



AL-439-00-921 EnoSense CO2

EnOcean Sensor for CO2 / temperature / rel. humidity

EnOcean 921.7 MHz / TAIWAN

Part no. 12850 (white) / 12900 (black)

Version 1.00, valid since FW / HW 2.3 / 1.7

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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1 Validity of this documentation

This documentation is only applicable to the product

AL-439-00-921 EnoSense CO2

and is only applicable starting from products with FW/HW Version 2.3 /1.7.

The device must only be installed and operated according to the instructions in these operating instructions.

2 Intended use

The **AL-439-00-921 EnoSense CO2** must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.

The **AL-439-00-921 EnoSense CO2** will typically be mounted besides a door or on a wall and can be mounted on any smooth surface using a double-sided adhesive tape.

The sensor elements inside the device are sensitive against shock and must be handled carefully during transport and mounting.

3 Disposal



Electrical and electronic equipment may not be disposed of with household waste. This also applies to products without this symbol.

Electrical and electronic equipment contain materials and substances that can be harmful to the environment and health. Electrical and electronic equipment must be disposed of properly after use.

Note only for EU: WEEE 2012/19/EU applies throughout Europe. Directives and laws may vary nationally.

4 Device description

4.1 Functionality

4.1.1 CO2 measurement, including temperature and humidity

If the energy level is sufficient, the device sends all 5 minutes the measured values for CO2, rel. humidity and temperature.

After 2 hours of darkness, the device reduces the transmission interval to an interval of approx. 60 minutes to save energy.

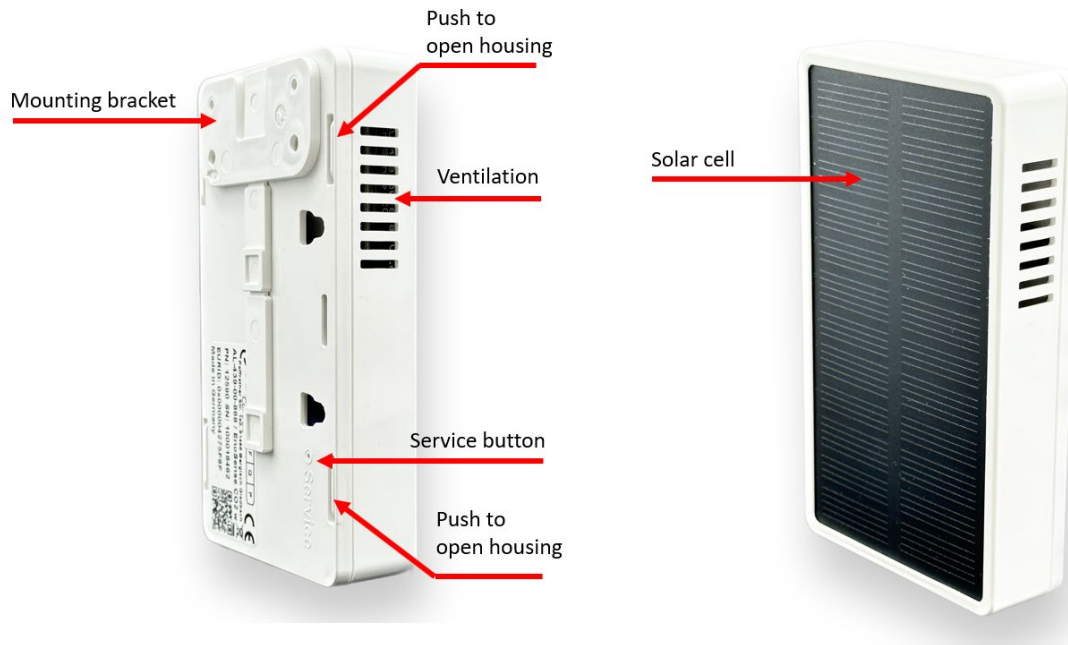
4.1.2 Supply voltage monitoring / maintenance

To support remote maintenance, the values of the supply voltage and the current solar voltage are measured and send via EnOcean in every message.

4.2 External product interface

The external product interface consists of the following items:

- Solar cell for energy harvesting (full-size, front)
- Service button to send teach in / learn telegram (back)
- Push areas to open sensor (access to battery holder)



4.3 Observe intended use

The **AL-439-00-921 EnoSense CO2** must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.

4.4 Observe statutory provisions for operating frequency range.

The **AL-439-00-921 EnoSense CO2** must only be operated in compliance with the country-specific provisions regarding operation of radio equipment.

4.5 Non-conduction mounting surface

A non-conductive mounting surface is necessary.

Ensure the **AL-439-00-921 EnoSense CO2** is mounted on a non-conductive surface. If it is not, performance may be adversely affected.

5 Technical data

5.1 Communication / EnOcean wireless interface

Type	EnOcean
Number	1
Operating frequency	921.7 MHz
Transmission power	92.31 dBuV/m
Modulation type	FSK
Number of channels	Ch 24 (921,7 MHz)
Transfer / data rate	125 kbit/s

Table 1: Technical data / communication

5.2 Sensor: CO2

Measuring range	0 .. 5.000 ppm
Accuracy	- typ. +/- (30 ppm +3% of reading) - max. +/- (45 ppm +3% of reading)

Table 2: Technical data / CO2 sensor

5.3 Sensor: Temperature

Measuring range	0 .. 50 °C
Accuracy	- typ. +/- 0.2 °C - max. +/- 0.4 °C

Table 3: Technical data / temperature sensor

5.4 Sensor: Humidity

Measuring range	0 .. 99 %
Accuracy	- typ. +/- 2.0 % - max. +/- 3.5 %

Table 4: Technical data / humidity sensor

5.5 User interfaces

Service button	Yes
Service LED	Yes

Table 5: Technical data / user interfaces

5.6 Housing / connection technology

Connection technology	-
Housing	Plastic, PC, white / black / beige

Table 6: Technical data / housing

5.7 Power supply

Power supply voltage	2x AA, 1,5V internal batteries
Power consumption	Typ. 1 mW, 50 µA standby
Power rating	3 V DC, 0.05 A max. (operational)

Table 7: Technical data / power supply

5.8 Environmental conditions

Operating temp.	0.. +50 °C
Storage temp.	-15 ..+60 °C
Rel. humidity	0..99 % rel. humidity, non condensing
Protection class	IP20

Table 8: Technical data / environmental conditions

5.9 Dimensions and weight

Weight	111 g
Dimensions	67 x 116 x 24 mm

Table 9: Technical data / dimensions and weight

5.10 Standards and guidelines

EMC	EN IEC 61000-6-2 :2016 EN IEC 61000-3-2 :2019 EN 61000-3-3 :2013 EN 55032 :2012/AC :2013
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Table 10: Technical data / standards and guidelines

6 Functional description in detail

6.1 CO2 / temperature / rel humidity measurement

The **AL-439-00-921 EnoSense CO2** will measure CO2 concentration, ambient temperature and rel. humidity as well.

6.2 Send learn telegram

To connect the **EnoSense CO2** to any building automation system, a so called learn telegram can be send by the device.

Simply push the service button. The **EnoSense CO2** will immediately a learn telegram.



6.3 Table of supported EEP's (EnOcean Equipment Profiles)

6.3.1 Transmit / TX

The EnOcean wireless standard defines so called EnOcean Equipment Profiles (EEP). Each EnOcean based product sends data according to at least one standardized data format. The **EnoSense CO2** transmits data described as follows:

Cons. nr.	EEP	Description	Tx-ID
1	47-D1-09-01	• CO2 • Humidity • Temperature • CAP voltage (energy buffer) • Solar voltage • ☐ Battery voltage	EURID

Table 11: Technical data / EnOcean EEP for TX

6.3.2 MSC data structure

Data field	CO2	Humidity	Temp.	CAP voltage	Solar voltage	Batt. voltage
Offset	16	32	40	49	57	65
Size	16	8	9	8	8	8
Range min / max	0 / 5000	0 / 200	0 / 500	0 / 255	0 / 255	0 / 255
Scale min / max	0 / 5000	0 / 100	0 / 50	0 / 5.1	0 / 5.1	0 / 5.1
Unit	ppm	%	°C	V	V	V
Meaning	CO2 Level	Rel. humidity	Temp.	Cap. voltage	Solar voltage	Batt. voltage

6.3.3 Data transmission rules

Operational description of CO2 measurement / data transmission rules

The sensor continuously measures the CO2 concentration, the ambient temperature and the rel. humidity.

If the energy level is sufficient, the device sends all 5 minutes the measured values for CO2, rel. humidity and temperature.

After 2 hours of darkness, the device reduces the transmission interval to an interval of approx. 60 minutes to save energy.

Supply voltage monitoring / maintenance

To support remote maintenance, the values of the supply voltage and the current solar voltage are measured and send via EnOcean in every message.

6.3.4 Receive/ RX

The **EnoSense CO2** only sends EnOcean telegrams. No data is received / interpreted.

7 Service / changing batteries



Caution: When opening the device, you have to take care of electrostatic discharge. Otherwise, electronics can be damaged.

In case of discharged batteries, they can be replaced with two new AAA batteries, 1.5 V.
You have to push the housing with your fingers within the marked area on the side of the EnoSense CO2 to open it.

8 Safety remarks



CAUTION: Risk of damage or explosion if a battery of incorrect type is used.



This product contains AA type batteries. If a battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death.



Keep new and used batteries away from children.

9 Device labels

The following labels are placed on the rear side of the AL-439-00-921.

9.1 AL-439-00-921 white:

Label 1:



Positioning:



9.2 AL-439-00-921 black:

Label 1:



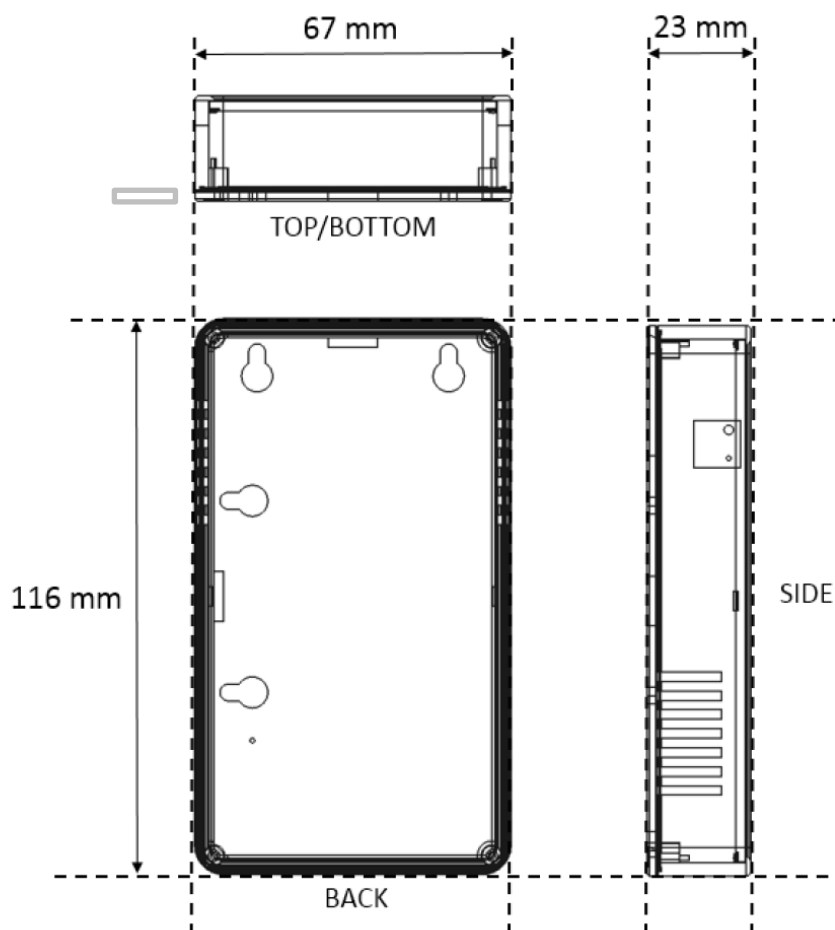
Positioning:



10 NCC statement

「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」

11 Dimensions / drawings



12 Ordering information

Article name	Part nr.	Part description
AL-439-00-921 EnOcean Sensor „EnoSense® CO2 “ / white / NCC / TAIWAN	12850	Sensor EnOcean "EnoSense® CO2 ", for measuring CO2, temp. and rel. humidity; for wall mounting with/without holder; power supply: internal solar cell, backup batteries: 2x AAA; dimensions 67 x 116 x 23mm, EnOcean 921 MHz, TAIWAN, Housing: PC, white (similar to RAL 9010 / pure white); incl. wall bracket EEP: 47-D1-09-01
AL-439-00-921 EnOcean Sensor „EnoSense® CO2 “ / black / NCC / TAIWAN	12900	Sensor EnOcean "EnoSense® CO2 ", for measuring CO2, temp. and rel. humidity; for wall mounting with/without holder; power supply: internal solar cell, backup batteries: 2x AAA; dimensions 67 x 116 x 23mm, EnOcean 921 MHz, TAIWAN, Housing: PC, black (RAL 9004 / signal black); incl. wall bracket EEP: 47-D1-09-01

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13 Revision history

Version	Author	Reviewer	Date	Major changes
1.00	Lehzen	Pohl	23.05.2025	Initial release
1.10	Lehzen	Pohl	01.08.2025	Updated with NCC ID's

----- End of document -----