TS60x

Temperature&Humidity Sensor

User Guide

Contents

Chapter 1. Preface

Copyright Statement

Safety Instruction

These instructions are provided to ensure correct product operation and to prevent personal injury or property damage. Milesight shall not be held liable for any loss or damage arising from failure to comply with the instructions in this guide.

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

- The PT100 temperature probe has a sharp point. Please be careful and keep the edges and points away from human body.
- Do not use the device as a reference sensor. Milesight will not be responsible for any damage caused by inaccurate readings.
- Do not disassemble or remodel the device in any way.
- Do not expose the device to open flames.
- Do not operate the device outside its specified temperature range.
- Take care to prevent electronic components from loosening or falling out when opening the enclosure.
- Do not subject the device to shock or impact.
- Change the device password during initial configuration for security purposes. The default password is 123456.

Revision History

Release Date	Version	Revision Content
Dec. 30, 2025	V1.0	Initial version

Chapter 2. Product Introduction

This chapter describes basic product information.

Overview

TS60x is a compact temperature and humidity sensor with a visualized data display. It features extendable connecting lines, a diverse range of detecting probes, and an IP67 waterproof design, making it applicable for accurate temperature and humidity data detection in various harsh environments. The enclosure, made of food-grade materials, allows safe contact with food or medicines. It not only supports multiple application modes that are compatible with IoT platforms, but is also equipped with base station positioning for tracking and security purposes.

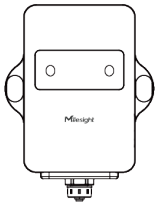
TS60x is widely used for temperature and humidity monitoring applications such as cold chain transportation of food or medicine.

It has the following features:

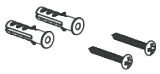
- IP67 waterproof with a specialized battery compartment design, making it suitable for harsh environment
- Locally stores historical records and supports retransmission to prevent data loss
- Built-in 3-axis accelerometer for monitoring device status
- Equipped with a light sensor for cargo box opening detection and alarm
- Support flight mode to comply with aviation safety requirements
- Support management and OTA upgrades via the Milesight Development Platform and AWS
- Flexible design supports various mounting options
- Equipped with NFC for quick and easy configuration
- Equipped with base station positioning for tracking
- Support one-click reporting functionality
- Support cumulative reporting to reduce power consumption
- Support multiple network protocols to compatibility with IoT platforms
- Equipped with an indicator to indicate device status and threshold alarms (TS601 Only)
- Provides optional high accuracy PT100 temperature probes, DS18B20 temperature probe and TH temperature - humidity probe (TS602 Only)
- Features a high resolution 0.96-inch OLED display, enabling intuitive data reading (TS602 Only)

Packing List

This chapter describes the packing list. You can verify the contents against the following list to ensure all items are present. If any of them is missing or damaged, you can contact your sales representative.



1 × TS60x Device



2 × Wall Screw Mounting Kits

2 × Screw Caps

1 × Cable Tie (3.6×500mm)

1 × 3M Tape

1 × Quick Guide

1 × Warranty Card

Accessories Exclusively for TS602

Temperature (Humidity) Probe

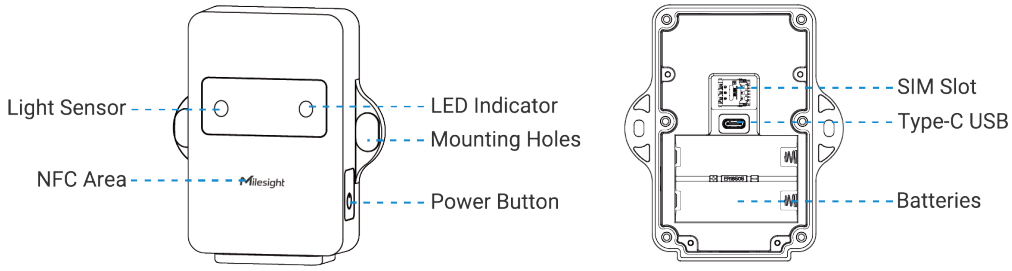
Glass Bead Thermal Buffer Bottle Kit (Optional)

Hardware Components

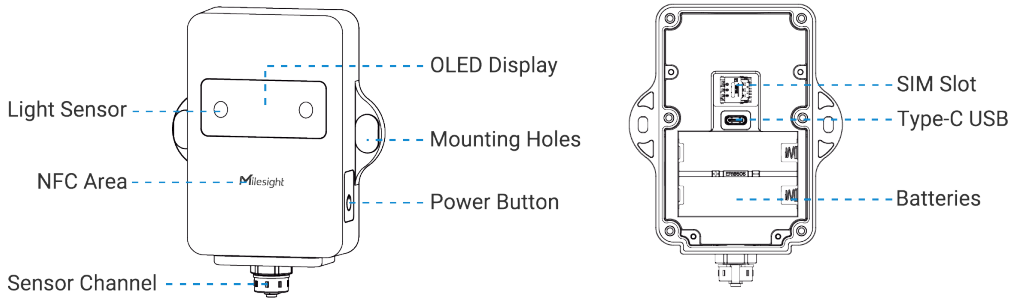
Hardware Overview

The following figure shows the main components of the device.

TS601



TS602



For the description of each component, refer to the following table.

Name	Description
Light Sensor	Measures ambient light intensity to detect door or case opening.
NFC Area	Allows for wireless configuration through mobile phone NFC.
Mounting Holes	Used for securing the device.
Power Button	Controls device power on/off or data reporting.
SIM Slot	Inserts a SIM card to enable cellular network connectivity.
Type-C USB	Used for data export.
Batteries	Houses the battery for power supply.
LED Indicator (TS601 Only)	Indicates the device status.
OLED Display (TS602 Only)	Displays device status and information.
Sensor Channel (TS602 Only)	Interface for connecting external sensors.

Button Description

TS601

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
Data Collection and Historical Data Reporting	Press the power button once.	No data in report: Green On
		Data is reporting: Red On
Reset to Factory Default	Press and hold the power button for more than 10s	Green blinks Quickly

TS602

Function	Action	OLED Screen
Power On/Off	Press and hold the power button for more than 3 seconds.	Power On: OLED Off → On
		Power Off: Displays "Release button. Powering off "
Data Collection and Historical Data Reporting	Press the power button once.	Lights up for 3 seconds and displays the latest device status
Switch Temperature and Humidity Data Display	Quick press the power button twice	Lights up for 3 seconds, switches to temperature and humidity mode display and displays the latest device status
Reset to Factory Default	Press and hold the power button for more than 10s	Displays "Release button. Resting"

Note:
After replacing the probe, it is recommended to quickly press the power button once to confirm the replacement.

Screen Description (TS602 Only)

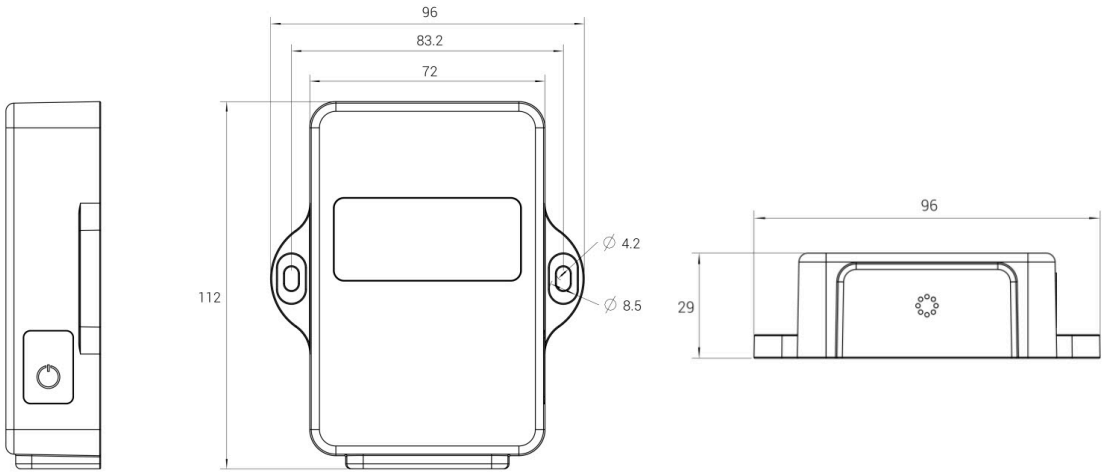
Icon	Description
	Battery level

Icon	Description
	Network signal strength
	Appears when the device is in flight mode
	Data is waiting to report
	Data is reporting
	Appears when the temperature/humidity threshold alarm is triggered
	Show temperature/humidity value, it can be switched using the power button

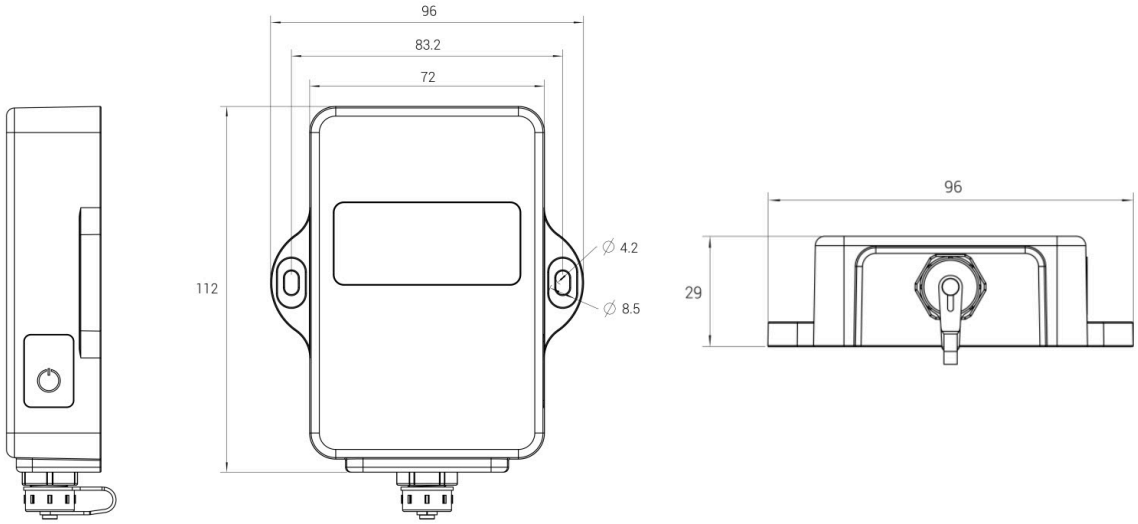
Dimensions

The following figure shows the device dimensions (unit: mm).

TS601



TS602


96
83.2
72
112
∅ 4.2
∅ 8.5
96
29

Chapter 3. Hardware Installation

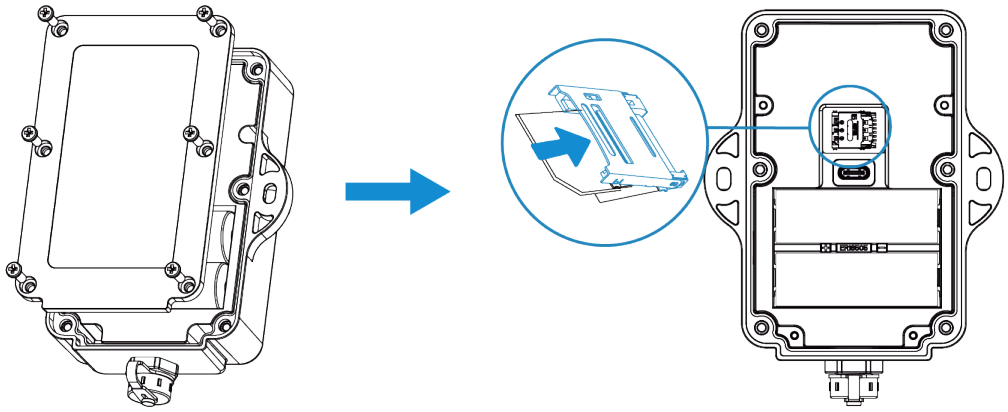
This section describes how to install the accessories and device.

SIM Installation

This chapter describes how to install the SIM (4FF) card to enable network access.

Steps:

1. Remove the back cover.
2. Open the SIM card slot.
3. Insert the SIM card into the card slot with the metal contacts facing downward.
4. Close the slot and reattach the back cover.



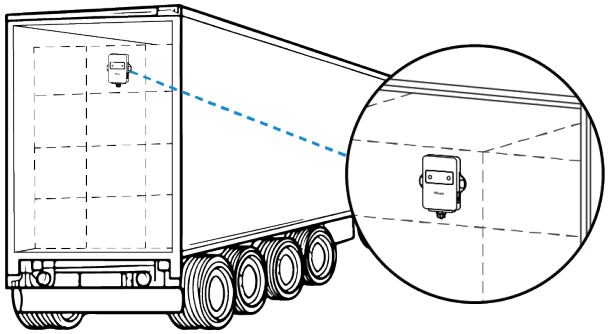
Install the Device

Installation Location Requirements:

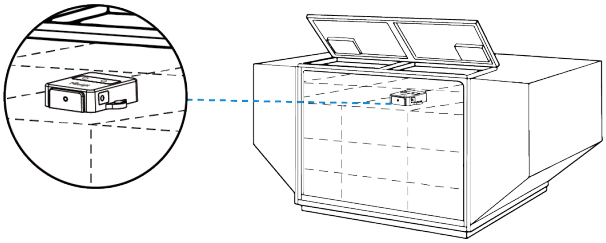
Cellular communications and light detection performance are related to the installation location. It is recommended to install the device in a position where the light sensor can effectively detect light and the cellular signal is strongest.

For example:

- Mount the device on the top cargo box positioned on the passenger side of the trailer, as close to the door as possible and facing it.



- For air shipments on ULD containers, mount the device on the top cargo box, ensures it faces the door.



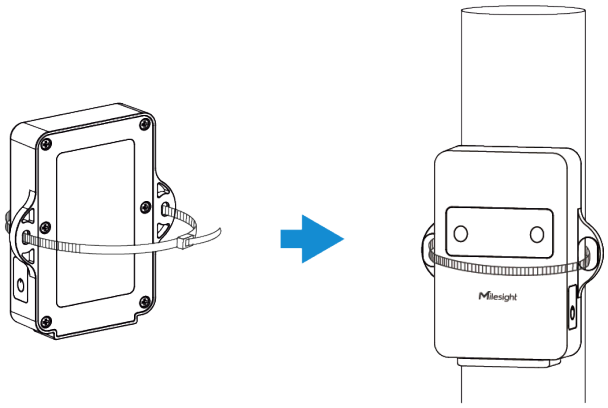
Cable-tie Mounting

Preparation:

- Cable Tie

Steps:

1. Pass a cable tie through the mounting holes.
2. Wrap the device to the pole.



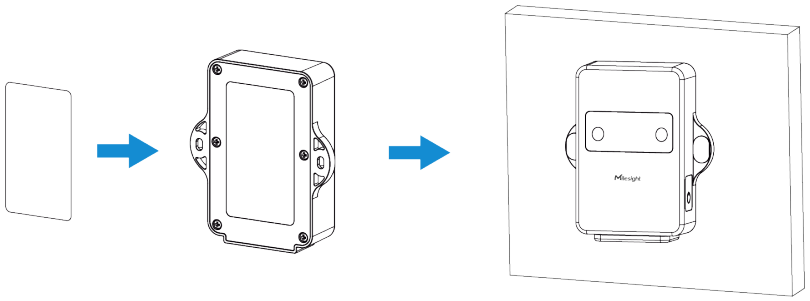
3M Tape Mounting

Preparation:

- 3M Tape
- Screw Caps

Steps:

1. Peel off the 3M tape and attach it to the back of the device.
2. Stick the device onto a flat surface.
3. (Optional) Cover the screws with cover caps.



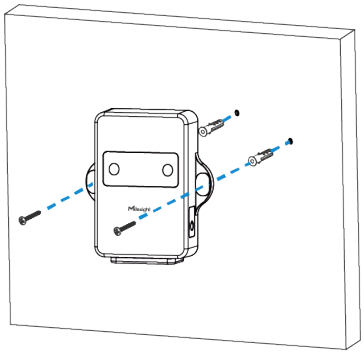
Wall Plugs and Screw Mounting

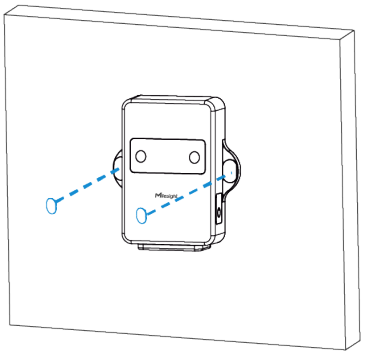
Preparation:

- Wall Screw Mounting Kits
- Screw Caps
- Electric drill

Steps:

1. Fix the wall plugs to a flat surface according to the mounting holes.
2. Secure the device to the wall plugs using screws.
3. (Optional) Cover the screws with cover caps.



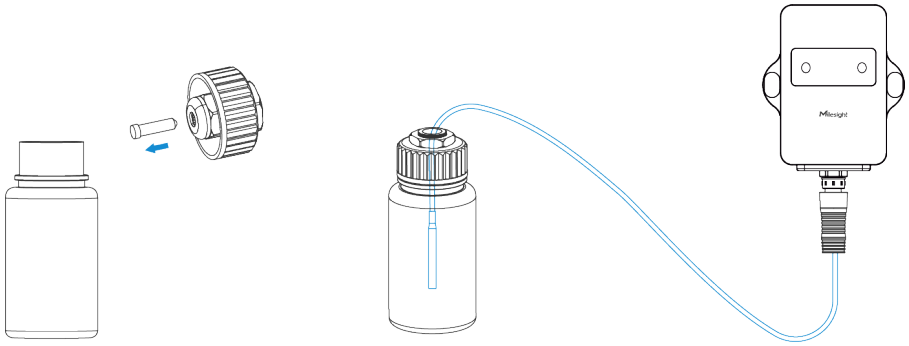


Thermal Buffer Bottle (Alternative)

This setup allows for more accurate temperature measurements and makes it suitable for placement in location such as freezers and refrigerators.

Steps:

1. Unplug the stopper inside the bottle cap.
2. Restore the cap and insert the PT100 probe into the bottle.



Battery Replacement

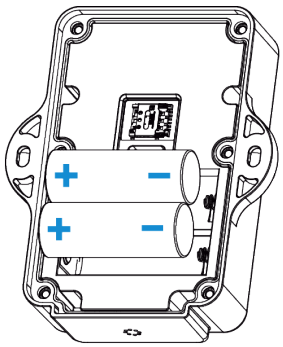
This chapter describes how to replace the batteries when the device runs out of power.

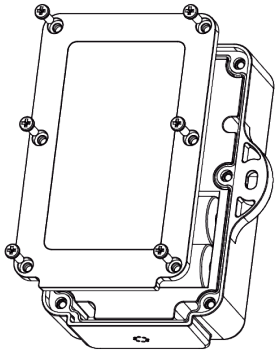
Battery Requirements:

- Power the device by CR18505 Li-MnO_2. batteries. Alkaline batteries are not supported.
- Remove batteries from the device if it is not used for an extended period.
- Always replace with new batteries. Using old batteries may reduce battery life or lead to inaccurate power level calculations.

Steps:

1. Remove the back cover.
2. Replace the battery correctly, ensuring proper orientation and model compatibility.





Chapter 4. ToolBox App Configuration

The Milesight ToolBox app can be used to configure the device. This chapter describes ToolBox related configuration.

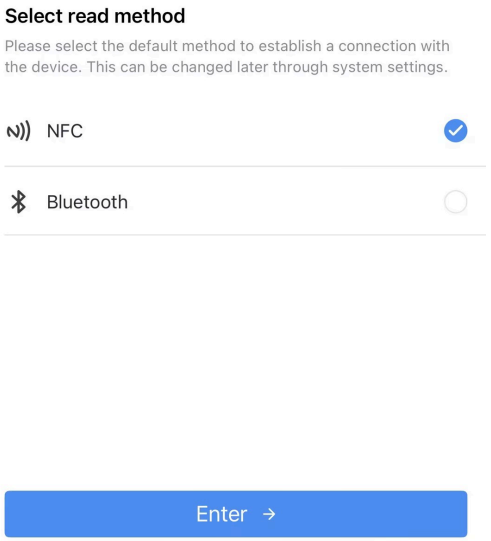
Access the Device Using NFC

This section describes how to access the device using NFC.

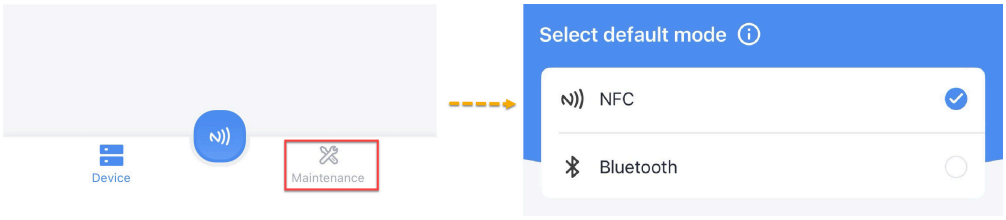
Steps:

1. Download Milesight ToolBox app from Google Play or Apple Store.
2. Enable the NFC function on the smart phone.
3. Launch ToolBox.

    a. Upon first launch, the following page is displayed. Select **NFC** and click **Enter**.

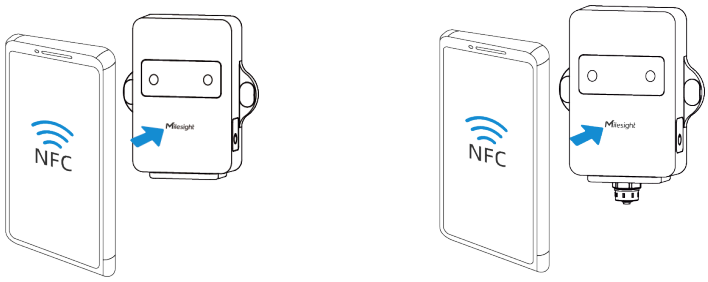


    b. Upon subsequent launches, Click **Maintenance** on the home page, and then select **NFC**.



4. (Optional) To locate the NFC detection areas of the phone and the device, click **Can't find the NFC location**.
5. Put the NFC detection area of the phone close to the NFC antenna of the device.

Tip:
It is recommended to take off the phone case.



6. Click . If the device is recognized successfully, the homepage is displayed.

Troubleshooting:
If read fails, move the phone away and reposition it close to the sensor to try again.

For a description of the homepage, refer to the following table.

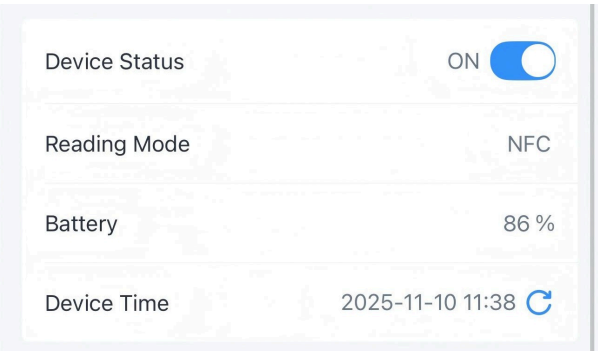
Item	Description
Basic Information	Shows basic device information and sync the system time.
Setting	Sets the device and network parameters.
	Imports, adds, exports or deletes a template.
	Sets the language, shows NFC positions and checks the version.

Synchronize Device Time

This section describes how to sync the device time.

Synchronize the Time Manually Through ToolBox

1. On the homepage of ToolBox, click **Basic Information**.
2. Click to synchronize the time.



3. Put the NFC detection area of the phone close to the NFC antenna of device.
4. If the time is synchronized successfully, the following page is displayed.

Sync successfully!

Synchronize the Time Through Downlink Command

After the device joins the network, it will automatically sync the time from the base station. Additionally, the device supports to manually sync the time from the base station via a downlink command.

Prerequisite: The device has joined the network and the application mode is connected.

Steps:

1. Send the downlink command **b8** to device.

Note:
This only supports to get the time but not time zone. The time zone can be configured by ToolBox App or other downlink command. For details, refer to Commands for Time Settings for details.

Configure Network Parameters

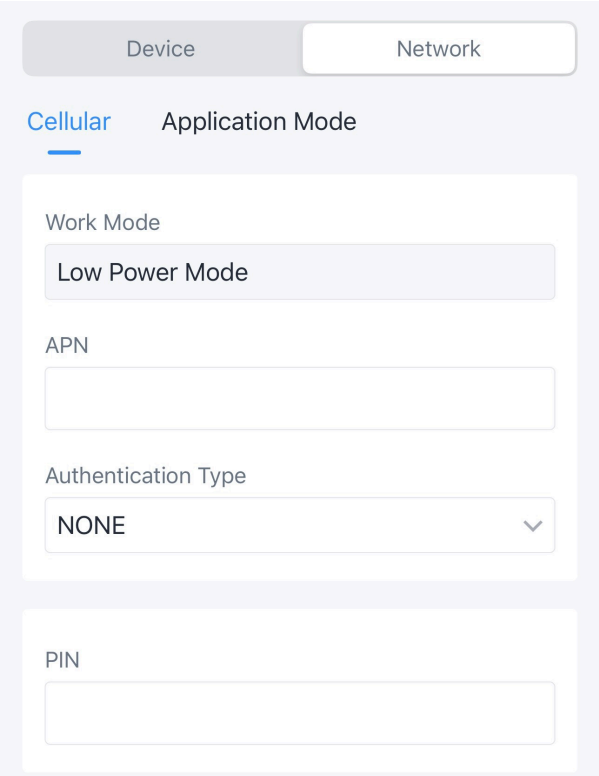
This section describes how to configure the cellular parameters and the application mode.

Configure the Cellular Parameters

This section describes how to configure the cellular parameters.

Steps:

1. On the homepage, click **Setting** to enter the **Setting** page.
2. Click **Network**. The following page is displayed.



3. Configure related parameters as need. For parameter descriptions, refer to the following table.

Parameter	Description
Work Mode	**Low Power Mode:** the device will power off the cellular module to save power after sending uplinks. Only when the device sends uplinks, it can receive downlink commands.

Parameter	Description
APN	Access point name for cellular dial-up connection provided by a local ISP. Maximum length: 31 characters.
Authentication Type	Options: **NONE**, **PAP** and **CHAP**.
PIN	PIN code to unlock the SIM. Length: 4-8 characters.

4. Click **Write** and put the NFC detection area of the phone close to the NFC antenna of device.
5. If the configuration succeeds, the following page is displayed.

Configure the Application Parameters

This section describes how to configure the application parameters to connect to the servers.

Prerequisites:

- Ensure the device is registered with the network.
- Obtained the server's information.

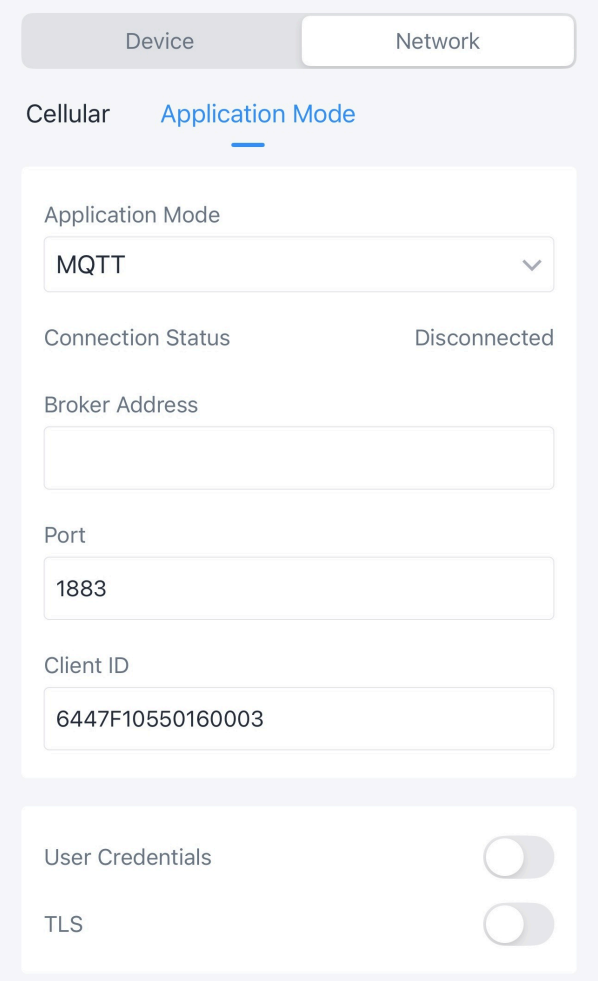
Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. Click the **Application Mode** and select the service from the **Application Mode** selection box, which includes:

Application Mode	Description
MQTT	Connects to the MQTT broker.
TCP	Connects to the TCP server.

Application Mode	Description
AWS	Connects to AWS IoT Core.
UDP	Connects to UDP server.
Milesight Development Platform	Connects to the Milesight development platform server.

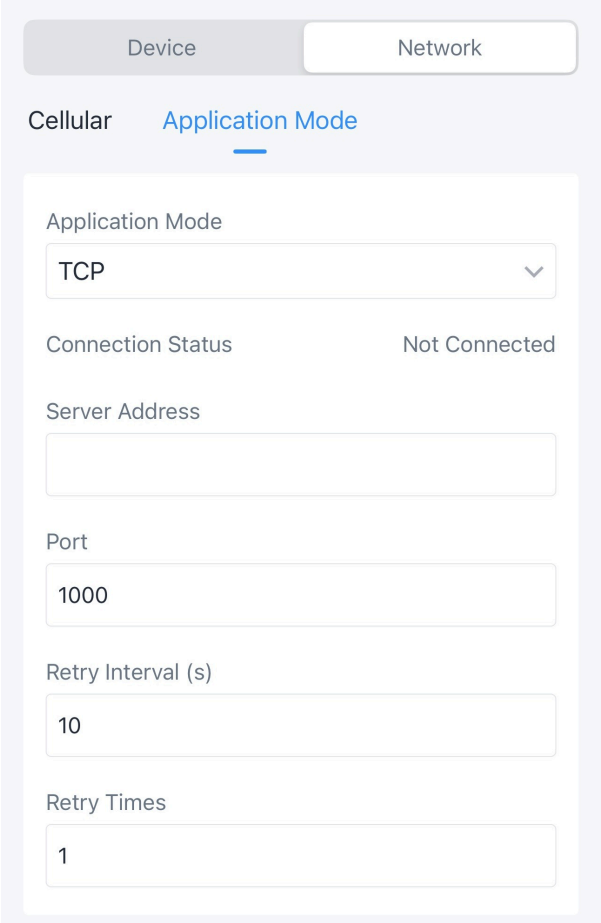
3. Configure related parameters as needed.
   - When **MQTT** is selected, the following configuration page is displayed:



Parameter	Description
Connection Status	Show the connection status of the group.
Broker Address	Fill in MQTT broker address to receive data.
Port	Fill in MQTT broker port to receive data

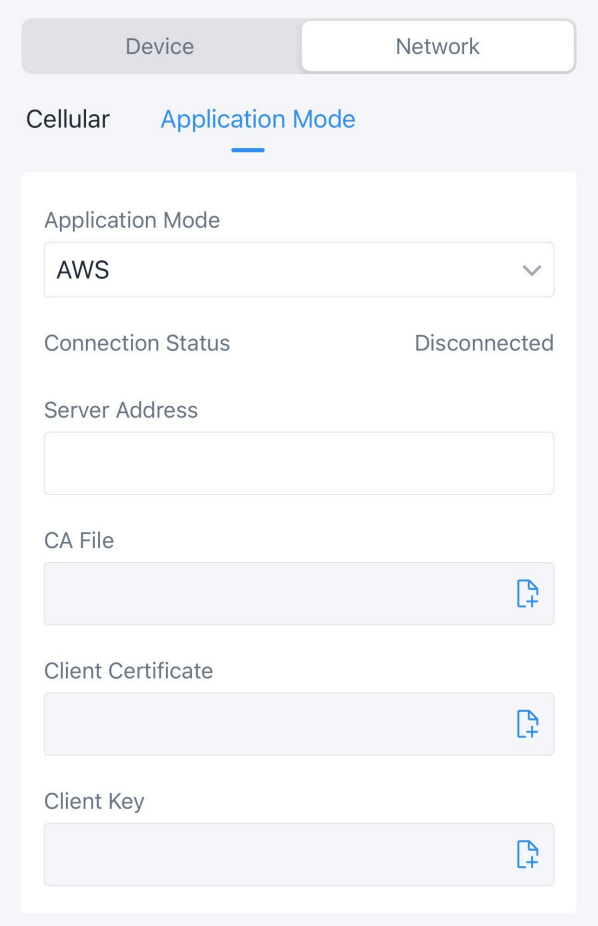
Parameter	Description
Client ID	Client ID is the unique identity of the client to the server, it must be uniquewhen all clients are connected to the same server.
User Credentials	
Enable	Enable user credentials.
Username	The username used for connecting to MQTT broker.
Password	The password used for connecting to MQTT broker.
TLS	
Enable	Enable the TLS encryption in MQTT communication.
Protocol	Fixed as TLS v1.2.
CA File	Import the CA.crt file.
Client Certificate	Import the client certificate.
Client Key	Import the client key.
MQTT Topic	
Uplink Topic	Receive periodic reports, threshold alarms, etc. Default: ts/[SN]/uplink
Downlink Topic	Send downlink commands. Default: ts/[SN]/downlink

◦ When **TCP** is selected, the following configuration page is displayed:



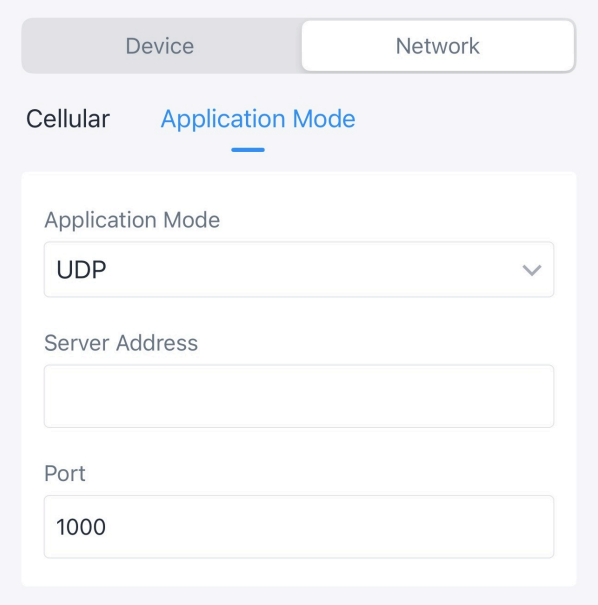
Parameter	Description
Connection Status	Show the connection status of the group.
Server Address	Fill in the TCP server address (IP/domain name).
Port	Fill in the TCP server port. Range: 1-65535.
Retry Interval (s)	Device waits before attempting to reconnect to the TCP server after a failed connection attempt.
Retry Times	The number of times that a device will attempt to reconnect to the TCP server after a failed connection attempt.

◦ When**AWS** is selected, the following configuration page is displayed:



Parameter	Description
Connection Status	Show the connection status of the group.
Server Address	Fill in the AWS server domain name which the data sends to.
CA File	Import the CA.crt file.
Client Certificate	Import the client certificate.
Client Key	Import the client key.

◦ When **UDP** is selected, the following configuration page is displayed:



Parameter	Description
Server Address	Fill in the UDP server address (IP/domain name).
Port	Fill in the UDP server port. Range: 1-65535.

- When **Milesight Development Platform** is selected, refer to Connect a Device for details.

4. Click **Write** in the lower right corner.
5. Put the NFC detection area of the phone close to the NFC antenna of device.
6. If the configuration succeeds, the following page is displayed.

Write successfully!

Configure Device Parameters

This section describes how to configure device parameters.

Change the Device Password

It is recommended to change the device password upon initial configuration for security purposes. This section describes how to change the password.

Steps:

1. On the homepage, click **Setting** to enter the **Setting** page.
2. In the **General** page, enable **Change Password**.
3. In the **New Password** text box, enter the new password as prompted.
4. In the **Confirm Password** text box, enter the password again.
5. Click **Write** in the lower right corner.
6. Put the NFC detection area of the phone close to the NFC antenna of device.
7. If the password was changed successfully, the following page is displayed.

Configure Basic Device Parameters

This section describes how to configure the basic parameters of the device, which includes:

- Reporting interval
- Cumulative Numbers
- Temperature Unit
- Data Storage
- RPS Pre-configured
- Button Lock
- Device Positioning
- Flight Mode
- Time Zone

- Daylight Saving Time
- Device password

Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. In the **General** page, configure the following device parameters as needed.

Parameter	Description
Reporting Interval	Periodic packet collection interval. Range: 10~1440min; Default: 30min.
Cumulative Numbers	Set cumulative count for cumulative periodic packet reporting. **Important:** Packet transmission interval = Reporting interval × Cumulative numbers. When the operating temperature≤0°C, the transmission interval must not be shorter than **30** minutes; when the temperature > 0°C, it must not be shorter than **15** minutes. For example, in an environment below 0°C, you can set the reporting interval to 10 minutes and the cumulative number to 3 or more.
Temperature Unit	Change the temperature unit displayed on the ToolBox and the OLED screen. **Note:** a. The temperature unit in the reporting package is fixed as Celsius(°C). b. Please modify the threshold settings if the unit is changed.
Data Storage	Disables or enables data storage. For details, refer to Configure the Data Storage&Retransmission.
Data Retransmission	Disables or enables data retransmission. For details, refer to Configure the Data Storage&Retransmission.

Parameter	Description
RPS Pre-configured	Enable or disable request a pre-configured profile from Milesight Development Platform or other RPS server after the devices powered on.
Button Lock	After it is enabled, the device cannot be **Turned Off** or **Collected and Reported**by pressing the external power button.
Device Positioning	Enable or disable the location feature. The location will be obtained only after the device is successfully connected to the network. **Note:** The device supports a maximum of 50 daily location reports. If you require reports with high-frequency location data, please contact your sales representative.
Flight Mode	Once enabled,the device won't report within the set timing period. **Note:** Please sync the time first and enable the **data storage** function to prevent collected data from being lost during this period.
Time Zone	Select the UTC time zone. When you click **Sync** button of ToolBox App to sync time, the device will also sync the time zone from smart phone automatically.
Daylight Saving Time	Enable or disable Daylight Saving Time (DST). **Start Time:** the start time of DST time range. **End Time:** the end time of DST time range. **DST Bias:** the DST time will be faster according to this bias.
Device password	Change the password for ToolBox App to write this device.

3. Click **Write** in the lower right corner.

4. Put the NFC detection area of the phone close to the NFC antenna of device. If the configuration succeeds, the following page is displayed.

Configure the Data Storage & Retransmission

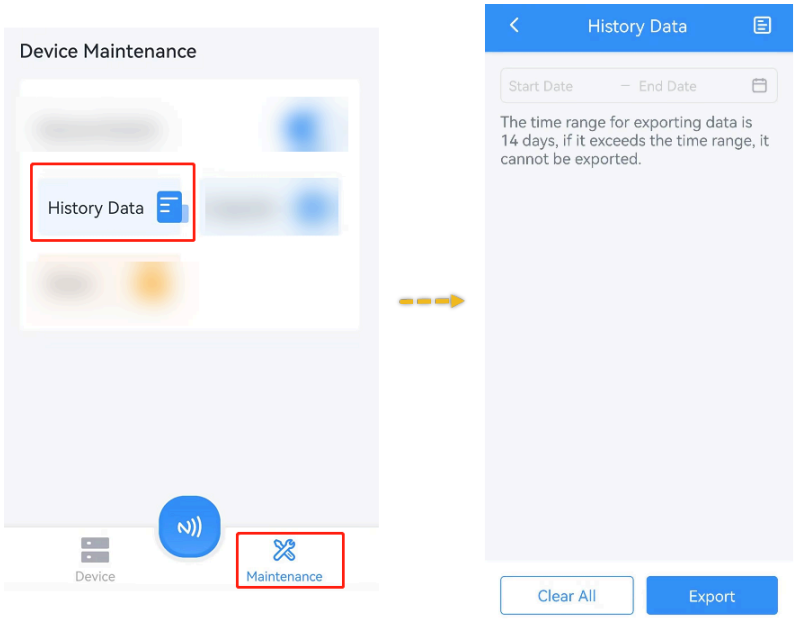
The device supports data storage and data retransmission to ensure data integrity. This section describes how to configure data storage and retransmission.

Export the Local Data

The device supports storing historical data for up to five periods of upload failure. Data will continue to be saved even when the network is de-activated. Since the ToolBox data export time range is limited to 14 days, you can export the complete data in segments if the time range exceeds this limit.

Steps:

1. Sync the time to ensure the data is stored in correct time.
2. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
3. Enable **Data Storage**.
4. Return to the homepage and click **Maintenance** in the lower right corner.
5. Click **Export**, select the data time range and click **Save** to export data.



Enable Data Retransmission

Data retransmission allows the network server receives all data, even after temporary network outages. The reported format of retransmission data will include timestamps and is different from periodic report data.

Prerequisites: This feature is unavailable in **UDP** mode.

Steps:

1. On the homepage, click **Setting** to enter the **Setting** page.
2. Enable **Data Storage** and **Data Retransmission**.
3. Click **Write** in the lower right corner.
4. Put the NFC detection area of the phone close to the NFC antenna of device.
5. If the configuration succeeds, the following page is displayed.

Write successfully!

Note:

1. Data retransmission increases the uplink traffic and shortens the battery life.
2. If the device reboots or loses power during data retransmission, it restarts and resends the entire retransmission dataset after reconnecting to the network.
3. If a new network disconnection occurs during an ongoing retransmission, only the data logged during this latest outage will be sent upon reconnection.
4. The default report data retransmission interval is 600s, this can be changed via downlink command.

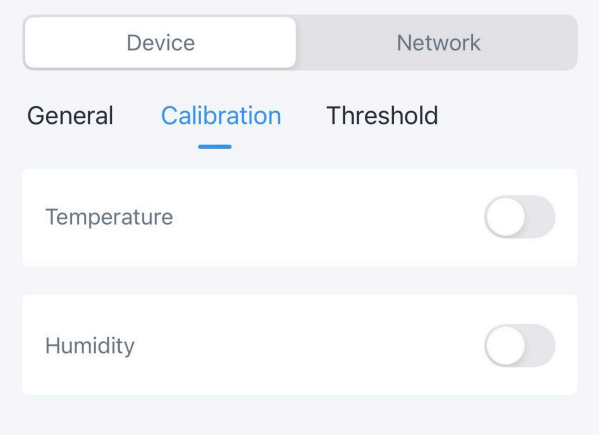
Configure Calibration Parameters

This section describes how to configure calibration. Set the calibration value, the device will add calibration value to the current temperature value, then display and report the final value.

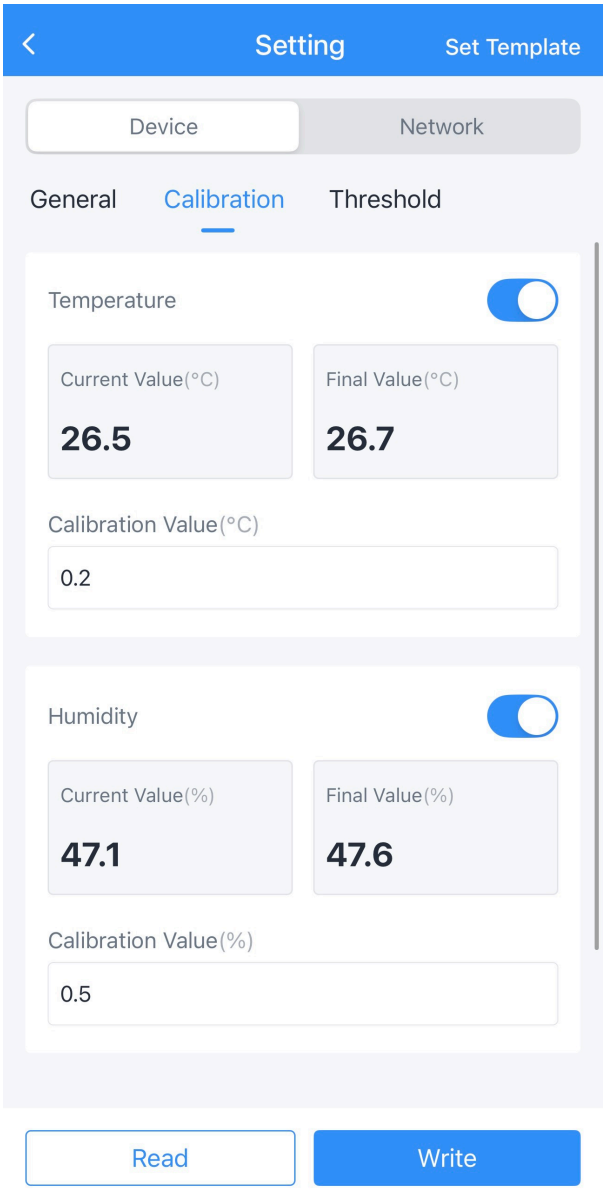
This configuration page is not displayed when the TS602 is powered off or the probe is not connected.

Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. Click **Calibration**. The following page is displayed.



3. Enable **Temperature** or **Humidity** . Enter a value in the **Calibration Value** text box. The following page is displayed.



4. Click **Write** in the lower right corner.

5. Put the NFC detection area of the phone close to the NFC antenna of the device. If the configuration succeeds, the following page is displayed.

Configure the Threshold Parameters

The device supports threshold alarms, shift threshold (change) alarms, light alarm, tilt alarm and drop alarm. This section describes how to configure this threshold parameters.

This configuration page is not displayed when the TS602 is powered off or the probe is not connected.

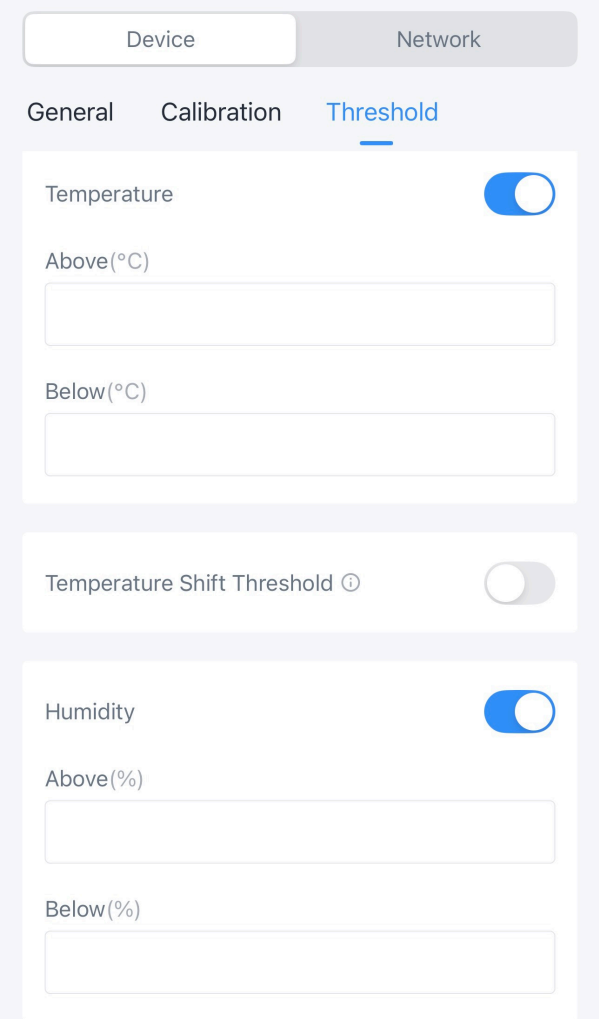
Note:
when you change the temperature unit, please re-configure the threshold.

Threshold Alarm

The device supports to collect temperature and humidity values at a configured interval. If the values reaches the configured threshold, the device immediately uploads the current data. Only after the previous alarm is cleared and the threshold is re-triggered, the device sends a new alarm.

Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. Click **Threshold** and enable **Temperature** or **Humidity**.



3. Configure the following threshold parameters.

Parameters	Description
Above/Below	Temperature or humidity threshold.
Collecting Interval	The interval to detect temperature or humidity value, this should be smaller than or equal to the reporting interval. Default: 15mins.
Alarm Reporting Times	Alarm packet report times after threshold alarm triggers. Default is 1.
Alarm Dismiss Report	When enabled, the device reports the current value to signal that the alarm has cleared once the reading returns to within the threshold range.

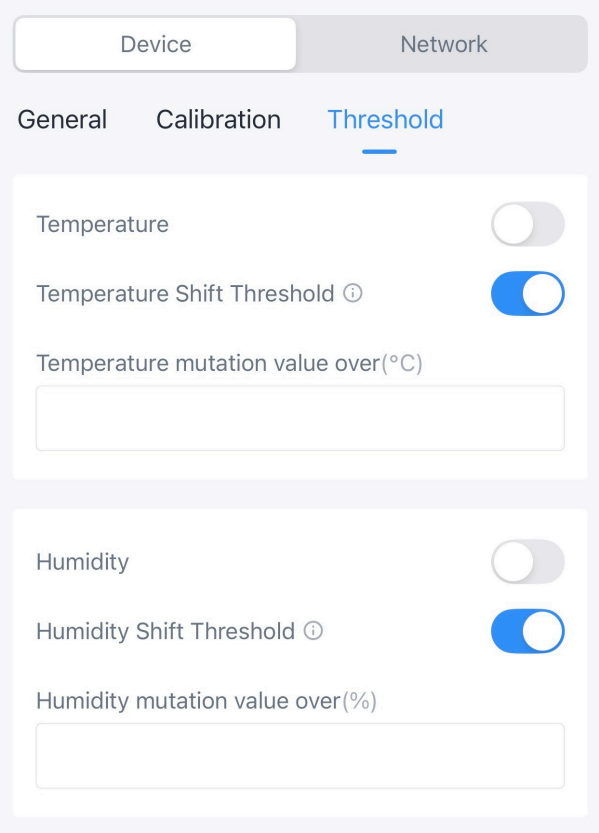
4. Click **Write** in the lower right corner.
5. Put the NFC detection area of the phone close to the NFC antenna of the device. If the configuration succeeds, the following page is displayed.

Shift Threshold Alarm

The device supports to report an alarm packet when the absolute value of the difference between the current value and the last collected value exceeds the threshold value.

Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. Click **Threshold** and enable **Temperature Shift Threshold** or **Humidity Shift Threshold**.



3. Configure the following threshold parameters.

Parameters	Description
Temperature/Humidity mutation value over	When enabled, the device triggers an alarm if the absolute change in value exceeds the set threshold.
Collecting Interval	The interval to detect temperature or humidity value, this should be smaller than or equal to the reporting interval. Default: 15mins.

4. Click **Write** in the lower right corner.

5. Put the NFC detection area of the phone close to the NFC antenna of the device. If the configuration succeeds, the following page is displayed.

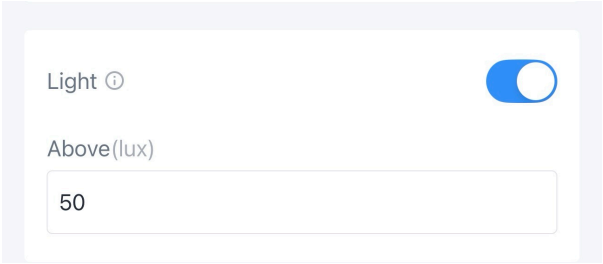
Light Alarm

The device supports to report an alarm packet when the collected light value exceeds the set threshold.

> **Note:**
> This feature is enabled by default with a default threshold of 50.

Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. Click **Threshold** and enable **Light**.



3. Configure the following threshold parameters.

Parameters	Description
Above	Light level threshold.

4. Click **Write** in the lower right corner.

5. Put the NFC detection area of the phone close to the NFC antenna of the device. If the configuration succeeds, the following page is displayed.

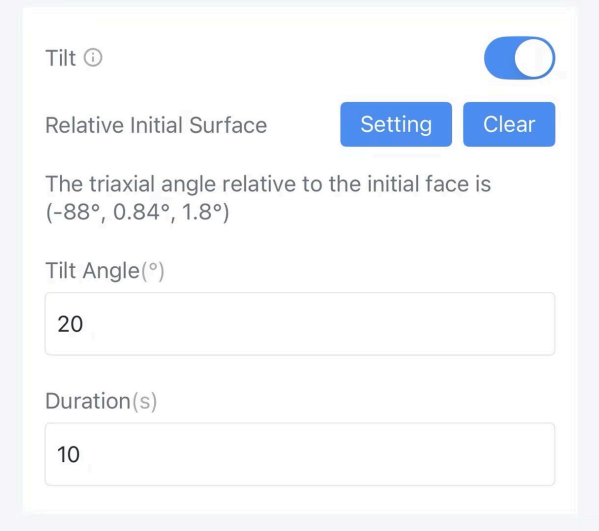
Tilt Alarm

The device supports to report an alarm packet when detecting the tilt angle exceeds the threshold.

Note:
If the road gradient exceeds the tilt alarm threshold angle, driving uphill may trigger a threshold alarm. Please set this value carefully and distinguish between actual tilt events and normal road conditions.

Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. Click **Threshold** and enable **Tilt**.



3. Place the device at the installation location and ensure the mounting surface is smooth and level.
4. Click **Setting** to set current position of device as initial position to measure the deflection angle. To reset the initial position to (0.00°, 0.00°, -90.00°), click **Clear**.

> **Note:**
> after writing **Setting** or **Clear** configuration, click **Read** to read the device to check if the initial position changes successfully.

5. Configure the following threshold parameters.

Parameters	Description
Tilt Angle	Tilt angle threshold.
Duration	Tilt duration threshold.

6. Click **Write** in the lower right corner.

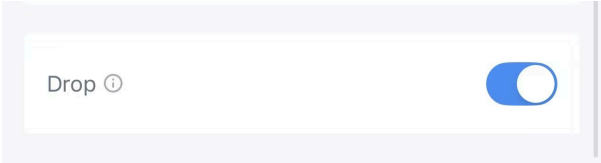
7. Put the NFC detection area of the phone close to the NFC antenna of the device. If the configuration succeeds, the following page is displayed.

Drop Alarm

The device supports to report an alarm packet when the device status is detected as falling.

Steps:

1. On the homepage of ToolBox, click **Setting** to enter the **Setting** page.
2. Click **Threshold** and enable **Drop**.



3. Click **Write** in the lower right corner.
4. Put the NFC detection area of the phone close to the NFC antenna of the device. If the configuration succeeds, the following page is displayed.

Maintain the Device

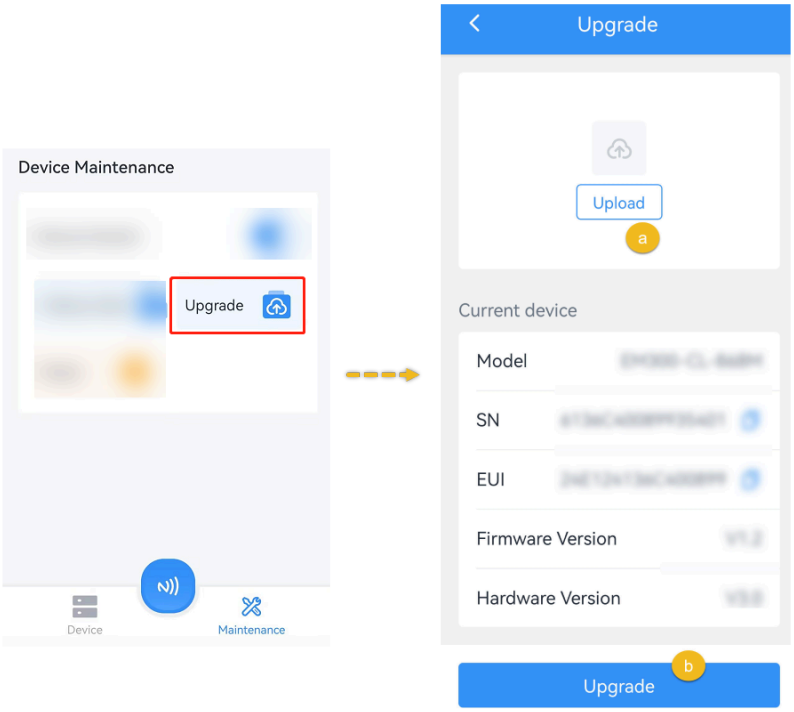
This section describes how to maintain the device.

Upgrade

This chapter describes how to upgrade the device. Any operation on ToolBox is not allowed during upgrading, otherwise the upgrading will be interrupted, or even the device will break down.

Steps:

1. Download firmware from Milesight official website and save it to the smart phone.
2. Launch ToolBox and click **Maintenance** in the lower right corner of the homepage.
3. Click **Upgrade** to import firmware and upgrade the device.
4. Click **Upgrade** to upgrade the device.



Configure a Template for Configuration Backup

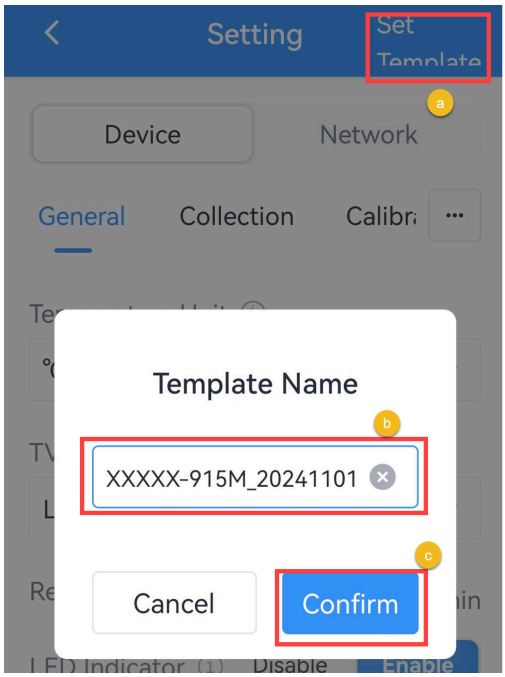
This device supports configuration backup, which enables quick and easy batch configuration. This function only applies for devices of the same model.

Steps:

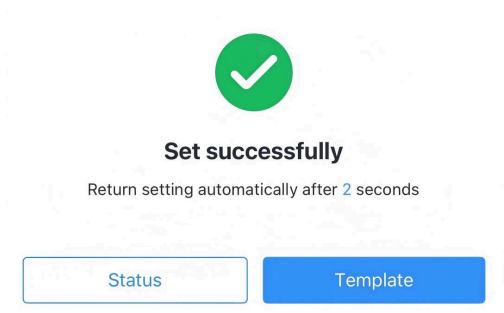
Set a Template

Steps:

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. Click **Confirm** to save the current configuration as a template.



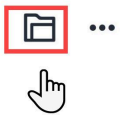
4. If the save is successfully, the following page is displayed.



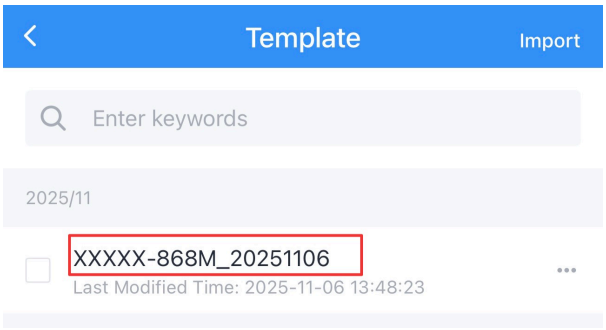
Write the template configuration to the target device

Steps:

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



2. Click the saved template. Do not select the template.



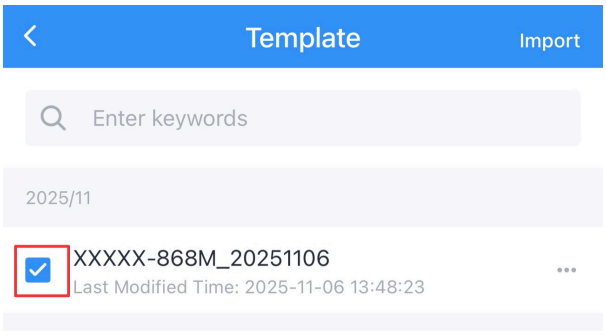
3. In the displayed page, click **Write** in the bottom and put the NFC detection area of the phone close to the NFC antenna of the target device. If the configuration is written to the target device, the following page is displayed.

Write successfully!

Note:
If you need to modify the encryption certificates, please import and write the new CA file, client certificate, and client key in the **Network** settings,

Export and Delete a Template

1. Select the checkbox of the target template as shown in the following figure.



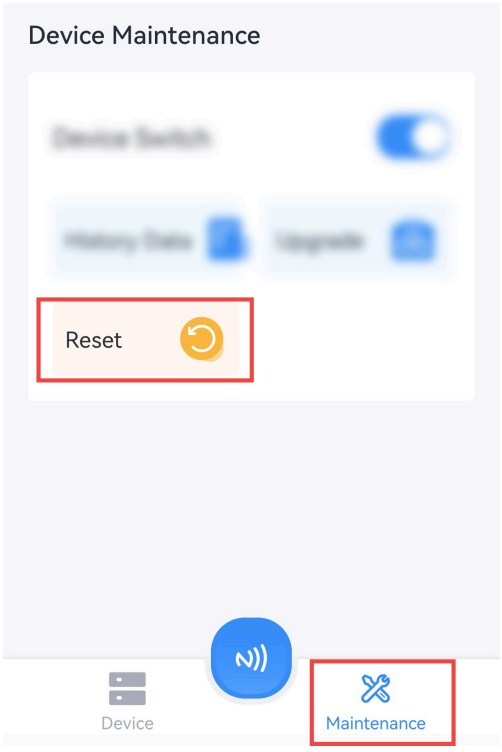
2. Click **Export** to export this template as a JSON format file and save it to the smart phone.
3. Click **Delete** and Confirm to delete this template from ToolBox.

Reset the Device

This section describes how to reset the device in ToolBox. Additionally, the device supports hardware reset. See Button Description for details.

Steps:

1. On the homepage of ToolBox, click **Maintenance** in the lower right corner. The **Maintenance** page is displayed, see the following figure.



2. Click **Reset**.
3. In the displayed dialog box, click **Confirm**.
4. Put the NFC detection area of the phone close to the NFC antenna of the device. If the device is successfully reset, the following page is displayed.

Write successfully!

Chapter 5. Uplink Packets and Downlink Commands

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

Command ID	Parameter/Data	...
N Bytes	0-N Byte	...

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

AWS/MQTT Topics

When the device is connected to AWS/MQTT server, the bi-directional communication uses different topics. MQTT topics support to be changed as required

Topic	Content
ts/[SN]/uplink	Receive periodic reports, threshold alarms, etc.
ts/[SN]/downlink	Send downlink commands.

Uplink Packets

This section describes the uplink packets reported by the device. They can be checked on the servers.

IMEI	IMSI	ICCID	Signal	Data1	...
15 Bytes	15 Bytes	20 Bytes	2 Byte	N Bytes	...

Example:

be02383634383034303733313930333733 be033436303234303431343937323637 39 be043839383630383431 31393234443333323236373 9 be05a4ff df0100		
Type	**Command**	**Content**
IMEI	be02	383634383034303733313930333733
IMSI	be03	343630323430343134393732363739
ICCID	be04	3839383630383431 31393234443333323236373 9
Network Signal	be05	a4ff =>ff a4 = -92dB

be02383634383034303733313930333733 be03343630323430343134393732363739 be043839383630383431 313932344433333232363739 be05a4ff df0100		
Type	**Command**	**Content**
Data	See details in below section	

Basic Information Packet

When the device is powered on or reboot, the device reports a packet containing the basic device information.

Packet description:

Item	Command	Byte	Description
Device Status	c8	1	Device Status
OEM ID	d9	2	4 digits
TSL Version	df	2	Example: 01 02 = V1.2
Serial Number	db	8	16 digits
Device Version	da	8	Hardware version (2B) + Software version (2B) + 00000000

Example:

df0100 db 6448f31325940008 da0102010100000000 d90000 c801	
Command	**Value**
df	TSL Version: 0100=>V1.0
db	SN: 6448f31325940008da
da	Hardware version: 0102=V1.2 Software version: 0101=V1.1
d9	OEM ID: 0000
c8	01: Device is On

Probe ID Report (TS602 Only)

When the device detects a probe replacement, it reports a Probe ID data packet. If the Probe ID Retransmission Count is set, subsequent data packets will also include a Probe ID packet.

Packet description:

Item	Channel	Byte	Description
Probe ID	03	9	**Byte 1:** • 00: No probe • 01: PT100 Sensor • 02: TH Sensor • 03: DS18B02 Sensor **Byte 2-9:** • PT100 Sensor: FFFFFFFFFFFFFFFF • TH Sensor: Probe ID+00000000 • DS18B02 Sensor: 03 + Probe ID **Note:** When probe ID is reported as all “F”, it means acquisition failure.

Example:

0302f1f6381400000000	
Command	**Value**
03	Probe version:02 =TH Sensor , ID: f1 f6 38 14

Periodically Reported Data Packet

The device reports a sensor data packet at a configured interval.

Packet description:

Item	Channel	Byte	Description
Battery level	01	1	UINT8, unit: %
Temperature	04	4	INT32/100, Unit: °C
Humidity	05	2	UINT16/10, Unit: %RH
Location	06	8	**Byte 1-4:** latitude/1000000 **Byte 5-8:** longitude/1000000
Flight Mode	07	1	00: Exit flight mode, 01: Enter flight mode
Probe Connected Status (TS602 Only)	0c	1	00: No probe, 01: Probe connected
Report Type	0e	1	00: Normal report, 01: Button report
Time	ed	5	**Byte 1:** • 00: Periodic reporting • 01: Data retransmission reporting **Byte 2-5:** Data time stamp, UINT32, Unit: s

Example:

ed0043e53b69 0e00 04d4090000 050402 0670c1770148fc0807 0164	
Command	**Value**
ed	Periodic reporting: 43e5 3b69 => Dec. 12 2025 09:49:55
0e	00: Normal report
04	Temperature: d4 09 00 00 =>09 d4=2516/100=25.16 °C
05	Humidity: 0402 => 0204=516/10=51.6 %RH
06	Latitude: 70c17701=>0177 c170=24625520/1000000=24.625520°, Longitude: 48fc0807=>0708 fc48=118029384/10000000=118.029384°
01	Battery: 64=>100%

Alarm Report

The device reports the following types of alarm packets.

Packet description:

Item	Command	Byte	Description
Temperature Overrage Alarm	08	1	• 00=Collection error • 01=Under-range • 02=Over-range • 03=No data
Tempera-ture Alarm	08	5	**Byte 1:** • 10=Below dismiss • 11=Below (min. threshold) alarm • 12=Above dismiss • 13=Above (max. threshold) alarm • 14=Within dismiss • 15=Within alarm • 16=Beyond dismiss • 17=Beyond alarm • 30= Shift threshold alarm **Bit 2-5:** Temperature, INT32/100, Unit: °C
Temperature Shift Alarm	08	9	**Byte 1:** 20 **Bit 2-5:** Temperature, INT32/100, Unit: °C **Bit 6-9:** Shift temperature, INT32/100, Unit: °C
Humidity Over-rage Alarm	09	1	• 00=Collection error • 01=Under-range • 02=Over-range • 03=No data
Humidity Alarm	09	3	**Byte 1:**

Item	Command	Byte	Description
			• 10=Below dismiss • 11=Below (min. threshold) alarm • 12=Above dismiss • 13=Above (max. threshold) alarm • 14=Within dismiss • 15=Within alarm • 16=Beyond dismiss • 17=Beyond alarm • 30= Shift threshold alarm **Bit 2-5:**Humidity, INT16/100, Unit: %RH
Humidity Shift Alarm	09	5	**Byte 1:** 20 **Bit 2-5:** Humidity, UINT16/10, Unit: %RH **Bit 6-9:** Shift humidity, UINT16/10, Unit: %RH
Device Position	0a	1	• 00: Abnormal collection report • 01: Positive overrange report • 02: Negative overrange report • 03: No data • 10: Tilt alarm release • 11: Tilt alarm report • 21: Drop alarm report
Light Alarm	0b	1	• 00: Abnormal collection report • 01: Positive overrange report • 02: Negative overrange report • 03: No data • 10: From bright to dark • 11: From dark to bright
Angles Report	0d	6	**Byte 1-2:** Angle_x, INT16/100, Unit:°

Item	Command	Byte	Description
			Byte 3-4: Angle_y, INT16/100, Unit:° **Byte 5-6:** Angle_z, INT16/100, Unit:° **Note:** the angles are based on relative initial surface.
Low Battery Alarm	11	2	**Byte 1:** 00 **Byte 2:** Battery level, UINT8

Example 1:

The device reports an alarm packet when the temperature below the threshold.

0813 c909 0000	
Command	**Value**
08	13: Above (max. threshold) alarm c909 0000=>0000 09c9= 2505/100=25.05°C

Example 2:

The device reports an alarm packet when the humidity shift alarm is trigger.

09202b038e00	
Command	**Value**
09	20: Humidity Shift Alarm Trigger Humidity: 2b03=>032b=811/10=81.1%RH Shift Threshold:8e00=>008e=142/10=14.2%RH

Example 3:

The device reports an alarm packet indicating the battery level has dropped to 10% when detecting the low voltage.

11000a	
Command	**Value**
11	Battery level: 0a=> 10%

Downlink Commands

The device supports remote configuration and management using downlink commands from the services. This section describes the downlink commands supported by the device.

Note:
The device can only receive downlink commands within the 10s after sending uplink packets.

Commands for General Setting

The device supports multiple commands for general setting.

Command description:

Item	Byte	Command	Parameter
Probe ID Report	1	53	-
Probe ID Retrans-mission Count	1	82	UNIT8, range: 1-10, Default: 1
Reporting Interval	1+3	60	**Byte 1**: 01 **Byte 2-3**: Interval time, Unit: min, range: 10-1440 , Default: 30mins
Cumulative Numbers	1+1	61	UINT8, Range: 1-20, Default: 8
Collecting Interval	1+3	62	**Byte 1**: 01 **Byte 2-3**: Interval time, Unit: min, range: 1-1440, Default: 15
Temperature Unit	1+1	65	00 = °C, 01= °F
Device Positioning	1+1	71	00 = Disable, 01= Enable
Button Lock	1+2	76	**Byte 1**: 00=Disable, 01=Enable

Item	Byte	Command	Parameter
			Byte 2: • 01: Lock power off • 02: Lock collection and report • 03: Lock powered off, collection and report
Enquiry Periodic Report	1	b9	-
Clear History Data	1	bd	-
Reboot	1	be	-
Reset	1	bf	-
RPS Pre-configured	1+1	c4	00 = Disable, 01= Enable
Probe ID Retransmission	1+1	82	UINT8, Range: 1-10, Default: 1
Data Storage	2	c500	00 = Disable, 01= Enable
Data Retransmission	2	c501	00 = Disable, 01= Enable
Data Retransmission Interval	2	c502	UINT16, Unit: s, Range: 30~1200, Default: 600

Example 1:

Set the reporting interval as 1440 minutes and the collecting interval as 725 minsutes.

6001a005 6201d502	
Command	**Parameters**
60	01 = Min, a0 05=>05 a0 =1440
62	01 = Min, d5 02=>02 d5 = 725

Example 2:

Reboot the device.

be

Example 3:

Enable the button lock, the device cannot be powered off, collected and reported by power button.

760103	
Command	**Parameter**
76	01= Enable 03 = Lock powered off, collection and report

Example 4:

Set the probe ID retransmission count to 5.

8205	
Command	**Parameter**
82	Count: 05

Commands for Time Settings

The device supports multiple commands for time setting.

Command description:

Item	Byte	Command	Parameter
UTC Time Zone	2	c7	INT16/60
Daylight Saving Time	1+10	c6	**Byte 1:** 00=Disable, 01=Enable **Byte 2:** DST bias, unit: min, range: 1-120 **Byte 3-6:** Start time, Month (1B)+Week&Day (1B) + Minute Time (2B) **Byte 7-10:** End time Week&Day:

Item	Byte	Command	Parameter	
			Bit7-4	Bit3-0
			Week number, range: 1-5	Weekday, range: 1-7
Sync Time	1	b8	-	
Set Time	1+4	b7	Time stamp, UINT32, Unit: s	

Example 1:

Set the time zone as UTC-4.

c710ff	
Command	**Parameter**
c7	10 ff => ff 10 = -240/60=-4

Example 2:

Set DST time: start time is last Sunday 1:00 of March, end time is last Sunday 1:00 of October, and bias is 1h (60 minutes).

c6013c03573c000a573c00	
Command	**Parameter**
c6	01=Enable DST bias: 3c=>60 mins Start time: 03=>March, 57=>last (5) Sunday(7), 3c 00 =>00 3c=60 minutes =1:00 End time: 0a=>10=October, 57=>last (5) Sunday(7), 3c 00 =>00 3c=60 minutes =1:00

Commands for Flight Mode Settings

The device supports multiple commands for flight mode settings.

Note:
Before enabling flight mode, please configure the time zone, sync the time, and ensure that data storage feature is enabled.

Command description:

Item	Byte	Command	Parameter
Flight Mode	1+1	70	00 = Disable, 01= Enable
Flight Mode Start Time	2+6	7300	**Byte 1**: Year **Byte 2**: Month, range: 1-12 **Byte 3**: Day, range: 1-31 **Byte 4**: Hour, range: 0-23 **Byte 5**: Minute, range: 0-59 **Byte 6**: Second, range: 0-59
Flight Mode End Time	2+6	7301	**Byte 1**: Year **Byte 2**: Month, range: 1-12 **Byte 3**: Day, range: 1-31 **Byte 4**: Hour, range: 0-23 **Byte 5**: Minute, range: 0-59 **Byte 6**: Second, range: 0-59

Example:

Set the start and end time of flight mode.

730037090d0b0c0073013709130b0c00	
Command	**Parameters**
7300	Start time: 37090d0b0c00

730037090d0b0c0073013709130b0c00	
Command	**Parameters**
7301	End time: 3709130b0c00

Commands for Screen Settings (TS602 Only)

The device supports multiple commands for screen setting.

Command description:

Item	Byte	Command	Parameter
Screen Display	1+1	74	00 = Temperature (default), 01= Humidity
Clear Alarm Icon	1	50	-

Example 1:

Switch the screen display to temperature.

7400	
Command	**Parameter**
74	01 = Humidity

Example 2:

Clear the shift alarm icon from the screen.

50

Commands for Calibration Settings

The device supports multiple commands for calibration setting.

Command description:

Item	Byte	Command	Parameter
Temperature Calibration	1+5	7b	**Byte 1:** 00=Disable, 01=Enable

Item	Byte	Command	Parameter
			Byte 2-5: Calibration value, INT32/100, Unit: °C, Range: -1000-1000
Humidity Calibration	1+3	7c	**Byte 1:** 00=Disable, 01=Enable **Byte 2-3:** Calibration value, UINT16/10, Unit: %RH, Range: -100 ~ 100
Initial Reference Surface Calibration	1+1	52	00=Set the initial position to (0.00°, 0.00°, -90.00°), 01=Set current position as initial position

Example 1:

Enable temperature calibration and set calibration value as 1°C.

7b01a0860100	
Command	**Parameter**
7b	01=Enable, 64 00 00 00=>00 00 00 64=100/100=1 °C

Example 2:

Set the current position as initial position.

5201	
Command	**Parameter**
52	01= Set current position as initial position

Commands for Threshold Settings

Item	Byte	Command	Parameter
Alarm Reporting Times	1+2	63	UINT16, Range: 1-1000, Default: 1
Light Collecting Interval	1+3	64	**Byte 1**: 01 **Byte 2-3**: Interval time, Unit: min, range: 1-1440, Default: 60

Item	Byte	Command	Parameter
Alarm Dismiss Report	1+1	75	00 = Disable, 01= Enable
Temperature Threshold	1+10	77	**Byte 1**: 00=Disable, 01=Enable **Byte 2**: 00=Disable, 01=Below, 02=Above, 03=Within, 04=Beyond **Byte 3-6**: Min. Threshold, INT32/100, Unit: °C, Range: -35-70 (TS601), -200-800 (TS602) **Byte 7-10**: Max. Threshold, INT32/100, Unit: °C, Range: -35-70 (TS601), -200-800 (TS602)
Temperature Shift Threshold	1+5	78	**Byte 1**: 00=Disable, 01=Enable **Byte 2-5**: Temperature shift threshold , INT32/100, Unit: °C, Range: 0.1-60
Humidity Threshold	1+6	79	**Byte 1**: 00=Disable, 01=Enable **Byte 2**: 00=Disable, 01=Below, 02=Above, 03=Within, 04=Beyond **Byte 3-4**: Min. Threshold, UINT16/10, Unit: %RH, Range:0-100 **Byte 5-6**: Max. Threshold, UINT16/10, Unit: %RH, Range: 0-100
Humidity Shift Threshold	1+3	7a	**Byte 1**: 00=Disable, 01=Enable **Byte 2-5**: Humidity shift threshold , INT16/10, Unit: %RH, Range: 0.1-100
Light Threshold	1+4	7d	**Byte 1**: 00=Disable, 01=Enable **Byte 2**: 00=Disable, 02=Above **Byte 3-4**: Threshold value, INT16, Range:0-600, Default: 50

Item	Byte	Command	Parameter
Tilt Threshold	1+4	7f	**Byte 1**: 00=Disable, 01=Enable **Byte 2**: 02=Above **Byte 3**: Threshold value, UINT8, Unit: °, Range: 1-90, Default: 20 **Byte 4**: Continue time, UINT8, Unit: s, Range: 1-60, Default: 10
Drop Threshold	1+1	80	00 = Disable, 01= Enable

Example 1:

Enable temperature threshold alarm and set the below threshold value as 70°C.

770101581b000000000000	
Command	**Parameter**
77	01=Enable, 01=Below Min. Threshold: 58 1b=>1b 58=7000/100=70°C

Example 2:

Enable the tilt threshold alarm, and set the threshold value to 10° with a duration of 60 seconds.

7f01020a3c	
Command	**Parameter**
7f	01=Enable, 02=Above Threshold value: 0a=>10°, Continue time: 3c = 60s

Chapter 6. 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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