VS351

Mini AI Thermopile People Counter

User Guide

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Chapter 1. Preface

Copyright Statement

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 is not intended to be used as a reference sensor, and Milesight will not should responsibility for any damage which may result from inaccurate readings.
- The device must not be disassembled or remodeled in any way.
- Do not place the device close to objects with naked flames.
- Do not place the device where the temperature is below/above the operating range.
- Make sure electronic components do not drop out of the enclosure while opening.
- When installing the battery, please install it accurately, and do not install the reverse or wrong model.
- The device must never be subjected to shocks or impacts.
- In order to protect the security of the device, please change device password when first configuration. The default password is 123456.

Revision History

Release Date	Version	Revision Content
July 5, 2024	V1.0	Initial version

Release Date	Version	Revision Content
Nov. 25, 2025	V1.1	1. Supports to report data on the dot and corresponding uplink command. 2. Supports installation scene and corresponding downlink command. 3. Compatible with VB01 optional mounting bracket. 4. Adds downlink commands for LoRaWAN® configuration. 5. Modified installation height and detection width.

Chapter 2. Product Introduction

Overview

VS351 is a compact AI thermopile people counter designed for indoor entrances and exits applications, it offers high accuracy in bi-directional people counting, enabling effective analysis of foot traffic and efficient space management. Combined with a radar sensor for presence detection, it intelligently schedules the activation time of the thermopile to optimize power consumption. As a Milesight D2D controller, the VS351 seamlessly communicates with other Milesight D2D devices, establishing more possible connections and paving the way for smoother operations.

With easy configuration and wireless detection, the VS351 facilitates simple deployment and connectivity. Compliant with the Milesight LoRaWAN® gateway and Milesight IoT Cloud solution, users can know the number of people in any indoor space and trigger other sensors or appliances easily via a webpage or mobile App remotely.

Key Features

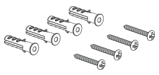
- Provide 80% - 90% detection accuracy for bi-directional people counting with radar (Battery Version Only) and the thermopile technology
- Built-in temperature sensor that can not only support environmental temperature detection but also monitor whether the operating temperature of the device is within a reasonable range
- 100% anonymity and GDPR-compliant without image capturing, free from privacy concerns
- Type-C version (wired) and battery version (wireless) optional for different installation environments
- Ultra-low power consumption with up to 1.6-year battery life, complies with ESG low-carbon standards
- Wireless connectivity and convenient size improve the accessibility and simplicity of deployment
- Store locally 1,000 historical records and support retransmission to prevent data loss
- Support Milesight D2D protocol to enable ultra-low latency and direct control without gateways
- Equipped with NFC for one touch configuration
- Function well with standard LoRaWAN® gateways and network servers
- Compatible with Milesight IoT Cloud and Milesight Development Platform

Chapter 3. Hardware Introduction

Packing List

1 × VS351 Sensor

1 × Mounting Plate

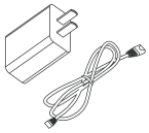


4 × Wall Screw Mounting Kits

1 × Warranty Card

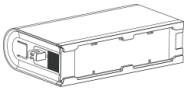
1 × Quick Start Guide

Type-C Version Only Accessories:

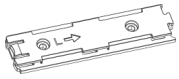


1 × Type-C Cable (1.2m) & Power Adapter

Battery Version Only Accessories:



1 × Battery Compartment

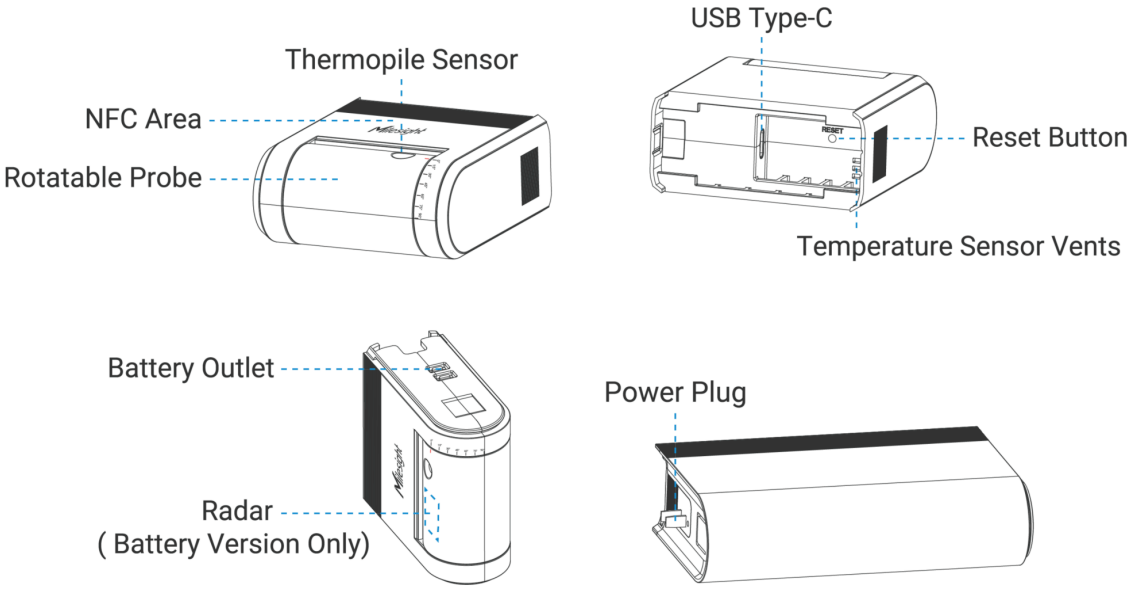


1 × Battery Compartment Mounting Plate

Note:

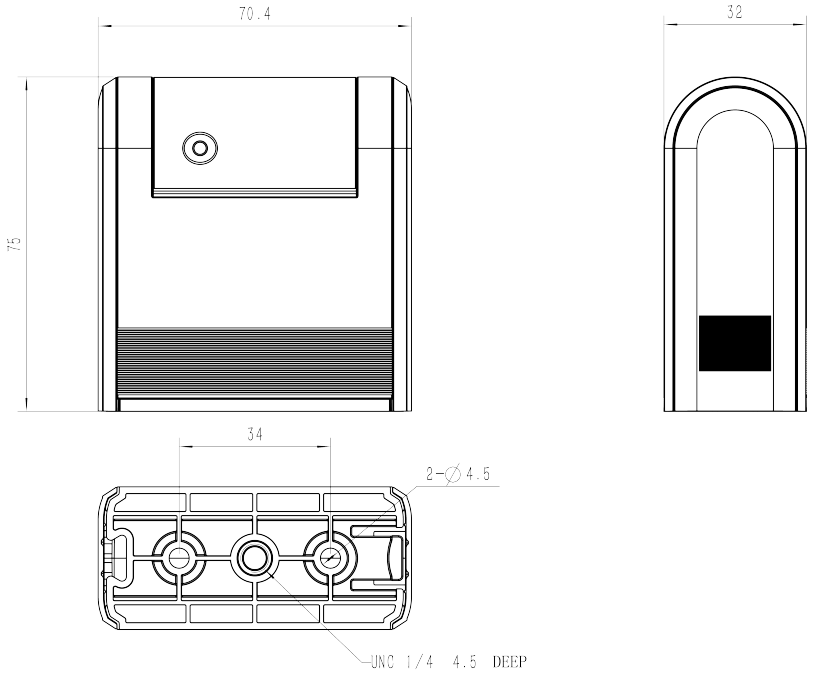
- If any of the above items are missing or damaged, please contact your sales representative.
- The device is also compatible with multiple mounting kits and accessories that can be purchased independently. For detailed information about them, refer to Accessories for Milesight People Counters.

Hardware Overview

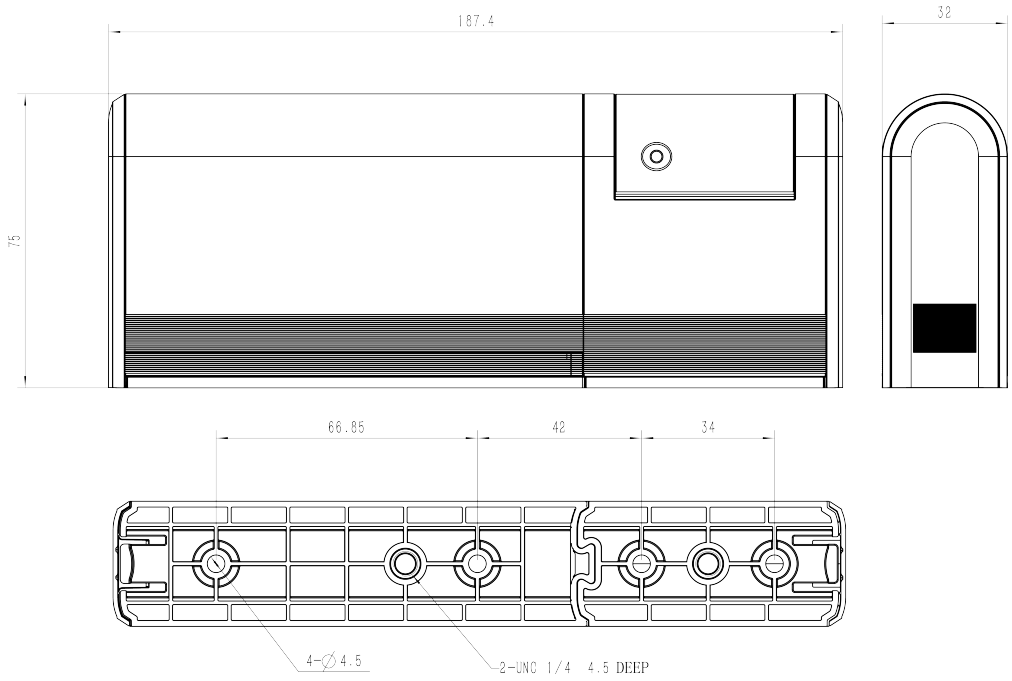


Dimensions (mm)

Type-C Version:

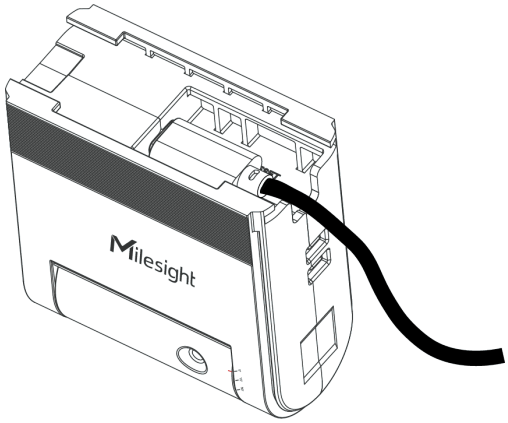


Battery Version:


187.4
32
75
66.85
42
34
4-∅4.5
2-UNC 1/4 4.5 DEEP

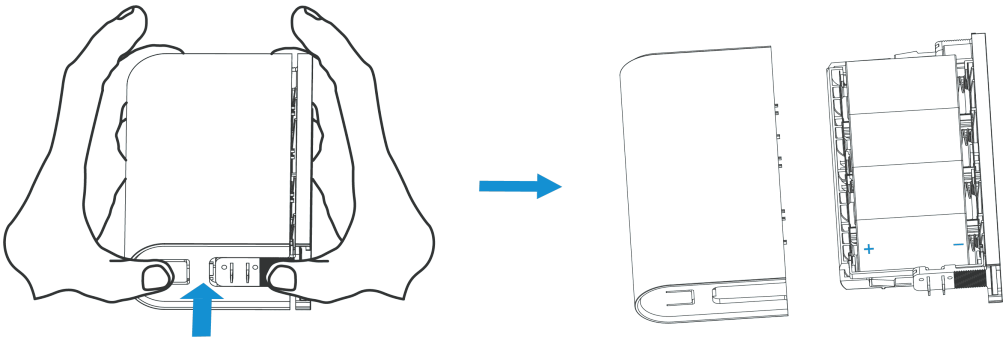
Chapter 4. Power Supply

Type-C Version: Connect power cable to type-C port of device.



Battery Version: The batteries are installed in the battery compartment by default, please connect the power plug of battery compartment to battery outlet of device to power on it.

If the batteries are necessary to replace, remove the battery compartment from device and open the cover of the battery compartment as shown to insert to batteries.



Note:

1. The device can only be powered by ER26500 Li-$SOCl_2$ batteries not alkaline batteries.
2. Ensure the battery direction is not reversed.
3. Ensure all replacing batteries are newest; otherwise it may shorten battery life or cause inaccurate power calculation.
4. The battery should be removed from the device if it is not used for an expended period.

Chapter 5. Quick Start

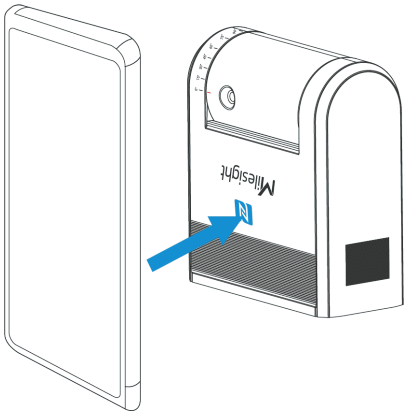
This chapter describe the steps to quickly configure this device to set up the connection with LoRaWAN® gateway and network server. If you requires more advanced settings, please refer to operation guide chapter.

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.



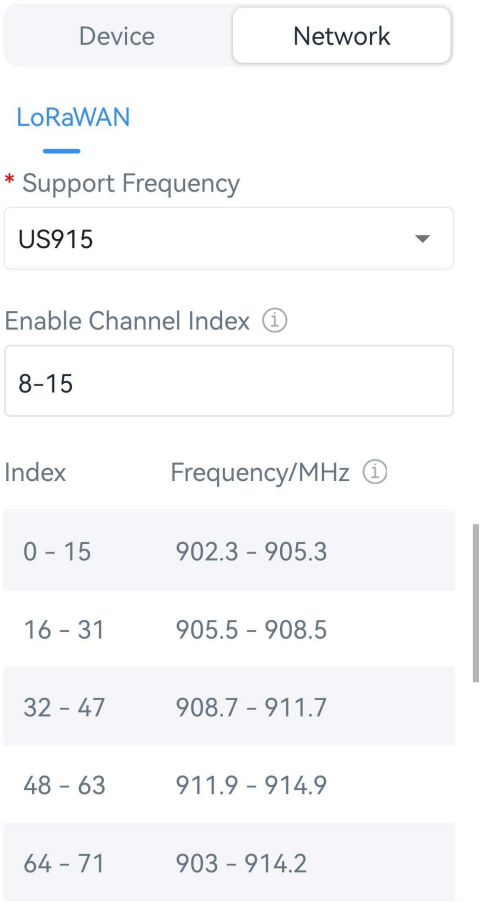
Configure the Network Setting

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 or Milesight Development Platform.

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.

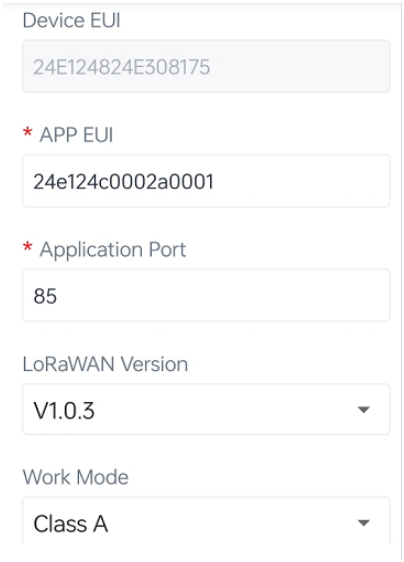


3. Keep other settings by default and click **Write** to save the settings.

Chapter 6. Operation Guide

LoRaWAN® Settings

Configure AppEUI, Join Type, Application Key, and other information. You can also keep all the default settings.

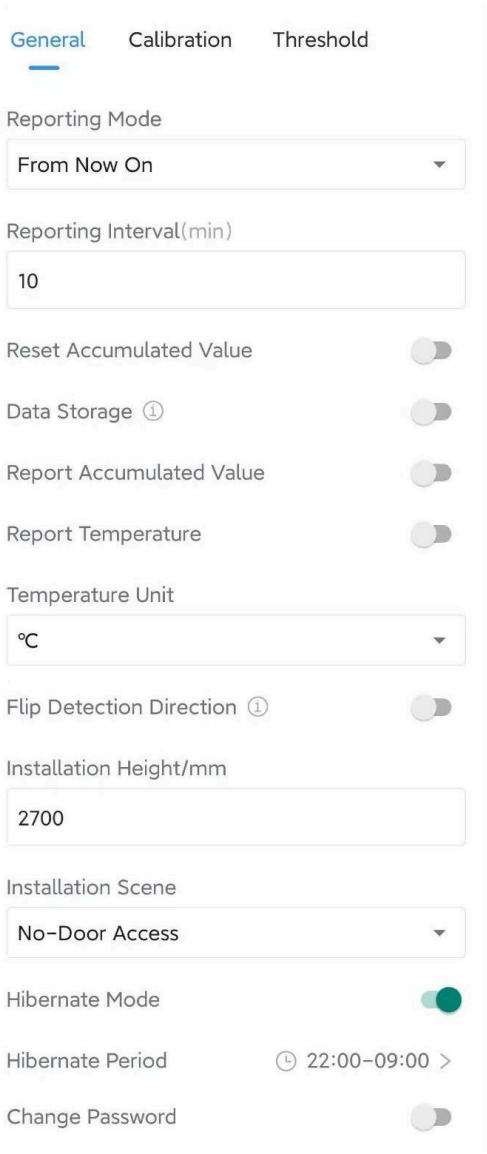


Parameters	Description
Device EUI	Unique ID of the device which can be found on the device. **Note:** please contact sales for device EUI list if you have many units.
App EUI	The default App EUI (join EUI) is 24E124C0002A0001.
Application Port	The port used for sending and receiving data, the default 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.

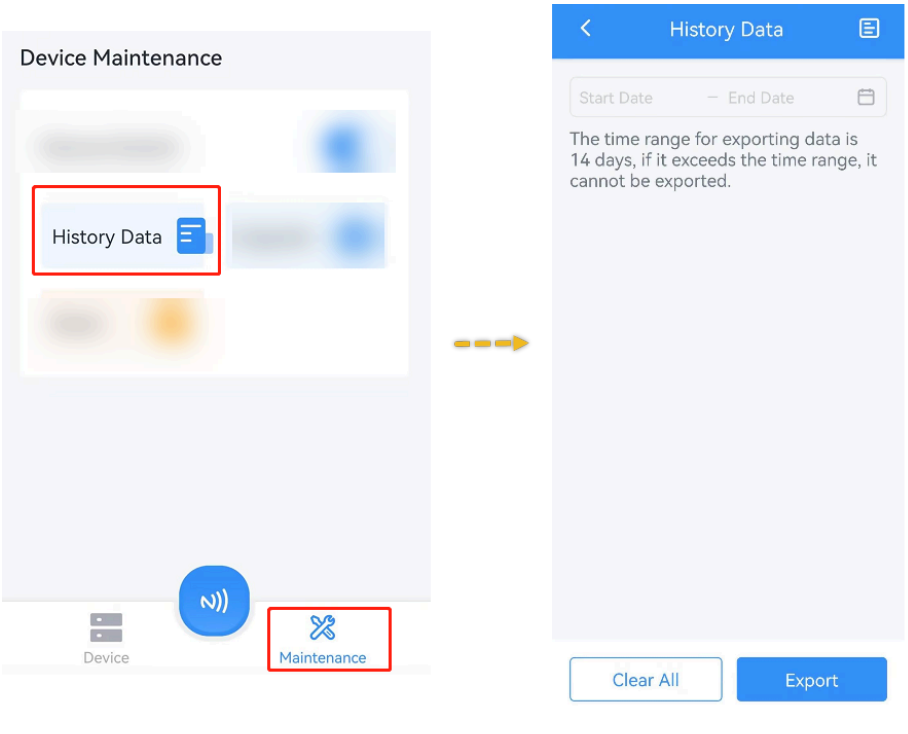
Parameters	Description
	Note: it's necessary to select OTAA mode if connecting device to Milesight IoT Cloud or Milesight Development Platform.
Application Key	Appkey for OTAA mode, default value: "Device EUI" + "Device EUI" (since Q4 of 2025). Example: 24e124123456789024e1241234567890 **Note:** • The 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 LinkCheck-Req 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 LinkCheck-Req MAC packets to the network server every reporting interval to validate connectivity; If there is no response, the device will re-join the network.

Parameters	Description
	Note: 1. Only OTAA mode supports rejoin mode. 2. The actual sending number is **Set the number of packets sent** +1.
Channel Mode	Select **Standard-Channel** mode or **Single-Channel** mode. When **Single-Channel** mode is enabled, only one channel can be selected to send uplinks.
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:** 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 or send D2D commands.
RX2 Frequency	RX2 frequency to receive downlinks or send D2D commands. Unit: Hz

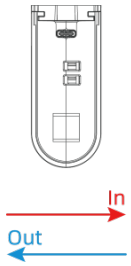
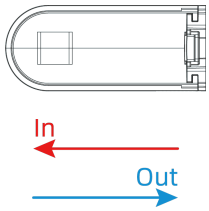
General Settings



Parameters	Description
Reporting Mode	Select the periodic reporting mode: "On the Dot" or "From Now On". **On the Dot:** Report at regular time marks. For example, if the current time is 0:07 and the interval is set to 10 minutes, reports will be sent at 0:10, 0:20, 0:30, etc. **From Now On:** Start reporting immediately and continue at regular intervals from that point forward.

Parameters	Description
Reporting Interval	The time interval for reporting people counting data and battery level to the network server. Default: 10 minutes.
Reset Accumulated Value	Enable or disable automatic reset of accumulated in/out counting values. Before resetting the accumulated value, the device reports the current accumulated value once, and then clears it. **Note:** The device will reset automatically when accumulate counting values reaches 65535 even this option is disabled.
Reset Time	The time to reset accumulated in/out counting values. **Note:** The cumulative value will be reported once before reset.
Data Storage	Disable or enable to store **periodic report** data locally. The stored data can be exported as CSV format file and saved to smartphone via ToolBox. 

Parameters	Description
	Note: 1. It is necessary to sync the time to ensure the data is stored in correct time. 2. The device will still store the data even the network status is de-activated. 3. ToolBox App can only export the last 14 days' data at most.
Data Retransmission	Disable or enable data retransmssion. When the device detects the network status is de-activated via Rejoin Mode, the device will record a data lost time point and re-transmit the lost data after device re-connects to the network. **Note:** 1. This setting only takes effect when Data Storage is enabled. 2. If the device is rebooted or re-power when data retransmission is not completed, the device will re-send all retransmission data again after device is reconnected to the network. 3. If the network is disconnected again during data retransmission, it will only send the latest disconnected data. 4. The default report data retransmission interval is 600s, this can be changed via downlink command. 5. The reported format of retransmission data will include timestamps and is different from periodic report data. 6. This setting will increase the uplink frequencies and shorten the battery life.
Report Accumulated Value	Disable or enable to report accumulated counting values in periodic packets.
Report Temperature	Disable or enable to report temperature in periodic packets, this option will not affect temperature threshold alarm packets.
Temperature Unit	Set the temperature unit displayed on the status page.

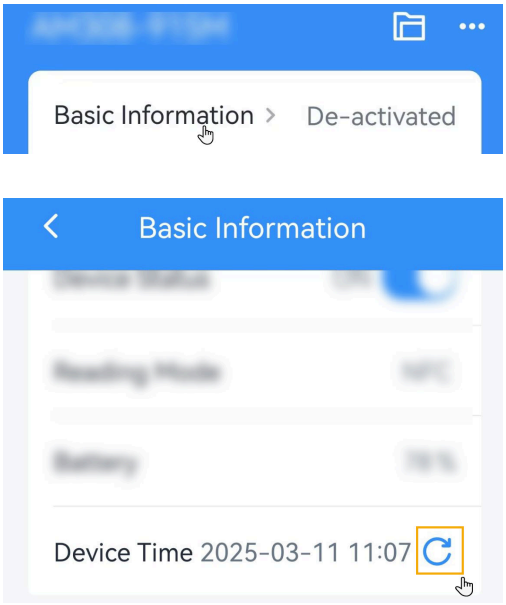
Parameters	Description
Flip Detection Direction	Disable or enable to change the detect direction.
	Default direction of ceiling mount:  Default direction of lintel mount: 
Installation Height/mm	Set the current installation height. Default: 2700 mm. Range: 2000 - 3000mm.
Installation Scene	**No-Door Access**: Suitable for scenarios with no physical door or where the door remains permanently open. **Door-Controlled Access**: Suitable for wooden or glass doors that require automatic opening and closing upon pedestrian passage.
Hibernate Mode	Disable or enable Hibernate mode and configure the Hibernation Period. It will stop counting and reporting when hibernating.
Change Password	Change the password for ToolBox App to write this device.

Time Synchronization

This section describes how to sync the time of the device.

Sync via ToolBox App

After reading the device via Milesight ToolBox App, sync the device time with time zone from the smart phone.



Sync via Network Server

This requires to ensure the LoRaWAN® network server supports device time synchronization feature. Example: Milesight gateway embedded NS.

1. Set the LoRaWAN® version of the device to V1.0.3.
2. Connect the device to the network server. After joining the network, the device will send a DeviceTimeReq MAC command to enquire the time from network server.

Note:

- This only supports to get the time but not time zone. The time zone can be configured by ToolBox App or downlink command.
- The device will send the DeviceTimeReq command every 5 days since the last sync.

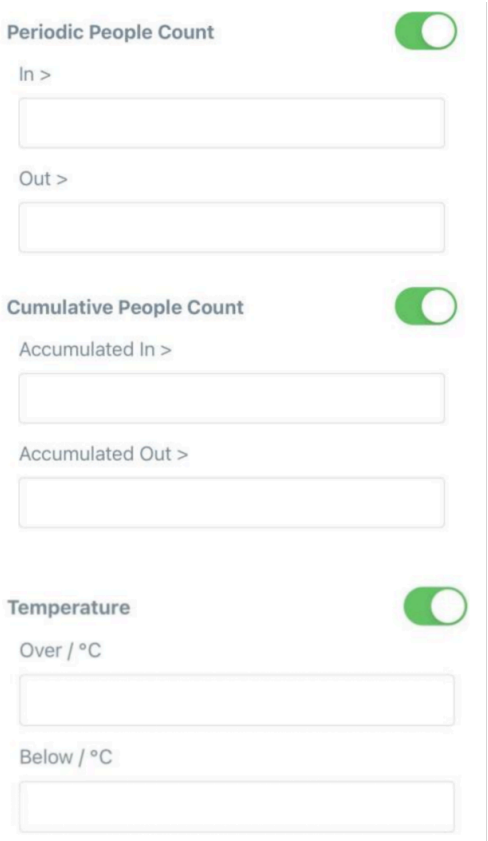
Advanced Settings

Calibration Settings

The device supports numerical calibration of the temperature value. Set the calibration value, the device will add calibration value to the current value and report the final value.

Threshold Settings

If the threshold is triggered, the device will report the threshold alarm packet instantly.



Parameter	Description
Periodic People Count	During each reporting interval, when the number of people reaches the set threshold, the device will send a alarm packet once. At the end of the interval, the count is reset to zero, and the next reporting interval begins.

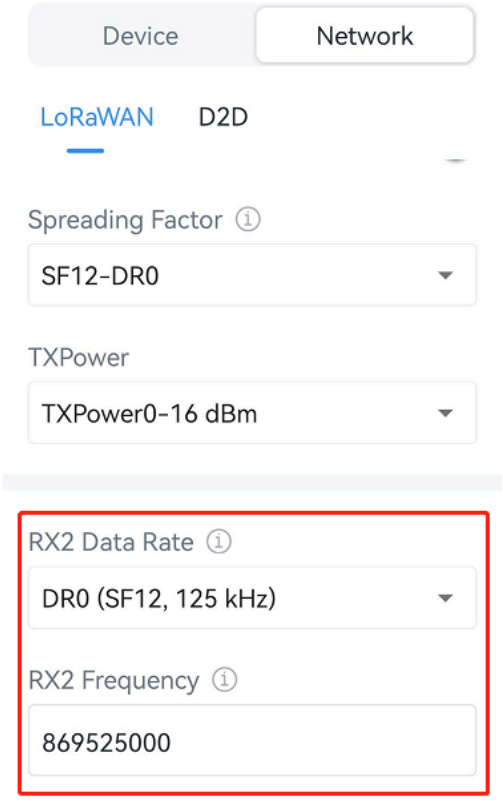
Parameter	Description
Cumulative People Count	When the device is powered on for the first time or after the accumulated count is reset, it sends an alarm data packet once the cumulative number of entries reaches the set threshold.
Temperature	When the temperature of the device reaches the set threshold, an alarm packet is sent once; when the temperature returns to normal, an alarm release packet will be sent once. **Note:** The device will also report alarm packet when temperature is above 30°C, even if the temperature threshold is disabled.

Milesight D2D Settings

Milesight D2D protocol is developed by Milesight and used for setting up transmission among Milesight devices without gateway. When the Milesight D2D settings is enabled, the device can work as a D2D controller to send control commands to trigger Milesight D2D agent devices.

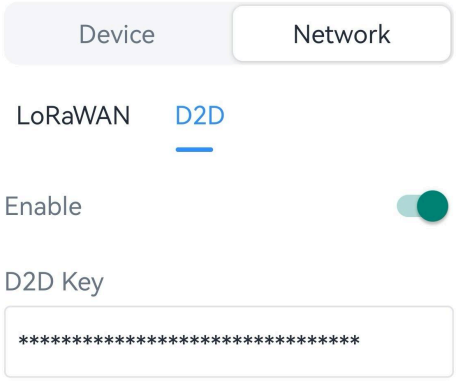
1. Configure the RX2 datarate and RX2 frequency.

Note:
It is suggested to change the default values if there are many LoRaWAN® devices around.



2. Enable and configure the threshold alarm settings.

3. Enable Milesight D2D feature and define a unique D2D key that is the same as Milesight D2D agent devices. (Default D2D key: 5572404C696E6B4C6F52613230313823)



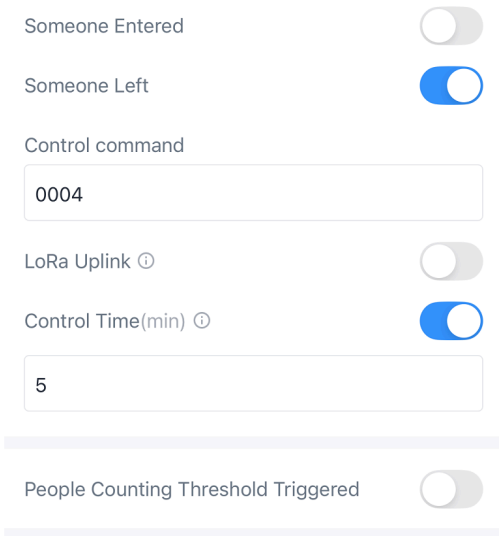
4. Enable one of statuses and configure 2-byte hexadecimal Milesight D2D command.

Note:

- If you enable **LoRa Uplink**, a LoRaWAN® uplink packet that contains corresponding alarm status will be sent to gateway after the Milesight D2D command packet. Otherwise, the alarm packet will not send to LoRaWAN® gateway.
- If you enable the **Control Time** setting, Milesight D2D agent devices will take corresponding actions within this duration after receiving commands from Milesight D2D controller. This feature is currently under development for Milesight D2D agent devices.

Example:

When someone is left, the device will send D2D command 0004 to Milesight D2D agent devices, which perform the corresponding action for 5 minutes.



Maintenance

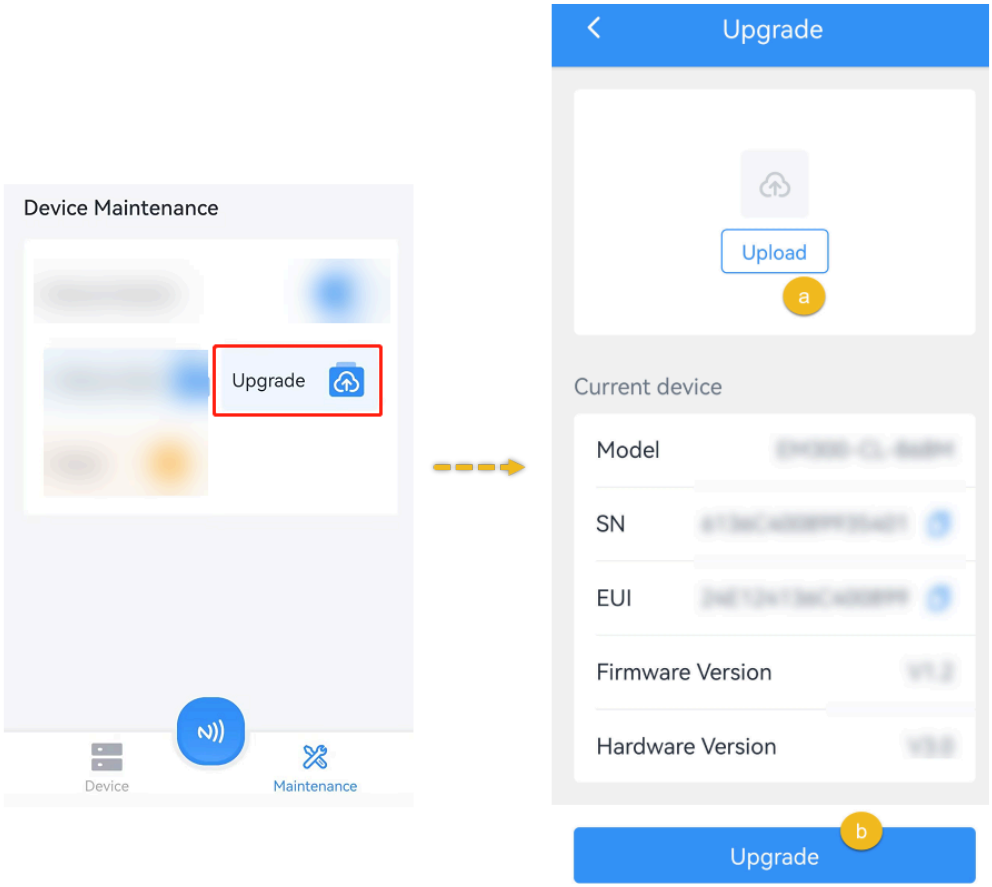
Upgrade

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.



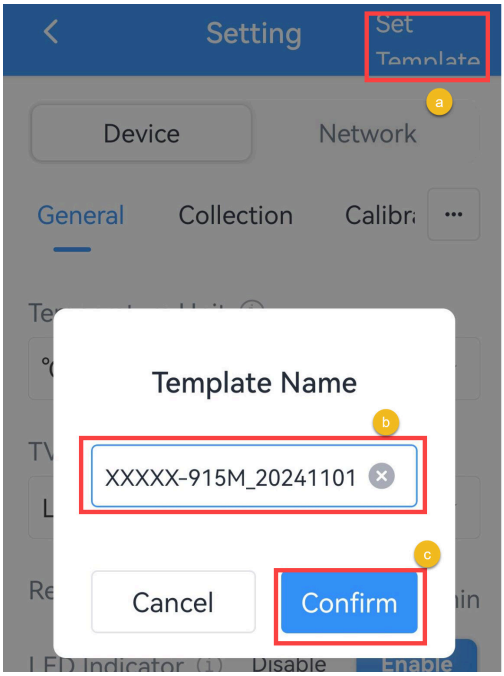
Backup and Restore

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.

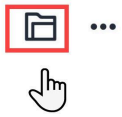
Backup and Restore

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

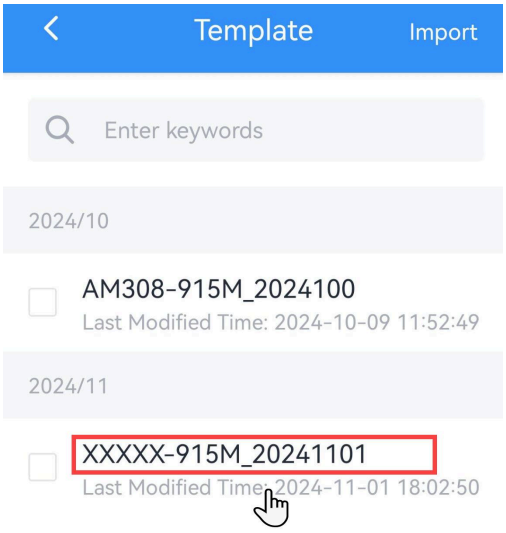
2. Edit the configuration as required, click **Set Template** to save current configuration as a template to the ToolBox App.



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



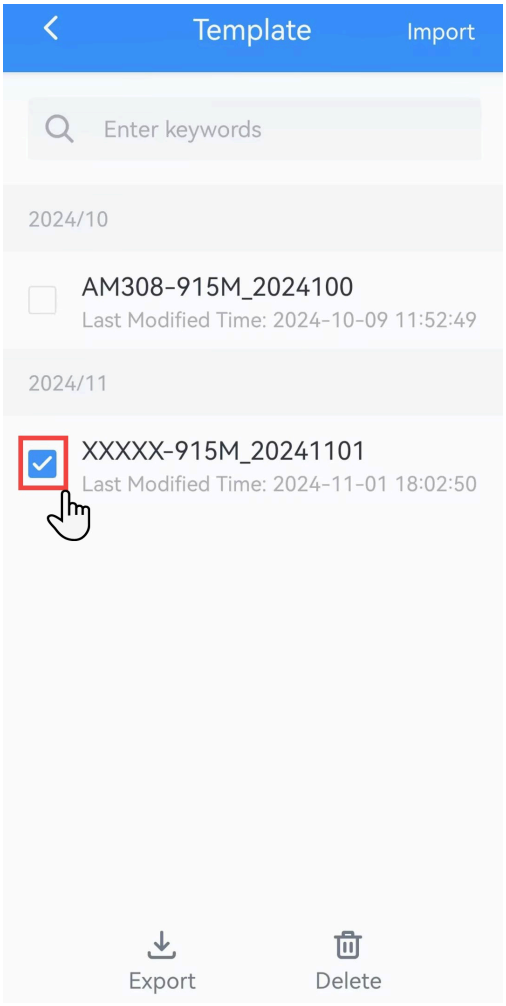
4. Select and click the target template, click **Write** to import the configuration to target devices.



Export and Delete Template

1. Check the box of the target template.

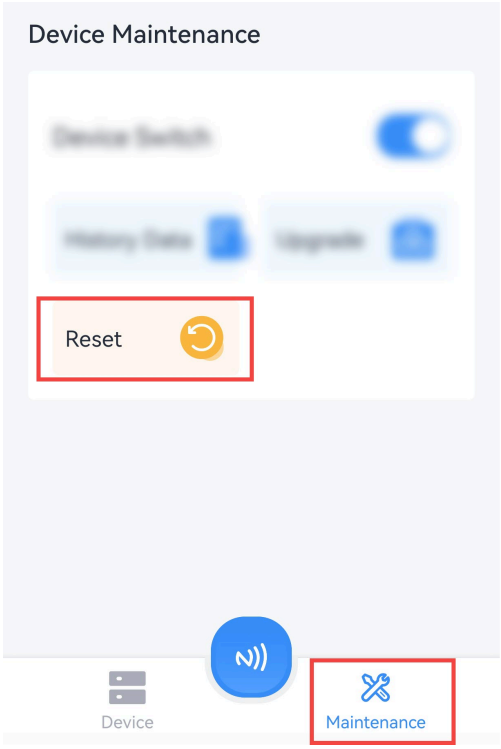
2. Click **Export** to export this template as JSON format file and save it to the smartphone, click **Delete** to delete this template from your ToolBox App.



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

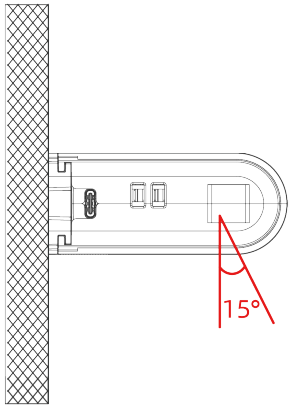
Chapter 7. Installation

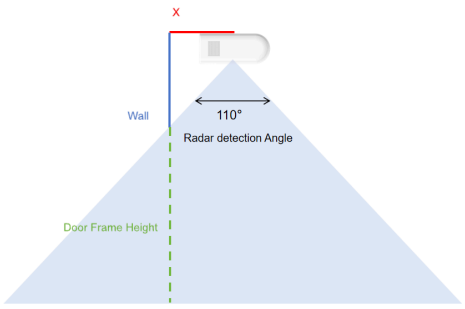
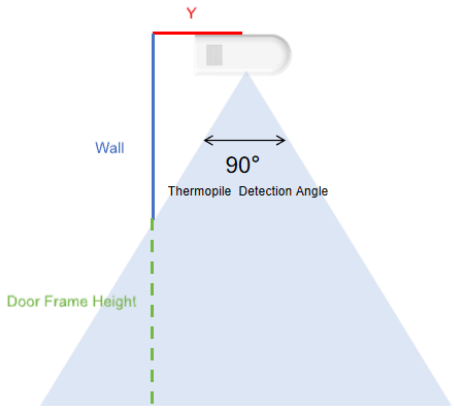
Note:

1. Wall materials must have sufficient strength and stability to ensure that screws are securely fastened and the overall structure is sturdy.
2. Screws should be fastened in locations that avoid electrical wiring, water pipes, and other elements within the wall to prevent damage to the wall structure or safety hazards.

Installation preparations and requirements

- The table below describes the relevant parameters for calculating distance from the wall:

Parameters	Description	Value
H	Installation Height	2 m- 3 m
h	Doorframe Height	≤ 3 m
a	Thermopile Detection Angle	90 °
b	Radar Detection Angle	110 °
c	Angle of the Rotatable Probe perpendicular to the ground	≤ 15 ° 
X	Distance from the wall for Battery Version	X=tan(b/2)*(H-h)

Parameters	Description	Value
		
Y	Distance from the wall for Type-C Version	Y=tan(a/2)*(H-h) 

- For the detection width corresponding to the installation height, please refer to the table below:

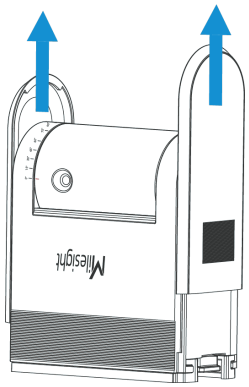
Installation Height (m)	Detection Width(m)
2.0	1.6
2.2	2.0
2.4	2.57
2.6	2.9
2.8	3.2
3.0	3.6

- The optimal operating temperature range is 15 - 30 °C, keep the device away from heat sources, cold sources, and the areas where airflow varies greatly, for example, windows, vents, fans, air conditioners, etc.

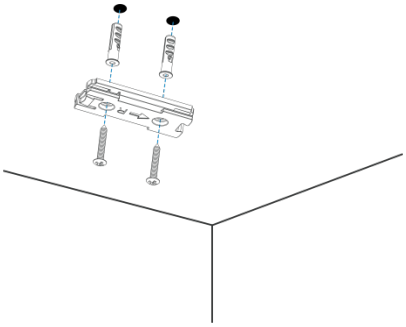
- The optimal distance between the target and the device is 60 - 100 cm.
- Keep the device away from glass or mirror and out of children's reach.
- Ensure that there is no metal directly below the device, no other radar device within 30cm around, and no obstacle in the detection area.
- For battery version, please make sure there is no fixed and large moving objects (such as swing head fan) within the detection area of the device.

Type-C Version Installation

Step 1: Remove the two decorated plates from the side of the device.

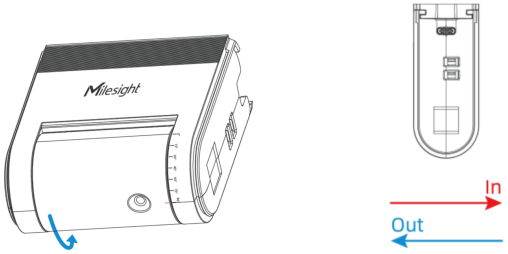


Step 2: Fix the wall plugs to the ceiling or lintel with wall plugs, then fix the mounting plate with screws.

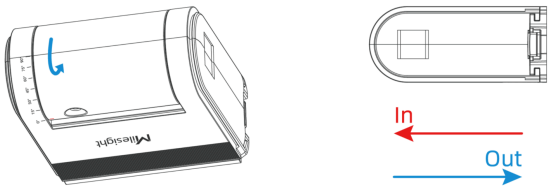


Step 3: Adjust the probe and installation direction.

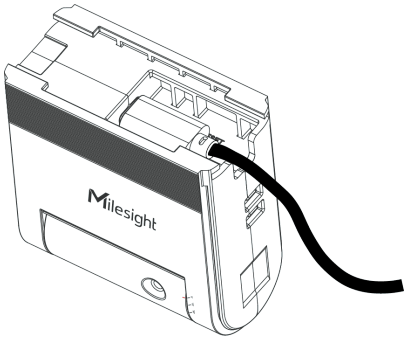
- Ceiling Mounted: rotate the probe and position the sensors facing directly downward.



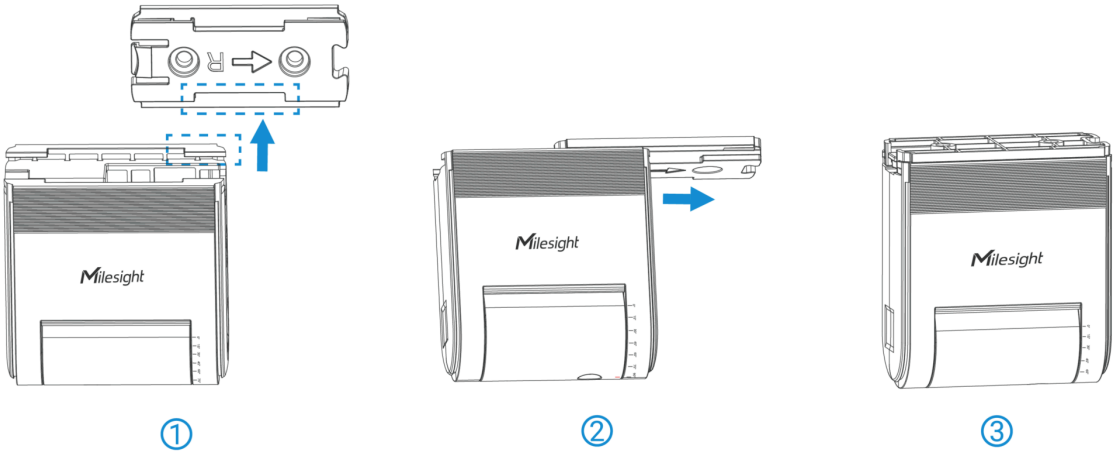
• Lintel Mounted: rotate the probe and make sensors straight face to the ground with the logo side.



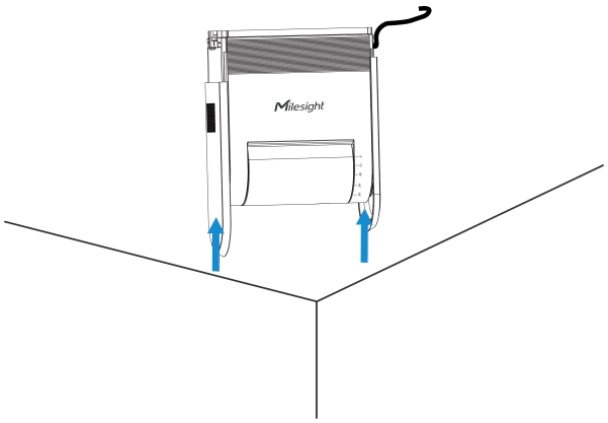
Step 4: Connect power cable to type-C port of device.



Step 5: Fix the device and the battery compartment to the mounting plate.

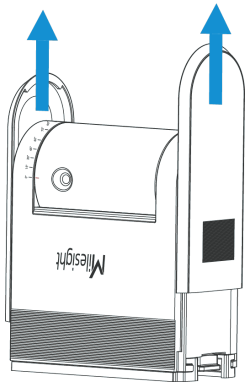


Step 6: Slide the two decorated plates to the side of the device.

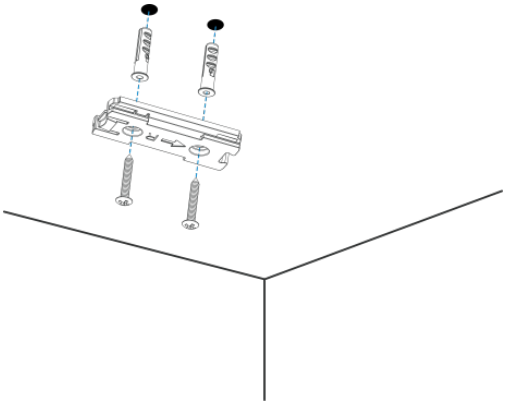


Battery Version Installation

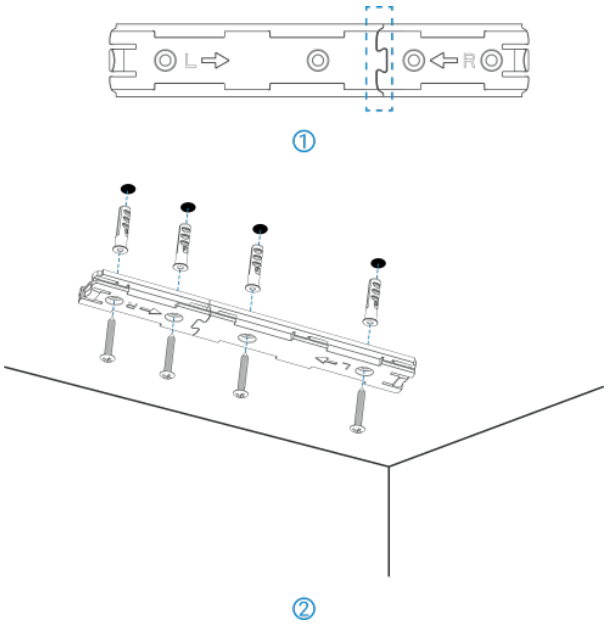
Step 1: Remove the two decorated plates from the side of the device.



Step 2: Fix the wall plugs to the ceiling or lintel with wall plugs, then fix the mounting plate with screws.

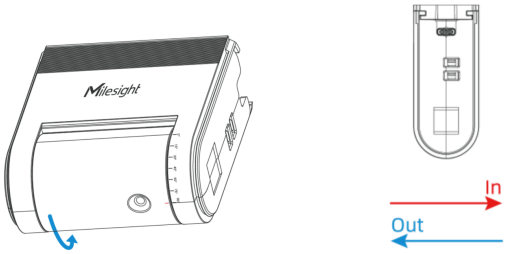


Then then splice two mounting plates together before fix them.

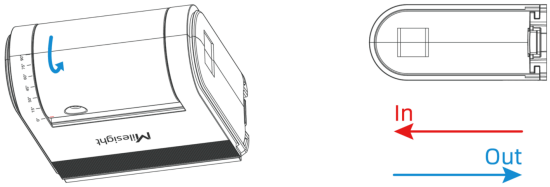


Step 3: Adjust the probe and installation direction.

- Ceiling Mounted: rotate the probe and make sensors straight face to the ground.

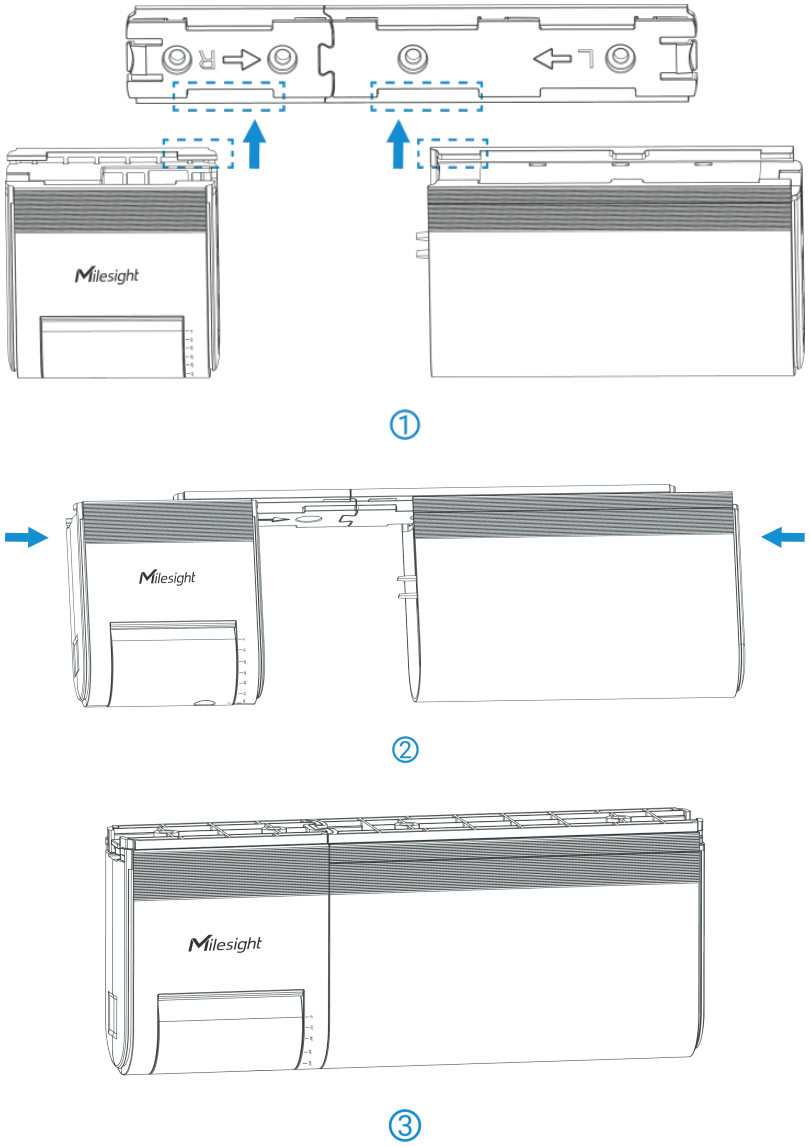


- Lintel Mounted: rotate the probe and make sensors straight face to the ground with the logo side.

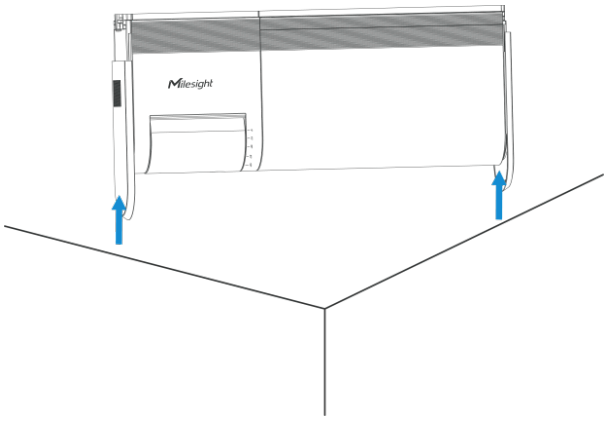


Step 4: Fix the device and the battery compartment to the mounting plate.

Align the device slots to the grooves in the middle of the mounting plate, then slide the device and battery compartment onto the mounting plate following the direction indicated by the arrow on the plate.



Step 5: Slide the two decorated plates to the side of the device.



VB01 Mounting Bracket Installation

The device is also compatible with VB01 mounting bracket, designed for challenging installation scenarios such as high ceilings or when a specific distance from the doorframe is required. For detailed installation steps, please refer to VB01 Datasheet.

Factors Affecting Accuracy

- The people counting value may decrease in the following cases:
  - Ambient temperature: ≥ 30°C
  - Distance from the target's head to the device: ≥120cm
  - Distance between the two people: ≤ 50cm
  - Distance of two people walking side-by-side: ≤ 30cm
  - Walking at an extremely high speed: ≥ 2 m/s
  - Target pass close to the detection area edge or tilt through
  - From a low-temperature area to a high-temperature area
  - Head Covering: Hats, helmets, or down jacket hoods
  - Body Insulation: Wearing down jackets
  - Behavioral Obstruction: Carrying large bags or walking sideways
- The people counting value may increase in the following cases:
  - Distance from the target's head to the device: ≤ 10 cm
  - From a high-temperature area to a low-temperature area
  - At an installation height of 2.1 m, a target taller than 2 m

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
Serial Number	ff	16	8	16 digits
Hardware Version	ff	09	2	Example: 03 10 = V3.1
Firmware Version	ff	0a	2	01 14 => V1.14
Device Type	ff	0f	1	00: Class A, 01: Class B, 02: Class C, 03: Class C to B
Power Supply	ff	cc	1	00: Battery supply, 01: Type-C supply

Example:

ff0bff ff0101 ff166791d19604050005 ff090100 ff0a0101 ff0f00 ffcc01		
Channel	**Type**	**Value**
ff	0b	Power On: ff
ff	01	Protocol Version: 01(V1)

ff0bff ff0101 ff166791d19604050005 ff090100 ff0a0101 ff0f00 ffcc01		
Channel	**Type**	**Value**
ff	16	SN: 6791d19604050005
ff	09	Hardware Version: 0100 (V1.0)
ff	0a	Firmware Version: 0101(V1.1)
ff	0f	Device Type: 00(Class A)
ff	cc	Power Supply: 01 (Type-C supply)

Periodic Report

The device supports the sensor data according to reporting interval.

Item	Channel	Type	Byte	Description
Battery Level	01	75	1	UINT8, Unit: %, [1-100]
Temperature	03	67	2	INT16*0.1, Unit: °C
Accumulated Counter	04	cc	4	Byte 1-2: Accumulated In Byte 3-4: Accumulated Out
Periodic Counter	05	cc	4	Byte 1-2: In Counter during the report interval Byte 3-4: Out Counter during the report interval
Unix Timestamp	0a	ef	4	Display only when report mode is on the dot. Unix Timestamp, Unit: s

Examples:

1. Periodic packet: report as reporting interval (From now on).

04cc20001700 03671a01 05cc01000000 017562		
Channel	**Type**	**Value**
04	cc	Accumulated In: 0c 00=> 00 0c=12 Accumulated Out: 07 00=>00 07=7

04cc20001700 03671a01 05cc01000000 017562		
Channel	**Type**	**Value**
03	67	Temperature: 1a01 => 011a =>282*0.1 =28.2°C
05	cc	In Counter during the report interval: 01 00=> 00 01=1 Out Counter during the report interval: 00 00=0
01	75	Battery Level: 62=>98%

2. Periodic packet: report as reporting interval (On the dot).

04cc20001700 03671a01 05cc01000000 017562 oaef4a7c5b63		
Channel	**Type**	**Value**
04	cc	Accumulated In: 0c 00=> 00 0c=12 Accumulated Out: 07 00=>00 07=7
03	67	Temperature: 1a01 => 011a =>282*0.1 =28.2°C
05	cc	In Counter during the report interval: 01 00=> 00 01=1 Out Counter during the report interval: 00 00=0
01	75	Battery Level: 62=>98%
0a	ef	4a7c5b63=> 63 5b 7c 4a=1666939978 s

Alarm Report

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

Item	Channel	Type	Byte	Description
Tempera-ture Alarm	83	67	4	Byte 1-2: Temperature, INT16*0.1, Unit: °C Byte 3: Alarm type 00 -Threshold Alarm Release

Item	Channel	Type	Byte	Description
				01 -Threshold Alarm 03 - High Temperature Alarm: temp > 30°C 04 - High Temperature Alarm Release
Accumulated Counter Alarm	84	cc	5	Byte 1-2: Accumulated In Byte 3-4: Accumulated Out Byte 5: 01
Periodic Counter Alarm	85	cc	5	Byte 1-2: Periodic In Counter Byte 3-4: Periodic Out Counter Byte 5: 01

Example:

1. People alarm packet: report when the counting value reaches the threshold.

84 cc 0200000001		
Channel	**Type**	**Value**
84	cc	Accumulated in: 0200=>0002=2 Accumulated out: 0000=0 01= Threshold Alarm

2. Temperature alarm packet: report when the temperature reaches the threshold or is above 30°C.

8367 0e0101		
Channel	**Type**	**Value**
83	67	Temperature threshold: 0e 01 =>01 0e = 270 *0.1 = 27 °C 01= Threshold Alarm

Historical Data

The device will report retransmission data or stored data as below example.

Channel	Type	Byte	Description
20	ce	9/13	Byte 1-4: Unix Timestamp, Unit: s Byte 5: 00-Periodic Counter 01-Periodic Counter + Accumulated Counter Byte 6-7: Periodic In Counter Byte 8-9: Periodic Out Counter Byte 10-11: Accumulated In Counter Byte 12-13: Accumulated Out Counter

Example:

20ce 4a7c5b63 01 0700 0300 4a00 3800			
Channel	**Type**	**Time Stamp**	**Value**
20	ce	4a7c5b63=> 63 5b 7c 4a=1666939978 s	01=Periodic Counter + Accumulated Counter Period In: 0700=>0007=7 Period Out: 0300=>0003=3 Accumulated In: 4a00=>004a=74 Accumulated Out: 3800=>0038=56

Downlink Command

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

General Setting

Item	Channel	Type	Byte	Description
Reboot	ff	10	1	ff
Report Mode	f9	10	1	00: On the Dot, 01: From Now On
Report Interval	ff	8e	3	**Byte 1**: 00 **Byte 2-3**: UINT16, Unit: minute **Note:** When the report mode is set to "On the Dot", only the following intervals can be configured: 5 min, 10 min, 15 min, 30 min, 1 h, 4 h, 6 h, 8 h, and 12 h. Other intervals are not supported.
Reset Accumulated Value	ff	a6	1	00: disable, 01: enable
Reset Accumulated Value Time	ff	ed	3	Byte 1: Reset date 00: Everyday; 01: Every Sunday; 02: Every Monday; 03: Every Tuesday ; 04: Every Wednesday; 05: Every Thursday; 06: Every Friday; 07: Every Saturday Byte 2: Reset hour Byte 3: Reset minute
Reset Accumulated Value	ff	a8	1	01: reset accumulate in value

Item	Channel	Type	Byte	Description
				02: reset accumulate out value
Data Storage	ff	68	1	00: Disable, 01: Enable
Data Retransmission	ff	69	1	00: Disable, 01: Enable
Data Retrans-mission Interval	ff	6a	3	**Byte 1**: 00 **Byte 2-3**: UINT16, Unit: s, Range: 30~1200, Default: 600
Report Accu-mulated Value	ff	a9	1	00: disable, 01: enable
Report Temperature	ff	aa	1	00: disable, 01: enable
Flip Detection Direction	ff	ec	1	01: enable, 00: disable
Installation Height	ff	77	2	Unit： mm, Range: 2000 - 3000
Installation Scene	f9	a2	1	00: No-Door Access, 01:Door-Controlled Access
Hibernate Period	ff	75	6	Byte 1: 01-enable, 00-disable Byte 2-3: Start Time, unit: min Byte 4-5: End Time, unit: min Byte 6: Set Hibernate Period, Bit0: 1 Bit7~Bit1: Sunday~Monday **Note:** if start time equals end time, it means all day.

Example:

1. Reboot the device.

ff10ff

2. Set report interval as 20 minutes.

ff8e001400		
Channel	**Type**	**Value**
ff	8e	1400=>0014=20minutes

3. Set Reset Accumulated Value Time as Every Sunday 12: 20.

ffed 01 0c 14		
Channel	**Type**	**Value**
ff	ed	01=>Every Sunday Reset hour: 0c => 12 Reset minute: 14=> 20

4. Set up Hibernate Mode.

ff75 01 e001 ec04 ff		
Channel	**Type**	**Value**
ff	75	01: Enable Hibernate mode e0 01 => 01 e0 = 480 minutes = 8 hours = 8:00 ec 04 => 04 ec = 1260minutes =21 hours = 21:00 ff: Hibernate period is from Sunday to Monday

Alarm Setting

Item	Channel	Type	Byte	Description
Threshold Alarm	ff	06	9	Byte 1: **Bit0~Bit2:**

Item	Channel	Type	Byte	Description
				000-disable 001-below (minimum threshold) 010-above (maximum threshold) 011-within 100-below or above **Bit3~Bit5:** 001-in/out threshold 010-accumulated in/out threshold 011-temperature threshold **Bit6~Bit7:** 11 Byte 2-3: Min. value Byte 4-5: Max. value Byte 6-9: 00000000

Example:

Set temperature threshold alarm.

ff06 dc 9600 2c01 00000000		
Channel	**Type**	**Value**
ff	06	dc=>11 011 100:100=below or above, 011=temperature threshold Min. value: 96 00=>00 96=15°C Max value: 2c 01=>01 2c=30°C

Calibration Setting

Item	Channel	Type	Byte	Description
Temperature Calibration	ff	ab	3	Byte 1: 00-disable, 01-enable Byte 2-3: calibration value*0.1, Unit: °C

Example:

Enable temperature and set calibration value.

ffab 01 fdff		
Channel	**Type**	**Value**
ff	ab	01=Enable fdff=>fffd=-3*0.1=-0.3 °C

LoRaWAN® Setting

Modifying the following parameters triggers the device to re-enter the network.

Item	Channel	Type	Byte	Description
Confirm Mode	ff	04	1	00: disable, 01: enable
LoRaWAN® Channel Mask	ff	05	3	Byte 1: Channel index range 01: 0-15 02: 16-31 03: 32-47 04: 48-63 05: 64-79 06: 80-95 Byte 2-3: indicate disable or enable via every bit, 0=disable, 1=enable

Item	Channel	Type	Byte	Description
ADR	ff	40	1	00: disable, 01: enable
Application Port	ff	41	1	[1-223], Default is 85
LoRa Re-join Mode	f9	85	2	Byte 1: 01-Enable; 00-Disable Byte 2: The Number of Detection, Range: 4~32
Spreading Factor	f9	86	1	00-SF12, 01-SF11, 02-SF10, 03-SF9, 04-SF8, 05-SF7
TXPower	f9	87	1	Range: 0~14
LoRaWAN® Version	f9	8b	1	01: V1.0.2 02: V1.0.3
RX2 Data Rate	f9	8c	1	00: DR0 (SF12,125k) 01: DR1 (SF11,125k) 02: DR2 (SF10,125k) 03: DR3 (SF9,125k) 04: DR4 (SF8,125k) 05: DR5 (SF7,125k)
RX2 Frequency	f9	8d	4	RX2 Frequency Value, Unit: Hz
Join Type	f9	a3	1	00: ABP, 01: OTAA

Example:

1. Set AU915 or US915 channel mask as 8-15.

ff0501ff00 ff05020000 ff05030000 ff05040000 ff05050000		
Channel	**Type**	**Value**
ff	05	01: Channel index 0-15, ff00 => 8-15 is enabled

ff0501ff00 ff05020000 ff05030000 ff05040000 ff05050000		
Channel	**Type**	**Value**
		02-05: Channel index 16-79, 0000 => all disabled

2. Set RX2 Frequency as 923.5Mhz.

f98d e07d0b37		
Channel	**Type**	**Value**
f9	8d	e0 7d 0b 37=> 37 0b 7d e0=923500000=923.5Mhz

Milesight D2D Setting

Item	Channel	Type	Byte	Description
D2D Feature	ff	84	1	01: enable; 00: disable
D2D Key	ff	35	8	The first 16 digits of D2D key, and the last 16 digits are fixed as 0.
D2D Settings	ff	96	8	Byte 1: 01-Someone Entered 02-Someone Left 03-People Counting Threshold Triggered Byte 2: 01-enable, 00-disable Byte 3: 01-enable LoRa Uplink, 00-disable LoRa Uplink Byte 4-5: D2D control command Byte 6-7: control time, unit: min Byte 8:

Item	Channel	Type	Byte	Description
				00-disable control time, 01-enable control time

Example:

1. Set D2D Key as 12345678123456780000000000000000.

ff35 1234567812345678		
Channel	**Type**	**Value**
ff	35	1234567812345678

2. Set D2D settings.

ff96 03 01 01 04e0 0500 01		
Channel	**Type**	**Value**
ff	96	03=> People counting threshold triggered; 01=>Enable; 01=>Enable LoRa Uplink; 04 e0=>e0 04, Control Command is e0 04; 05 00=>00 05, Control time is 5 mins; 01=>Enable Control Time

Historical Data Enquiry

The device supports data retrievability feature to send downlink command to enquire the historical data stored in the device. Before that, ensure the device time is correct and data storage feature was enabled to store data.

Command Format:

Item	Channel	Type	Byte	Description
Enquire Data in Time Point	fd	6b	4	Unix timestamp, Unit: s
Enquire Data in Time Range	fd	6c	8	Byte 1-4: Start timestamp, Unit: s Byte 5-8: End timestamp, Unit: s
Stop Query Data Report	fd	6d	1	ff
Data Retrievability Interval	ff	6a	3	Byte 1: 01 Byte 2-3: UINT16, Unit: s, Range: 30~1200, Default: 60

Reply Format:

Item	Channel	Type	Byte	Description
Enquiry Result	fc	6b/6c	1	00: Enquiry success. The device will report the historical data according to data retrievability interval. 01: Time point or time range invalid 02: No data in this time or time range

Note:

1. Use Unix Timestamp Converter to calculate the time.
2. The device only uploads no more than 300 data records per range enquiry.
3. When enquiring the data in time point, it will upload the data which is closest to the search point within the reporting interval range. For example, if the device's reporting interval is 10 minutes and users send command to search for 17:00's data, if the device find there is data stored in 17:00, it will upload this data; if not, it will search for data between 16:50 to 17:10 and upload the data which is closest to 17:00.

Example:

Enquire the historical data in a time range.

fd6c 64735b63 7c885b63		
Channel	**Type**	**Value**
fd	6c	Start time: 64 73 5b 63 => 63 5b 73 64 = 1666937700s End time: 7c 88 5b 63 => 63 5b 88 7c = 1666943100s

Reply:

fc6c00		
Channel	**Type**	**Value**
fc	6c	00: Enquiry success

20ce 4a7c5b63 01 0700 0300 4a00 3800			
Channel	**Type**	**Time Stamp**	**Value**
20	ce	4a7c5b63=> 63 5b 7c 4a=1666939978 s	01=Periodic Counter + Accumulated Counter Period In: 0700=>0007=7 Period Out: 0300=>0003=3 Accumulated In: 4a00=>004a=74 Accumulated Out: 3800=>0038=56

Chapter 9. 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/

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