URSALINK

AM100 Series
User Guide

Safety Precautions

Ursalink will not shoulder responsibility for any loss or damage resulting from not following the instructions of this operating guide.

❖ The device must not be disassembled or remodeled in any way.

❖ Do not place the device outdoors where the temperature is below/above operating range. Do not place the device close to objects with naked flames, heat source (oven or sunlight), cold source, liquid and extreme temperature changes.

❖ The device is not intended to be used as a reference sensor, and Ursalink will not should responsibility for any damage which may result from inaccurate readings.

❖ The battery should be removed from the device if it is not to be used for an extended period. Otherwise, the battery might leak and damage the device. Never leave a discharged battery in the battery compartment.

❖ The device must never be subjected to shocks or impacts.

❖ Do not clean the device with detergents or solvents such as benzene or alcohol. To clean the device, wipe with a soft moistened cloth. Use another soft, dry cloth to wipe dry.
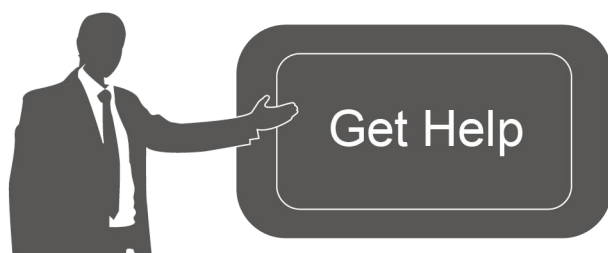
Declaration of Conformity

Ursalink AM100 series is in conformity with the essential requirements and other relevant provisions of the CE, FCC, and RoHS.

For assistance, please contact
Ursalink technical support:
Email: helpdesk@ursalink.com
Tel: 86-592-5023060
Fax: 86-592-5023065

Get Help

Revision History

Date	Doc Version	Description
Apr. 7, 2020	V 1.0	Initial version
May 19, 2020	V 1.1	APP pictures replacement
Aug. 26, 2020	V 1.2	Add screen display mode and configuration examples(Firmware 1.17)
Sept. 14, 2020	V 1.3	Add screen alarm settings (Firmware 1.19)

Contents

1. Overview

1.1 Description

AM100 series is a compact indoor ambience monitoring sensor including motion, humidity, temperature, light, TVOC, CO_2, barometric pressure for wireless LoRa network. AM100 series is a battery powered device and is designed to be wall-mounted. It is equipped with NFC (Near Field Communication) and can easily be configured via a smartphone or a PC software.

Sensor data are transmitted in real-time using standard LoRaWAN protocol. LoRaWAN enables encrypted radio transmissions over long distance while consuming very little power. The user can obtain sensor data and view the trend of data change through Ursalink Cloud or through the user's own Network Server.

1.2 Features

- Robust LoRa connectivity for indoor or HVAC environments
- Integrated multiple sensors like temperature, humidity, light, air quality, etc.
- Easy configuration via NFC
- Visual display via E-Ink screen
- Standard LoRaWAN support
- Ursalink Cloud compliant
- Low power consumption (about 1 year battery life)
- Standard AA alkaline battery

1.3 Specifications

Model	AM102	AM100
LoRaWAN		
Frequency	EU433/CN470/IN865/RU864/EU868/US915/AU915/KR920/AS923	
Tx Power	16dBm(868)/20dBm(915)/19dBm(470)	
Sensitivity	-147dBm @300bps	
Mode	OTAA/ABP Class A	
Sensors		
Temperature		
Range	-20°C to + 70°C	
Accuracy	0°C to + 70°C (+/- 0.3°C), -20°C to 0°C (+/- 0.6°C)	
Humidity		
Range	0% to 100% RH	
Accuracy	10% to 90% RH (+/- 3%), below 10% and above 90% RH (+/- 5%)	
PIR		

Detection Area	94 ° Horizontal, 82 ° Vertical	
Detection Distance	5 m	
Output Range	0-65535	
Light		
Range	60000 lux (Visible + IR, IR)	
Accuracy	±30%	
CO_2		N/A
Range	400 - 5000 ppm	
Accuracy	±30 ppm or ±3 % of reading	
TVOC		
Range	0 - 60000 ppb	
Accuracy	±15 %	
Long-term Stability	1.3 % accuracy drift per year	
Barometric Pressure		
Range	300 - 1100 hPa (-40°C - 85°C)	
Accuracy	±1 hPa	
Display & Configuration		
Display	2.13-inch Black&White E-Ink Screen	
Configuration	1. Mobile APP via NFC 2. PC software via NFC or USB type-C port	
Physical Characteristics		
Power Supply	1. 2 × AA Alkaline battery 2. 5VDC USB type-C power supply	
Battery Life[1] (10 min interval, SF7-SF10) VOC Disabled	0.9-0.7 year 0.8-0.6 year (Smart Mode Disabled[2]) 1.1-0.9 year 1-0.8 year(Smart Mode Disabled)	1.5-1.2 year 1.3-1 year(Smart Mode Disabled)
Operating Temperature	0°C to +45°C	
Relative Humidity	0% to 100% (non-condensing)	
Dimension	105 × 70.4 × 21.2 mm (4.1 × 2.8 × 0.8 in)	
Mounting	Wall	

1. Tested under laboratory conditions and for guideline purposes only.

2. Smart Mode：When Activity Level (PIR) =0 and lasts for 20 minutes, screen will go to sleep mode to save power.

2.Hardware Introduction

2.1 Packing List

1 ×	2 ×	1 ×	2 ×	1 ×	1 ×	1 ×
AM100/AM102	AA Batteries (LR6)	Mounting Sticker	Mounting Screws	Warranty Card	Quick Guide	NFC Reader (Optional)

⚠️ **If any of the above items is missing or damaged, please contact your Ursalink sales representative.**

2.2 Product Overview
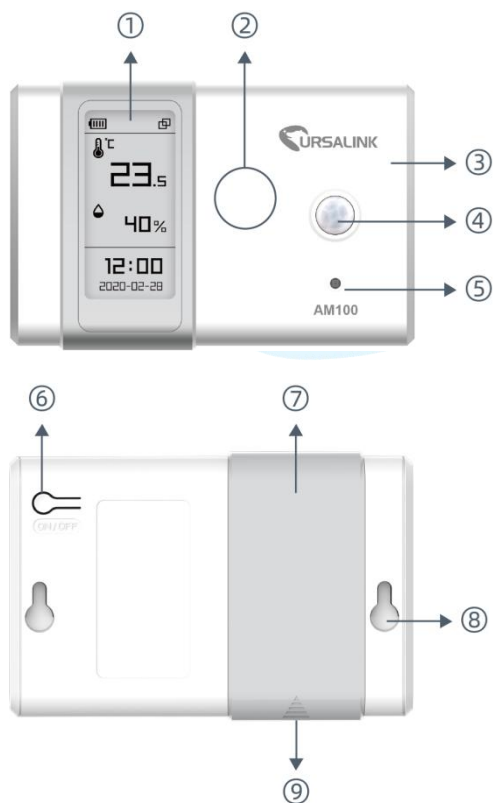
Front Panel:
① E-ink screen
② NFC Area
③ LoRa Antenna (Internal)
④ PIR Sensor
⑤ Light Sensor

Back Panel:
⑥ Power button
⑦ Battery Cover
⑧ Mounting Holes
⑨ Type-C Port

2.3 E-link Screen

2.3.1 Screen Description

AM100 series provide 3 types of display modes:

AM100		
Mode 1	**Mode 2**	**Mode 3**

AM102		
Mode 1	**Mode 2**	**Mode 3**

To learn what an icon means, find it below.

Icon	Description	Screen Update
	Battery level	Once per day
22:22	Sync time with software or mobile APP	1 min
	The device joins the network.	According to join
	The device fails to join the network.	status

	Temperature	1 min
	Humidity	1 min
☀ ▪ ■ ☐ ☐	Luminance Level 0：0-5 lux Level 1：6-50 lux Level 2：51-100 lux Level 3：101-400 lux Level 4：401-700 lux Level 5：≥701 lux	1 min
TVOC ▪ ■ ☐ ☐	Total volatile organic compounds Level 0：0-100 ppb Level 1：101-200 ppb Level 2：201-250 ppb Level 3：251-300 ppb Level 4：301-350 ppb Level 5：351-400 ppb	1 min
🔔	Show alarm when TVOC exceeds the threshold value.(400 ppb by default)	
▥▥▥ 🔔	Show CO_2 history tendency from 0 to 1400ppm. Show alarm when CO_2 exceeds the threshold value.(1200 ppm by default)	2 min

Note:
- AM100 series will do a full-screen refresh every 30 minutes in order to remove ghosting.
- Please refer section 5.3.3 for TVOC and CO_2 threshold settings.
- AM100 series shows current value on the screen and uplink the average value of the reporting interval to the gateway.

2.3.2 Screen Mode Switch

Here are 3 methods to switch between the three modes:
- Power button: Quick press on the power button to switch the mode.
- Mobile APP: Go to APP menu "Device > Settings > Basic Settings" to select screen display mode.
- Software: Go to Toolbox menu "Device Settings > Basic > Basic Settings" to select screen display mode.

2.4 Dimensions(mm)
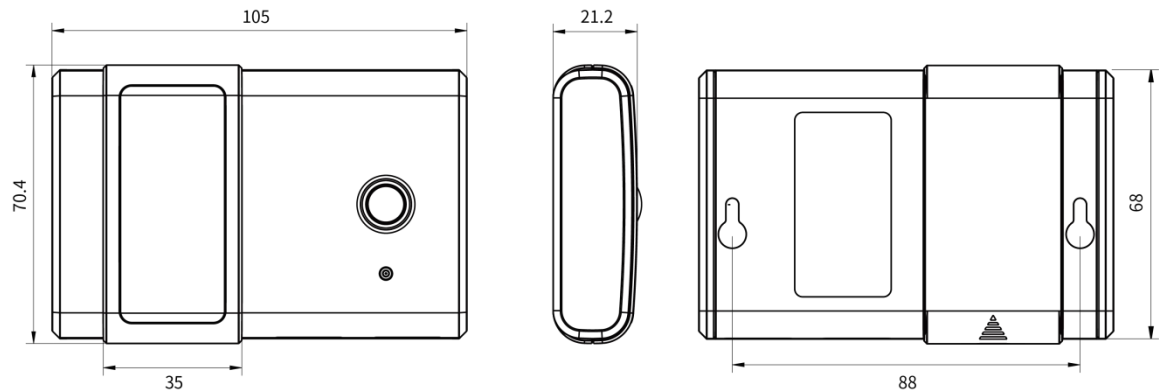
3. Power Supply

Remove the battery cover and install two new AA/LR6 batteries. Batteries can be replaced on the fly.
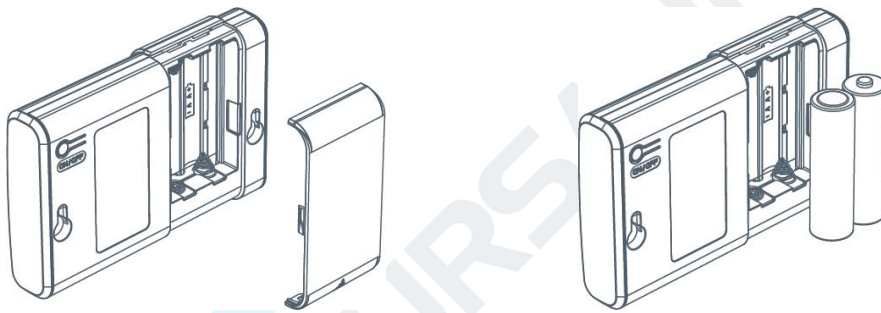
Note:
- AM100 series can also be powered by type-C USB port (5V, 100mA). When batteries and external power are both connected, external power will power the device first.
- USB port can't be used to charge battery.
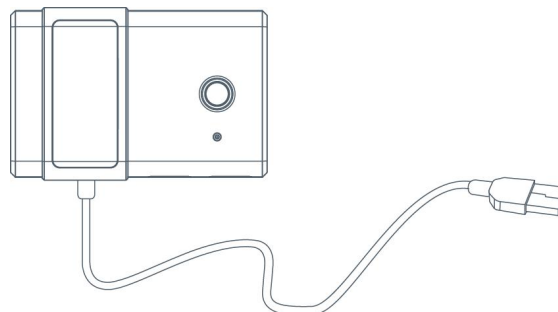
4. Turn On/Off via Power Button

AM100 series can be turned on/off or reset by power button on the rear panel.

Function	Action
Turn On	Press and hold the power button for more than 3 seconds until the screen changes state.
Turn Off	Press and hold the power button for more than 3 seconds until the screen changes state.
Reset	Press and hold the power button for more than 10 seconds. **Note:** AM100 will be automatically power on after reset.
Change Screen Mode	Quick press on the power button.

5. Sensor Configuration

AM100 series sensor can be monitored and configured through one of the following methods:
● Mobile APP (NFC);
● Windows software (NFC or Type-C port).
In order to protect the security of sensor, password validation is required when first configuration. Default password is **123456**.

5.1 Configuration via Smartphone APP

Preparation:
● Smartphone (NFC supported)
● Toolbox APP: APP can be download on Google Play or Apple Store.

5.1.1 Read/Write Configuration via NFC

1. Enable NFC on the smartphone and open "Toolbox" APP.
2. Attach the smartphone with NFC area to the device to read basic information.
Note: Ensure your smartphone NFC area and it is recommended to take off phone case before using NFC.
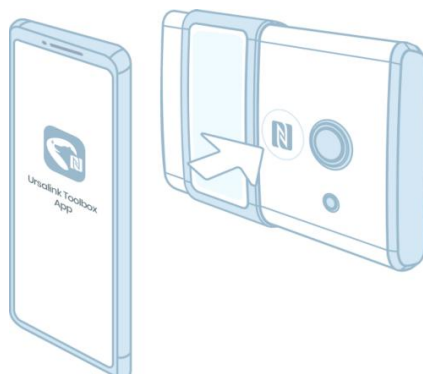
3. Click "Write" to change the configuration of AM sensor and attach the smartphone with NFC area to the device until the APP shows a successful prompt.

Note: If you use a new smartphone to configure the sensor at the first time, it's necessary to enter the password. (Default password: 123456)
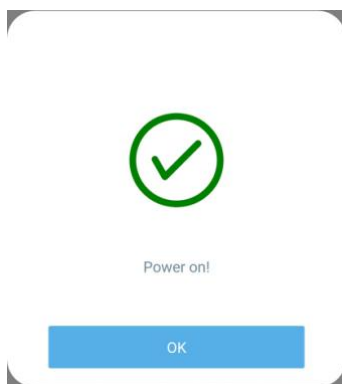
4. Click "Read" to fetch the current data of sensor.
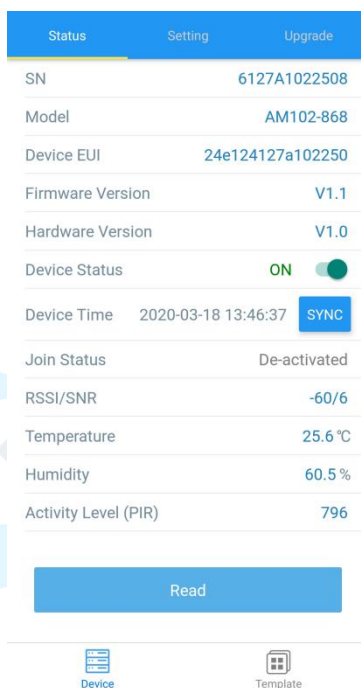
5.1.2 Template Settings

Template settings are used for easy and quick device configuration in bulk.

Note: Template function works only for sensors with the same model and LoRa frequency band.

1. Go to "Template" page of APP and save current settings as a template.
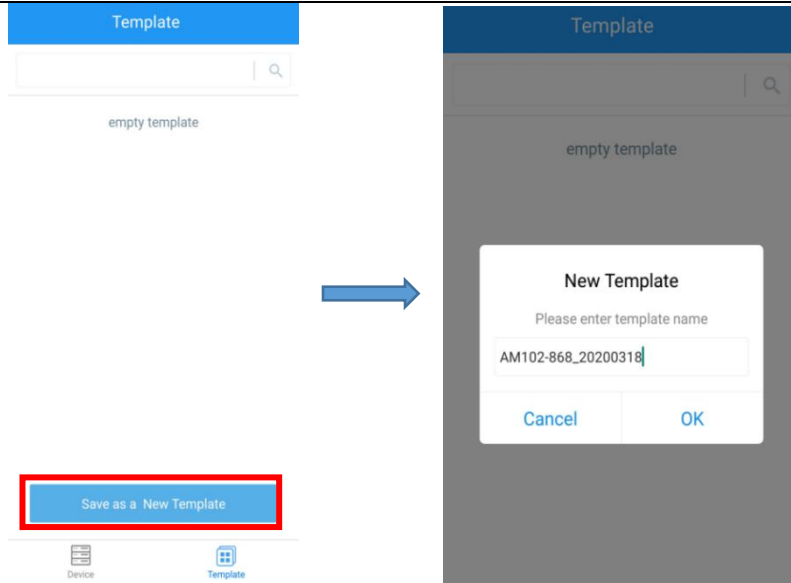
2. Attach the smartphone with NFC area to another device.

3. Select the template file from Toolbox and click "Write".
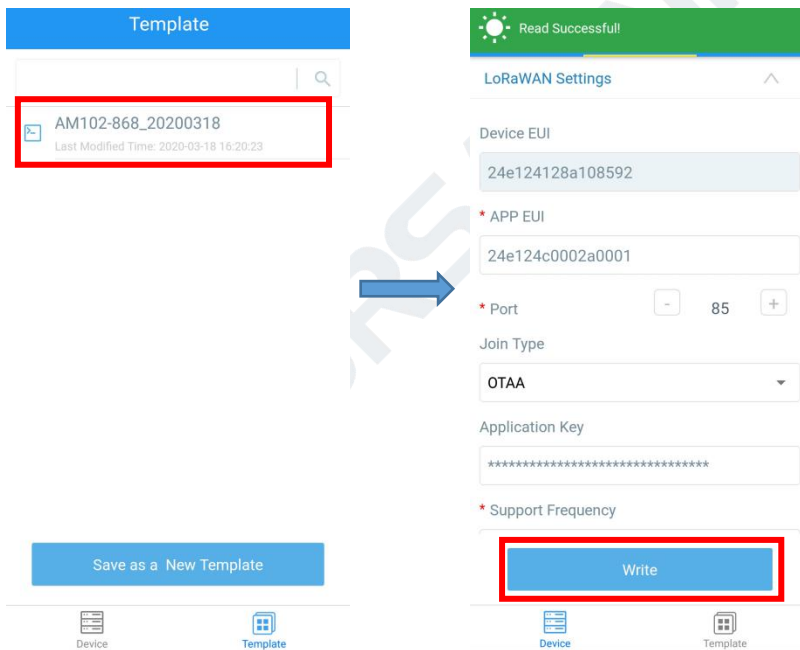
4. Keep the two devices close until the APP shows a successful prompt.
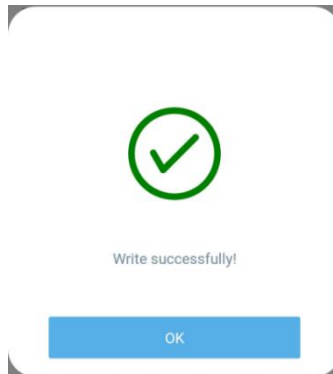
5. Slide the template item left to edit or delete the template.
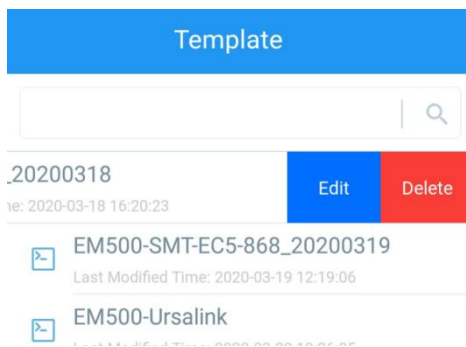
5.2 Configuration via PC

Preparation:
● Dedicated NFC Reader or Type-C USB cable
● PC (Windows 10 is recommended)
● Toolbox: https://www.ursalink.com/en/software-download/

5.2.1 Log in the Toolbox

Make sure "Toolbox" is downloaded on your computer. Select one of the following methods to log in Toolbox.

USB Connection
1. Connect the AM100/AM102 sensor to computer via type-C port.

2. Select type as "General" and click password to log in Toolbox. (Default password: 123456)
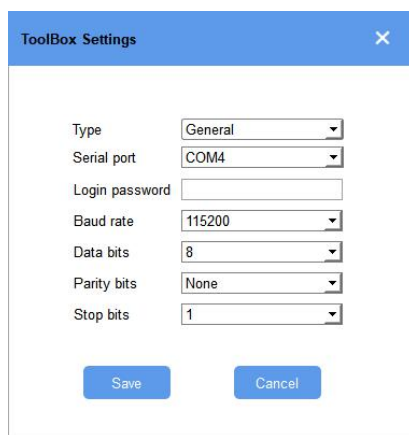
NFC Connection

1. Connect the NFC reader to computer, then attach the sensor to NFC area of the reader.
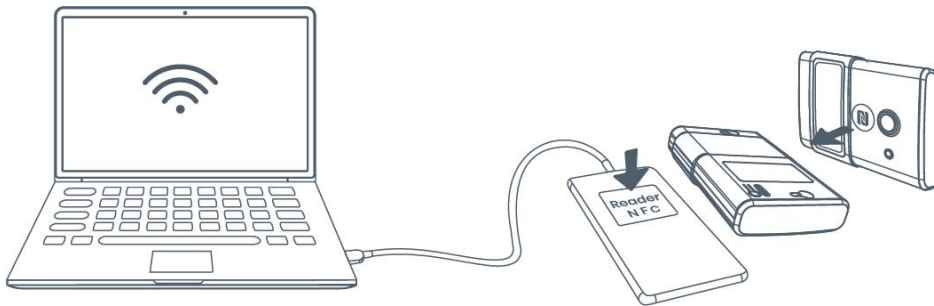
2. Select type as "NFC" and serial port as NFC reader port on Toolbox.
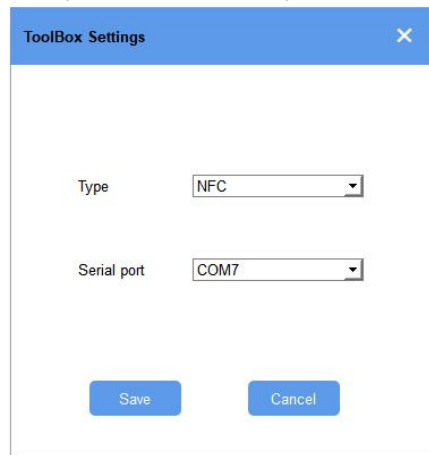
5.2.2 Basic Configuration

1. Click "Read" to read current data of the sensor.
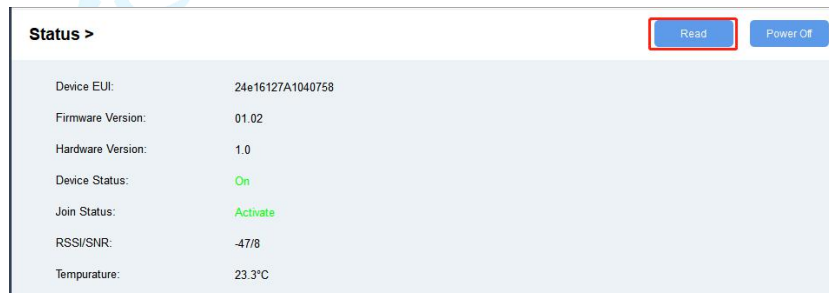
2. When you perform one of the following operations, type the password and click "Enter", then wait a few seconds until toolbox shows a successful prompt. (Password is not needed if you connect it via type-C port)

- Turn on/off the sensor
- Reset the sensor
- Sync the time
- Click "Write" to change settings
- Upgrade

5.2.3 Upgrade

1. Download AM firmware to your computer.
2. Go to "Maintenance -> Upgrade" page of Toolbox.
3. Click "Browse" and select the firmware from computer.
4. Click "Upgrade" to upgrade the device.
Note: If NFC connection is selected, please keep the two devices close and don't move them in order to get the best connectivity as possible when upgrading.

5.2.4 Template Settings

Note: Template function works only for sensors with the same model and LoRa frequency band.
1. Go to "Maintenance -> Template and Reset" page of Toolbox.
2. Click"Export" to save the current settings as a template.
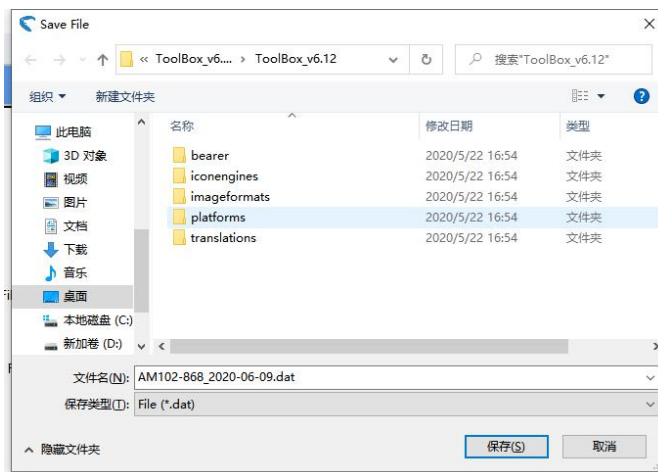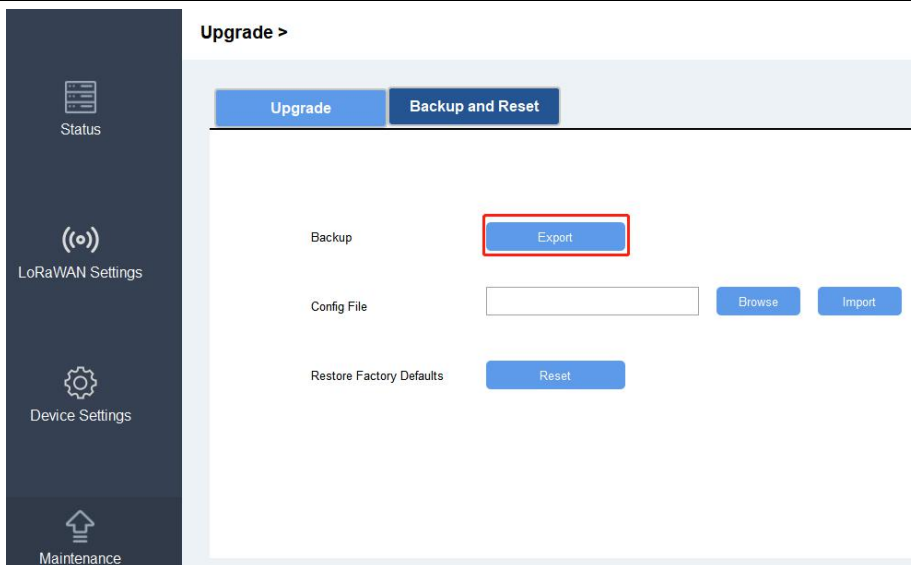
3. Click"Browse" to select the correct template from computer.
4. Click"Import"to import the template to the device.
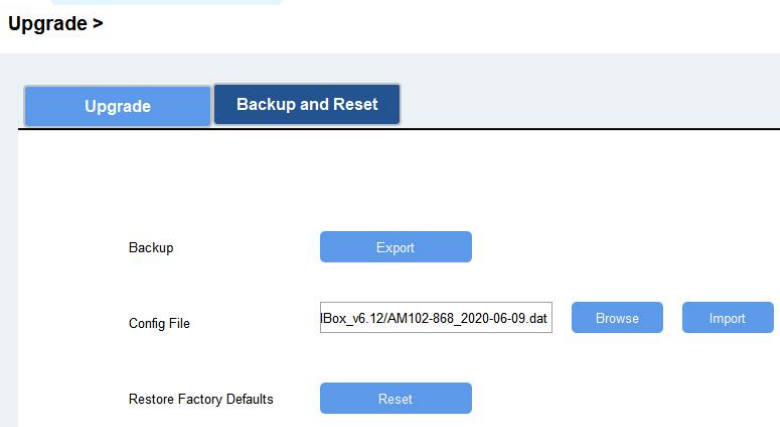
5.3 Configuration Examples

5.3.1 LoRaWAN Channel Settings

The configuration of LoRaWAN channel of AM100/AM102 must match the LoRaWAN gateway's. Refer to Appendix to check default channel settings of AM100/AM102.

Mobile APP Configuration:
Open Toolbox APP and go to "Device ->Setting -> LoRaWAN Settings" to change the frequency and channels.

Software Configuration:
Log in Toolbox and go to "LoRaWAN Settings -> Channel" to change frequency and channels.

Note: If frequency is one of CN470/AU915/US915, you can enter the index of the channel that you want to enable in the input box, making them separated by commas.
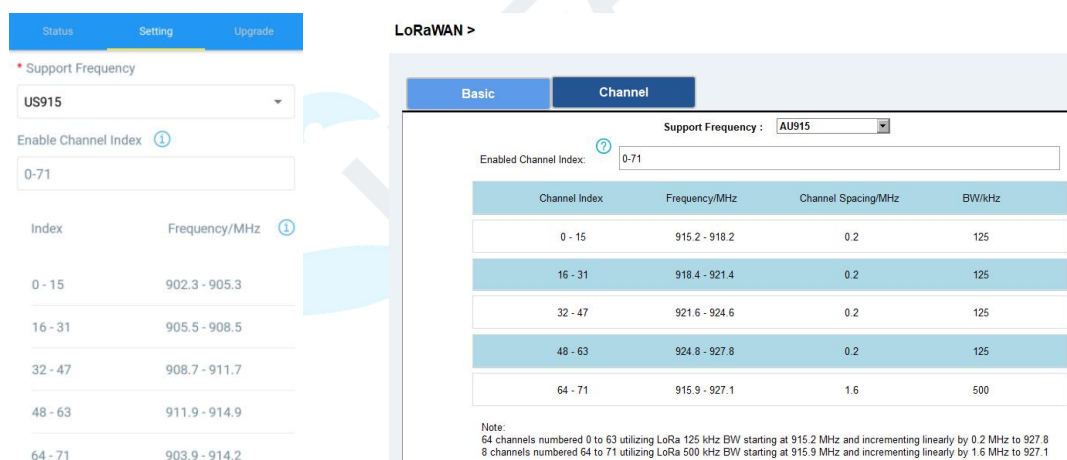
Examples:
1, 40: Enabling Channel 1 and Channel 40
1-40: Enabling Channel 1 to Channel 40
1-40, 60: Enabling Channel 1 to Channel 40 and Channel 60
All: Enabling all channels
Null: Indicates that all channels are disabled

5.3.2 Time Synchronization

Mobile APP Configuration:
Open Toolbox APP and go to "Device ->Status"to click "sync" to sync the time on the screen.

Software Configuration:

Log in Toolbox and go to "Status" page to sync the time on the screen.
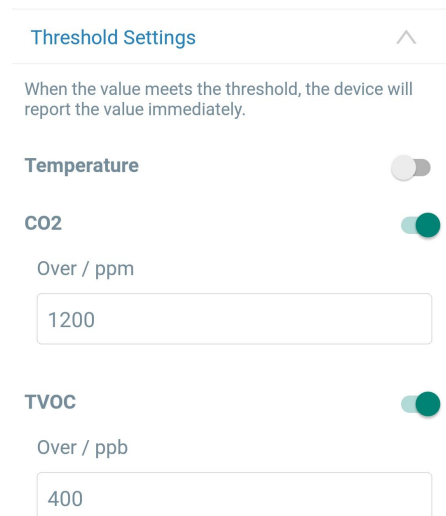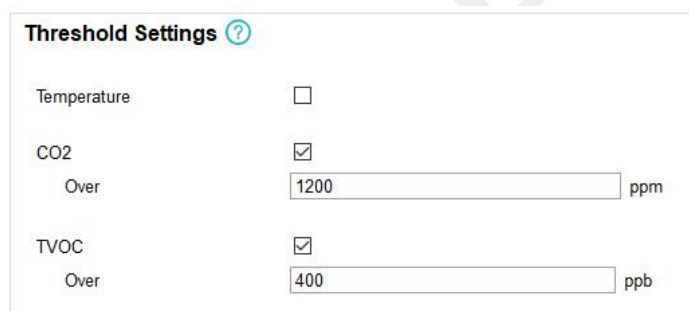

5.3.3 Alarm Settings

AM100 series will upload the current data instantly after the threshold is triggered. AM102 will also show alarms of CO_2 and TVOC on the screen.

Mobile APP Configuration:

Open Toolbox APP and go to "Device -> Setting -> Threshold Settings"to enable the threshold settings and input the threshold.

Threshold Settings ∧

When the value meets the threshold, the device will report the value immediately.

Temperature

CO2

Over / ppm

1200

TVOC

Over / ppb

400

Software Configuration:

Log in Toolbox and go to "Device Settings -> Basic -> Threshold Settings" to enable the calibration and input the calibration value.

Threshold Settings ?

Temperature	☐	
CO2	☑	
Over	1200	ppm
TVOC	☑	
Over	400	ppb

6. Sensor Installation

6.1 Installation Note

In order to ensure the best detection and LoRaWAN communication effect, it is recommended to install AM100 series as follows:

➢ There should not be any isolates or barriers in PIR and light detection range.

➢ Do not mount the device where the temperature is below/above operating range and temperature varies greatly.

➢ Stay far away from any heat source or cold source like oven, refrigerator.

➢ Do not mount the device close to where airflow varies greatly like windows, vent, fan and air conditioner.

➢ Do not mount the device upside down.

➢ Do not place the device right to the window or door. If you have to, you'd better pull the curtain.

➢ It is recommended to install at least 1.5m high from floor.
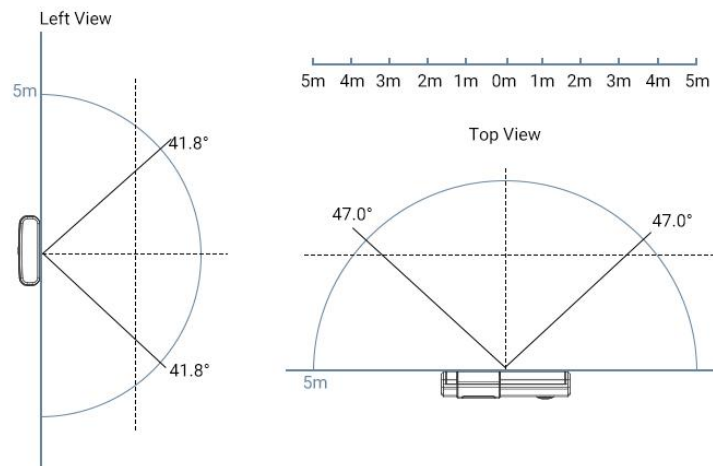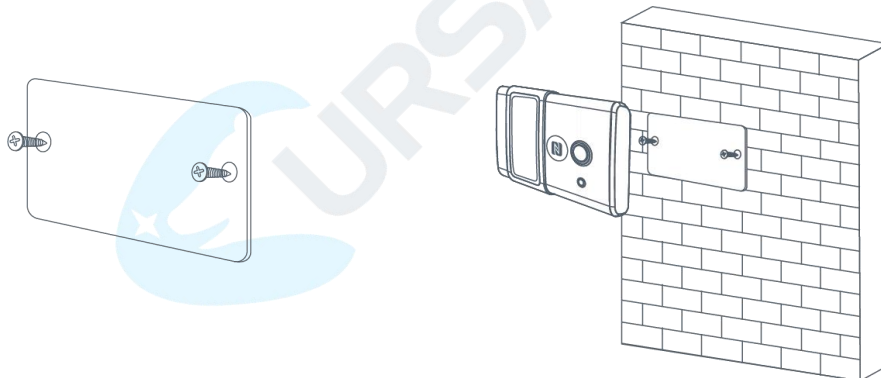

6.2 Wall Mounting

1. Attach the mounting sticker to the wall.

2. Mark the wall where the two mounting holes are according to the sticker's mark (around 88mm).

Note: The connecting line of two holes must be a horizontal line.

3. Drive two screws into wall at the marks using screw driver.

4. Mount the device on the wall.

7.Sensor Management via Ursalink Cloud

Ursalink cloud is a comprehensive platform that provides multiple services including device remote management and data visualization with the easiest operation procedures.

7.1 Ursalink Cloud Registration

Register and log in Ursalink Cloud.

Ursalink Cloud URL: https://cloud.ursalink.com/login.html
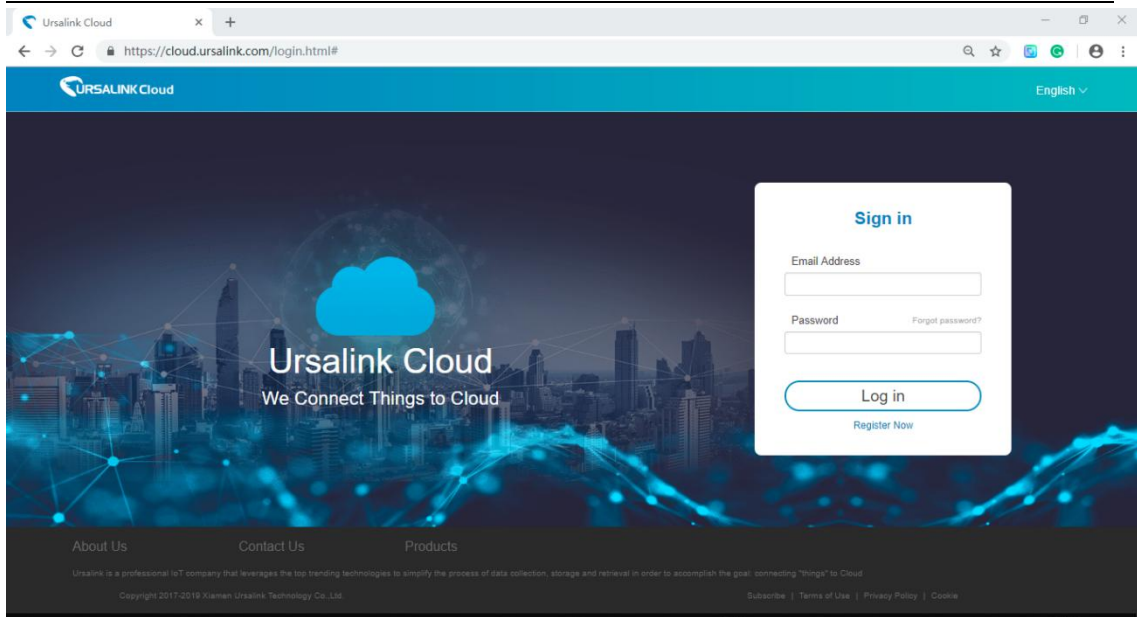
7.2 Add a Ursalink LoRaWAN Gateway

1. Enable "Ursalink" type network server and "Ursalink Cloud" mode in gateway web GUI.
Note: Ensure gateway has accessed the Internet.
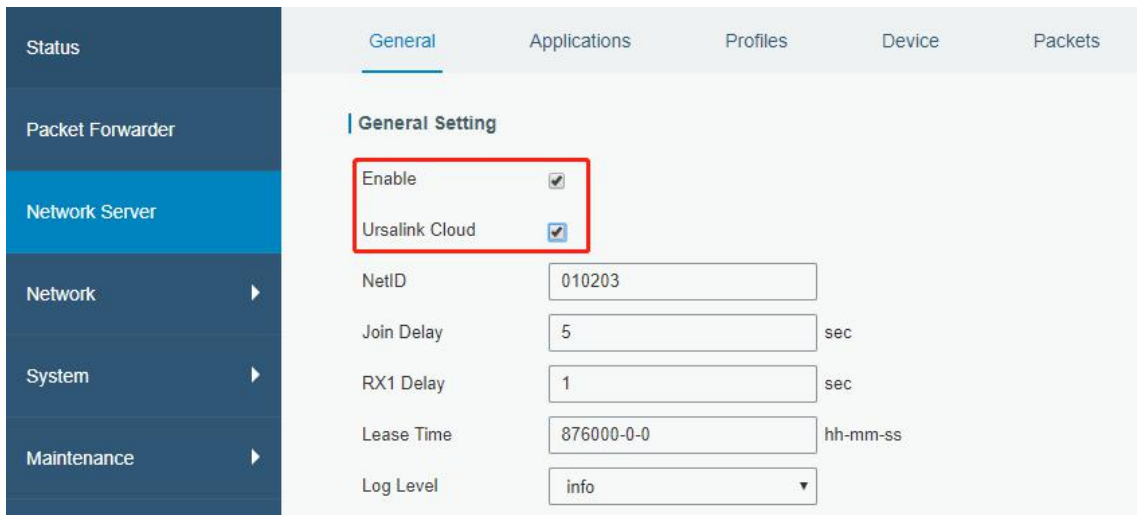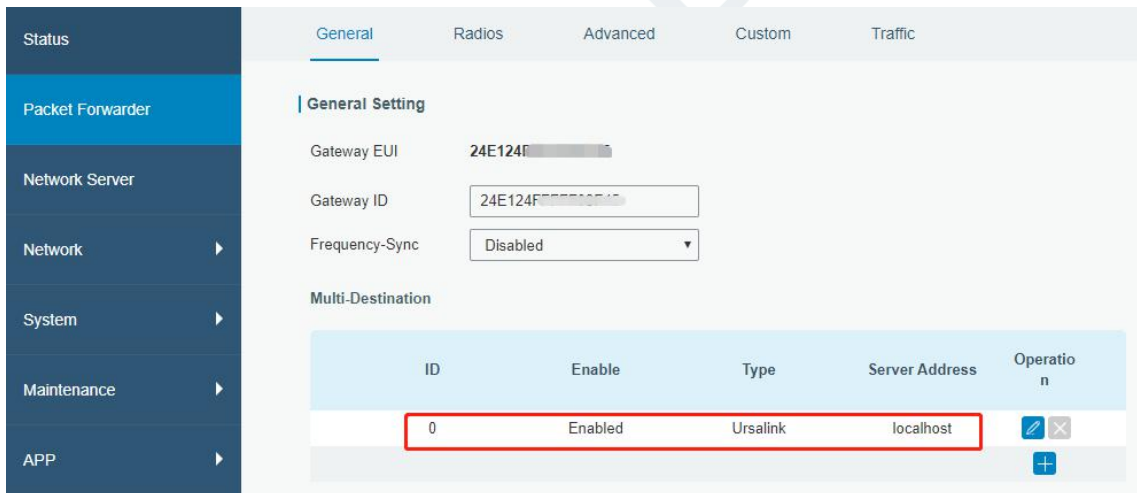
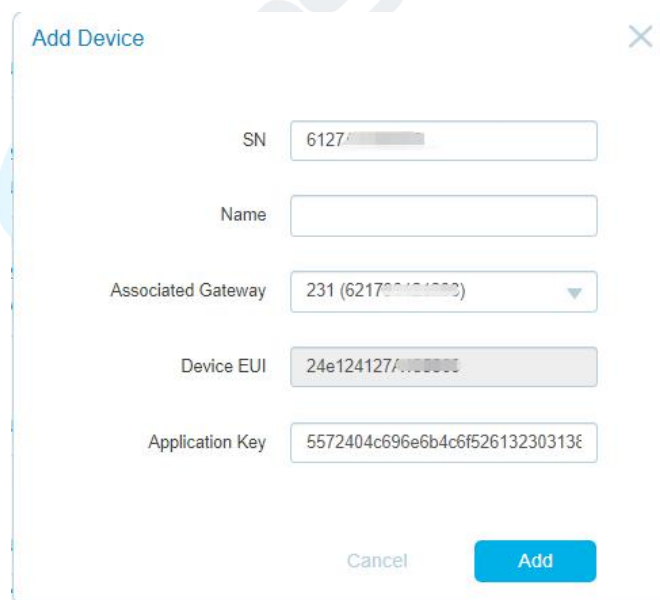2.Go to "My Devices->Gateway" of Ursalink Cloud and click "Add" to add gateway to Ursalink Cloud via SN.
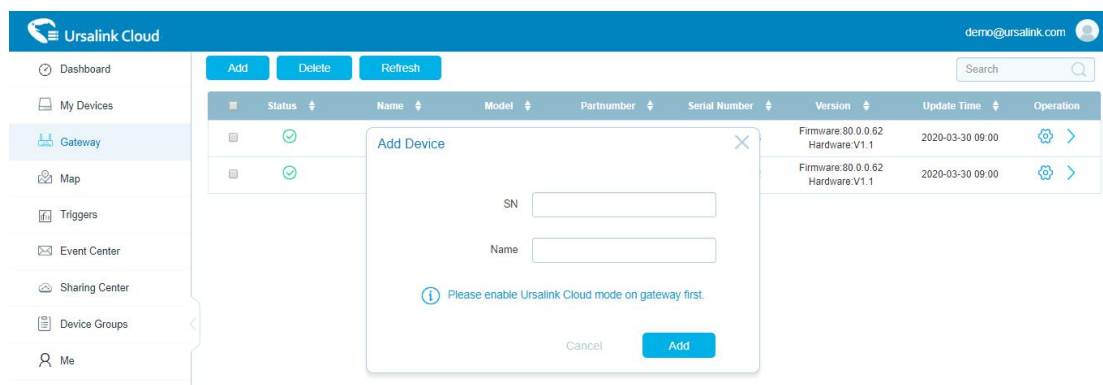
3.Check if gateway is online in Ursalink Cloud.
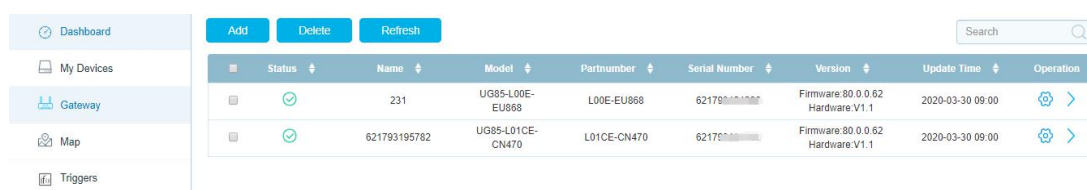
7.3 Add AM100/AM102 to Cloud

1. Go to "Device->My Devices" and click "Add Device". Fill in the SN of AM100/AM102 and select associated gateway.

2.After AM100/AM102 is connected to Ursalink Cloud, Click ⟩ or "History Data" to check the data on Ursalink cloud.

3.Go to "Dashboard" page to add widgets to the dashboard.

Appendix

Default LoRaWAN Parameters

DevEUI	24E124 + 2nd to 11th digits of SN e.g. SN = 61 26 A1 01 84 96 Then Device EUI = 24E124126A101849
AppEUI	24E124C0002A0001
Appport	0x55
NetID	0x010203
DevAddr	The 5th to 12th digits of SN e.g. SN = 61 26 A1 01 84 96 00 41 Then DevAddr = A1018496
AppKey	5572404C696E6B4C6F52613230313823
NwkSKey	5572404C696E6B4C6F52613230313823
AppSKey	5572404C696E6B4C6F52613230313823

Default Uplink Channels

Model	Channel Plan	Channel Settings/MHz
AM10x-433	EU433	433.175, 433.375, 433.575
AM10x-470	CN470	470.3~489.3 (All 95 channels)
AM10x-868	EU868	868.1, 868.3, 868.5
AM10x-915	AU915	915.2~927.1 (All 72 channels)

-END-