

# ERS CO<sub>2</sub>

## Description

ERS CO<sub>2</sub> is a sensor for measuring the indoor environment. It is enclosed in a room sensor box and is designed to be wall mounted. ERS CO<sub>2</sub> is completely wireless and powered by two 3.6V AA lithium batteries. Inside you will find internal sensors for measuring indoor CO<sub>2</sub> levels, temperature, humidity, light, and motion.



## Applications

- Indoor environment measuring
- Smart buildings
- Workplace management
- Room occupancy

## Product features

- LoRaWAN Certified <sup>CM</sup>
- CO<sub>2</sub> sensor
- Temperature sensor
- Humidity sensor
- Light sensor
- Motion detection sensor (PIR)
- NFC for configuration
- Configuration over the air

## Device Specifications

### Mechanical specifications

Weight	80 g excluding batteries / 120 g including batteries
Dimensions	86 x 86 x 27 mm
Enclosure	Plastic, PC/ABS

### Operating conditions

Temperature	0 to 50 °C
Humidity	0 to 85% RH (non-condensing)

### Device Power Supply

Battery Type	2 x 3.6V AA Lithium Batteries
Expected Battery Life	<10 years (Depending on configurations and environment)

### Device Logging Function

Sampling Interval	Configurable via NFC and downlink configuration
Data Upload Interval	Configurable via NFC and downlink configuration

Radio / Wireless	
Wireless Technology	LoRaWAN® 1.0.3
Wireless Security	LoRaWAN® End-to-End encryption (AES-CTR), Data Integrity Protection (AES-CMAC)
LoRaWAN Device Type	Class A/C (configurable) End-device
Supported LoRaWAN® features	OTAA, ABP, ADR, Adaptive Channel Setup
Supported LoRaWAN® regions	US902 – 928, EU863 – 870, AS923, AU915 – 928, KR920 – 923, RU864, IN865
Link Budget	137 dB (SF7) to 151 dB (SF12)
RF Transmit Power	14 dB / 20 dB (Region specific)

Data types			
Type value	Type	Data size	Comment
0x01	Temperature	2	-3276.5 °C → 3276.5 °C (Value of: 100 → 10.0 °C)
0x02	Humidity	1	0 – 100 %
0x04	Light	2	0 – 65535 Lux
0x05	Motion (PIR)	1	0 – 255 (Number of motion counts)
0x06	CO <sub>2</sub>	2	0 – 2000 ppm (Extended: 0 – 10000 ppm)
0x07	VDD (Battery voltage)	2	0 – 65535 mV
0x3D	Debug information	4	Data depends on debug information
0x3E	Sensor settings	n	Sensor setting sent to server at startup (first package). Sent on Port+1.

## Sensors

### Temperature

Resolution: 0.1 °C

Accuracy: ±0.2 °C (See figure 1)

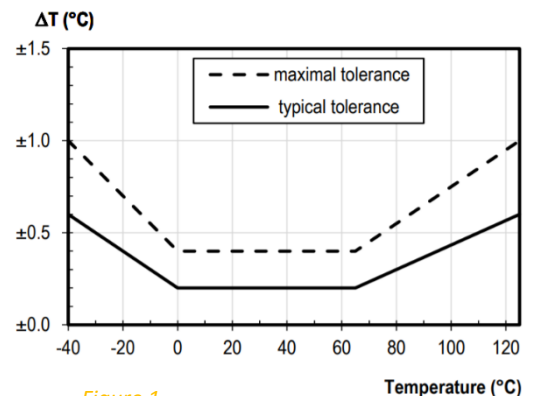


Figure 1

### Humidity

Resolution: 0.1 % RH

Accuracy at 25 °C: ± 2 % RH (See figure 2)

Accuracy of humidity over temperature: See figure 3

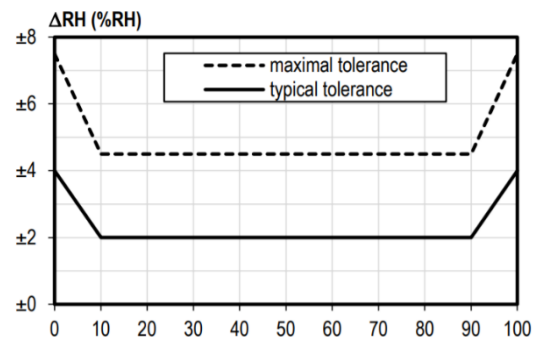


Figure 2

## Light

Range: 4 – 2000 LUX

Resolution: 1 LUX

Accuracy:  $\pm 10$  LUX

## Motion (PIR)

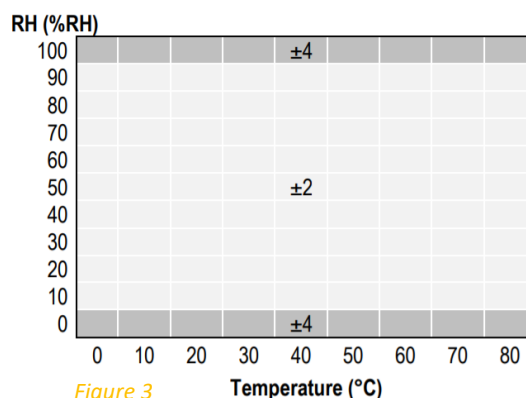
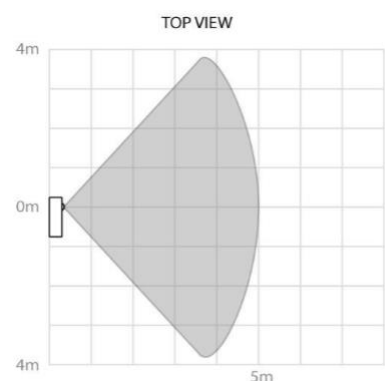
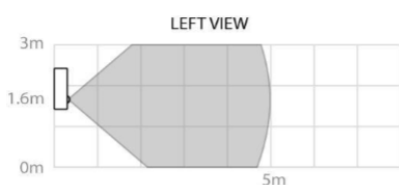


Figure 3 Temperature (°C)

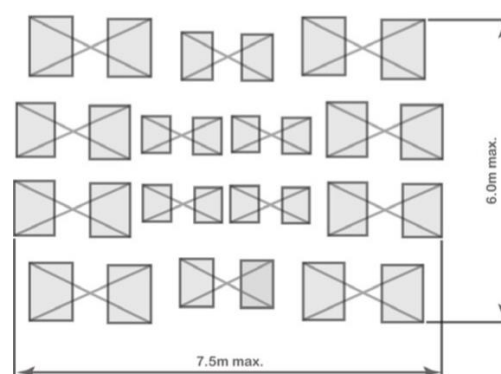


Figure 4 - Detection pattern

### Note:

There is a blanking time of 30 seconds of the PIR triggering after each PIR trig and after each transmission. This is to reduce the risk of self-triggering from internal events that could disturb the high sensitivity PIR circuits.

## CO<sub>2</sub>

Range, calibrated: 0 – 2000 ppm

Range, extended: 0 – 10000 ppm

Accuracy, calibrated:  $\pm 50$  ppm /  $\pm 3\%$  of reading

Accuracy, extended:  $\pm 10\%$  of reading

*Accuracy is met at 10 – 40°C, 0 – 60%RH, after minimum three (3) performed Automatic Baseline. Corrections, preferably spanning eight (8) days in-between, or a successful zero-calibration*

Noise: 14 ppm at 400 ppm / 25 ppm at 1000 ppm

### Note:

The CO<sub>2</sub> sensor has an internal automatic calibration routine. This routine calibrates the sensor to set 400 ppm to the lowest value that has been read in the last period of approximately 8 days. This means that in an 8 day period, the sensor must be exposed to fresh (well ventilated) air at least once for the calibration to work. The sensor can also be manually calibrated.