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# Commissioning of the EP5000-L (LoRa) probe

| Ver | Date | Modification / Update |
|---|---|---|
| V1 | 04/01/2020 | Initial Version |
| V2 | 20/01/2020 | Flickering added |
| V3 | 01/6/2020 | Dimming LEDs removed, Byte numbering corrected, Lux range extended |
| V4 | 01/03/2021 | New organization of the telegram with index, NOx and O3 |
| V5 | 15/04/2021 | Number of bits reduction for noise |
| V6 | 19/11/2021 | BITE reduced to 1 byte |
| V7 | 21/03/2022 | Outdoor air quality downlink added |
| V8 | 10/06/2022 | Corrections |
| V9 | 22/06/2022 | Return BITE to 2 bytes, Occupancy added |

# Summary



# 1. Overview

The EP5000L (powered) and E5000AL (autonomous with indoor light supply) probe communicates by radio in LoRaWAN. This document describes how to commission the probe on the LoRaWAN network and describes the content of the telegrams.

# 2. Memory security accessible by NFC

The NFC chip has a password to protect it in read and / or write.
Thus the serial number, radio ID and other parameters to be secured cannot be modified by a third party.
The settable data (parameters) can only be accessed from the manufacturer's Android Application containing the passwords to avoid any hacking or corruption of data by people using standard NFC chip reading and writing software.

# 3. Download the setting application

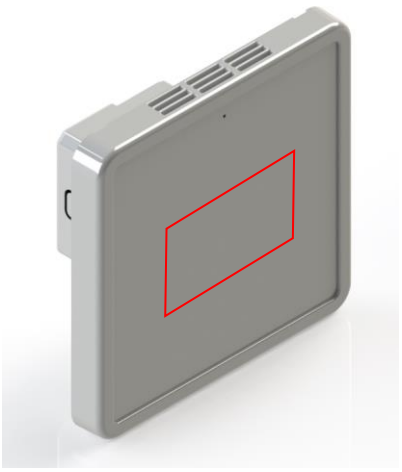
The setting of parameters and the reading of data is compatible with Android smartphones (not IOS because Apple does not allow the use of the on-board NFC of their smartphone for purposes other than payment).
You can go to the Google store and search for NanoSense. You will see a list of applications: Select the application corresponding to the IAQ probe model and download it.

# 4. Smartphone type and settings

Make sure your Android smartphone has an integrated NFC function.
Activate NFC in the settings section.

# 5. Reading the LoRa Keys with the NFC application

Open the NFC configuration App and approach the back of the smartphone from the center of the front face of the probe (the antenna is located in the middle).
Reading by NFC does not require the unit to be powered or even mounted. It is even possible to read the NFC memory through the cover of the box (a marking on the box indicates the location of the NFC antenna)
The power supply for the front panel comes from the smartphone via NFC. When the NFC antenna on the probe responds, you should hear a Beep on the phone.
You can read the unique LoRa keys. To do this, click on the "Read" button in the application.
The keys can now be copied for recording in the network or sent by Email.



NFC antenna location

# 6. Join a network

By default, the probe is in public mode. For private mode, you must use the dedicated smartphone application and activate this function by NFC. Do not confuse private mode and private network. Private mode exchanges longer keys.
Select OTAA mode in the web page of the LoRaWAN network or of the gateway used.

Enter the following keys:

| Key | Bits | Byte | Contend | Contend in hexadecimal for input |
|---|---|---|---|---|
| **Device EUI** | 64 | 8 | "Unique" | Contained in the NFC chip |
| **Application EUI** | 64 | 8 | EP5000-L | Contained in the NFC chip<br>(45 50 35 30 30 30 2D 4C) |
| **Application Key** | 128 | 16 | "Unique" | Contained in the NFC chip |

Keys are confidential and readable on smartphone via the App and NFC
Keys can then be protected by password or even be erased (Bur DevEUI). Refer to the App manual for details
Copy the keys on the LoRa platform of an operator or a gateway.
At startup, the radio module will be automatically recognized by the LoRa or LoRaWAN network.
When the radio module is connected to the LoRaWAN network, The Joined green LED in the upper part of the front panel remains on.

Joined LED

Be careful, recording on an operated network may require several radio transmission cycles.
The management of this LED is settable by NFC:
• Always ON
• On for one hour after connection to the network
• Disabled if no downlink in the last 8 hours
• Disabled if no downlink in the last 12 hours
• Disabled if no downlink in the last 24 hours

# 7. Setting the LoRa emission rate

The transmission rate depends mainly on the operator and the contract with him. It is generally allowed to transmit on average at most every 10 minutes in an operated network. In a private network, the rate may be faster.
By default, the cadence of the Radio LoRa module is 10 minutes.

The transmission rate can be configured by NFC and by the downlink for powered EP5000L.
The following command must be sent:
0x01 0xdd 0xdd
0x01: command number for time cycling change. (See chapter 2.2.2)
0xdd 0xdd is the delay between two frames in minutes, it will be taken into account after the next emission.

# 8. LoRaWAN Payload

## 8.1. Contend of LoRaWAN Payload

Regularly, the LoRa module sends a set of measurements distributed over its emission rate. This message can be timestamped on receipt. It belongs to a gateway or the database that archives the recordings to time stamp the data.

## 8.2. LoRa messages format

### 8.2.1. Uplink

**EP5000 LoRa Telegram:**

| Presence sensor | Probe Frm | LoRa Module Frm | BITE | Autonomy | Emission rate | RH | T° | PM | Noise | Occupancy | CO2 | TCOV | Formaldehyde | Benzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 2 Bytes | 1 Byte | 9 bits | 27 bits | 14 bits | 1 bit | 13 bits | 2 Bytes | 2 Bytes | 2 Bytes |

| Sulphurous odors | NOx | Ozone | Atmospheric pressure | Lux | Color T° | Flickering | Health index | Cognitivity index | Quality of sleep index | Throat irritation index | Virus spreading risk index | Building health index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Byte | 1 Byte | 1 Byte | 14 bits | 10 bits | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte |

Total 37 Bytes

Please note that the standard authorizes 51 bytes (from SF12 to SF10, the longest ranges at 125Khz) in most regions and particularly in Europe, but only 11 in DR0 and 53 in DR1 in North America. So the radio stack for North America starts at DR1 which limits the range a little bit.

**Detail of the sensor presence byte (byte 1):**

| Byte 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Presence sensors | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

| Bit | |
|---|---|
| 0 | 1 = T°, RH active |
| 1 | 1 = PM active |
| 2 | 1 = Bruit active |
| 3 | 1 = CO2 active |
| 4 | 1 = TCOV, sulfurous odors active |
| 5 | 1 = NOx, O3 active |
| 6 | 1 = Benzene, Formaldehyde active |
| 7 | 1 = Lux & light T° active |

**Detail of EP5000L probe Firmware version and LoRa stack software bytes:**

| Byte 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Probe Firmware Version | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

| Byte 3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| LoRa Stack Firmware Version | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Bits 4 to 7: integer
Bits 0 to 3: tenths
Valid range: 1.0 to 15.15

**Detail of BITE (Built In Test Equipment) bytes:**

The 2 bytes of the BITE identify the FRU (**F**iled **R**eplaceable **U**nit) to be changed.

| Bit | |
|---|---|
| 0 | LoRa front panel board. |
| 1 | Single band CO2 sensor module. |
| 2 | Dual band CO2 sensor module |
| 3 | VOC/odors/NOx/O3 sensors module |
| 4 | Motherboard. |
| 5 | Interconnection board. |
| 6 | Particles sensor board |
| 7 | Radio version power supply board. |
| 8 | Multiple failures. |
| 9 | Perishable sensor arrived at end of life. |
| 10 to 16 | Reserved |

0: OK, 1: Defective

**Detail of Autonomy byte:**

| Byte 6 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Autonomy | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Used for indoor solar stand-alone version only.
Valid range from 0 to 100%
Resolution 1% by LSB

**Detail of the Transmission rate bytes:**

| Byte 7 | | | | | | | | Byte8 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Emission rate | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Unit: Minutes
Useful to verify that the cadence command has been received.
By default, the value is zero which corresponds to an emission rate of 10 minutes. Note that values greater than 720 also correspond to the default value of 10 minutes.
Therefore, the range goes from 1 minute to 12h.
Valid range: 0-720 minutes (12 hours)

**Detail of the RH byte:**

| Byte 9 | | | | | | | |
|---|---|---|---|---|---|---|---|
| RH | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Valid range: 0/200 LSB
Range of measurement: 0 to 100%RH
Resolution: 0.5%/LSB

**Detail of Temperature:**

| Byte 10 | | | | | | | | Byte 11 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Valid range: 0/511 LSB
Range of measurement: 0 to +51°C
Resolution: 0.1°C/LSB

**Detail of PM:**

| Byte 11 | | | | | | | | Byte 12 | | Byte 13 | | | | | | Byte 14 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PM 10 | | | | | | | | | PM 2.5 | | | | | | | PM 1 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Valid range: 0/511 LSB
Range of measurement: 0 to 511 µg/m$^3$
Resolution: 1 µg/m$^3$/LSB

**Detail of Noise:**

| Byte 14 | | | | | | | | Byte 15 | | | | | | | | Byte 16 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Average Noise | | | | | | | Pic Noise | | | | | | | Occupancy | CO2 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

valid Range pic & average: 0/103 LSB
Range of measurement: 17 to 120 dB
Resolution: 1 dB

**Detail of Occupancy (suspicion based on CO2):**
Bit 5 of byte 15
0: Unoccupancy
1: Occupancy

**Detail of CO2:**

| | Byte 16 | | | | | | | | Byte 17 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO2 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Concentration:
Valid Range: 0/5000 LSB
Range of measurement: 0 to 5000ppm
Resolution: 1ppm / LSB

**Detail of TVOC**

| Byte 18 | | | | | | | | Byte 19 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TVOC Concentration | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Concentration:
Valid Range: 0/65 535 LSB
Range of measurement: 0 to 65535 µg/m$^3$
Resolution: 1 µg/m$^3$ / LSB

**Detail of Formaldehyde:**

| Byte 20 | | | | | | | | Byte 21 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Formaldehyde Concentration | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Concentration:
Valid Range: 0/65 535 LSB
Range of measurement: 0 to 655.35 µg/m$^3$
Resolution: 0.01 µg/m$^3$ / LSB

**Detail of Benzene:**

| Byte 22 | | | | | | | | Byte 23 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene Concentration | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Concentration:
Valid Range: 0/65 535 LSB
Range of measurement: 0 to 655.35 µg/m$^3$
Resolution: 0.01 µg/m$^3$ / LSB

**Detail of Sulphurous Odors:**

| Octet 24 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sulphurous Odors | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Concentration:
Valid Range: 0/100 LSB
Range of measurement: 0 to 100 OU (Odor Units)
Resolution: 1 OU / LSB

**Detail of NOx:**

| Octet 25 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NOx | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Concentration:
Valid Range: 0/250 LSB
Range of measurement: 0 to500 ppb
Resolution: 2 ppb / LSB

**Detail of Ozone:**

| Octet 26 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ozone | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Concentration:
Valid Range: 0/250 LSB
Range of measurement: 0 to500 ppb
Resolution: 2 ppb / LSB

**Detail of Atmospheric Pressure:**

| Byte 27 | | | | | | | | Byte 28 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mbar / hPa | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Atmospheric Pressure:
Valid Range: 0/16 38 LSB
Range of measurement: 0 to 1638.3 mbar
Resolution: 0.1 mbar / LSB

**Detail of Lux:**

| Byte 28 | | | | | | | | Byte 29 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Lux | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Luminosity:
Valid Range: 0/1023 LSB
Range of measurement: 0 to 4092 Lux
Resolution: 4 lux / LSB

**Detail of Light color Temperature:**

| Byte 30 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Light color T° in Kelvin | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

light color Temperature:
Valid Range: 0/255 LSB
Range of measurement: 1 635°K to 7 500°K
Resolution: 23°K / LSB

**Detail of Light flickering:**

| Byte 31 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Flickering in % | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

Flickering of the light:
Valid Range: 0/100 LSB
Range of measurement: 0 to 100%
Resolution: 1% / LSB

**Detail of Physiological Effects:**

| Octet 32 | Octet 33 | Octet 34 | Octet 35 |
|---|---|---|---|
| Health Index | Cognitivity Index | Sleeping Index | Throat irritation index |
| | | | |

Valid Range: 0/100 LSB
Range of measurement: 0 à 100%
Resolution: 1% / LSB

**Detail of Building Health:**

| Byte 36 |
|---|
| Building Index |
| |

Valid Range: 0/100 LSB
Range of measurement: 0 à 100%
Resolution: 1% / LSB

**Detail of virus spreading risk index:**

| Octet 37 |
|---|
| Virus spreading risk index |
| |

Valid Range: 0/100 LSB
Range of measurement: 0 à 100%
Resolution: 1% / LSB

**Conversion of physical values:**

| Parameters measured | Size | Range | Resolution | Physical Values |
|---|---|---|---|---|
| CO2 | 13 bits | 0…5000 | 1 LSB = 1 ppm | 0…5000 ppm |
| Humidity | 1 Byte | 0…200 | 1 LSB = 0.5% | 0…100 %RH |
| Temperature | 9 bits | 0…511 | 1 LSB = 0.1°C | 0…+51 °C |
| VOC | 2 Bytes | 0…65535 | 1 LSB = 1 µg/m$^3$ | 0…65535 µg/m$^3$ |
| Formaldehyde | 2 Bytes | 0…65535 | 1 LSB = 0.01 µg/m$^3$ | 0…655.35 µg/m$^3$ |
| Benzene | 2 Bytes | 0…65535 | 1 LSB = 0.01 µg/m$^3$ | 0…655.35 µg/m$^3$ |
| PM10, PM2.5, PM1 | 9 bits per value | 0…511 | 1 LSB = 1 µg/m$^3$ | 0…511 µg/m$^3$ |
| Sulphurous Odors | 1 Byte | 0…100 | 1 LSB = 1 OU | 0…100 OU |
| NOx | 1 Byte | 0…250 | 1 LSB = 2ppb | 0…500 ppb |
| Ozone | 1 Byte | 0…250 | 1 LSB = 2ppb | 0…. 500 ppb |
| Average and pic Noise | 2 x 7 bits | 0…103 | 1 LSB = 1dBA | 17…120dB |
| Atmospheric Pressure | 14 bits | 0…16384 | 1 LSB = 0.1 mBar | 0…1638.4 mBar |
| Lux | 10 bits | 0…1023 | 1 LSB = 4 Lux | 0…4092 lux |
| Color T° | 1 Byte | 0…255 | 1 LSB = 2°K | 1 635°K to 7 500°K |
| Flickering | 1 Byte | 0…200 | 1 LSB = 0.5% | 0…100 % |
| Health Index | 1 Byte | 0…100 | 1 LSB = 1% | 0…100 % |
| Cognitivity Index | 1 Byte | 0…100 | 1 LSB = 1% | 0…100 % |
| Sleeping Index | 1 Byte | 0…100 | 1 LSB = 1% | 0…100 % |
| Irritation index | 1 Byte | 0…100 | 1 LSB = 1% | 0…100 % |
| Building Index | 1 Byte | 0…100 | 1 LSB = 1% | 0…100 % |
| Virus spreading index | 1 Byte | 0…100 | 1 LSB = 1% | 0…100 % |

#### 8.2.1.1. Time stamp

It is up to the gateway or the operator which receives the telegram to time stamp the measurements.

### 8.2.2. Down Link

The transmission of the configuration data is done on port 2.

| Byte 1<br>Command Code | Byte 2 | Byte 3 |
|---|---|---|
| 0x01 | Emission rate in minutes | |

Total 3 Bytes

**Emission rate command 0x01**

This command is used to set the transmission rate.

The two Bytes of rate are a delay between two frames expressed in minutes, it will be taken into account after the next transmission.

By default, the value is at zero which corresponds to a transmission rate of 10 minutes. Note that values greater than 720 also correspond to the default value of 10 minutes.

The range goes from 1 minute to 12 hours.

**Outdoor air quality data:**

| Byte 1<br>command Code |
|---|
| 0x03 |

| Present sensors 1 | RH1 | T°1 | Particles1 | Noise1 | NOx1 | Ozone1 |
|---|---|---|---|---|---|---|
| 1 Byte | 1 Byte | 9 bits | 27 bits | 14 bits | 1 Byte | 1 Byte |

| Present sensors 2 | RH2 | T°2 | Particles2 | Noise2 | NOx2 | Ozone2 |
|---|---|---|---|---|---|---|
| 1 Byte | 1 Byte | 9 bits | 27 bits | 14 bits | 1 Byte | 1 Byte |

Total 23 Bytes.

**Detail of the Present sensors byte**

| Byte 2 & 9 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Present sensors | | | | | | | |
| | | | | | | | |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

| Bit | |
|---|---|
| 0 | 1 = T°, RH active |
| 1 | 1 = PM active |
| 2 | 1 = Noise active |
| 3 | 1 = NOx active |
| 4 | 1 = Ozone active |
| 5 | Reserved |
| 6 | Reserved |
| 7 | Reserved |

Humidity, T°, Particles, noise, NOx and Ozone coded identically to the uplink of the EP5000

# 9. CODEC example of uplink payload (Objenious)

```
{
"attributes": {

"sensor_Light" : {
"type": "bool",
"length": 1
},

"sensor_Benzene_Formaldehyde" : {
"type": "bool",
"length": 1
},

"sensor_NOx_O3" : {
"type": "bool",
"length": 1
},

"sensor_VOC_Odor" : {
"type": "bool",
"length": 1
},

"sensor_CO2" : {
"type": "bool",
"length": 1
},

"sensor_Noise" : {
"type": "bool",
"length": 1
},

"sensor_PM" : {
"type": "bool",
"length": 1
},

"sensor_Temp_RH" :
{
"type": "bool",
"length": 1
},

"Firmware_E5000": {
"type": "uint",
"length": 8
```

},

"Firmware_Lora": {
"type": "uint",
"length": 8
},

"BITE_FrontLoRa" : {
"type": "bool",
"length": 1
},

"BITE_CO2_1B" : {
"type": "bool",
"length": 1
},

"BITE_CO2_2B" : {
"type": "bool",
"length": 1
},

"BITE_VOC_NOx_O3" : {
"type": "bool",
"length": 1
},

"BITE_LoRa" : {
"type": "bool",
"length": 1
},

"BITE_InterBoard" : {
"type": "bool",
"length": 1
},

"BITE_PM" : {
"type": "bool",
"length": 1
},

"BITE_PowerLoRa" : {
"type": "bool",
"length": 1
},

"BITE_MultipleFailure" : {
"type": "bool",

"length": 1
},

"BITE_EndOfLife_Sensor" : {
"type": "bool",
"length": 1
},

"BITE_dummy" : {
"type": "uint",
"length": 6
},

"Autonomy" : {
"type": "uint",
"length": 8
},

"Emission_Rate": {
"type": "uint",
"length": 16
},

"humidity": {
"type": "uint",
"length": 8,
"divide": 2
},

"temperature": {
"type": "uint",
"length": 9,
"divide": 10
},

"PM10_Value": {
"type": "uint",
"length": 9
},

"PM2_5_Value": {
"type": "uint",
"length": 9
},

"PM1_Value": {
"type": "uint",
"length": 9
},

"Noise_Avg": {
"type": "uint",
"length": 7
},

"Noise_Peak": {
"type": "uint",
"length": 7
},

"Dummy1": {
"type": "uint",
"length": 1,
"hidden": true
},

"CO2": {
"type": "uint",
"length": 13
},

"VOCt": {
"type": "uint",
"length": 16
},

"Formaldehyde": {
"type": "uint",
"length": 16
},

"Benzen": {
"type": "uint",
"length": 16
},

"Odor": {
"type": "uint",
"length": 8
},

"NOx": {
"type": "uint",
"length": 8,
"multiply" : 2
},

"Ozone": {
"type": "uint",
"length": 8,
"multiply" : 2
},

"AtmoPressure": {
"type": "uint",
"length": 14,
"divide": 10
},

"LightLux": {
"type": "uint",
"length": 10,
"multiply": 4
},

"LightTemp": {
"type": "uint",
"length": 8,
"multiply": 23
},

"LightFlickering": {
"type": "uint",
"length": 8
},

"PhysioHealth": {
"type": "uint",
"length": 8
},

"PhysioCognitivity": {
"type": "uint",
"length": 8
},

"PhysioSleep": {
"type": "uint",
"length": 8
},

"PhysioRespiratory": {
"type": "uint",
"length": 8
},

"VirusRisk": {
"type": "uint",
"length": 8
},

"BuildingIndex": {
"type": "uint",
"length": 8
}

},

"format":[
{"attributes":["sensor_Temp_RH","sensor_PM","sensor_Noise","sensor_CO2","sensor_VOC_Odor"
,"sensor_NOx_O3","sensor_Benzene_Formaldehyde","sensor_Light","Firmware_E5000","Firmware_Lora
","BITE_FrontLoRa","BITE_CO2_1B","BITE_CO2_2B","BITE_VOC_NOx_O3","BITE_LoRa","BITE_I
nterBoard","BITE_PM","BITE_PowerLoRa","BITE_MultipleFailure","BITE_EndOfLife_Sensor","BITE_
dummy","Autonomy","Emission_Rate","humidity","temperature","PM10_Value","PM2_5_Value","PM1_
Value","Noise_Avg","Noise_Peak","Dummy1","CO2","VOCt","Formaldehyde","Benzen","Odor","NOx",
"Ozone","AtmoPressure","LightLux","LightTemp","LightFlickering","PhysioHealth","PhysioCognitivity",
"PhysioSleep","PhysioRespiratory","VirusRisk","BuildingIndex"]
}
]
}