User Manual

Senseair ExplooraCO_2

LoRaWAN, battery powered
CO_2, temperature and relative humidity transmitter

General

Senseair ExplooraCO_2 is designed to measure carbon dioxide, temperature and humidity in indoor environments. The sensor is intended for indoor climate control. It is optimised for reliable and secure measurements with 15 years lifespan (battery lifespan >5 years @ reporting interval 20 min).
Standard measurement interval is every minute and standard reporting interval is every 20 minutes, other reporting intervals can be configured over the air.

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2 Installation and activation

See Installation manual

Configure the device in the LoRaWAN server, according to chapter 2.1, and insert the batteries. The sensor starts and flashes 2 + 6 times during the boot-up sequence. The sensor is activated by pressing the push button for 3 seconds until the red LED makes two short flashes.
When the device has successfully joined the LoRaWAN network there will be a 2-second-long flash.
Attach the electronic board to the bottom piece and attach the plastic cover.

2.1 LoRaWAN Configuration

Configuration on the network server is done with
AppEUI: 70-B3-D5-D7-2F-F8-18-00 (a.k.a. JoinEUI)
It is possible to order a batch of devices configured with a customer unique AppEUI, contact Senseair for information.
The device is configured with device unique DevEUI and AppKey. The DevEUI is printed on device box and the AppKey is distributed by the sales team. The device is default configured for OTA provisioning. Contact Senseair for ABP configuration. The device follows the LoRaWAN standard related Join configuration parameters, such as RX1 and RX2 windows, RX2 downlink frequency etc.
The default setting is ADR enabled.

2.1.1 Frequency band

EU:	868 MHz *
USA, Australia:	915 MHz

*Other options will be available

See senseair.com

2.2 Sensor states and state check

The sensor has five states: Powered, Booting, Initial, Joining, Configure and Operational state.

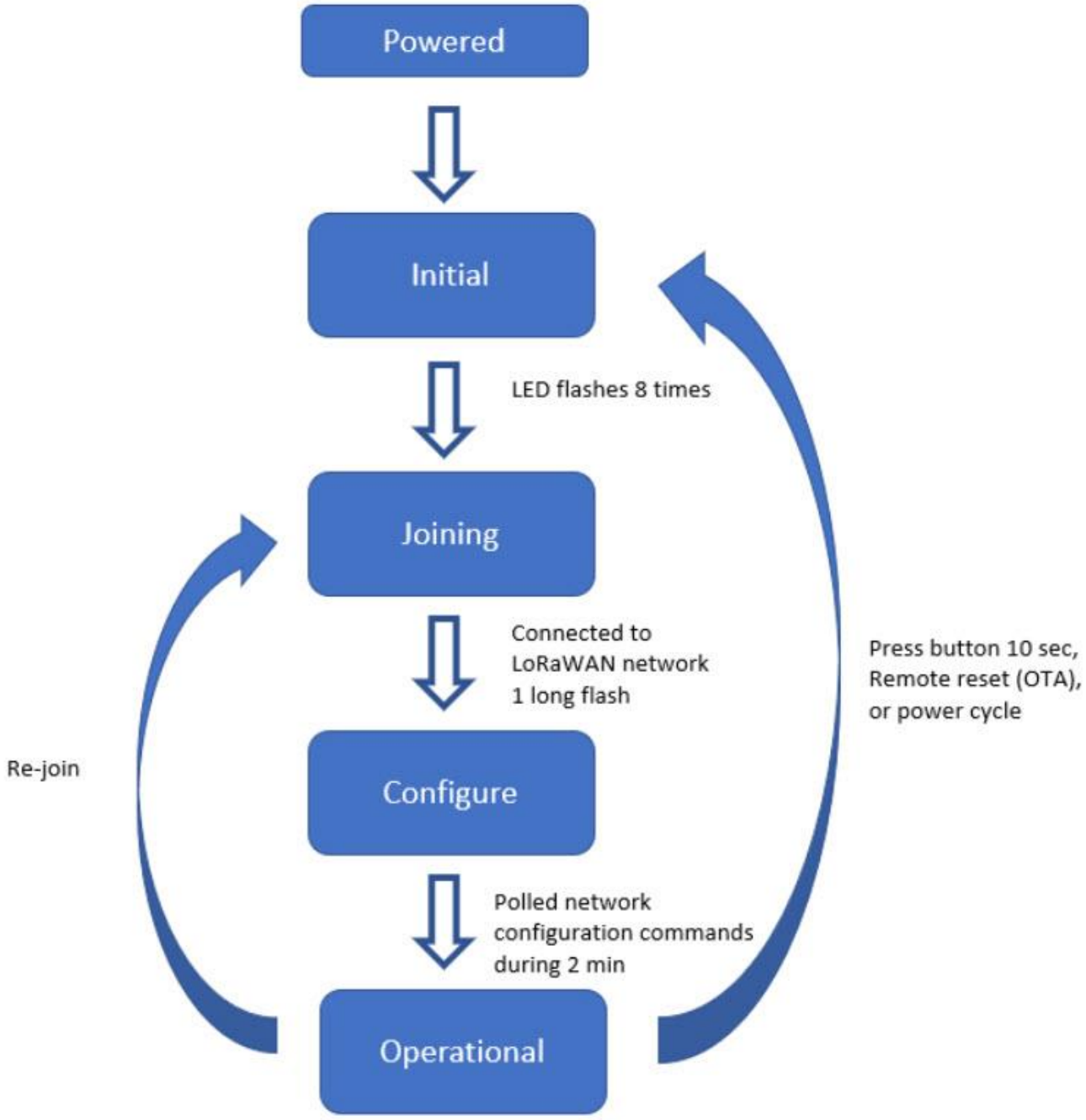

Figure 1 Device states

When the unit is initially powered, the LED flashes twice, after a few seconds the unit enters initial state automatically. This is indicated by flashing 6 times.
To check the device state, press the button and hold it pressed until the red LED starts flashing after 0.5s.

State	Description	LED response
Initial	Low power state during transport. Radio not active	1 short flash (0.5 sec)
Joining	Trying to join a LoRaWAN network. The device will remain in this state until successfully joined a LoRaWAN network	2 short flashes (0.5 sec)
Configure	Enables quick over-the-air configuration, by polling server after configuration commands during 2 minutes. This is done by sending uplink status command (0x20).	1 long flash (2 sec)
Operational	Joined to a LoRaWAN network, measures temperature and humidity periodically, and sends measurement reports toward a LoRAWAN network.	1 long flash (2 sec)

2.2.1 Re-join functionality

The device supervises its connectivity to the network by monitoring that periodic downlink messages are received.
The device tries to re-join the network if it has not heard anything from the network for 288 uplinks (4 days @ 20-minute message interval). The device requests and normally gets a downlink ever 64th uplink due to the ADRAckReq functionality.

3 Security

- Cryptographical coprocessor for ultra-secure hardware based key storage
- Secure boot
- Encrypted FW
- Message encryption (AES-128 bit)
- Message integrity (MIC AES-128 bit)
- No port access to device.

4 Calibration

No calibration needed. Internal self-adjusting calibration with Automatic Baseline Correction (ABC) function takes care of normal long-term drift. To secure highest accuracy, a time interval of five years is recommended between CO_2 calibrations, unless some special situations have occurred.

Check can be done on site without interfering with ventilation system.

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