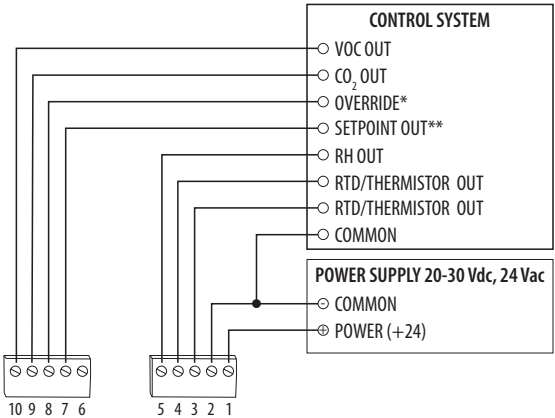


Installation (cont.)

Wiring for models with temperature transmitter:.



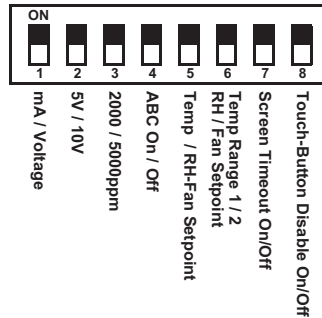
Wiring for models with RTD/thermistor:



\* Momentary to ground.  
\*\* 0-10V DIP switch selectable for temperature, RH (if equipped) or fan speed (off, 0V, Auto 1.5V, Low 3.3V, Medium 6.7V or high 10V).

## Installation (cont.)

6. Set the DIP switches.



Switch	Function	Description
1	Output mode	ON - 4-20mA output mode enabled OFF - Voltage output mode enabled
2	Voltage output range*	ON - 0-5V output range enabled OFF - 0-10V output range enabled
3	CO <sub>2</sub> output range	ON - 0-2000 ppm CO <sub>2</sub> output range enabled OFF - 0-5000 ppm CO <sub>2</sub> output range enabled
4	Automatic Baseline Calibration (ABC) for CO <sub>2</sub>	ON - ABC enabled OFF - ABC disabled
5	Setpoint output type	ON - Temperature setpoint enabled (temp range selected on DIP switch 6) OFF - RH or Fan Speed setpoint enabled (specific setpoint output type to be selected on DIP switch 6) Models without RH option select only temp or fan setpoint
6	Setpoint output temperature range or RH/Fan Speed output type	Temperature setpoint (must be enabled on DIP switch 5) ON - Temp range 1, 50 to 95 °F (10 to 35 °C) enabled OFF - Temp range 2, 32 to 122 °F (0 to 50 °C) enabled
		RH or Fan Speed setpoint (must be enabled on DIP switch 5) ON - RH setpoint enabled OFF - Fan Speed setpoint enabled Models without RH option, set to OFF
7	Display times out and turns off after 6-10 seconds of touchscreen/button press	ON - Display Timeout enabled OFF - Display Timeout disabled
8	Touchscreen touch functions and buttons are disabled	ON - Touchscreen touch/button functions disabled OFF - Touchscreen touch/button functions enabled

\* Only used with voltage output mode enabled. Not applicable to setpoint output. Setpoint is 0-10V fixed.

7. With sensor base fully installed, align top of cover to mounting tabs on top of sensor base. Swing cover downward until it latches at the bottom.



## Installation (cont.)

8. Install locking screw to secure cover in closed position.

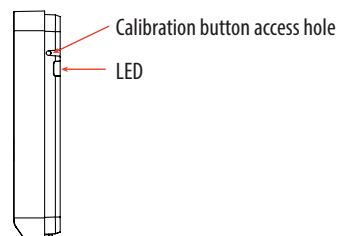


## CO<sub>2</sub> Sensor Calibration

There are two methods for CO<sub>2</sub> calibration available: 400 ppm baseline calibration and automatic baseline calibration (ABC).

### 400 ppm Baseline Calibration

400 ppm baseline calibration allows the sensor to be set at 400 ppm. Push and hold the calibration button for 3 to 5 seconds. The LED will flash green. Once the button is released, calibration is complete and the LED switches off.



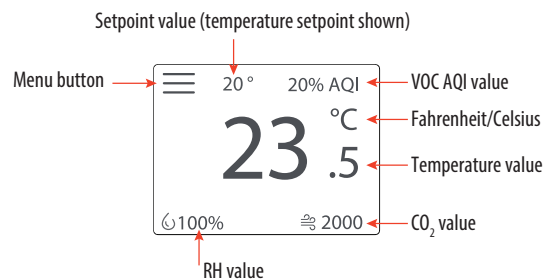
### Automatic Baseline Calibration (ABC)

The ABC mode addresses the 400 ppm calibration. It allows turning on or off a background correction/recovery mode that will minimize any calibration error that has been caused by shock during handling and transportation or is caused by a long term shift in measurement. The ABC algorithm constantly keeps track of the sensor's lowest reading over a preconfigured time interval and slowly corrects for any long-term drift detected as compared to the expected fresh air value of 400 ppm. After initial startup, it is expected that the sensor reaches specified accuracy after 7 to 21 days.

## Touchscreen Operation

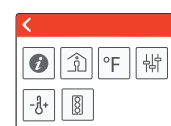
### Main Screen

The touchscreen user interface displays applicable sensor output values (temperature, RH, CO<sub>2</sub> and VOC), setpoint value, menu button and CO<sub>2</sub> stoplight status (if enabled).

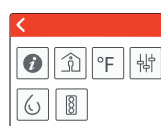


### Menu Screen

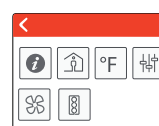
The menu screen opens when pressing the Menu button on the main screen. Integrator's submenu, occupancy/override, Fahrenheit/Celsius, settings, setpoint submenu (temp, RH or fan, determined by DIP switch settings) and CO<sub>2</sub> stoplight buttons are displayed on the menu screen.



Temperature setpoint  
DIP switch selected



RH setpoint  
DIP switch selected



Fan Speed setpoint  
DIP switch selected

## Touchscreen Operation (cont.)

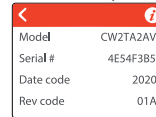
### Menu Button Functions



#### Integrator's Submenu

Press this icon to access the Integrator's menu.

#### Submenu Only



#### Occupied Override Button

Press this icon to provide momentary ground output to the controller

#### Single Press Only



Signals occupied/override call to controller.



#### Fahrenheit/Celsius Switch

Press this icon to display either °C or °F.

#### Single Press Only



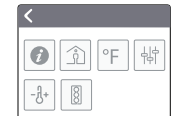
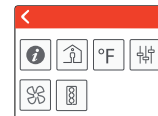
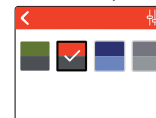
Changes units to Fahrenheit when pressed.  
Changes units to Celsius when pressed.



#### Settings

This icon provides the ability to change the color scheme of the display.

#### Submenu Only



#### Temp Setpoint Adjustment

Click this icon to access the setpoint change menu. Toggle the Temp Setpoint Display button to display or hide the setpoint value on the home screen.

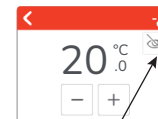
#### Submenu Only



Temp Setpoint Display Button On



Setpoint



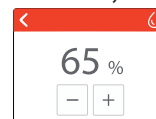
Temp Setpoint Display Button Off



#### Humidity Setpoint Adjustment

Click this icon to access the setpoint change menu. Mutually exclusive with humidity and fan speed. Set by DIP switch.

#### Submenu Only



#### Fan Speed

Click this icon to access the fan speed menu. Mutually exclusive with humidity and fan speed. Set by DIP switch.

#### Submenu Only



Selected

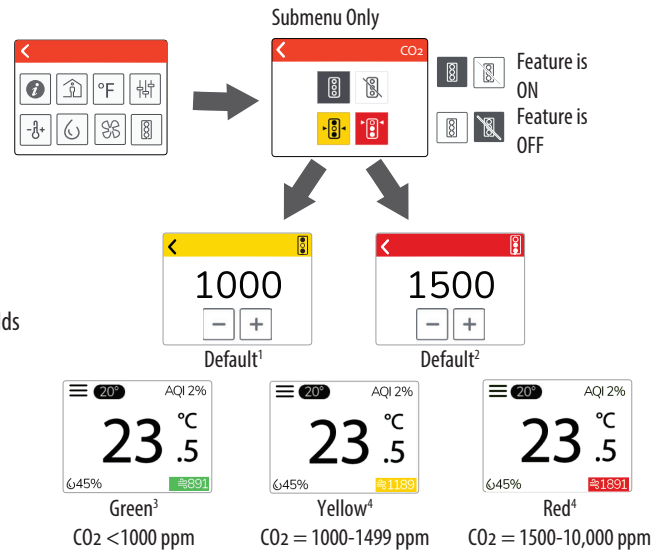
## Touchscreen Operation (cont.)



### CO<sub>2</sub> Stoplight Menu

Click this icon to toggle the CO<sub>2</sub> Stoplight feature on and off. With CO<sub>2</sub> Stoplight turned on, the background color of the main screen changes with CO<sub>2</sub> level. This provides a visual indicator of CO<sub>2</sub> levels to the room occupants.

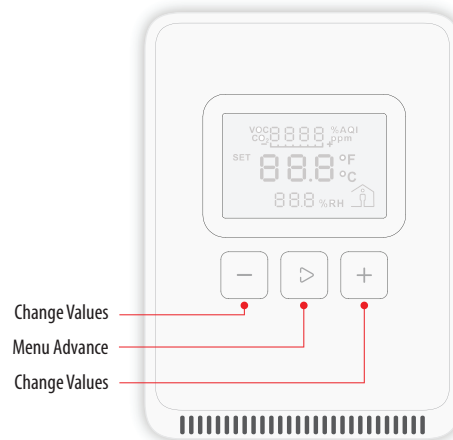
Using the +/- buttons, the thresholds at which the colors change on the main screen are user configurable, as described in the diagram.



1. Values < 400 ppm will be rounded up to the minimum limit of 400 ppm.
2. Values > 10,000 ppm will be rounded down to the maximum limit of 10,000 ppm.
3. Possible to adjust CO<sub>2</sub> thresholds by changing the yellow and red limits.
4. User configurable in increments of 10 ppm using the +/- buttons. With a long press of these buttons, the number will change more quickly.

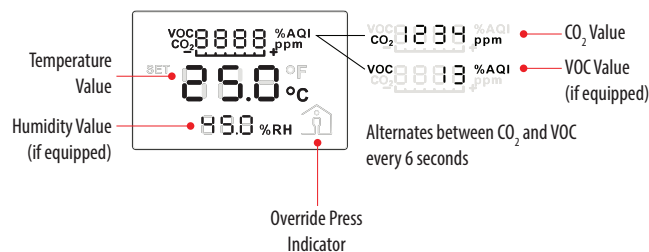
## LCD Display Operation

### Button Functions



### Display Icons

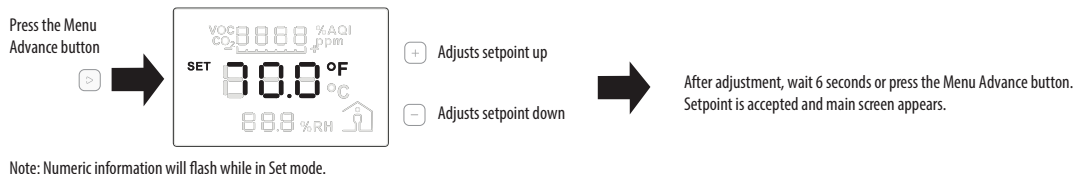
The main screen displays sensor values for CO<sub>2</sub>, VOC (if equipped), RH (if equipped), temperature and Celsius/Fahrenheit.



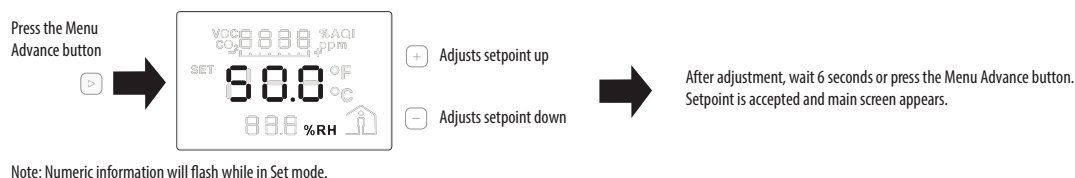
## Setpoint Function

A single 0-10V setpoint (temperature, RH (if equipped) or fan speed) can be selected via DIP switch.

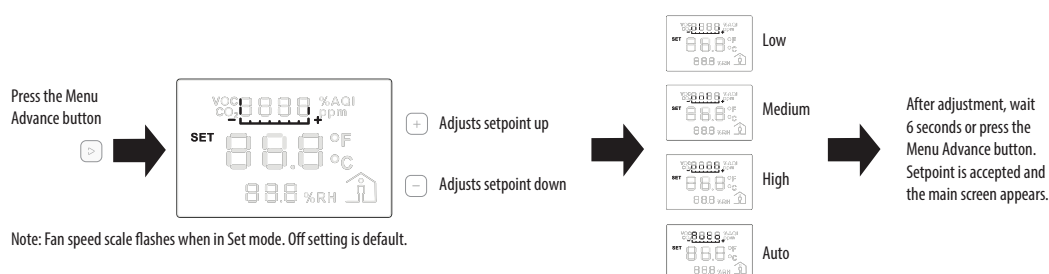
### Temperature Setpoint Adjustment



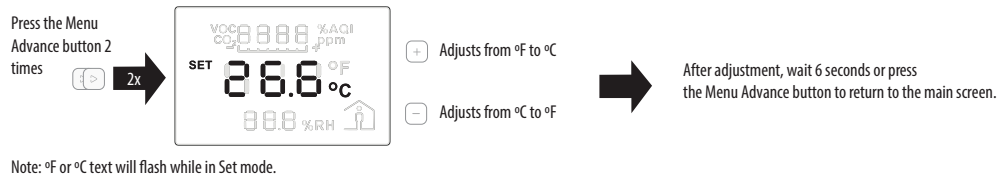
### RH Setpoint Adjustment



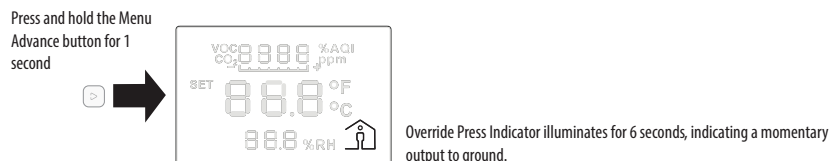
### Fan Speed Setpoint Adjustment



### Changing Celsius and Fahrenheit Scales



### Occupied/Override Button



China RoHS  
Compliance  
Information

Environment-Friendly Use Period (EFUP) Table

部件名称		有害物质 - Hazardous Substances				
Part Name	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电子件 Electronic	X	O	O	O	O	O

本表格依据SJ/T11364的规定编制。

O: 表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。

X: 表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

(企业可在此处，根据实际情况对上表中打“X”的技术原因进行进一步说明。)

This table is made according to SJ/T 11364.

O: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.

X: indicates that concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572

Z000057-0B