

Wireless CO₂ + TRH Sensor

Installation Guide



Introduction

The wireless CO₂ + TRH (Carbon Dioxide + Temperature and Relative Humidity) sensor is a wall mounted device with ambient (indoor) comfort monitoring and HVAC control applications.



Please note the sensor is available in two variations:

1. CO₂ + TRH sensor (SED-CO2-G-5045)
2. TRH only sensor (SED-TRH-G-5045)

All information related herein applies to both models, except for CO₂ functionalities which are only available on the CO₂ + TRH sensor.

The sensor can measure ambient temperature, relative humidity and depending on the model - CO₂ concentration. The measured data is communicated wirelessly using ZigBee Green Power protocol to a Room/ Zone controller.

Description

The sensor integrates an ultra-low power CO₂ and a digital temperature(T) and relative humidity (RH) sensor.

The Human Machine Interface (HMI) of the sensor is based on a bi-color Light-Emitting Diode (LED) and a pushbutton, both covered by a plastic housing. A small tool or stylus is needed to push the button located through a small hole. The LED flashes through the top plastic cover and is not visible when not active. All communication with the device is done wirelessly via a bidirectional ZigBee Green Power protocol after a successful pairing/commissioning procedure.

The sensor is powered by an embedded AA size lithium-thionyl chloride spiral battery (not rechargeable, not removable). The battery capacity allows up to 10 years of operating time at nominal conditions. The device must be replaced and recycled when the battery is discharged.

Box Contents

The wireless CO₂ + TRH sensor box contains the following:

- Wireless CO₂ + TRH sensor or TRH sensor
- Wall-mounting bracket
- Two screws for wall-mounting bracket
- Installation guide

System Requirements

If used in conjunction with a Schneider Electric Room Controller, the wireless CO₂ + TRH sensor requires a SE8000 Series Room Controller running firmware version 1.7 or higher.



The CO₂ + TRH sensor is not compatible with SE7000 Series Room Controllers.

Installation

The wireless CO₂ + TRH sensor can be secured directly on a wall or flat surface using double-sided adhesive tape (Fig.2), or by securing the plastic bracket to the wall (Fig.1) and mounting the sensor (Fig. 3). Using the screws is the recommended method.

Attaching A Sensor Using The Wall Bracket

1. Using two screws provided, secure wall bracket to wall (Fig. 1).



To perform an accurate ambient comfort measurement, the sensor should not be installed in areas exposed to direct sunlight or near doors, windows or areas exposed to air flow.

2. Once bracket is secured, slide sensor on bracket using downward motion.

3. Ensure click sound is heard to verify sensor is secured to bracket and ensure side tab of bracket is aligned with opening on side of sensor (Fig. 3).

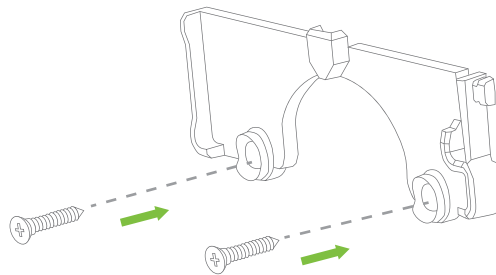


Figure 1



It is strongly recommended to attach the sensor to the wall by using the two screws. The adhesive in double-sided tape may not be as long-lasting or as strong to support the sensor throughout its lifetime.

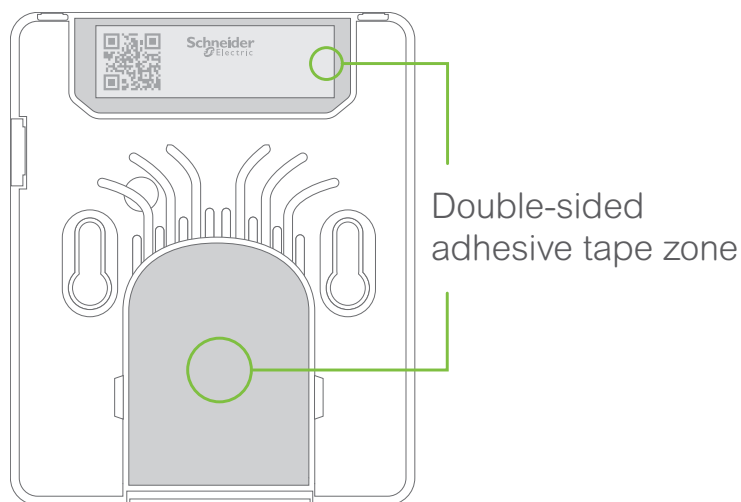


Figure 2

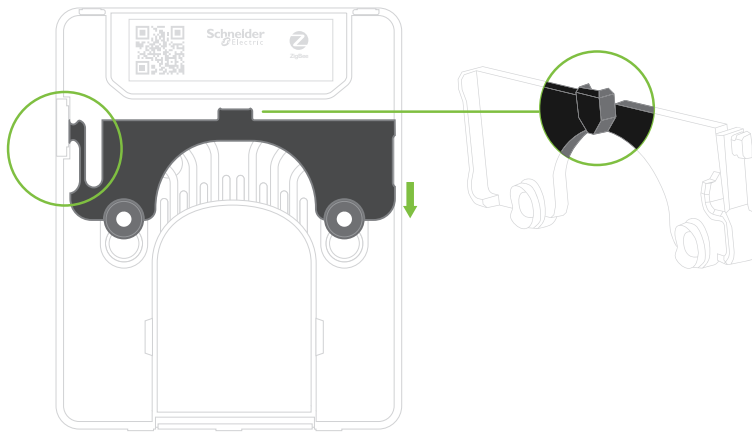


Figure 3

De-mounting the sensor from the wall bracket:

To remove the sensor from the wall bracket, press on the side tab as circled in Fig.3 and slide the sensor up and then out.

Technical Characteristics

The sensor is intended for indoor applications. The operating temperature range is 0 – 45°C. For an accurate CO₂ concentration measurement the sensor should operate in 0 to 95% RH, non-condensing environment.

Sensor Features	CO ₂ Concentration	Digital Temperature	Relative Humidity
Operating Range	0 – 5000 ppm	- 10 ~ 85 °C	0 - 100 %
Accuracy (typ. @ 25°C)	±50 ppm +/- 3% of reading	± 0.3 °C	± 2%
Accuracy (max @ Tmin,max)	± 80 or up to +/- 3% of readings	± 0.4 °C	± 3%
Resolution (typ. @ 25°C)	±17 ppm (or up to 1σ @ 1000ppm)	0.01 °C	0.025%
Resolution (max @ Tmin,max)	± 50ppm (@Tmax)	0.01 °C	0.025%

Radio communication protocol used by the wireless sensor is compliant with the ZigBee Green Power standard supporting bi-directional communication, commissioning and security encryption features. The device is ZigBee 3.0 compliant.

Technical Data	
Wireless Technology	ZigBee Green Power
Operating Frequency	2.4 GHz
Transmission Range (typ)	20m (indoor) / 100m (free field)
Measuring & Transmitting Period (typ)	2.5 - 10 min or up to 100m (line of sight) Note: Range may vary depending on local interference sources or RF attenuation from building materials.
Operating Conditions	0 °C to 50 °C (32 °F to 122 °F) 0% – 95 % rH non-condensing environment
Storage Conditions	-30 °C to 50 °C (-22 °F to 122 °F) 0% – 95 % rH non-condensing environment
Product Lifespan ¹	typ 10 years
Power Rating	3.6vDC (Non-replaceable battery) Peek Current: 0.1A

¹ The battery lifetime depends on measurement and communication parameters setting and can vary depending on sampling rate, communication rate, or environmental operating conditions.

Interface

A wireless CO₂ + TRH sensor is deployed by setting the interface with a push button and a multi-color LED. Both are hidden under the sensor housing and intended for use by a trained installer only.

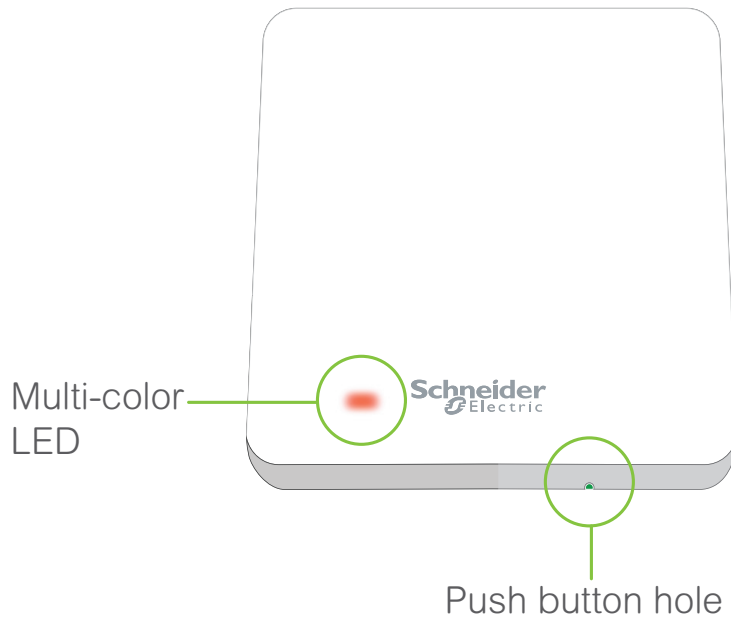


Figure 4

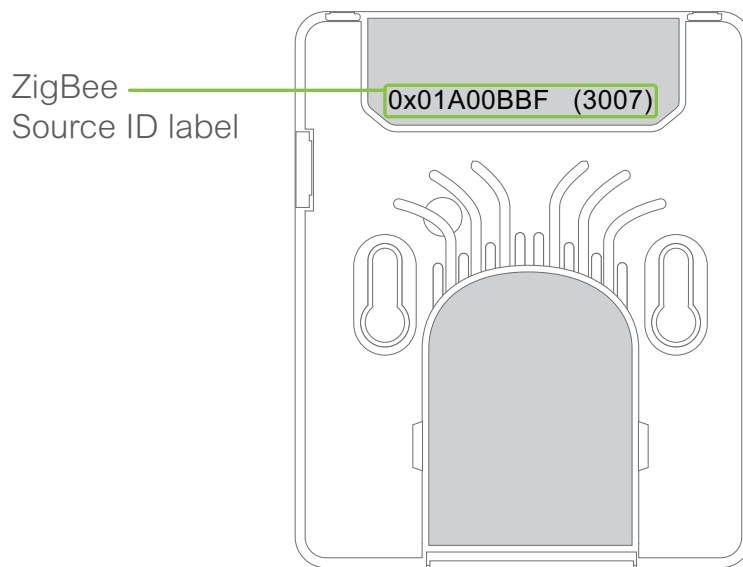


Figure 5

Refer to the information below for detailed sensor operating instructions.

Push button

The push button can be pressed through a hole from the bottom side of the sensor, with a slim tool (Figure 4). Each recorded button press is signaled by 2 yellow LED flashes.

- Short push

One short push starts the commissioning procedure if the sensor is in the decommissioned (energy saving / hibernation) mode. If the sensor is already commissioned, it will enter "demo mode" for a 5min timeout interval.

- Long push

One long push puts the sensor into decommissioned / hibernate mode. The long push is confirmed by one red LED flash roughly 1 second after 2 yellow LED push signaling flashes. After a red LED signal, the button should be released in order to prevent another unintended short push detection.

Multi-colour LED

The multicolor LED is hidden under the top plastic cover, positioned on left (Figure 4). In normal state the LED is off in order to conserve battery life. It is only used to signal the following special events:

- 2 YELLOW flashes confirm each button push taken into account by the sensor.
- 1 RED flash acknowledges a long push. The decommissioning procedure and a sensor reset will be executed, then the sensor will enter hibernation mode.
- 3 RED flashes signal a commissioning procedure failure. The sensor stays in decommissioned / hibernation mode.
- 3 GREEN flashes signal a commissioning procedure success. The sensor will enter demo mode for 5 min. This demo mode will automatically timeout after 5 minutes. The sensor then stays in commissioned mode, periodically transmitting the measured values to the receiver.
- 1 GREEN flash acknowledges a valid GP command received by the sensor in demo mode. This feature can be used as a feedback to an installer to confirm that the sensor is still in range during the commissioning (it works only in demo mode). In this case the receiver has to be programmed to send an acknowledgement command to the sensor after the sensor data report frames.



The multiple LED flashes are executed only in 1/2 second intervals.

Operating Modes

Factory Mode

The wireless CO₂ + TRH sensor is in a deep sleep mode waiting for a button push. No measurements, no radio communications are performed.

Commissioning

During commissioning the wireless CO₂ + TRH sensor will automatically find and pair with the nearest compatible ZigBee Green Power receiver. ZigBee parameters (e.g. operational channel, Src-ID, PAN-ID, security level and key) are exchanged between the sensor and receiver in order to establish a reliable and secure link.

During commissioning the sensor is presented as an UNSPECIFIED DEVICE (GP ModelID = 0xFE) with the GP Product ID = 17305 (0x4399) and its unique source ID (SrcID). The SrcID of each sensor is marked on its backside (Figure 5). The receiver should be ZigBee 3.0 compliant.

The commissioning procedure can be triggered only from the Decommissioned / Hibernation Mode by a long push of the button. The commissioning procedure can be resumed through the following steps:

1. Set a ZigBee operational channel (11 - 26) and the PAN-ID of your network (0xFFFF by default) on your ZigBee 3.0 compliant receiver.
2. Put the receiver into the automatic commissioning mode (opened for the commissioning and accepting the commissioning with GP ModelID = 0xFE and GP Product ID = 17305 devices).
3. On the wireless CO₂ + TRH sensor press the push button once to start the bidirectional ZGP commissioning. The button actuating is immediately confirmed by two yellow LED pulses. The sensor then automatically scans all ZigBee channels (channel 11-26) in order to find the nearest ZGP Proxy device (receiver in commissioning mode) and initiates the pairing.
4. Wait approximately 10s – during this time the sensor automatically performs the commissioning. The LED will not flash during this period (even if you push the button again).
5. Commissioning success is indicated by 3 green LED pulses. You can check measured data reported from the sensor to the receiver. If the commissioning fails (indicated by 3 red LED pulses) please ensure the sensor is in Factory Mode and in proximity of the receiver, then repeat the procedure.

Demo Mode

The data measurement and TX period is temporarily reduced to 5 seconds. The green LED flashes once after each valid ZGP command reception by the sensor. This feature can be used as a feedback to an installer confirming that the sensor is still in the radio range of the receiver. Remember the sensor can receive a ZGP command only after a measured values report, so maximum green LED flashing rate is 5s. The receiver has to be programmed to send an acknowledgment command to the sensor. The sensor automatically switches to Commissioned Mode once the 5min timeout elapses.

Normal Mode

The sensor periodically measures T, rH and CO₂ and reports the measured values to the receiver which it is paired with. By default the nominal measurement and Transmission(TX) period is 150s (2min and 30sec). This parameter can be edited by a ZigBee command. The sensor is always sleeping in between two data measurements and TX. It can be woken up at any time with the push button.

When the CO₂ concentration drops below the customizable comfort value the transmission period is multiplied by 4. The sensor automatically returns back to nominal transmission period if the CO₂ concentration value exceeds the comfort threshold value.

CO₂ Sensor Autocalibration

Principle of operation

The CO₂ module inside the wireless CO₂ + TRH sensor, is fully calibrated prior to shipping from the factory. Over time, the measurement offset needs to be calibrated to maintain the long term stability of the sensor. In most applications, this can happen automatically using the built in auto-calibration function. This technique can be used in situations in which sensors will be exposed to typical background levels (400-450ppm) at least once during the auto-calibration period. For example, many buildings will drop quickly to background CO₂ levels when unoccupied overnight or at weekends. The auto-calibration function uses the information gathered at these periods to recalibrate.

The auto-calibration function uses the lowest point of CO₂ concentration to recalibrate the offset. During every measurement cycle, the CO₂ sensor stores the latest values, and also the lowest value recorded since the last calibration point.



The first 50 measurements after calibration are ignored when calculating the lowest value.

Autocalibration default setting

The CO₂ sensor is shipped with the auto-calibration feature enabled. There isn't any CO₂ measurement in the Factory Mode before the Commissioning. After the Commissioning all previous CO₂ measurement data stored in the sensor is erased.

By default the first autocalibration will happen 1 day after the commissioning, and the following auto-calibrations in 8-day intervals.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: • this device may not cause harmful interference • this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not approved by the manufacturer could void the user's authority to operate the equipment. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm during normal operation.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: • this device may not cause interference • this device must accept any interference, including interference that may cause undesired operation of the device.

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Technical Support



For any issues with SmartStruxure Solution or SmartStruxure Lite, contact Schneider Electric Technical Support according to your region.

North America (NAM) Product Support

- Building Management Systems (BMS): www.nampss.com

Global Product Support

- Building Management Systems (BMS): productsupport.BMS@schneider-electric.com

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At Schneider Electric, we call this **Life Is On.**