OrionM2M

INDOOR AIR QUALITY SENSOR

NM-103

LoRaWAN EU868 / IN865 / KZ865 / RU864 · Class A · CO_2 NDIR 400 … 5000 ppm · IP30



01 FEATURES

- Temperature, humidity and CO_2 (NDIR) in one housing
- 2.13" E-ink screen: CO_2 trend and comfort emoticon
- Traffic light indicator and CO_2 threshold alarm reports
- 640-entry data storage and retransmission after link loss
- Li-$SOCl_2$ batteries: ≈ 3–4.5 years (EU868, 10 min interval)
- Configuration via mobile app (NFC) and downlink commands

APPLICATIONS

- Offices
- Classrooms
- Stores
- Hospitals

02 GENERAL

Screen (except L variant)	**2.13" E-ink**	black & white
CO_2 level indicator	**traffic light**	1 LED
Button (under back cover)	**power / reset**	
Configuration	**NFC · downlink**	
Operating temp.: device · screen	**–20 … +60 · 0 … +40**	°C
Operating RH, non-condensing	**0 … 95**	%
Housing · ingress protection	**PC + ABS, white**	IP30
Dimensions	**68 × 65 × 20.5**	mm
Weight incl. batteries	**182.5**	g
Wall mounting	**screws / tape**	

03 POWER

Replaceable ER14505 batteries	**2 × 2700**	mAh
Battery life, 10 min interval, +25 °C, EU868 (laboratory estimate):		
with screen, SF7 / SF10	**≈ 4.5 / 3**	years
without screen (L), SF7 / SF10	**≈ 5 / 3.3**	years

04 MEASUREMENT

Temperature · resolution	**–20 … +60 · 0.1**	°C
T accuracy typ.: 0…+60 / –20…0	**±0.2 / ±0.3**	°C
Humidity · resolution	**0 … 100 · 0.5**	% RH
RH accuracy typ., +25 °C	**±2**	% RH
CO_2 (NDIR) · resolution	**400 … 5000 · 1**	ppm
CO_2 accuracy at 0…+50 °C	**±30 ppm ±3 %**	of reading
CO_2 calibration	**manual · auto**	ABC
Altitude compensation	**0 … 5000**	m

05 LORAWAN

Specification version	**1.0.2 / 1.0.3**	
Class · activation	**A · OTAA / ABP**	
Frequency plans	**EU868 · IN865 · KZ865 · RU864**	
Transmitter power (868 MHz)	**16**	dBm
Sensitivity at 300 bps	**–137**	dBm
Antenna	**internal**	
Reporting interval (def. 10)	**1 … 1080**	min

06 ORDER INFO

SKU	DESCRIPTION
NM-103[L]/[F] L — variant F — frequency plan	**LoRaWAN indoor air quality sensor: temperature, humidity, CO_2**

L — VARIANT
- no L — with screen
- L — no screen

F — FREQUENCY PLAN
- EU — EU868
- IN — IN865
- KZ — KZ865
- RU — RU864

PACKAGE CONTENTS
- sensor with pre-installed batteries
- 2 wall mounting kits, theft-deterring screw
- double-sided mounting tape
- quick guide, warranty card

NM-103

INTEGRATION REFERENCE

07 LORAWAN PROTOCOL

FPort: uplink and downlink	**85**	default
Payload format	**channel · type · data**	little-endian
Radio settings (via NFC)	**ADR · SF · Tx power**	and RX2
Single-channel mode	**yes**	
Retries if no ACK	**1**	
Link check (OTAA)	**LinkCheckReq**	fail: rejoin
Network time sync, LoRaWAN 1.0.3	**DeviceTimeReq**	every 5 days
Basic info on network join	**versions · S/N · mask**	

08 UPLINK FIELD MAP

CH. · TYPE	FIELD	DATA
PERIODIC REPORT AND ALARMS		
01 75	Battery level	UINT8 · 1 %
03 67	Temperature	INT16/10 · 0.1 °C
04 68	Relative humidity	UINT8/2 · 0.5 %
07 7d	CO_2 concentration	UINT16 · 1 ppm
HISTORICAL DATA		
20 ce	Historical record: time, T, RH, CO_2	9 bytes
fc 6b/6c	Reply to historical data enquiry	00 / 01 / 02
BASIC INFORMATION — ON NETWORK JOIN		
ff 0b	Power-on	ff
ff 01	Protocol version	01 = V1
ff 09/0a	Hardware · software versions	2 + 2 bytes
ff 0f	Device class	00 = Class A
ff 16	Serial number	8 bytes
ff 18	Sensor status mask: bits 0 T, 1 RH, 4 CO_2	2 bytes

Periodic report example: `017564 03671001 046871 077d1303` — 100 %, 27.2 °C, 56.5 % RH, 787 ppm. Alarm reports (temperature threshold, upper CO_2 threshold, low battery at 1 %) use the same fields; there is no alarm flag. Reply to a historical data enquiry: 00 — retrieval started; 01 — invalid time point or range; 02 — no data.

09 STORAGE AND RETRANSMISSION

Storage capacity	**640**	entries
Record timestamp	**UINT32**	unix s
Retransmission interval (def. 600)	**30 … 1200**	s
Per range enquiry	**≤ 300**	entries
Retrieval interval (def. 60)	**30 … 1200**	s

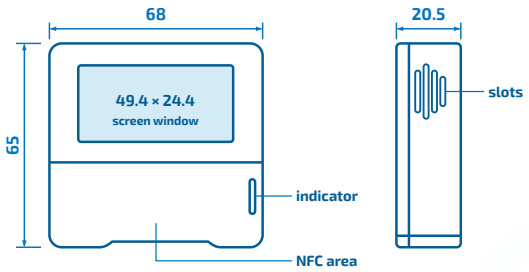
Timestamps are correct once the device time is synced. Retransmission requires data storage to be enabled and shortens battery life.

10 KEY DOWNLINK COMMANDS

COMMAND	FUNCTION	DATA
ff 10 ff	Reboot	
ff 03	Reporting interval	UINT16, s
ff 17	Time zone	INT16/10, h
ff 11	Device time	UINT32, unix s
ff 68	Data storage off / on	00 / 01
ff 69	Retransmission off / on	00 / 01
ff 6a 00/01	Retransmission / retrieval interval	UINT16, s
ff 1a	CO_2: manual / factory calibration	03 / 00
ff 39	CO_2: auto background calibration (ABC)	01 · h · ppm
ff 87	CO_2: altitude compensation	01 · m, 0…5000
ff 2d	Screen off / on (except L)	00 / 01
fd 6b	Data enquiry: time point	UINT32, unix s
fd 6c	Data enquiry: time range	2 × UINT32
fd 6d ff	Data enquiry: stop retrieval	

Examples: `ff03b004` — reporting interval 1200 s (20 min); `ff3901a8009001` — CO_2 auto background calibration, 168 h period, 400 ppm reference.

11 DIMENSIONS AND MOUNTING



Dimensions in mm; L variant has no screen window

Location	on a wall at least 1.5 m above the floor, not upside down; away from windows, doors, vents, fans, air conditioners and heat or cold sources.
Mounting	fix the back cover with screws and wall plugs or double-sided tape; lock the bottom of the device to the cover with the theft-deterring screw.
Start-up	remove the back cover, take out the battery insulation sheet and hold the button for 3 s.
CO_2 calibration	manual — at least 10 min outdoors before installation, reading set to 400 ppm; auto background (ABC) — for ventilated rooms.

12 TYPICAL APPLICATION

