CW2TPxxx *CW2LPxxx* *CW2XPxxx*

CW2 Protocol Series

Wall Mount Air Quality Sensors

Product Overview

The CW2 Protocol Series of air quality sensors for living space is a flexible multi-sensor platform for use with BAS controllers designed to accept BACnet or Modbus outputs. CW2 Protocol Series sensors are available with three user interface options: touchscreen, LCD with three buttons and blank. CO_2 and temperature sensors are included with all CW2 Protocol Series air quality sensors. Models with VOC sensors and relative humidity sensors are also available.

Product Identification

CW2 [ ] [ ] [ ] A [ ]

User Interface
T = Color touchscreen
L = 3-button LCD display
X = None

Output
P = BACnet/Modbus

*RH Accuracy**
2 = 2%
X = None

VOC Sensor
V = NDIR CO_2/VOC
= None

** Replaceable RH module available to be ordered separately per table below.*

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
Protocol Output	BACnet or Modbus via RS-485, selectable
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
CO_2 TRANSMITTER	
Sensor Type	Non-dispersive infrared (NDIR), diffusion sampling
Output Range	0 to 10,000 ppm
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

Veris Industries
Stratford Park 5
Telford TF3 3BL
United Kingdom

⚠ 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.
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.

Specifications (cont.)

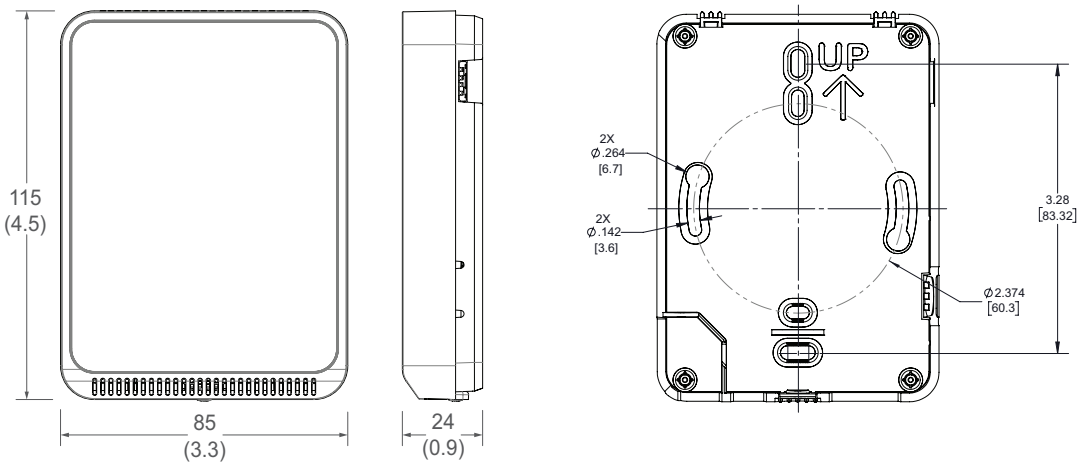
Output Range	0 to 100% AQI for VOC		
Accuracy	±15% of measured value		
Output Scale	0 to 1,000 ppb of total VOC (TVOC)		
	Level	**Ventilation Recommendation**	**TVOC (ppb)**
AQI Table*	>61%	Greatly increased	>610
	20 to 61%	Significantly increased	200 to 610
	10 to 20%	Slightly increased	100 to 200
	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			
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: 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: Temperature, humidity or fan speed selectable Timeout override: Display timeout Lockout override: Touchscreen/button lockout		
SETPOINTS			
Temperature Setpoint	Scale: 0 to 50 °C (32 to 122 °F) or 10 to 35 °C (50 to 95 °F) max., adjustable span		
Humidity Setpoint	Scale: 0 to 100% RH		
Fan Speed Setpoint	Off, Low, Medium, High, Auto		
OVERRIDE			
Override Button	Display models feature a momentary 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		

Specifications (cont.)

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.*

Dimensions



Functions

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

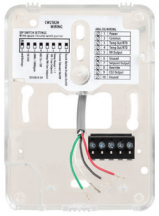
Installation

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

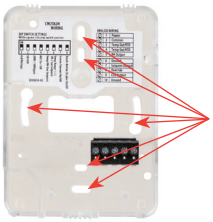
2. Position the sensor base vertically on the wall 1.35 m (4.5 ft.) above the floor with the “UP” arrow facing upward. Locate away from windows, vents and other sources of draft. If possible, do not mount on an external wall, as this may cause inaccurate temperature readings.

Installation (cont.)

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

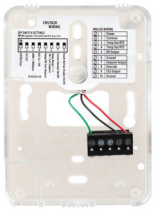


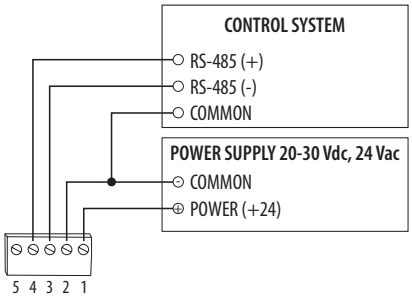
4. Mount the backplate onto the wall using the screws provided.



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.



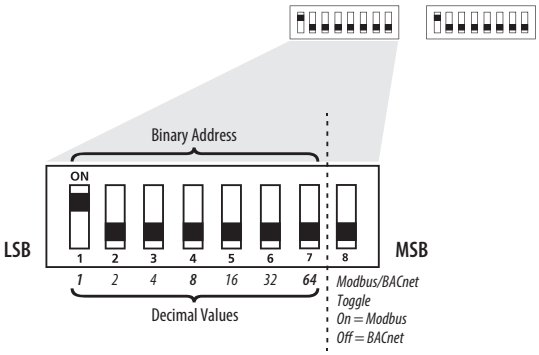


6. Configure the device.

Address Configuration:
Each device on a single network must have a unique address. Set the DIP switch labeled "ADDRESS" to assign a unique address before the device is connected to the network. If an address is selected that conflicts with another device, neither device will be able to communicate.

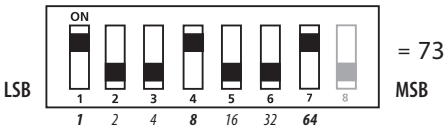
Installation (cont.)

Address the device as any whole number between and including 1 to 127. Note that zero is not a valid address for Modbus; zero is a valid address for BACnet. Positions 1 through 7 of the "ADDRESS" DIP switch designate the address. Position 8 toggles between the Modbus and BACnet communication protocols, as shown in the diagram below. This is the left bank of DIP switches on the sensor.



To set an address using the DIP switch, simply add the values of any switches that are in the ON position.

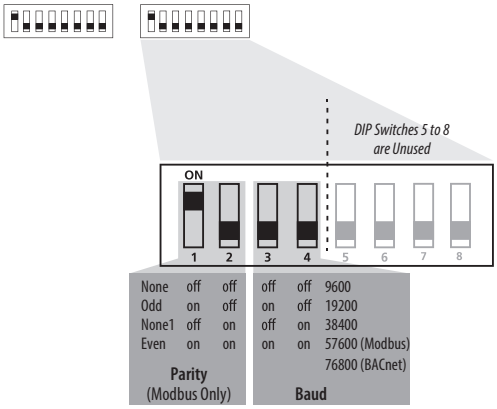
For example, an address of 73 is set as shown in the diagram below.



Position number 1 has an ON value of 1, position number 4 has an ON value of 8 and position number 7 has an ON value of 64 (1 + 8 + 64 = 73).

Communications Configuration:
The following parameters are configurable:

- Parity (Modbus only): None, Odd, None1 (one stop bit), Even
- Baud rate: 9600, 19200, 38400, 57600 (Modbus), 76800 (BACnet)



Example: No Parity, 19200 Baud

1	2	3	4	5	6	7	8
off	off	on	off	off	off	off	off
None		19200 Baud		Unused			

Installation (cont.)

Modbus Point Map

Function Codes:

Function Code	Function
03	Read holding (RW) registers
04	Read input (RO) registers
06	Write single register*
16	Write multiple registers
01	Read coils
05	Write single coil
15	Write multiple coils

** Not supported.*

All of these values correspond to BACnet objects with the same name. See the BACnet Conformance Statement for their definitions.

Note that an attempt to write to "read only" holding registers will give an error and the entire write command will not be executed even if writing to read/write locations were also requested. Exception code 2 is given in this case. "Preserved" means the values is maintained through power outages.

32-Bit Input Registers (Read Only):

16-Bit Register Location	Description	Format
1	Temperature reading	32-bit floating point
2		
3	Humidity reading	32-bit floating point
4		
5	CO_2 reading	32-bit floating point
6		
7	VOC reading	32-bit floating point
8		
9	Model number	4x16-bit ASCII characters as a single query
10		
11		
12		
13~41	Unused	NA
42	Serial Number	4x16-bit ASCII characters as a single query
43		
44		
45		

32-Bit Holding Registers (Read/Write):

16-Bit Register Location	Description	Format
1	Temperature setpoint	32-bit floating point
2		
3	Humidity setpoint	32-bit floating point
4		
5	Screen color set	32-bit
6		
7~39	Device name	4x16-bit ASCII characters as a single query
40	Fan speed	32-bit
41		
42	CO_2 yellow threshold	32-bit floating point
43		
44	CO_2 red threshold	32-bit floating point
45		
46~51	Unused	NA

Installation (cont.)

52	Offset temp by this value	32-bit floating point
53		
54	Offset humidity by this value	32-bit floating point
55		
56	Offset CO_2 by this value	32-bit floating point
57		
58	Offset VOC by this value	32-bit floating point
59		

Note: All holding registers are preserved during power outages.

Coils (Read/Write):

Register	Description
2*	CO_2 stoplight
3*	Touchbutton disable
4*	Invoke CO_2 calibration
5*	Temperature (°C)
6	Occupancy override
7*	Touch timeout
8*	Display shows humidity
9*	Display shows CO_2 level
10*	Display shows VOC level
11	Set 400ppm as CO_2 baseline
12*	Display shows temperature setpoint on main screen
14*	Display shows setpoint

**Preserved during power outages.*

BACnet Descriptions

Note: In the tables below, all properties are read-only unless otherwise noted. "Preserved" means the value is maintained through power outages.

Present_Value Range Restrictions:

Object Name	Minimum Value	Maximum Value
DEV - Object_Name	1 Character	65 Characters
Temperature Setpoint Min_Pres_Value Max_Pres_Value	Min_Pres_Value 0 Min_Pres_Value +1	Max_Pres_Value Max_Pres_Value -1 50
Humidity Setpoint Min_Pres_Value Max_Pres_Value	Min_Pres_Value 0 Min_Pres_Value +1	Max_Pres_Value Max_Pres_Value -1 100
Screen Color	1	4
CO2 Yellow Limits	400	10000
CO2 Red Limits	400	10000
Fan Speed	1	5
Device_Instance	0	4,194,302
Temp Offset	-5	5
Humidity Offset	-10	10
CO_2 Offset	-250	250
VOC Offset	-10	10

Installation (cont.)

Standard Object Types Supported:

Object Type	Supported Optional Properties	Writable Properties
Analog Input - AI	Reliability	None
Analog Value - AV	Min_Pres_Value Max_Pres_Value	Min_Pres_Value Max_Pres_Value Present_Value
Binary Value - BV	None	Present Value
Multistate Value - MSV	None	Present Value
Device - DEV	Max Info Frames Max_Master	APDU_Timeout Max_Master Object_Name

Objects Table:

Object Name	Object Identifier	Object Property
Room Temperature	AI 1	Temperature in Room
Room Humidity	AI 2	Humidity in Room
CO2 Sensor	AI 3	CO_2 Concentration
VOC Sensor	AI 4	VOC Level
Temperature Setpoint*	AV 1	Setpoint Value for Temperature
Humidity Setpoint*	AV2	Setpoint Value for Humdidity
CO2 Yellow Limit*	AV3	CO2 threshold at which the screen color changes from green to yellow
CO2 Red Limit*	AV4	CO2 threshold at which the screen color changes from yellow to red
Temperature Offset*	AV7	Offset value to add to the temperature sensor output value
Humidity Offset*	AV8	Offset value to add to the humidity sensor output value
CO2 Offset*	AV9	Offset value to add to the CO2 sensor output value
VOC Offset*	AV10	Offset value to add to the VOC sensor output value
CO2 Stoplight*	BV1	ACTIVE enables CO_2 Stoplight INACTIVE disables CO2 Stoplight
Touch Disable*	BV2	ACTIVE disables Touch Response INACTIVE enables Touch Response
CO2 ABC Cal*	BV3	ACTIVE enables ABC Calibration INACTIVE disables ABC Calibration
Temperature Units*	BV4	ACTIVE displays temperature in Fahrenhiet INACTIVE displays temperature in Celsius
Occupancy Override	BV5	ACTIVE means room is not occupied INACTIVE means room is occupied
Screen Timeout*	BV6	ACTIVE enables Screen Timeout INACTIVE disables Screen Timeout
Display Humidity*	BV7	ACTIVE displays humidity on Screen INACTIVE removes humdity from Screen
Display CO2*	BV8	ACTIVE displays CO_2 level on Screen INACTIVE removes CO_2 level from Screen
Display VOC*	BV9	ACTIVE displays VOC level on Screen INACTIVE removes VOC level from Screen
CO2 FRC 400	BV10	ACTIVE sets 400 ppm as CO2 baseline after Present_Value is read INACTIVE leaves CO2 baseline in last state (no action)

Installation (cont.)

Object Name	Object Identifier	Object Property
Select Temperature Display*	BV11	ACTIVE displays temperature setpoint on main screen INACTIVE displays temperature setpoint in upper left corner and current temperature on main screen
Display Setpoint*	BV13	ACTIVE enables temperature setpoint display on home screen INACTIVE disables temperature setpoint display on home screen
Screen Color Set*	MSV1	Selection for Screen Color Theme
Fan Speed*	MSV2	Fan Speed Selection

** Preserved during power outages.*

Device Objects Table:

Object Name	Object Identifier	Object Property	Description
Living Space Room Unit XXXXXXX	Vendor_ID + nnn	Object _Identifer (R/W)	Unique value where nnn initially is the MS/TP address

BACnet Protocol Implementation Conformance Statement
Vendor Name: Veris Industries
Product Name: Living Space Room Unit
Product Model: CW2XXXX
BACnet Protocol Version : 1
BACnet Protocol Revision: 16
Product Description: Environmental Sensor
BACnet Standardized Device Profile (AnnexL):
BACnet Application Specific Controller (B-ASC)
List All BACnet Interoperability Building Blocks Supported(Annex K):
DS-RP-B, DS-RPM-B, DS-WP-B, DM-DDB-B, DM-DOB-B, DM-DCC-B, DM-RD-B
Data Link Layer Options: MS/TP (Clause 9), baud rates, 9600, 19200, 38400, 76800
Device Address Binding: Static Device binding is not supported.
Networking Options: None
Character Sets supported: ISO 10646 (UTF-8)

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.

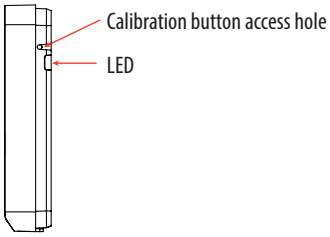
8. Install locking screw to secure cover in closed position.

CO_2 Sensor Calibration

There are two methods for CO2 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.



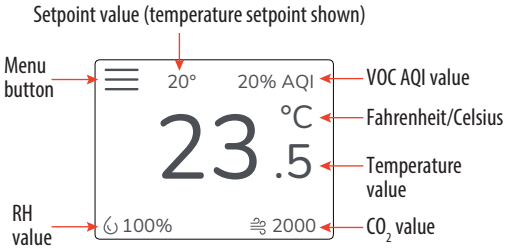
Automatic Baseline Calibration (ABC)

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.

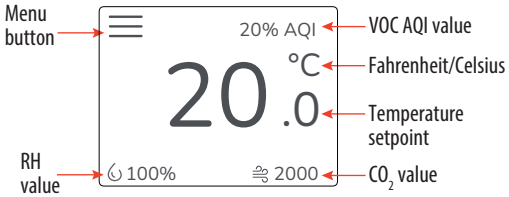
Touchscreen Operation

Main Screen

The touchscreen user interface displays applicable sensor output values (temperature, RH, CO2 and VOC), setpoint value, menu button and CO2 stoplight status (if enabled).



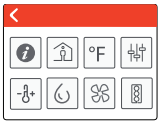
Room Temperature Display Option



Temperature Setpoint Display Option

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 and fan) and CO_2 stoplight buttons are displayed on the menu screen.



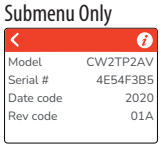
Note: RH setpoint will not appear on non-RH models.

Touchscreen Operation (cont.)

Menu Button Functions

Integrator's Submenu
Press this icon to access the Integrator's menu.

Submenu Only

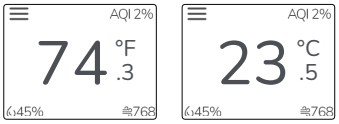


Occupied Override Button
Press this icon to provide momentary signal output to the controller

Single Press Only
Signals occupied/override call to controller.

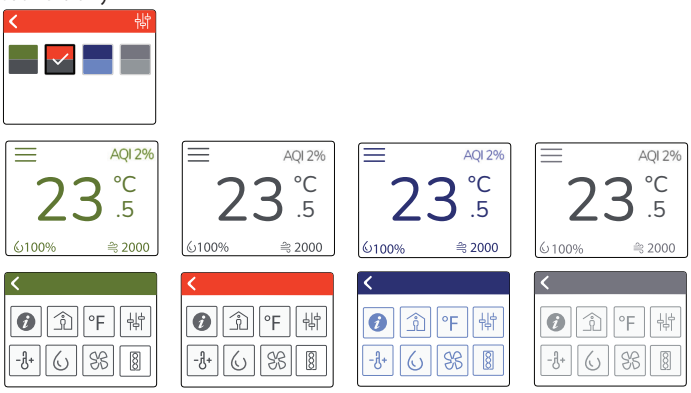
Fahrenheit/Celsius Switch
Press this icon to display either °C or °F.

Single Press Only
°F Changes units to Fahrenheit when pressed.
°C Changes units to Celsius when pressed.



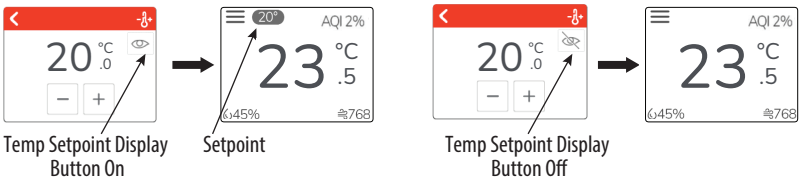
Settings
This icon provides the ability to change the color scheme of the display.

Submenu Only



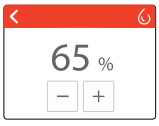
Temp Setpoint Adjustment
Click this icon to access the setpoint change menu.
Toggle the Temp Setpoint Display button to display or hide the setpoint value on the home screen.

Submenu Only



Humidity Setpoint Adjustment
Click this icon to access the setpoint change menu.

Submenu Only



Fan Speed
Click this icon to access the fan speed menu.

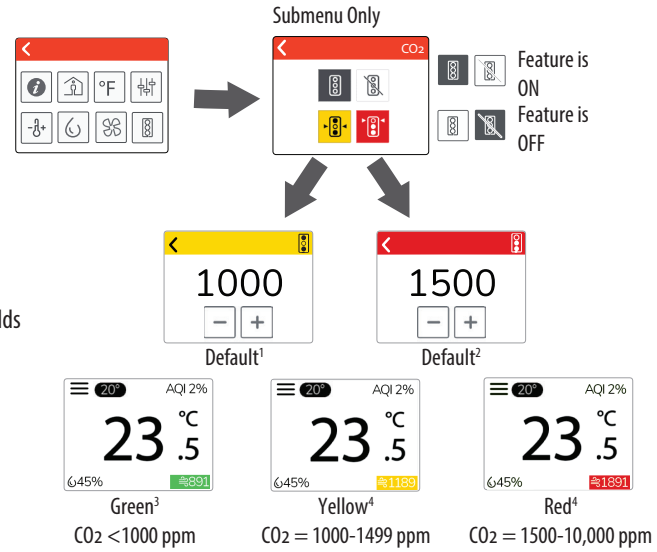
Submenu Only

Touchscreen Operation (cont.)

CO_2 Stoplight Menu

Click this icon to toggle the CO_2 Stoplight feature on and off. With CO_2 Stoplight turned on, the background color of the main screen changes with CO_2 level. This provides a visual indicator of CO_2 levels to the room occupants.

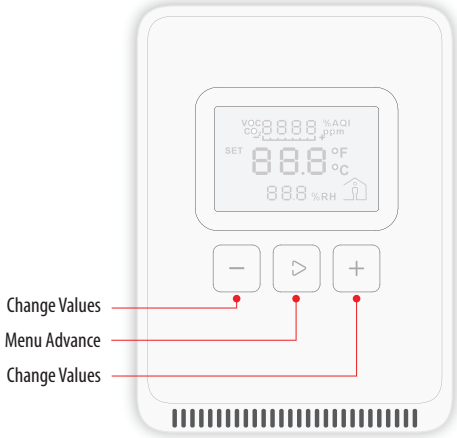
Using the +/- buttons, the thresholds at which the colors change on the main screen are user configurable, as described in the diagram.



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_2 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.

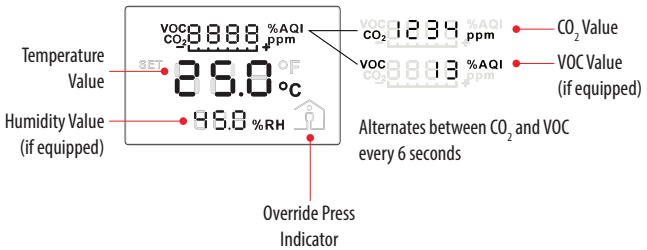
LCD Display Operation

Button Functions



Display Icons

The main screen displays sensor values for CO_2, VOC (if equipped), RH (if equipped), room temperature or temperature setpoint and Celsius/Fahrenheit.

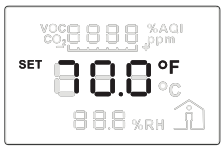


Setpoint Function

The Menu Advance button cycles between Temperature, RH (if equipped), Fan Speed setpoints and Celsius/Fahrenheit adjustment screens in order.

Temperature Setpoint Adjustment

Press the Menu Advance button



Adjusts setpoint up

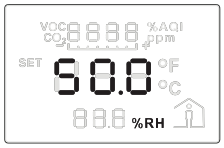
Adjusts setpoint down

After adjustment, wait 6 seconds or press the Menu Advance button. Setpoint is accepted and main screen appears.

Note: Numeric information will flash while in Set mode.

RH Setpoint Adjustment

Press the Menu Advance button



Adjusts setpoint up

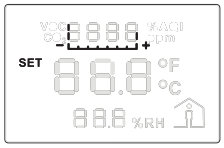
Adjusts setpoint down

After adjustment, wait 6 seconds or press the Menu Advance button. Setpoint is accepted and main screen appears.

Note: Numeric information will flash while in Set mode.

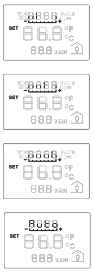
Fan Speed Setpoint Adjustment

Press the Menu Advance button



Adjusts setpoint up

Adjusts setpoint down



Low

Medium

High

Auto

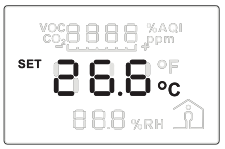
After adjustment, wait 6 seconds or press the Menu Advance button. Setpoint is accepted and the main screen appears.

Note: Fan speed scale flashes when in Set mode. Off setting is default.

Changing Celsius and Fahrenheit Scales

The Menu Advance button cycles between Temperature, RH (if equipped), Fan Speed setpoints and Celsius/Fahrenheit adjustment screens in order.

Press the Menu Advance button



Adjusts from °F to °C

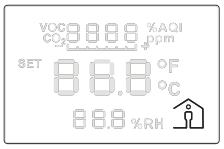
Adjusts from °C to °F

After adjustment, wait 6 seconds or press the Menu Advance button to return to the main screen.

Note: °F or °C text will flash while in Set mode.

Occupied/Override Button

Press and hold the Menu Advance button for 1 second



Override Press Indicator illuminates for 6 seconds.

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

