

RCT Installation Guide

WIRELESS CO₂, HUMIDITY AND TEMPERATURE SENSOR



Overview

The RCT sensor is a wireless transmitter, monitoring indoor CO₂, temperature and relative humidity levels. The sensor is available in 902, 868 and 928MHz frequencies.

The package includes the CO₂ sensor and this installation guide.

A detailed installation and commissioning guide for the RCT is available for download on www.echoflexsolutions.com

Scan QR code for link to detailed guide



The RCT is a wireless, energy harvesting sensor that monitors CO₂ levels from 0-2000 ppm, room temperature in the range of 0-51°C (32°F to 124°F) and relative humidity in the range of 0-100%. The CO₂ measurement is automatically corrected for altitude by monitoring absolute pressure via an on-board sensor.

The RCT transmits wireless telegrams that contain the information defined within an equipment profile, EEP: A5-09-04.



Note:

The RCT comes populated with a CR2032 coin cell battery. The battery is not required for normal operation when the RCT receives adequate natural or artificial light. The battery is required for calibration.



Note:

Even with a brief exposure to light the sensor will operate, however for best results the sensor should be mounted in a location with exposure to 4 hours of natural or artificial light on a daily basis.

Preparing To Install

The RCT can be mounted to most surfaces; glass, stone, concrete, wallboard, cubicle partitions, etc. The sensor can be mounted using screws (not supplied) through the removable back plate (2 keyholes or using double-sided tape or Velcro™ (not supplied)).

The mounting location of the sensor is important as this will directly affect the receiver's reception of the sensor's wireless telegrams. High density construction materials in the space and furniture can disrupt wireless transmissions. The sensor should be installed in the space near where the receiver is mounted, however the signal will travel through other material - refer to the detailed guide for more information.

Performing an Ambient CO₂ Calibration

It is highly recommended that the installer perform an ambient air calibration of the RCT as part of the installation process. The sensor will take the lowest CO₂ recorded since its last calibration cycle and assign this reading the value of 420ppm (outdoor air). Refer to the CO₂ Calibration Mode section described later in this guide.

Installation

The RCT has a removable back plate. The back plate has a security feature which requires a tool for the removal of the device from the back plate.

1. To remove the back plate, insert a flat head screw driver, into the slot and exert torque on the key tab to separate the back plate from the housing body as shown in the image. Once the tab is free, pull the body away from the



back plate.

2. Mount the back plate to a bracket or the wall surface in a vertical orientation with the plastic key on the bottom. There are keyholes in the back plate that mate with standard electrical box screw patterns. Alternatively, you can mount the sensor using double sided tape or Velcro® (not supplied).
3. Once the back plate has been secured to the wall or mounting bracket, align the two top alignment tabs on the back plate with the enclosure body and press the lower edge over the plastic key until it clicks in place.

Replacing the Battery

The battery is not required for normal operation when the RCT receives adequate natural or artificial light. A battery is included and is required for calibration. The voltage level of the battery should be between 2.7V -3.0V for calibration.

1. Remove the sensor from the back plate by pressing the key on the lower edge of the sensor body and pull the body away from the back plate.
2. To remove an old battery: Using a small flat head screwdriver or pen as a lever, insert pointed end under the clear plastic battery retaining clip's edge and pop the clip off.
3. Replace the battery in the clip with a new CR2032 coin cell battery insuring the positive side (+) will be facing up.
4. Align the two straight edges of the retaining clip with the battery holder and press the clip in with your finger.



Linking the Sensor to a Receiver

This process requires the controller or receiver to be mounted, powered and within range of the RCT sensor to be linked.

1. Remove the sensor from the back plate by pressing the key on the lower edge of the sensor body and pull the body away from the back plate.
2. Activate LEARN or LINK mode at the receiver, if necessary refer to the manufacturers documentation.
3. Press the CO2 sensors Link button.
4. Deactivate LEARN mode at the receiver.

Using the Function Button

The RCT has a function button that allows installers and users to view current CO2 values, make adjustments to the CO2 calibration or utilize built-in test functions. Pressing the function button found at the lower right side of the sensor allows navigation to these different functions. Operational and navigational feedback is provided via the color LEDs.

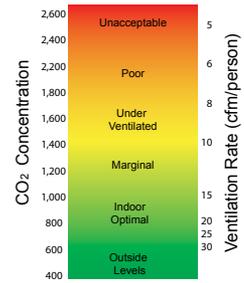


Reading the Explicit CO2 Value

To acquire the exact CO2 value press the function button on the side of the sensor. The LEDs will flash in sequence, green, amber then red to indicate the value. Add the number of color blinks together to total the CO2 concentration where a single LED blink; green = 500 ppm/blink, amber = 100 ppm/blink, red = 25 ppm/blink.

For example:	2 green blinks	= 1000 ppm
	3 amber blinks	= 300 ppm
	2 red blinks	= 50 ppm
	Total CO2	= 1350 ppm

The colored chart is a guideline for mapping the CO2 concentration and how this value reflects on the spaces ventilation rate. (2,600 = Red; 1,500=Yellow; 400=Green)



Light Level Test Mode

This test will indicate the real-time energy produced by the solar panel allowing the installer to verify a good installation location.

1. Press the function button on the sensor until the Green LED is blinking, about 6 seconds.
2. Tap the function button to cycle through modes. Once the Green LED (only) is blinking, press and hold for ~ 6 seconds to enter Light Level Test mode. There will be a pause then the green LED will start blinking a pattern according to the light level, see table below.

Blinks	Lux	Foot Candles	Time to Fully Charge	Discharge time
0	< 50	< 4.6	Non operational	n/a
1	50-100	4.6 - 9.3	Min. operating level	n/a
2	100-200	9.3 - 18.6	32 hours to full charge	72 hours
3	200-500	18.6 - 246.5	16 hours to full charge	72 hours
4	500-1000	46.6 - 92.9	8 hours to full charge	72 hours
5	1000+	92.9+	4 hours to full charge	72 hours

CO2 Background Calibration Mode

1. Place the sensor in outdoor air above 32°F (0°C) and out of direct sunlight for 15 - 60 minutes. Avoid areas where people are lingering so the background CO2 readings are not affected. The sensor will take the lowest CO2 recorded since its last calibration cycle and assign this reading the value of 420ppm (outdoor air).
2. Press the function button on the sensor until the Green LED is blinking, about 6 seconds.
3. Tap the function button to cycle through modes. Once the Red LED (only) is blinking, press and hold for ~ 6 seconds to enter CO2 background calibration mode. There will be a pause then the Green LED will begin blinking.
4. After about 6 seconds the green LED will stop blinking when calibration is complete.

CO2 Calibration and Setup Mode.

1. Press the function button on the sensor until the green LED is blinking, about 6 seconds.
2. Tap the function button to cycle through modes. Once the Red and Green LEDs are blinking, press and hold for ~ 6 seconds to enter CO2 calibration setup mode. If the Green LED is blinking, ABC is enabled. If the Red LED is blinking, ABC is disabled.
3. Press the function button to cycle through CO2 calibration mode.
 - Green LED blinking - Automatic Background Calibration (ABC) enable.
 - Red LED blinking - ABC disable
 - Amber LED blinking - calibrate to absolute CO2 value. (see detailed guide for more info)

Step through the menu until at the desired mode. Press and hold the function button for about 6 seconds to set desired mode.

Test modes time out after approximately 2 minutes.

Sensor Operation

In order to best manage power, the transmitting interval of the RCT is automatically managed dependent on ambient light levels, rate of measurement change and amount of power stored in the sensor. Telegrams are sent at the following intervals:

- If the temperature change between last transmitted value and the current sample is $> 0.6^{\circ}\text{C}$ (1.1°F) the sensor will transmit immediately.
- If the RH value change between last transmitted value and the current sample is $> 3\%$ the sensor will transmit immediately.
- If the CO₂ value change between samples is > 200 ppm, the sample and heartbeat rate shall adjust to 300 sec (5 min.) for 1 sample period.
- The CO₂ sample rate value is derived from three consecutive readings from the CO₂IR sensor averaged with the previous transmitted value, level 1 and 2 only. For level 3, only the 3 readings taken during the current sample are averaged.

Level	Ambient Light	Temp/RH Rate	CO ₂ sampling Rate	Heartbeat Rate
1	> 200 lux (18.5 fc)	16 sec	300 sec (5 min)	300 sec (5 min)
2	< 200 lux (18.5 fc)	32 sec	600 sec (10 min)	600 sec (10 min)
3	< 50 lux for 16 hours	64 sec	1200 sec (20 min)	1200 sec (20 min)

Reading the CO₂ Value

The RCT does not have a digital display but it is possible to quickly determine the general range of CO₂ concentration in the space by observing the LEDs. The 3 colored LEDs located on the right side of the solar panel will blink every 15 seconds providing visual indication of the current CO₂ measurement range.

CO₂ ranges indicated by the color LED blink:

- Green $\Rightarrow < 1100$ ppm (Good ventilation/air quality)
- Yellow $= 1100 \dots 1,500$ ppm (marginal ventilation/air quality)
- Red $\Rightarrow > 1500$ ppm (low ventilation & potentially poor air quality)

You can also determine actual CO₂ concentrations in the space by pressing the function button to read the explicit CO₂ value (see page 2).

Regulatory Statements

FCC Part 15.231 (902 MHz models only)

Contains FCC ID: STM300U

The enclosed device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (i.) this device may not cause harmful interference and
- (ii.) this device must accept any interference received, including interference that may cause undesired operation.

IC RSS-210 (902 MHz models only)

Contains IC: 5713A-STM300U

CE (868 MHz models only)

CE Marking

ARIB STDT108 (928MHz models only)

Complies with the Japanese radio law and is certified according to ARIB STDT108. This device should not be modified (otherwise the granted designation number will become invalid)

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