



Connected AirWits CO2 User Manual

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Connected AirWits CO2 is a connected carbon dioxide (CO2), temperature, and humidity metering device

AirWits CO2
R5.2

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Using this manual

Thank you for choosing this Connected Inventions device. This device will provide you high-quality IoT with Connected Inventions' exceptional technology and high standards. This manual has been specially designed to guide you through the functions and features of your device.

Read me first

- Before using your device, read the entire manual and all safety instructions to ensure safe and proper use.
- The descriptions in this manual are based on the default settings of your device.
- The images used in this manual may differ from the actual product.
- The contents of this manual may differ from software provided by service providers or carriers, and are subject to change without prior notice.
- Access the Connected Inventions website (www.connectedinventions.com) for the latest version of the manual.
- Available features and additional services may vary by service provider.

- Applications on this device may perform differently from comparable applications and may not include all functions available (by ie. downlink messaging features)
- Connected Inventions is not liable for performance issues caused by third-party applications or improper installation.
- Please keep this manual for future reference.

Malfunction

- In case of malfunction, deliver the device to the supplier. Do not open the cover.

Transportation

- Do not remove packing material and do not repack the device unless necessary. Contact the shipping agent before transportation. Inside the device there is a battery which contains approximately 3.0 g of lithium.

Disposal

- Return the device to a disposal station which collects electronics waste and batteries.

Operation

- Protect the device from moisture, water, and dirt.

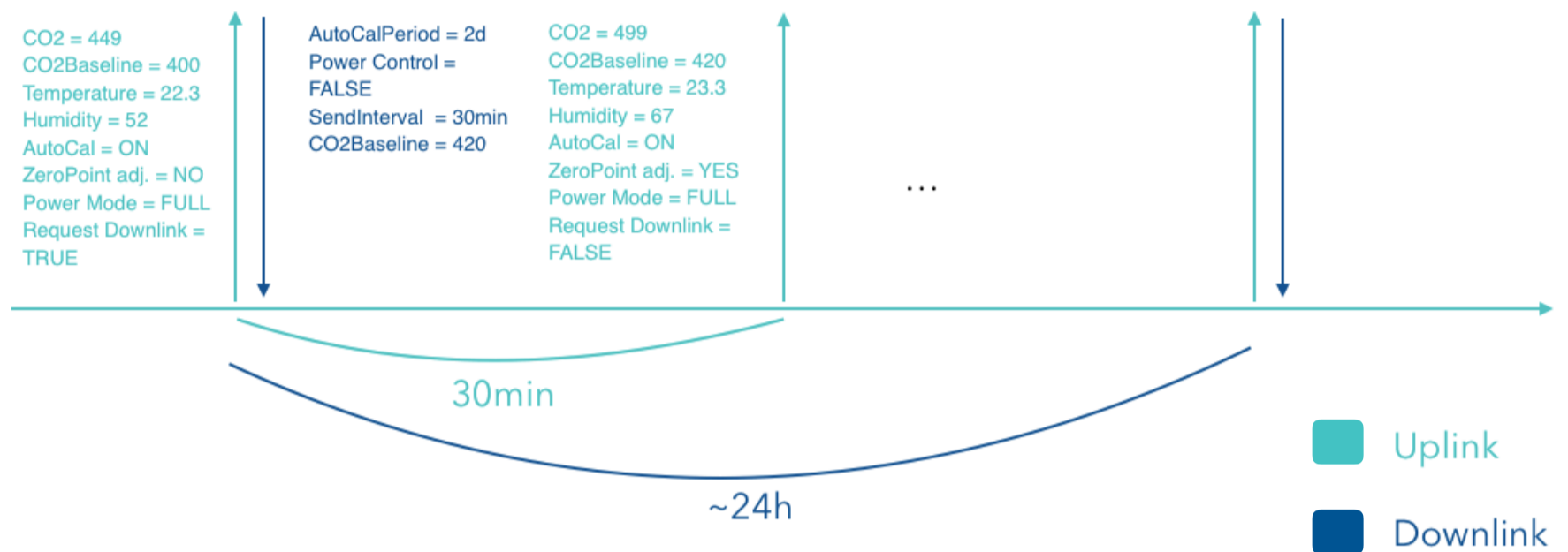
About

Connected Inventions AirWits CO2 is a wireless air quality metering device with ultra long battery life. This intelligent and small device measures and sends the CO2, temperature and humidity data sequentially from 10 min to 24 hours using the world-wide Sigfox IoT-network connectivity for data transmission, enabling very low lifetime cost. The installation of the device is extremely simple procedure and requires neither special tools nor configuration operation. The device is maintenance free, and thus a great solution especially for long term indoor air quality metering providing accurate data for energy savings and comfortable living conditions which can be monitored remotely. By default, the device calibrates itself every 48 hours yet it offers different calibration features for advanced use, when needed.



Function

The basic functionality procedure example:



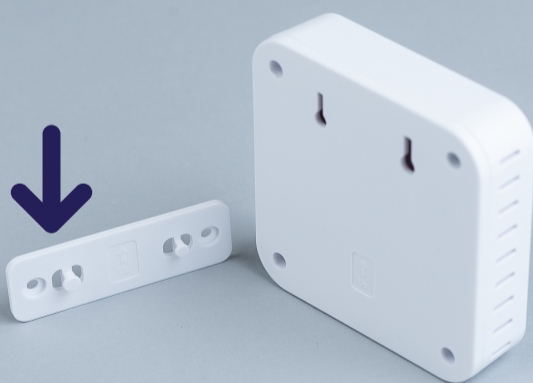
When the device is powered on, it will do initial CO2 measurement calibration within 30 minutes. For this time, place the sensor in fresh air environment clear from any human, gas or petrol operated devices, stoves, burning objects or animals as the initial calibration target is 400ppm CO2. After calibration is ready, the device will send the initial measurements and ask downlink message from the network. The CO2 Baseline, transmission interval time and adaptive power control function can be set through downlink message. In case the downlink message is not in use, the device continues to send a measurement message every 30 minutes and request downlink message every 24 hours.

Assembly & Installation



- 1 Save the identifier and the key of the device. The identifier and the PAC key is on the label on the bottom of the device. You can also read the identifier and the PAC key using the QR code.

- 2 Move the device to fresh air location and switch the device on by sliding the power switch to position "1"



- 3 Install the wall plate to the wall using screws suitable for the wall material. Please note the orientation!

- 4 Attach the device to the wall having the pins meeting installation holes in the device. Please note the orientation!





The device needs to be calibrated. During the first 24 hours of initialisation the device needs minimum of 1 hour of fresh air in order to work properly. This means that the device needs a minimum of 1 hour after initialisation in an environment without any CO2

! Please note! Avoid placing device closer than 15cm on any metal or magnetic object, electric cables, electric devices or selective glass as this will dramatically reduce radio performance as well as battery life of the device.

Replacing batteries

The device battery pack is proprietary made. Once device runs out of battery, please contact your local partner or Connected Inventions for support the battery pack replacement. Do not try to replace the battery pack with other brands available as there is a risk of breaking the device. The battery pack lasts years in normal use so in case of no messages received from the device, please check first the power is switched on and the Sigfox radio coverage is available at the location.

Uplink: Payload Description

BYTE	BIT	TYPE	NAME	DESCRIPTION
0	0	Boolean	Auto Calibration	FALSE = off, TRUE = on
0	1	Boolean	Zero Point Adjusted	1= TRUE, 0 = FALSE
0	2	Boolean	Transmit power	FALSE = Low, TRUE = Full
0	3	Boolean	Power Control	Active power control. TRUE= On, FALSE = OFF
0	4-7	UInt4	FW version	FW version
1-2	0-15	UInt16	Temperature	(Value /10) - 40 = Temperature [°C] (Value /18) - 8 = Temperature [°F]
3	0-7	UInt8	Humidity	Humidity [%]
4-5	0-15	UInt16	CO2	CO2 concentration [ppm]
6	0-7	UInt8	CO2 Baseline	Baseline = (N*10)ppm, if N=0 then Baseline = 400ppm
0	0	Boolean	Auto Calibration	FALSE = off, TRUE = on

Indexing: bytes are in big-endian order and bits in standard 76543210 "little endian" order.

Example: UL Messages

1C000000010028

- Firmware: 1
- Power control: On
- TX power: Full
- Zero Point Adjusted: FALSE
- Auto Calibration: Off
- Temperature: -40.0°C
- Humidity: 0%
- CO2: 256ppm
- CO2 Baseline: 400ppm

18000000010028

- Firmware: 1
- Power control: on
- TX power: Low
- Zero Point Adjusted: FALSE
- Auto Calibration: Off
- Temperature: -40.0°C
- Humidity: 0%
- CO2: 256ppm
- CO2 Baseline: 400ppm

24024D09019840

- Firmware: 2
- Power control: Off
- TX power: Full
- Zero Point Adjusted: FALSE
- Auto Calibration: Off
- Temperature: 18.9°C
- Humidity: 9%
- CO2: 408ppm
- CO Baseline: 640ppm

27024D09019840

- Firmware: 2
- Power control: Off
- TX power: Full
- Zero Point Adjusted: TRUE
- Auto Calibration: On
- Temperature: 18.9°C
- Humidity: 9%
- CO2: 408ppm
- CO Baseline: 640ppm

25024D09019840

- Firmware: 2
- Power control: Off
- TX power: Full
- Zero Point Adjusted: FALSE
- Auto Calibration: On
- Temperature: 18.9°C
- Humidity: 9%
- CO2: 408ppm
- CO Baseline: 640ppm

Advanced Features

CO2 Baseline

- CO2 Baseline is an offset point for CO2 measurement observation value. By default, when the device calibrates itself, it assumes the lowest value measured during calibration period to be 400ppm. If you know the CO2 level on the particular place the device is located to be higher or lower, you can set the lowest CO2 value accordingly. By example in crowded cities the CO2 level can be considerably higher than 400ppm even in fresh air environment. On the other hand, in rural areas the CO2 level could sometimes be lower than 400ppm. You can set the CO2 Baseline using downlink message (see Downlink: Payload description below). By default CO2 Baseline is set to 400.
- Note: When setting new CO2 Baseline value with Downlink message, the Auto Calibration Period will start from beginning and at the end of the period set the lowest value measured to match the new CO2 Baseline.
- Note: If you are not sure about the CO2 levels in the location the device is in, it is not recommended to alter the CO2 Baseline from default settings.

Auto Calibration

- By default, the device calibrates itself every 48 hours for the lowest value to be the CO2 Baseline value (default setting : 400ppm). You can set the Auto Calibration Period from 2 to 30 days. When the calibration period is over, the device will apply the lowest value measured to be the CO2 Baseline value and set the Zero Point Adjusted bit to "1" for the next Uplink payload. You can also disable the Auto Calibration feature off by adjusting Auto Calibration Period value to 0 in Downlink message. In this case the existing calibration will remain and it will not be adjusted any more. This might be reliable solution in places where the CO2 values may vary a lot based on weekdays, amount of people, time of the year etc. - The calibration drifting caused by the hardware is only +/- 35ppm for 5 years life span.
- Note: If you are not sure about the CO2 level variation in the place the device is in, it is not recommended to alter the Auto Calibration settings from default settings.

Downlink

The settings of the device can be updated with the downlink message

- The device requests new settings every 50 messages

You must be very careful when you update the settings

- The settings affect both the subscription and the battery life of the device

The downlink message is optional

If the downlink message is not sent, the device continues with the current settings

Default settings when device has not been configured with downlink:

- Uplink reporting period is 30minutes
- Adaptive Power Control is OFF
- Full transmit power is used
- Auto Calibration is on and set to 2 days calibration period
- CO2 Baseline is 400 ppm

If the Adaptive power control feature is set on, the device will automatically adjust the transmit power to optimum level to save battery and create less unnecessary interference to radio network

- By default power control is OFF
- When power control is OFF, full TX power is used

! The Adaptive power control feature is only available in RCZ1 device

Downlink: Payload Description

BYTE	BIT	TYPE	NAME	DESCRIPTION
0	0-3	UInt4	Auto Calibration Period	$n \cdot 2$ days, 0 = off
0	4-5	UInt2	Reserved	Set to 0
0	6	Boolean	Automatic Power Control	FALSE = Off , TRUE = On
0	7	UInt1	Reserved	Set to 0
1	0-7	UInt8	Update interval	$5,5 \text{ min} \cdot (n+2) \rightarrow 11 \text{ min} \dots \sim 24 \text{h}$. If $n=0$ then 11min
2	0-7	UInt8	CO2 Baseline /10	$BL=(n \cdot 10) \text{ppm}$, if $n=0$ then $BL=400 \text{ppm}$
3-7	0-39	UInt40	Reserved	Set to 0

Indexing: bytes are in big-endian order and bits in standard 76543210 "little endian" order.

Example: DL Messages


- 0000000000000000
- Power control: Off
- Auto Calibration: Off
- Update interval: 11 min
- CO2 Baseline: 400 ppm
- 4F08500000000000
- Power control: On
- Auto Calibration: 30 days
- Update interval: 50 min
- CO2 Baseline: 800 ppm
- 4001310000000000
- Power control: On
- Auto Calibration: Off
- Update interval: 15 min
- CO2 Baseline: 490ppm

Troubleshooting

- Ensure the power is switched on
- Check there is Sigfox network coverage available
- Ensure the device is not installed near metallic objects, electric cables, electric devices or selective windows.
- Metallic roofs, steel reinforced concrete, underground location and other obstacles can dramatically reduce radio signal.
- Check the operation mode of the device.
- Incorrect downlink configuration will affect the behaviour of the product.
- Ensure the configuration is properly done.

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Technical Specification

Description	AirWits CO2 is a wireless IoT CO2, -temperature and humidity metering device.
Size	100 x 100 x 27 mm
Weight	178 g
IP rating	IP20
Batteries	3xA 3.6 V LiSoCl2
Battery capacity	12000 mAh
Battery life	5 years with 30 min measuring interval
Sensors	GSS CozIR LP, Sensirion SHT30
Environment	Temperature 0 ... 50 °C [accuracy 0.2°C] Humidity 0 ... 95 % [accuracy 2%] 0...5000 ppm [typical accuracy +3%, +/-30ppm in +25°C]
Radio configurations	Sigfox 868 MHz (RCZ1), 902 MHz (RCZ2), 920 MHz (RCZ4)
Antenna	Internal helical antenna
Communication	Uplink & Downlink
Certification	CE, Sigfox
Product Code	CICO2-3005-R0502 (RCZ1) CICO2-3205-R0502 (RCZ2) CICO2-3405-R0502 (RCZ4)

