Milesight

WS302

Sound Level Sensor

User Guide

Contents

Chapter 1. Preface..... 4

Copyright Statement.....4

Safety Instruction.....4

Revision History..... 5

Chapter 2. Product Introduction..... 6

Overview..... 6

Feature..... 6

Chapter 3. Hardware Introduction..... 7

Packing List.....7

Hardware Overview.....7

LED Patterns..... 7

Dimensions(mm)..... 8

Chapter 4. Quick Start.....9

Power On..... 9

Access the Sensor via NFC..... 9

Configure the Network Setting..... 10

Chapter 5. Operation Guide..... 12

LoRaWAN Settings..... 12

General Settings.....14

Calibration Settings..... 15

Threshold Settings.....16

Maintenance.....16

Upgrade.....16

Backup and Restore.....17

Reset to Factory Default.....19

Chapter 6. Installation..... 21

Installation Note..... 21

Installation Step....21
Chapter 7. Battery Replacing....23
Chapter 8. Uplink and Downlink.... 24
Overview.... 24
Uplink Data....24
Basic Information....24
Periodic Report....25
Alarm Report.... 26
Downlink Command.... 27
General Settings....27
Threshold Alarm Settings....28
Chapter 9. Appendix....29
Sound Level Guidelines....29
Chapter 10. Services....30

Chapter 1. Preface

Copyright Statement

This guide may not be reproduced in any form or by any means to create any derivative such as translation, transformation, or adaptation without the prior written permission of Xiamen Milesight IoT Co., Ltd (Hereinafter referred to as Milesight).

Milesight reserves the right to change this guide and the specifications without prior notice. The latest specifications and user documentation for all Milesight products are available on our official website http://www.milesight.com

Safety Instruction

These instructions are intended to ensure that user can use the product correctly to avoid danger or property loss. Milesight will not shoulder responsibility for any loss or damage resulting from not following the instructions of this operating guide.

CAUTION:
Injury or equipment damage may be caused if any of these cautions are neglected.

- The device must not be remodeled in any way.
- In order to protect the security of the device, please change the device password when first configuration. The default password is 123456.
- 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 Milesight will not take 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.

Revision History

Date	Version	Description
June 9, 2022	V 1.0	Initial version
October 9, 2025	V 1.1	Battery pre-installed in the device and removed from packing list.

Chapter 2. Product Introduction

Overview

Milesight WS302 is a LoRa sound level sensor with integrated microphone. WS302 can not only measure a wide range of noise levels and send various kinds of noise level values via LoRaWAN® network, but also supports multiple weighting measurements for different application scenarios. Compliant with Milesight LoRaWAN® gateway and Milesight IoT Cloud solution, users can manage all sensor data and trigger other sensors or appliances easily via webpage or mobile App remotely.

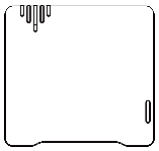
WS302 can be widely used in smart buildings, smart cities, schools, heath monitoring, etc.

Feature

- Support multiple weighting measurements to suit different scenes: A weighting, C weighting, fast weighting
- Support measuring various kinds of values to judge the sound level accurately: actual value, equivalent continuous value and max value
- Equipped with an LED indicator to indicate threshold alarms
- More than 4 years battery life
- Built-in NFC for easy configuration
- Compliant with standard LoRaWAN® gateways and network servers
- Quick and easy management with Milesight IoT Cloud solution

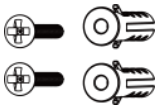
Chapter 3. Hardware Introduction

Packing List



1 × WS302 Device

1 × 3M Double-Sided Tape



2 × Wall Mounting Kits

1 × Theft-Deterring Screw

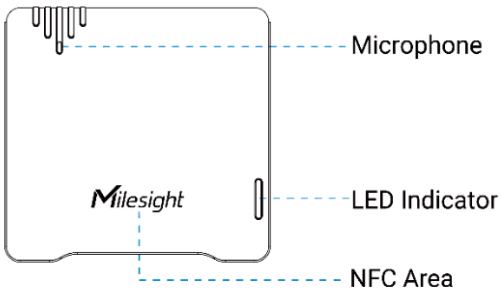
1 × Quick Guide

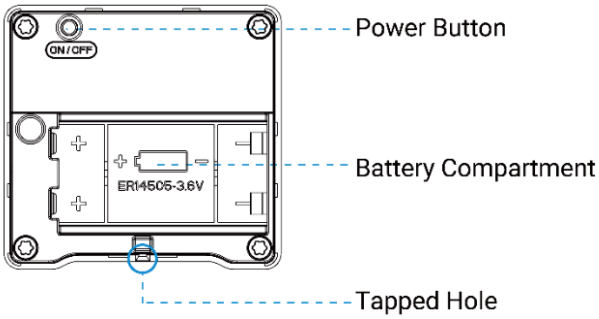
1 × Warranty Card

Note:

If any of the above items is missing or damaged, please contact your sales Representative.

Hardware Overview



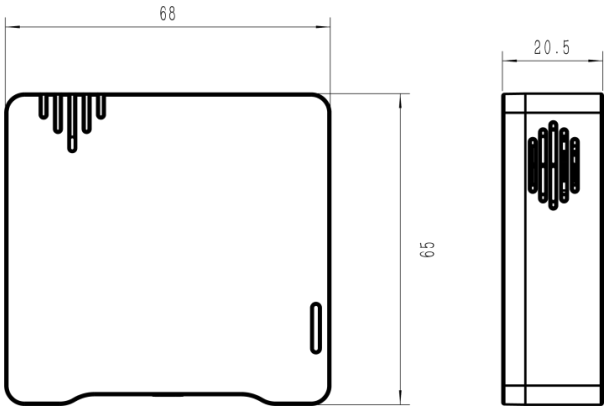


LED Patterns

Function	Action	LED Indicator
Power ON/OFF	Press and hold the power button for more than 3 seconds	Power On: Off → On
		Power Off: On → Off

Function	Action	LED Indicator
Reset to Factory Default	Press and hold the reset button (internal) for more than 10 seconds	Quickly Blinks
Threshold Alarm	When the level does not exceed the threshold	Green Blinks
	When the level exceeds the threshold for more than 1 minute	Red Blinks

Dimensions(mm)

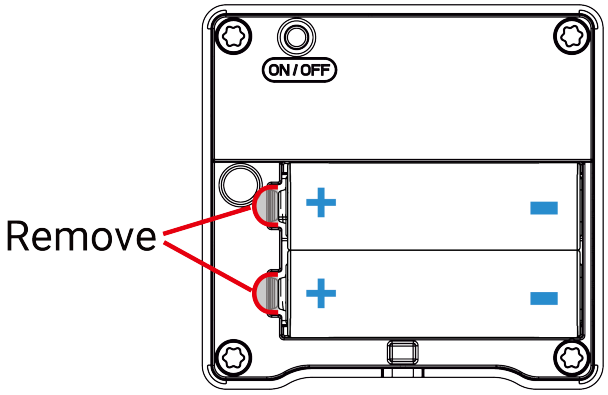


Chapter 4. Quick Start

This chapter describes how to access the status and configuration page of the device.

Power On

Take out the battery insulation sheet, and then long press the power button for 3s to turn on the device.

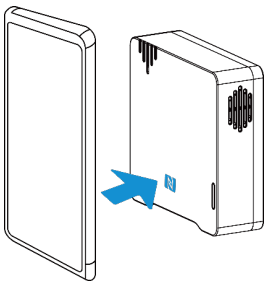


Access the Sensor via NFC

1. Download and install “Milesight ToolBox” App from Google Play or Apple Store on an NFC-supported smartphone.
2. Enable NFC function on the smartphone.
3. Launch Milesight ToolBox, and select the default mode as NFC.
4. Attach the smart phone with NFC area to the device and click to read device information. Basic information, data, and settings of the device will be shown on the Milesight ToolBox App if it’s recognized successfully.
5. Adjust the settings on the App, then attach the smartphone with NFC area to the device and click **Write** to write the settings. After writing, reread the device to check if the configuration is written well.

Note:

- Ensure the location of smartphone NFC area and it’s recommended to take off phone case.
- If the smart phone fails to read/write configurations via NFC, keep the phone away and back to try again.
- The default device password is 123456. Please change a new password for security.



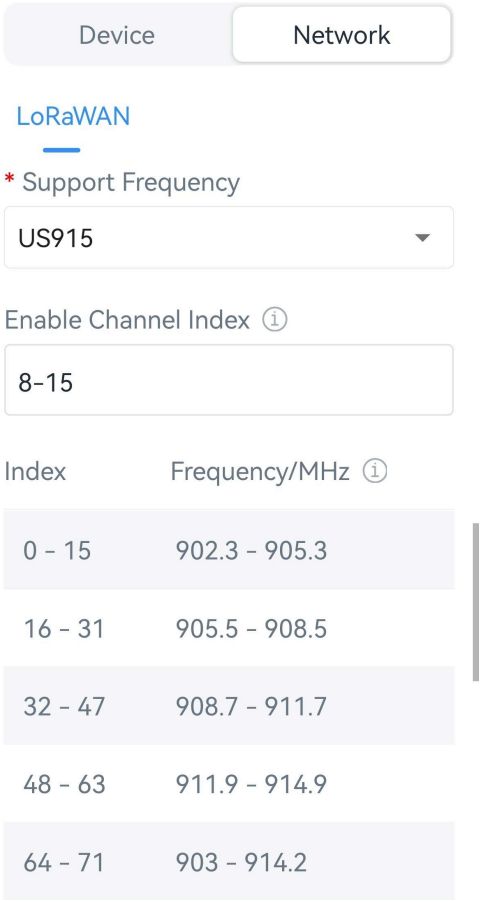
Configure the Network Setting

1. Go to **Network** settings page, select the join type as OTAA or ABP as required.

Note:
OTAA mode is required if you connect device to Milesight IoT Cloud.

2. Select supported frequency the same as LoRaWAN® gateway.

Note:
Set the channel index as 8-15 for US915 or AU915 if using default settings of Milesight gateways.



3. Keep other settings by default and click **Write** to save the settings.

Chapter 5. Operation Guide

LoRaWAN Settings

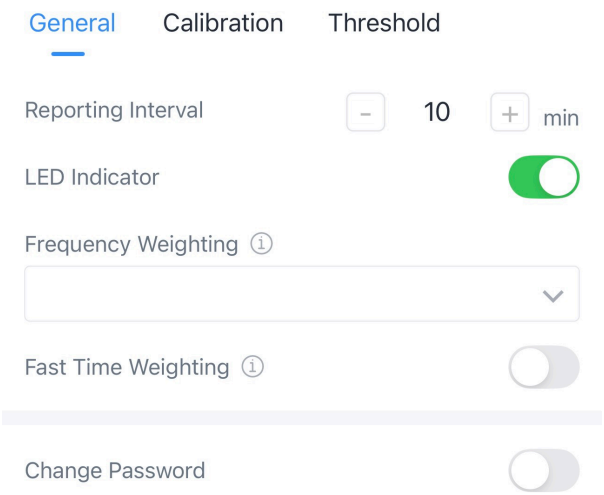
This chapter describes the LoRaWAN® network settings of device.

Parameter	Description
Device EUI	Unique ID of the device which can be found on the device. **Note:** please contact sales for device EUI list if you have many units.
App EUI	The default App EUI (join EUI) is 24E124C0002A0001.
Application Port	The port used for sending and receiving data, the default port is 85.
LoRaWAN® Version	V1.0.2 and V1.0.3 are available.
Work Mode	It's fixed as Class A.
Confirmed Mode	If the device does not receive ACK packet from network server, it will resend data once.
Join Type	OTAA and ABP mode are available. **Note:** it's necessary to select OTAA mode if connecting device to Milesight IoT Cloud.
Application Key	Appkey for OTAA mode, default value: "Device EUI" + "Device EUI" (since Q4 of 2025). Example: 24e124123456789024e1241234567890

Parameter	Description
	Note: • The default value of earlier devices is 5572404C696E6B4C6F52613230313823. • Please contact sales before purchase if you require random App Keys.
Network Session Key	Nwkskey for ABP mode, the default is 5572404C696E6B4C6F52613230313823.
Application Session Key	Appskey for ABP mode, the default is 5572404C696E6B4C6F52613230313823.
Device Address	DevAddr for ABP mode, default is the 5th to 12th digits of SN.
Rejoin Mode	Reporting interval≤35 mins: the device will send a specific number of Link-CheckReq MAC packets to the network server every reporting interval or every double reporting interval to validate connectivity; If there is no response, the device will re-join the network. Reporting interval > 35 mins: the device will send a specific number of Link-CheckReq MAC packets to the network server every reporting interval to validate connectivity; If there is no response, the device will re-join the network. **Note:** 1. Only OTAA mode supports rejoin mode. 2. The actual sending number is **Set the number of packets sent** +1.
Supported Frequency	Enable or disable the frequency to send uplinks. If frequency is one of CN470/AU915/US915, enter the index of the channel to enable in the input box, making them separated by commas. **Examples:**

Parameter	Description
	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: Indicate that all channels are disabled
ADR Mode	Enable or disable network server to adjust Spreading Factor, Bandwidth an Tx Power to optimize data rates, airtime and energy consumption in the network.
Spreading Factor	If ADR mode is disabled, the device will send uplink data following this SF parameter. The higher the spreading factor, the longer the transmission distance, the slower the transmission speed and the more the consumption.
Tx Power	Tx power (transmit power) refers to the strength of the outgoing signal transmitted by the device. This is defined by LoRa alliance.
RX2 Data Rate	RX2 data rate to receive downlinks.
RX2 Frequency	RX2 frequency to receive downlinks. Unit: Hz

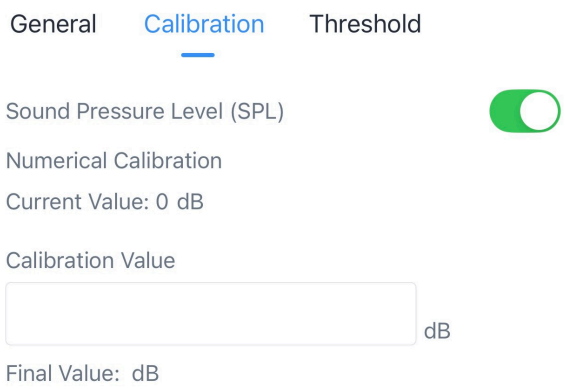
General Settings



Parameters	Description
Reporting Interval	Reporting interval of noise level and battery level to the network server. Default: 10 mins, Range: 1 - 1080 mins
LED Indicator	Enable or disable the indicator threshold alarm feature in LED Patterns
Frequency Weighting	Choose A weighting or C weighting to detect environmental sound. **A-weighting**: suitable for normal environment like office, hospital, residential, etc. **C-weighting**: suitable for noisy environment (> 100dB) like factories, construction yards, dancing halls, etc.
Fast Time Weighting	Enable or disable fast time weighting, this suit the environment in which sound has great fluctuation. It will increase power consumption as well as shorten the battery life.
Change Password	Change the password for ToolBox App to write this device.

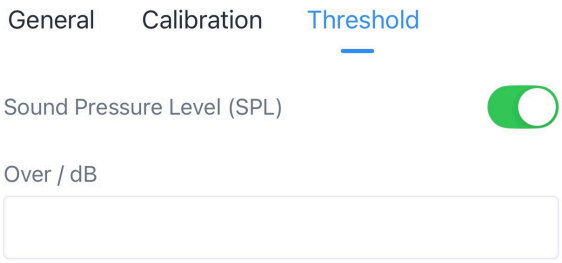
Calibration Settings

WS302 supports to set the numeral calibration of sound pressure level. With the calibration value saved, the device will add the calibration value to the raw value in each report automatically.



Threshold Settings

When enable the threshold settings and input the threshold, it will upload the current data once when SPL value exceeds the threshold for **more than one minute**. Only when the threshold alarm is dismissed and re-triggered, the device will send the threshold alarm again.



Maintenance

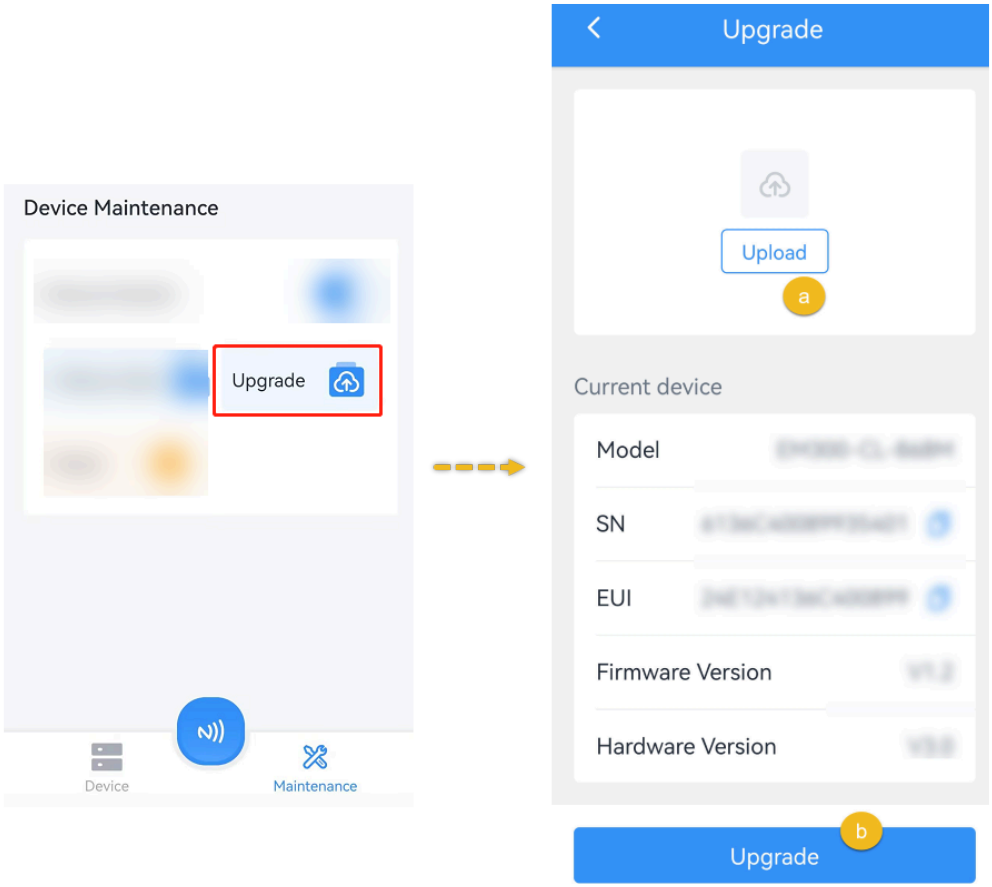
Upgrade

This chapter describes the steps to upgrade the device via ToolBox App.

1. Download firmware from Milesight official website to your smartphone.
2. Read the target device via ToolBox App, click **Upgrade** to upload the firmware file.
3. Click **Upgrade** to upgrade the device.

Note:

- Operation on ToolBox is not supported during an upgrade.
- Only Android version ToolBox supports the upgrade feature.



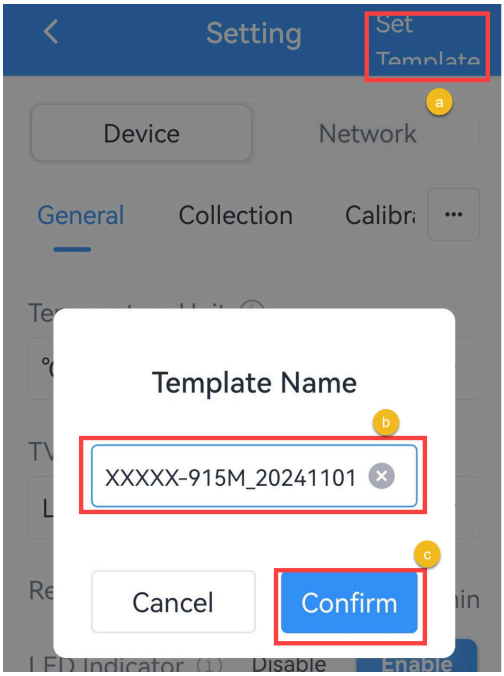
Backup and Restore

This device supports configuration backup for easy and quick device configuration in bulks. Backup and restore is allowed only for devices with the same model and frequency band.

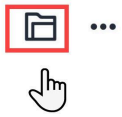
Backup and Restore

1. Launch ToolBox App, attach the NFC area of smartphone to the device to read the configuration.

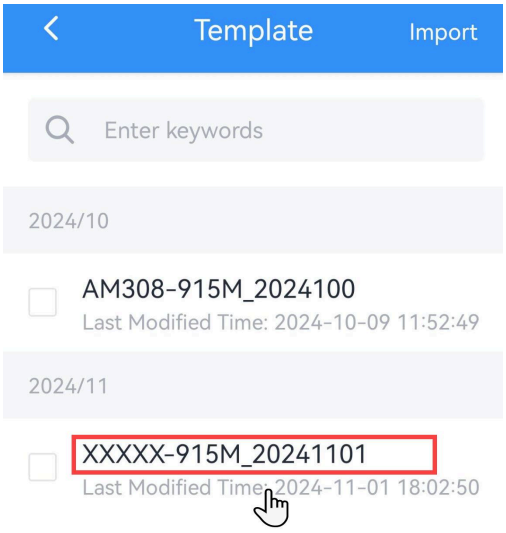
2. Edit the configuration as required, click **Set Template** to save current configuration as a template to the ToolBox App.



3. Go to **Device >Template** page.



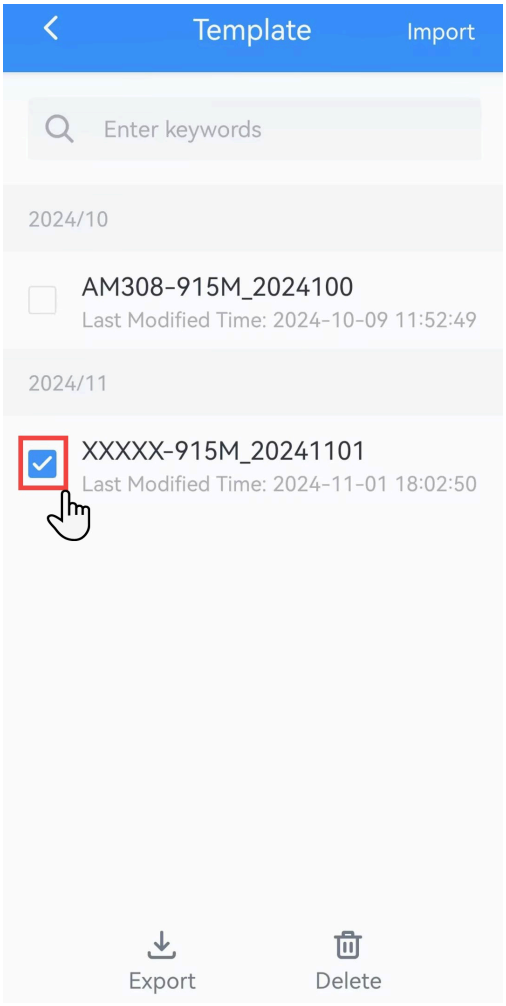
4. Select and click the target template, click **Write** to import the configuration to target devices.



Export and Delete Template

1. Check the box of the target template.

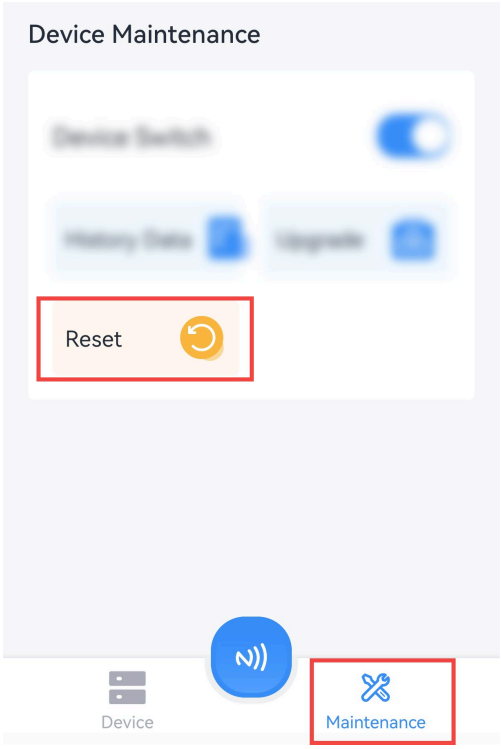
2. Click **Export** to export this template as JSON format file and save it to the smartphone, click **Delete** to delete this template from your ToolBox App.



Reset to Factory Default

Via Hardware: Hold on the reset button for more than 10s until the LED indicator quickly blinks.

Via ToolBox App: Click **Reset** and attach the smartphone to device to reset the device.


Device Maintenance
Reset
Device
Maintenance

Chapter 6. Installation

Installation Note

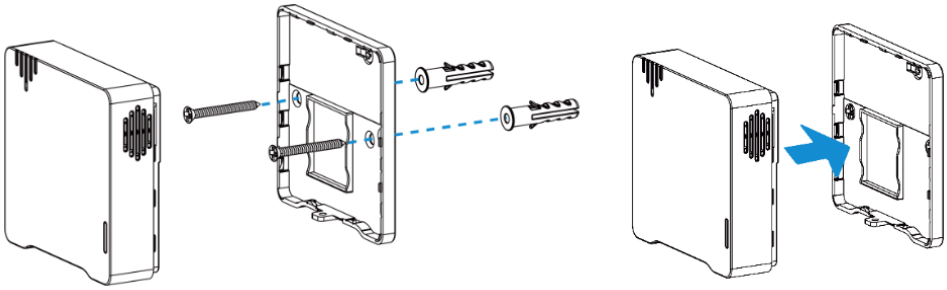
In order to ensure the best detection, please install the device as follows:

- The recommended installation height is 1.2 m to 1.5 m.
- The distance between the device and walls or reflectors should be at least 1 m, and the distance between the device and doors or windows should be about 1.5 m.
- Do not install the device close to the noise source.
- The microphone on the device should not be blocked or trapped by obstacles.
- Recommend installing the device to the ceiling when you need to measure sound level in a small room.

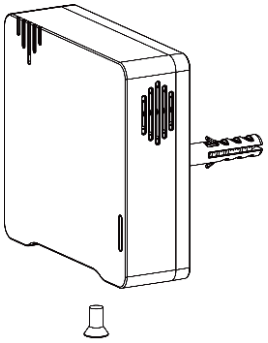
Installation Step

Fixed by Screws

1. Remove the rear cover of the device, screw the wall plugs into the wall, and fix the rear cover with screws on it, then install the back of the device.

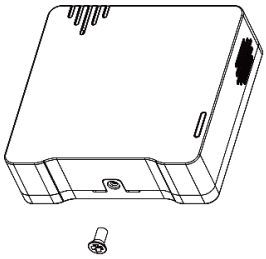


2. Fix the bottom of the device to the rear cover with the theft-deterring screw.

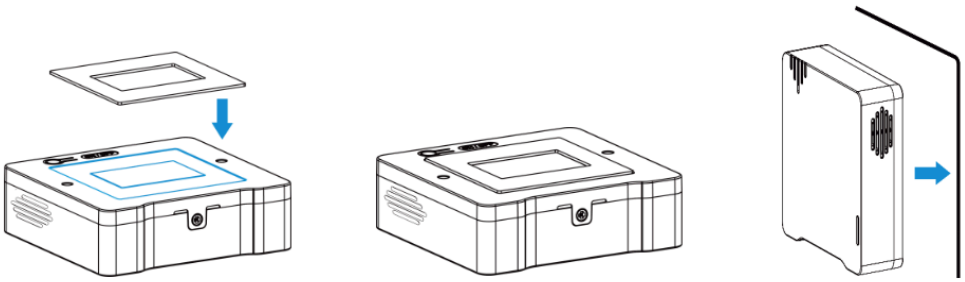


Fixed by 3M Tape

1. Fix the bottom of the device to the rear cover with the theft-deterring screw.



2. Paste 3M double-sided tape to the back of the device, then tear the other side off and place it on a flat surface.



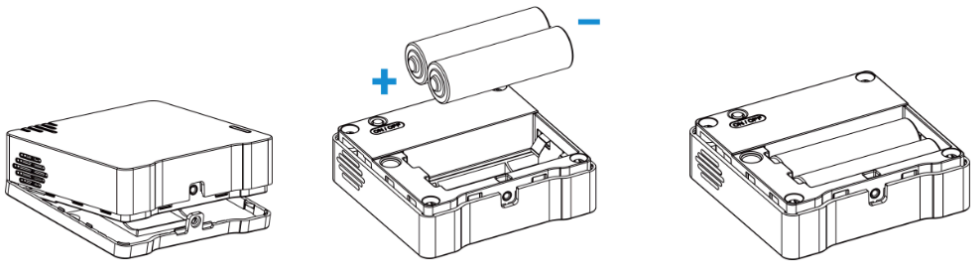
Note:

To ensure the devices are securely installed and prevent them from falling due to adhesive peeling, please strictly adhere to the following requirements.

1. Do not install the device on rough, damp, crumbling, greasy, or wallpapered walls.
2. Before installation, wipe the wall with a clean cloth to ensure it is free of dust and grease.
3. After adhering the device to the wall, press firmly to ensure it is fully adhered. Allow 24 hours for the best adhesion results.
4. If the wall conditions do not meet the above requirements, choose an alternative installation method, such as screw fixation.

Chapter 7. Battery Replacing

Remove the back cover to replace the batteries, do not reverse the direction of the batteries when installing.



Note:

- The device can only be powered by ER14505 Li-$SoCl_2$ batteries. The alkaline battery is not supported.
- Ensure the replacing batteries is newest; otherwise it may shorten the battery life or cause inaccurate power calculation.
- The batteries should be removed from the device if it is not used for an expended period.

Chapter 8. Uplink and Downlink

Overview

All messages are based on following format (HEX), the Data field should follow little-endian:

Channel1	Type1	Data1	Channel2	Type2	Data2	Channel3	...
1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	N Bytes	1 Byte	...

For decoder examples please find files on https://github.com/Milesight-IoT/SensorDecoders.

Uplink Data

Basic Information

The device will report a basic information packet whenever joining the network.

Item	Channel	Type	Byte	Description
Power On	ff	0b	1	Device is on
Protocol Version	ff	01	1	Example: 01=V1
Hardware Version	ff	09	2	Example: 03 10 = V3.1
Software Version	ff	0a	2	Example: 03 01 = V3.1
Device Type	ff	0f	1	00: Class A, 01: Class B, 02: Class C, 03: Class C to B
Serial Number	ff	16	8	16 digits

Example:

ff0bff ff0101 ff166743c13353300001 ff090100 ff0a0102 ff0f00		
Channel	**Type**	**Value**
ff	0b	Power On: ff
ff	01	Protocol Version: 01=V1
ff	16	SN: 6743c13353300001

ff0bff ff0101 ff166743c13353300001 ff090100 ff0a0102 ff0f00		
Channel	**Type**	**Value**
ff	09	Hardware Version: 0100=V1.0
ff	0a	Software Version: 0102=V1.2
ff	0f	00: Class A

Periodic Report

The device supports the sensor data according to reporting interval (10 mins by default).

Item	Channel	Type	Byte	Description
Battery Level	01	75	1	UINT8, Unit: %
Noise Level	05	5b	7	Weighting Mode (1 Byte) +SPL (2 Bytes) + L_{eq}(2 Bytes)+L_{max} (2 Bytes) **Weighting Mode:** 01: A-weighting+disable time weighting 02: C-weighting+disable time weighting 05: A-weighting+enable fast time weighting 06: C-weighting+enable fast time weighting **SPL:** the average sound pressure level, employing the selected weighting mode during the reporting interval, is indicative of the current noise intensity. INT16/10, Unit: dB. **L_{eq}:** the equivalent continuous sound level with selected weighting mode during the reporting period, INT16/10, Unit: dB. **L_{max} :** the maximum sound level value with selected weighting mode during the reporting period, INT16/10, Unit: dB.

Example:

017564 055b 05 3f02 da01 6a02		
Channel	**Type**	**Value**
01	75	64 => 100%
05	5b	05 => A-weighting + enable fast time weighting 3f 02 => 02 3f = 575, L_{AF} = 575÷10 = 57.5 dBA da 01 => 01 da = 474, L_{Aeq} = 474÷10 = 47.4 dBA 6a 02 => 02 6a = 618, L_{AFmax} = 618÷10 = 61.8 dBA

Alarm Report

The device supports to report below types of alarm report packets.

Example:

1. Noise threshold alarm: report when threshold alarm is enabled.

055b 05 3f02 da01 6a02		
Channel	**Type**	**Value**
05	5b	05 => A-weighting + enable fast time weighting 3f 02 => 02 3f = 575, L_{AF} = 575÷10 = 57.5 dBA da 01 => 01 da = 474, L_{Aeq} = 474÷10 = 47.4 dBA 6a 02 => 02 6a = 618, L_{AF-max} = 618÷10 = 61.8 dBA

2. Low battery alarm: report when battery level drops to 1%.

017501		
Channel	**Type**	**Value**
01	75	Battery Level: 01 => 1%

Downlink Command

This device supports downlink commands for configuration and control. The downlink application port is 85 by default.

General Settings

Item	Channel	Type	Byte	Description
Reboot	ff	10	1	ff
Report Interval	ff	03	2	UINT16, Unit: s
LED Indicator	ff	2f	1	00: disable, 01: enable
Weighting Mode	ff	5d	2	**Byte 1:** 01: A-weighting, 02: C-weighting **Byte 2:** 00: disable time weighting, 01: enable fast time weighting

Example:

1. Reboot the device.

ff10ff

2. Set report interval as 20 minutes.

ff03b004		
Channel	**Type**	**Value**
ff	03	b004=>04b0=1200s=20 minutes

3. Set weighting mode to A-weighting and disable fast time weighting.

ff5d0100		
Channel	**Type**	**Value**
ff	5d	01: A-weighting, 00: disable time weighting

Threshold Alarm Settings

Channel	Type	Byte	Description
ff	06	9	**Byte 1-3:** 0a0000 **Byte 4-5:**SPL threshold value, UINT16/10, Unit: dB **Byte 6-9:** 00000000

Example:

Enable threshold alarm and set threshold value as 65 dB.

ff060a00008a0200000000		
Channel	**Type**	**Value**
ff	06	8a 02=>02 8a = 650/10=65 dB

Chapter 9. Appendix

Sound Level Guidelines

It's recommended to maintain environmental noises below 70 dBA over 24 hours (75 dBA over 8-hours) to prevent noise-induced hearing loss.

Source	Sound Pressure Level (dBA)
Threshold of hearing	0
Breathing	10
Rustling leaves	20
Whispering	30
Quiet library or residential area	40
Quiet office	50
Normal conversation	60
Busy traffic, normal radio	70
Noisy restaurant	80
Heavy truck, hair drier, power tools	90
Subway train	100
Construction noise	110
Rock concert, thunder	120
Threshold of pain	130

Chapter 10. Services

Milesight provides customers with timely and comprehensive technical support services. End-users can contact your local dealer to obtain technical support. Distributors and resellers can contact directly with Milesight for technical support.

Technical Support Mailbox: iot.support@milesight.com

Online Support Portal: https://support.milesight-iot.com

Resource Download Center: https://www.milesight.com/iot/resources/download-center/

MILESIGHT CHINA

TEL: +86-592-5085280

FAX: +86-592-5023065

Add: Building C09, Software Park Phase III, Xiamen 361024, Fujian, China