Smart Thermostat

Featuring LoRaWAN®

WT201

User Guide

Safety Precautions

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

- The device must not be disassembled or remodeled in any way.
- 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.
- Do not place the device where the temperature is below/above the operating range.
- Do not place the device close to objects with naked flames, heat source (such as oven), or exposure to sunlight, cold source, liquid, and extreme temperature changes.
- The device must never be subjected to shocks or impacts.
- Do not clean the device with detergents or solvents such as benzene or alcohol. To clean the device, wipe with a soft moistened cloth. Use another soft, dry cloth to wipe dry.

Declaration of Conformity

WT201 is in conformity with the essential requirements and other relevant provisions of the FCC and RoHS.

For assistance, please contact

Milesight technical support:

Email: iot.support@milesight.com

Support Portal: support.milesight-iot.com

Tel: 86-592-5085280

Fax: 86-592-5023065

Address: Building C09, Software Park Phase III, Xiamen 361024, China

Revision History

Date	Doc Version	Description
Oct. 30, 2023	V 1.0	Initial version
May 14, 2024	V 1.1	1. Support to select control permission; 2. Support humidity collection, calibration and control features; 3. Add BACnet control point list.

Contents

1. Product Introduction

1.1 Overview

WT201 is a LoRaWAN® thermostat used as a HVAC controller supporting a wide range of different heating and cooling systems, including heat pumps, AC, boilers, furnaces, AHU, and PTAC devices. WT201 smart thermostat provides multiple modes including heat/cool, emergent heat, auto, and fan mode, enabling precise temperature adjustments in buildings. It allows for automatic control through scheduled programming and remote management via cloud system. Real-time monitoring ensures timely alerts for sudden temperature changes, prioritizing people's safety and protecting assets. Additionally, it has the capability to store up to 1000 pieces of data, providing ample data security.

With a 4.2" LCD screen and embedded temperature and humidity sensor, the WT201 continuously displays the room status while monitoring the ambient temperature. It also accommodates to different time zones and summer/winter time, catering to users in various regions. Moreover, the thermostat seamlessly integrates with hotel room card systems, allowing for convenient remote management. Compliant with Milesight LoRaWAN® gateway and Milesight IoT Cloud solution, users can control the room temperature as well as trigger other sensors or appliances easily via a webpage or mobile App remotely and D2D protocol.

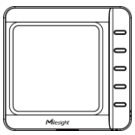
1.2 Key Features

- Support most 24VAC HVAC system, including furnaces and air conditioners (2H/2C), heat pumps (4H/2C + 1 stage AUX heat), boilers, and PTAC
- Support intuitive 4.2-inch display, allowing for showing temperature, humidity and status of the room clearly
- Support the child lock function and anti-theft installation for safety reasons
- Support 4 temperature control modes and 3 fan modes for flexible temperature control
- Adjust the room temperature manually or automatically with 4 kinds of schedule plans and allow up to 16 schedules for each plan
- Enabling real-time monitoring ensures timely alerts for sudden temperature changes
- Built-in temperature and humidity sensor, enabling environmental detection and accurate control
- Store 1000 local historical records and support retransmission to prevent data loss
- Support flexible adjustments based on time zones and summer/winter time catering to region differences

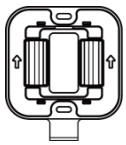
- Compatible with hotel room card systems for convenient remote management
- Equipped with NFC for one-touch configuration
- Function well with standard LoRaWAN® gateways and network servers
- Supports Milesight D2D protocol to enable ultra-low latency control without gateway
- Supports multicast for control in bulk

2. Hardware Introduction

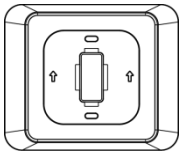
2.1 Packing List



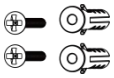
1 × WT201 Device



1 × Wiring Backplate

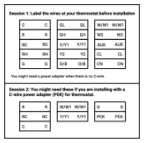


1 × Decorative Cover Plate



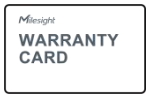
2 × Wall Mounting Kits

1 × Fixing Screw



1 × Thermostat Wire Label Sticker

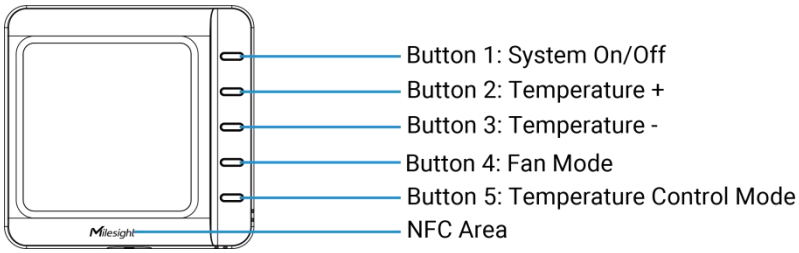
1 × Quick Start Guide

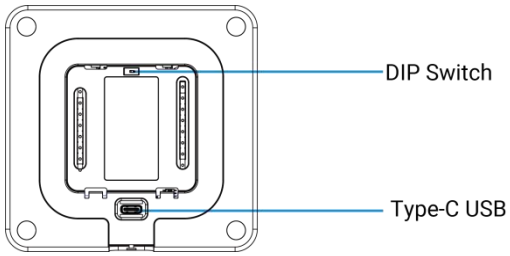


1 × Warranty Card

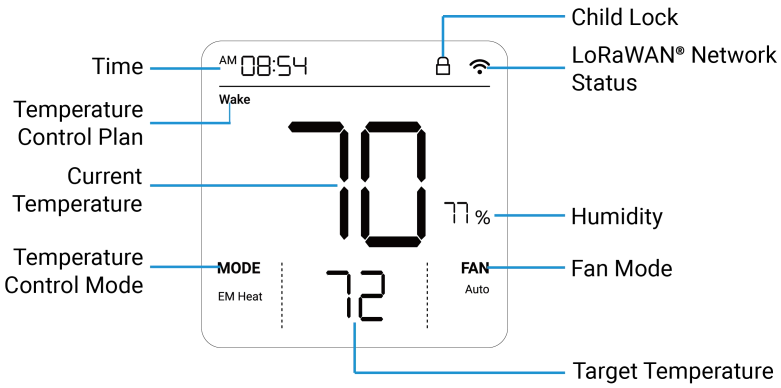
If any of the above items are missing or damaged, please contact your sales representative.

2.2 Hardware Overview





Note: the buttons only take effect when control permission is Thermostat.



Note:

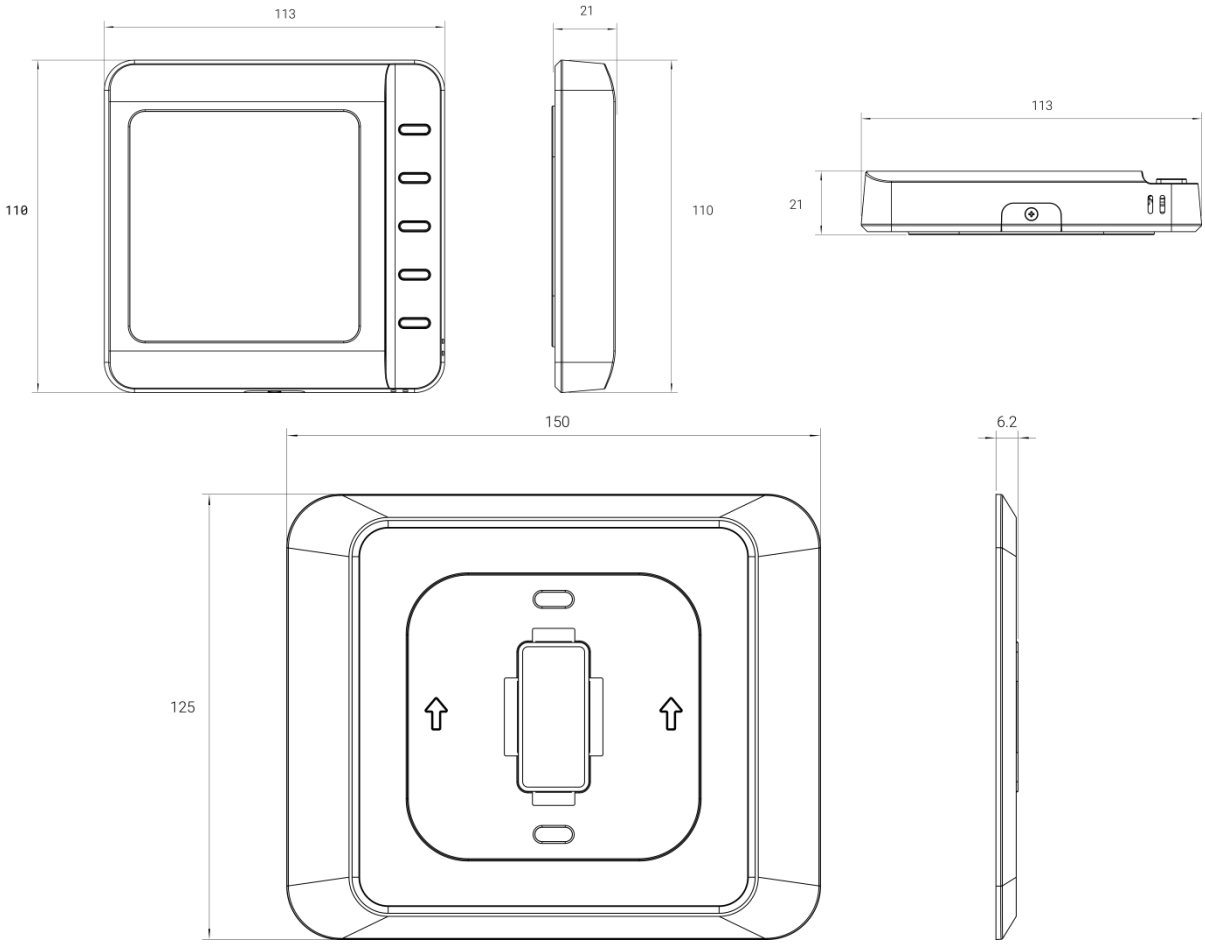
1) When system status is off, the screen will only show temperature and humidity.

2) When system status is on and control permission is Remote Control, the screen will only show temperature, humidity, time, child lock and network status.

Screen Descriptions:

Icon	Description
Child Lock	Display only when all buttons are locked or any locked button is pressed
LoRaWAN® Network Status	Blinks: the network is de-activated
	Static On: the network is activated
	Blinks twice: send LoRaWAN® uplink packet
Temperature	WT201 will display the value of internal temperature sensor by default. If the external temperature value is required to display, please enable this feature via downlink commands in ***WT201 Communication Protocol***.

2.4 Dimensions (mm)



3. Wiring Diagrams

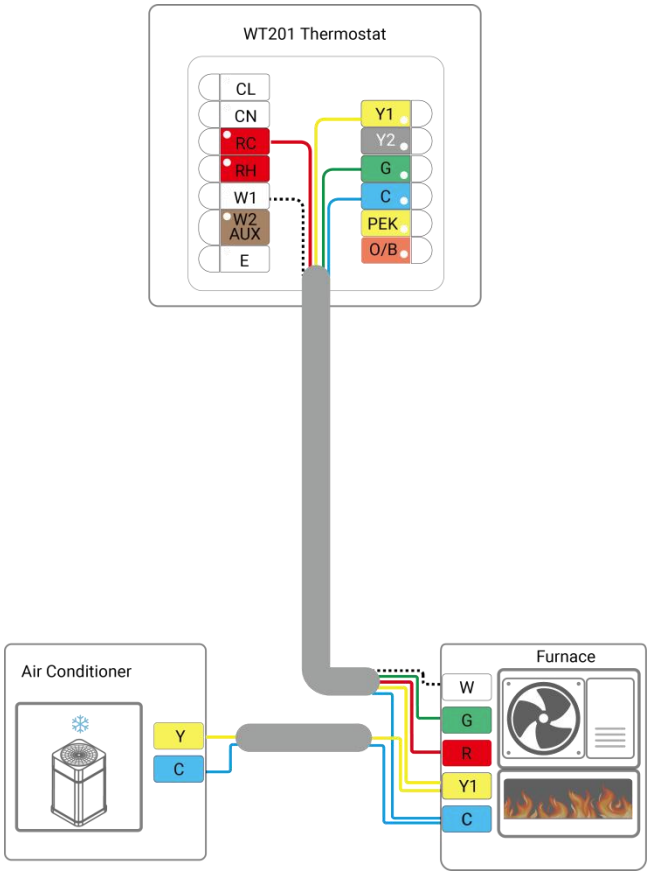
3.1 Wiring Descriptions

Wire	Description
CL	Live line out of room card switch
CN	Neutral line of room card switch
RC	Power of cooling system and heating system(24VAC)
RH	Power of heating system(24VAC)
W1	Heating/The first stage of heating.
W2/AUX	The second stage of heating/Auxiliary heating
E	Emergency heating used on very cold days
Y1	The first stage of cooling on cooling system or compressor on heat pump system
Y2/GL	Y2: The second stage of cooling on cooling system or compressor on heat pump system GL: Control fan to low speed.

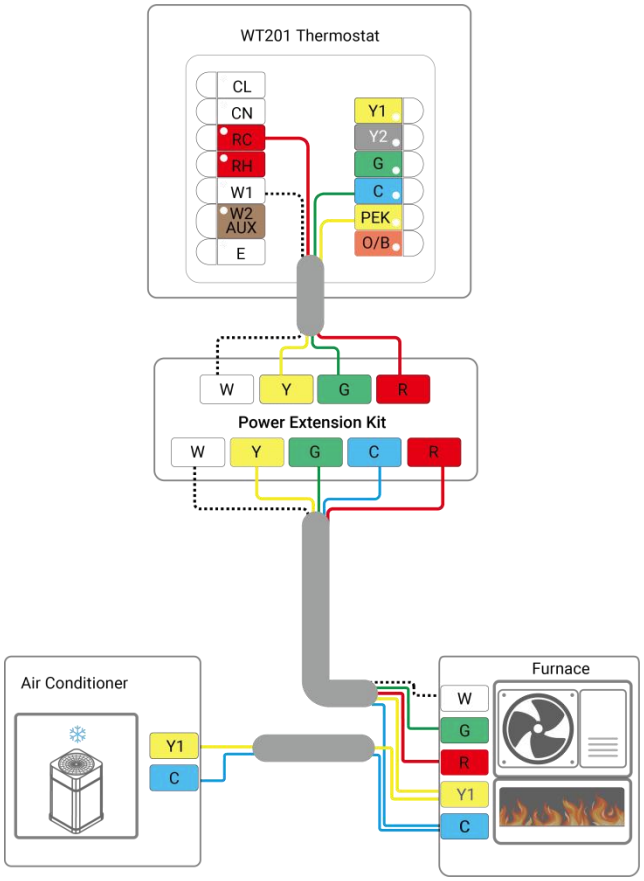
G/GH	G: Control fan GH: Control fan to high speed
C	Common of 24VAC power. It also might be labeled as X or B wire.
PEK	Connect Power Extender Kit when there is no C wire.
O/B	Switch between heating and cooling on the heat pump system. **Note:** If you only have O wire or B wire, please connect to O/B terminal and enable it by configuring Reversing Valve as OB on Heat(O) or OB on Cool(B).

3.2 Wiring Examples

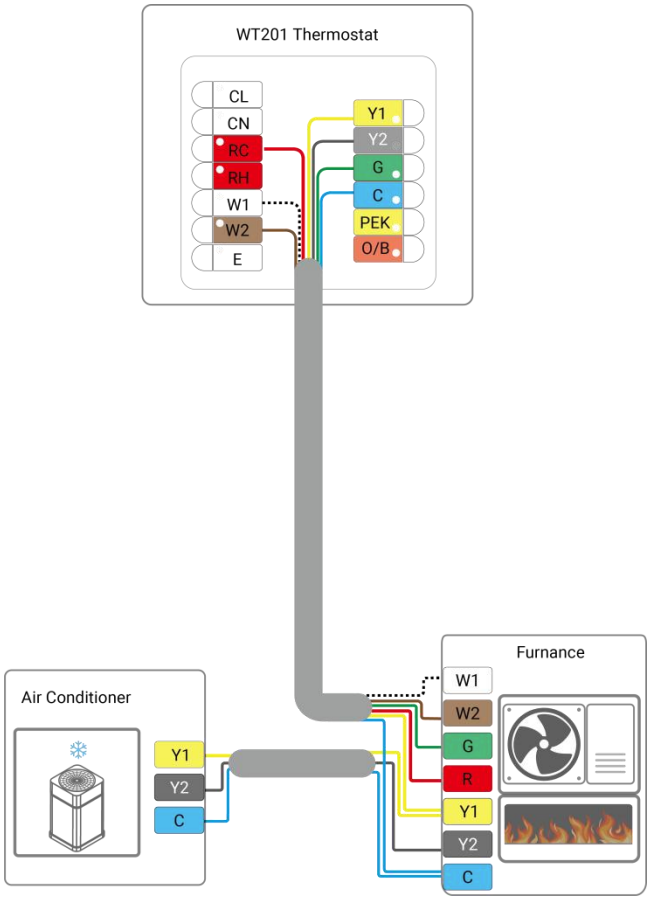
1. Furnace + Air Conditioner



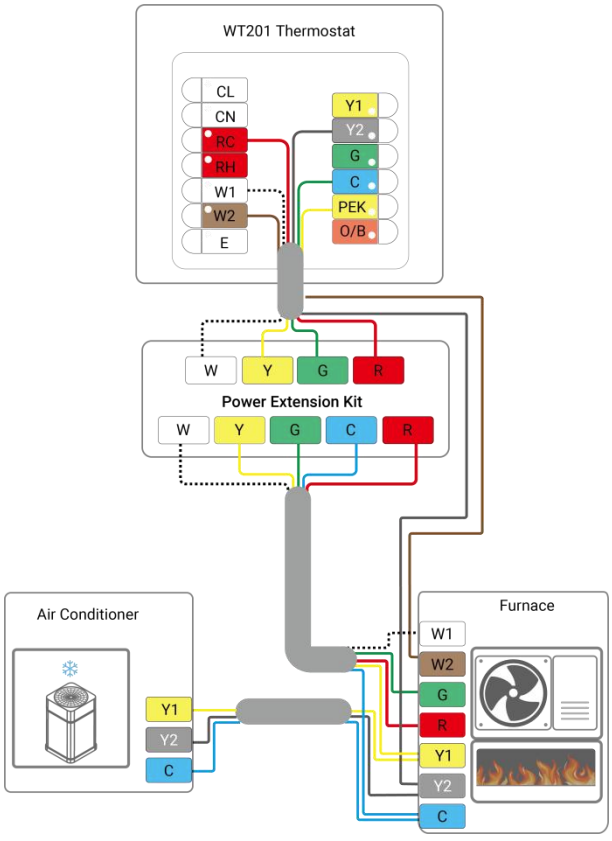
If there is no C wire, it is necessary to add a Power Extension Kit.



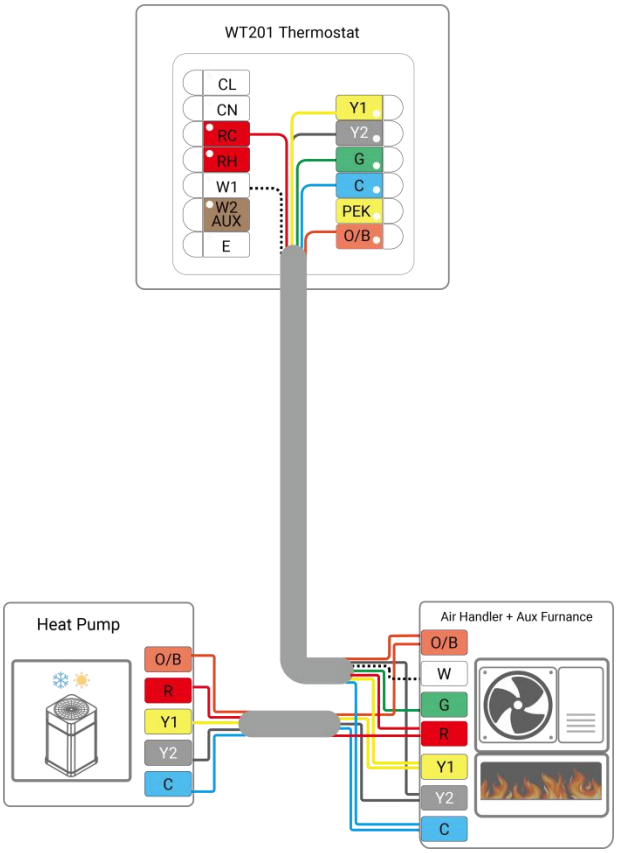
2. Furnace (2-stage) + Air Conditioner (2-stage)



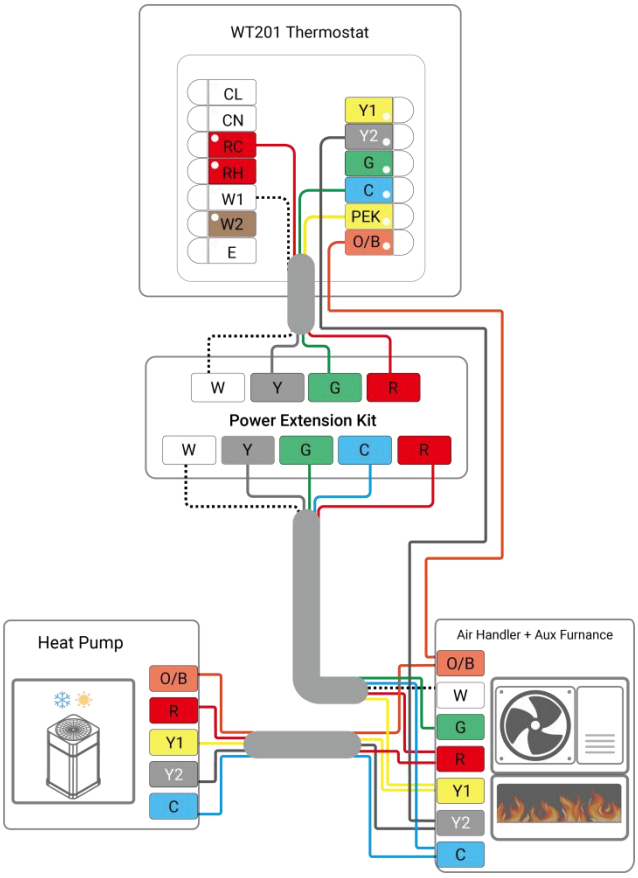
If there is no C wire, it is necessary to add a Power Extension Kit.



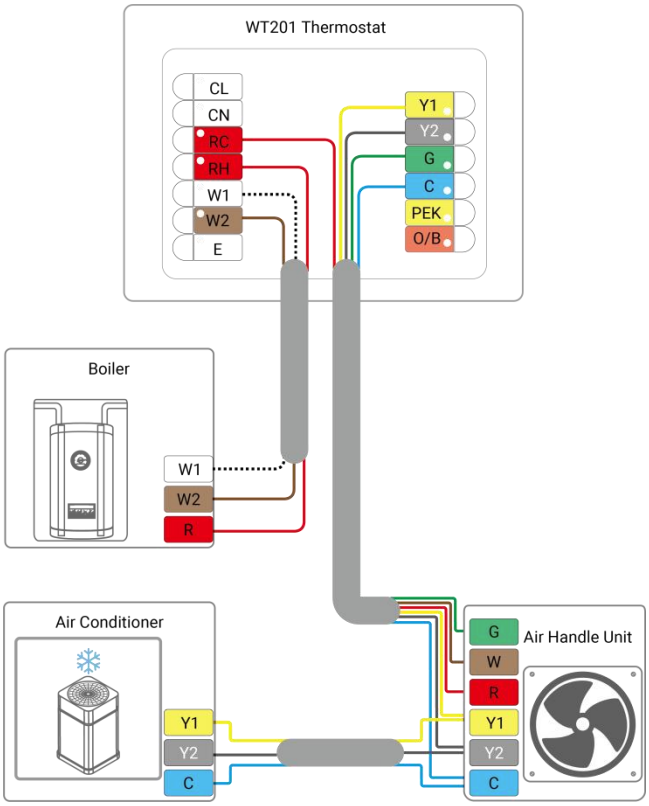
3. Heat Pump with Auxiliary Heat



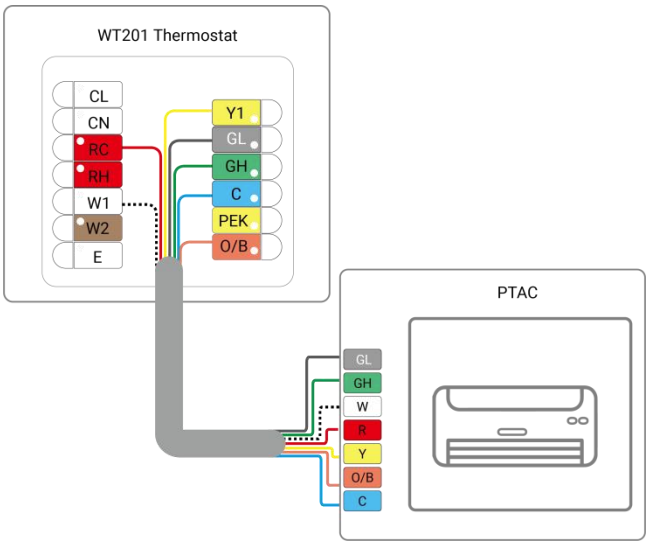
If there is no C wire, it is necessary to add a Power Extension Kit.



4. Boiler + Air Conditioner



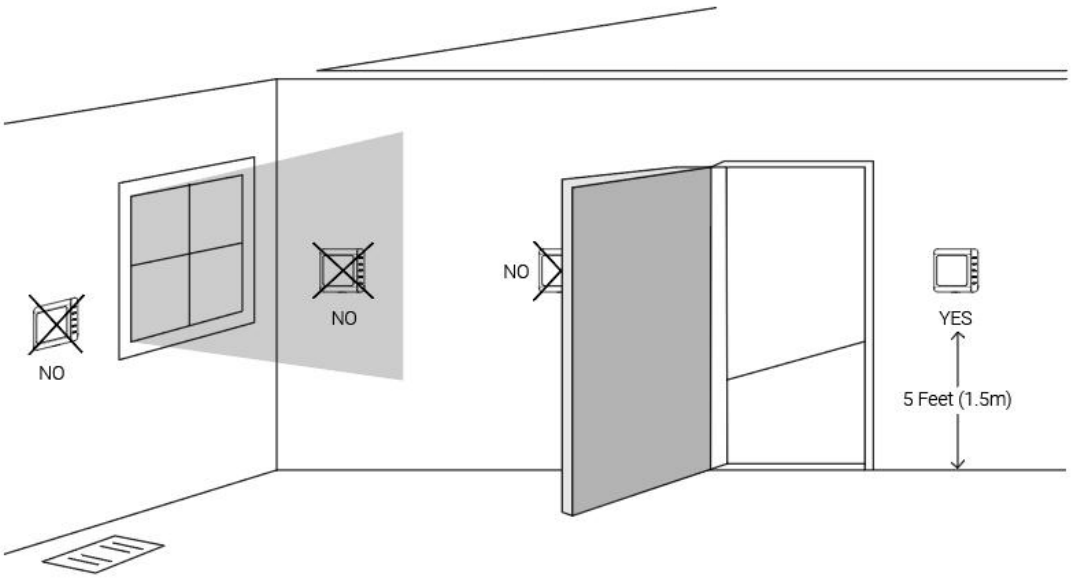
5. PTAC



4. Installation

Installation Locations

It is suggested to install the WT201 thermostat about 5 ft. (1.5m) above the floor in an area with good air circulation at average temperature.



Do not install the device where:

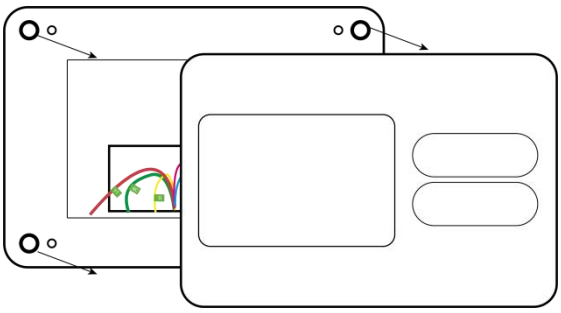
- Close to hot or cold sources like hot or cold air ducts;
- The place in direct sunlight;
- Dead spots or drafts (behind the doors and in corners);
- In areas that do not require conditioning;
- Close to concealed chimneys or pipes;
- Close to metal objects and obstacles which affect the LoRaWAN® transmission;
- The place with lots of electromagnetic interfaces;
- The place where strong vibration may happen or easy to be subjected to physical shock.

Installation Steps

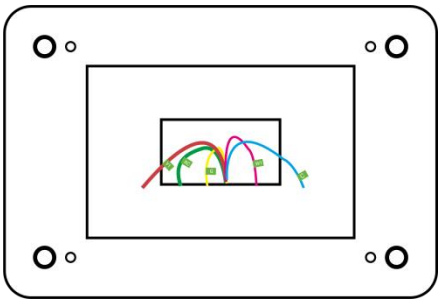
1. Ensure the circuit of all related systems are shut off before installation.

2. Remove the old thermostat from the wall, check if the power supply is 24 VAC with less than 2A maximum current.

Note: do not power the WT201 device with maximum current for long time, which will damage the device.



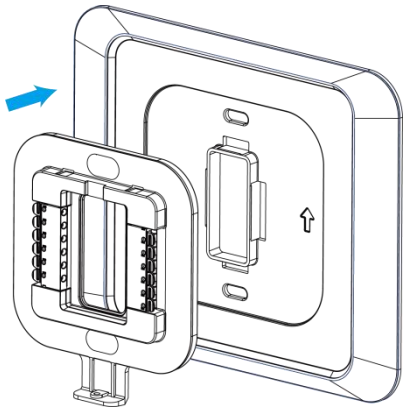
3. Disconnect the wires from old thermostat and label the wires with stickers. It is suggested to take a photo of the connected wires on the old thermostat for reference.



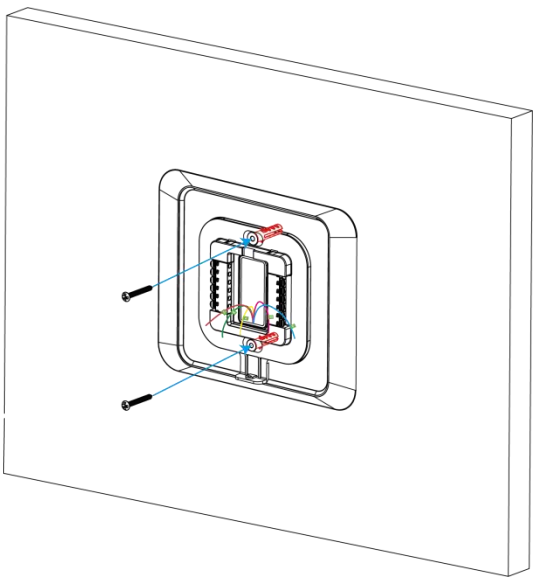
4. Remove the mounting plate of old thermostat. When removing, ensure that the wires do not fall into the holes.

5. Press the wiring backplate to decorative cover plate to fix them together. Ignore this step if you are not using a decorative cover plate.

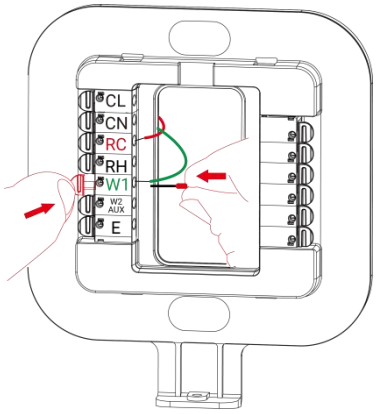
Note: it is suggested to use a decorative cover plate to cover the holes on the wall left by old thermostat, and to reduce the airflow from the hole that will affect temperature measurement.



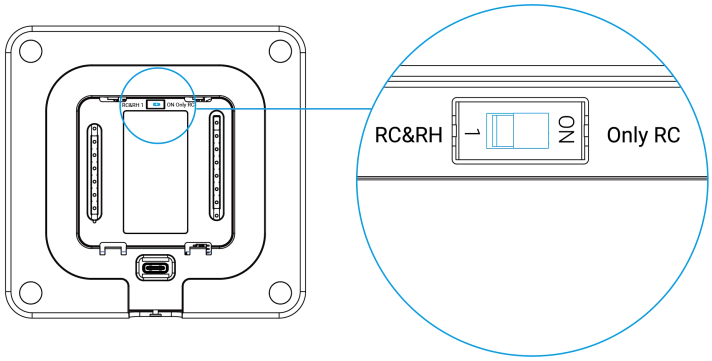
6. Pass the wires through the hole in the middle of the wiring backplate, then fix the wiring backplate (and decorative cover plate) to the wall using wall plugs and wall mounting screws.



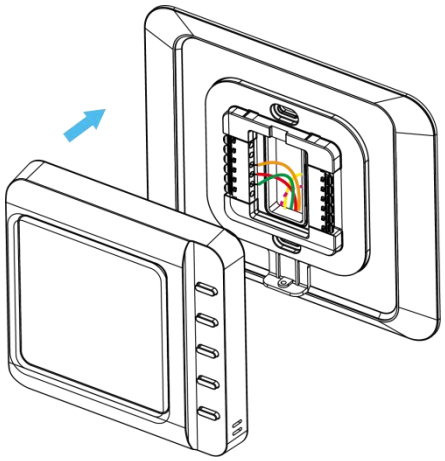
7. Hold the tabs and insert the wires into the holes of the corresponding terminals on the wiring backplate until they are firmly in place. Gently tug the wires to ensure that they are securely connected. If you need to release the wires again, take off the terminal tabs.
8. Push the remaining wires back into the hole on the wall.



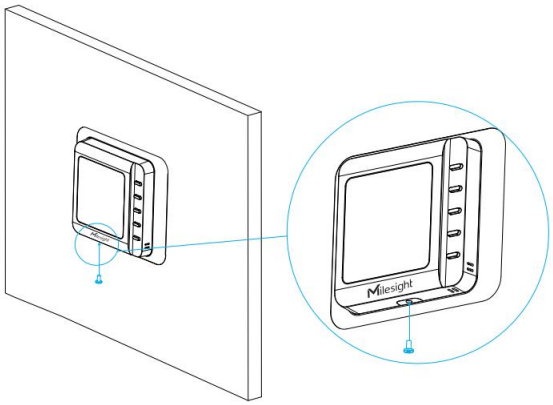
9. Adjust the DIP switch on the WT201 device. If there is only the RC wire connected, switch to Only RC; If both the RC and RH wires are connected, switch to RC & RH.



10. Push the WT201 device into the wiring backplate gently and ensure that both parts are securely fixed.



11. Turn on the systems to check if the WT201 device is on. Configure the device and ensure that it can function well.
12. Fix the bottom of WT201 device to the wiring backplate with the fixing screw.



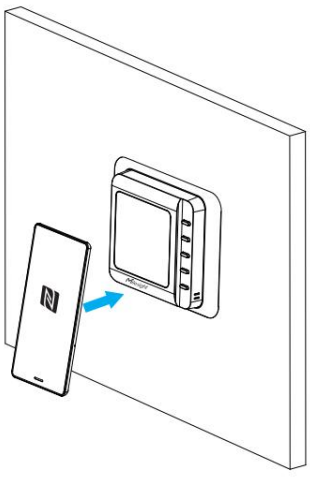
5. Operation Guide

5.1 ToolBox Login

WT201 can be configured via NFC or Type-C port. Please select one of them to complete the configuration.

5.1.1 NFC Configuration

1. Download and install the Milesight ToolBox App from Google Play or Apple App Store.
2. Enable NFC on the smartphone and launch Milesight ToolBox.
3. Attach the NFC area of a smartphone to the device, and click **NFC Read** to read device information. The basic information and settings of the device will be shown on ToolBox App if it's recognized successfully. You can read and configure the device by tapping the Read/Write device on the App. In order to protect the security of the device, please change the password when first configuring. The default password is **123456**.



Note:

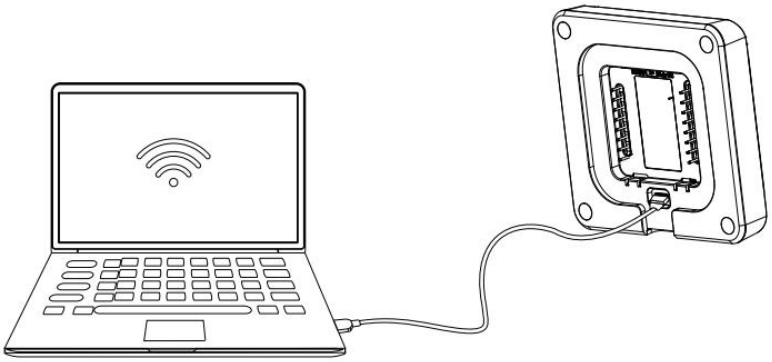
1) Ensure that you get the right location of NFC area of the smartphone and it's recommended to take off phone case.

2) If the smartphone fails to read/write configurations via NFC, remove the phone and try again.

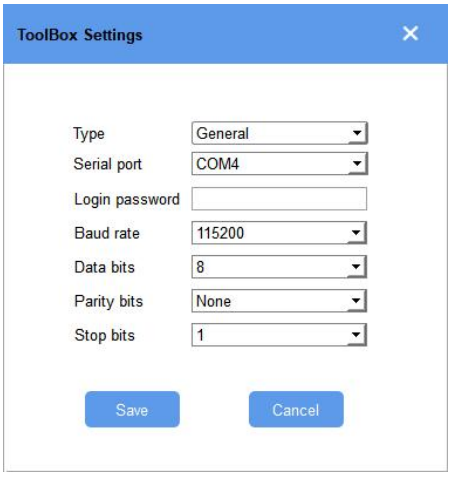
5.1.2 USB Configuration

1. Download ToolBox software from Milesight's official website.

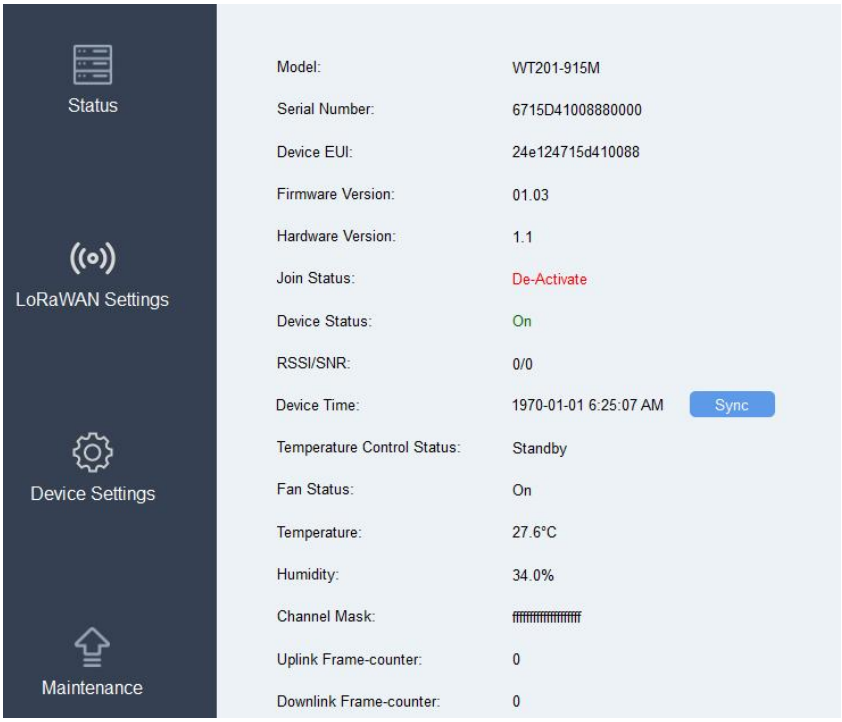
2. Remove the WT201 device from the backplate, connect the device to a computer via the Type-C port.



3. Open the ToolBox and select type as "General", then click password to log into the ToolBox. (Default password: **123456**)



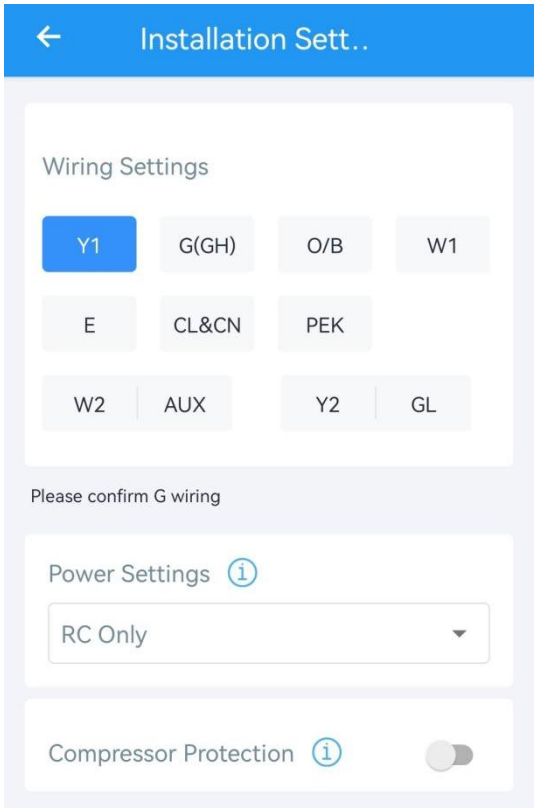
4. After logging into the ToolBox, you can check device status and change device settings.



5.2 Installation Settings

Note: Below settings only take effect when control permission is Thermostat.

If it is the first time configuration, please click the boxes of wires to complete the wiring settings according to your installation. About the wiring description please refer to Wiring Description.

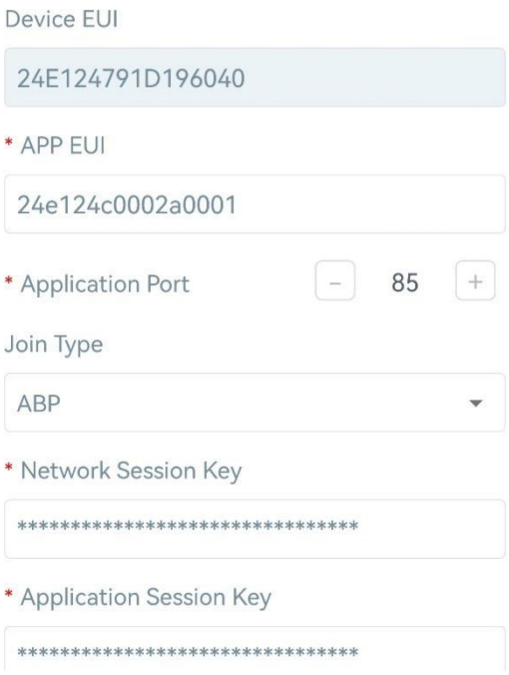


Parameters	Wire	Description
Power Settings	/	Select RC Only or RC & RH. This setting should be the same as the DIP switch setting on the WT201 device.
Reversing Valve	O/B	Switch the O/B mode of a heat pump or PTAC. This can also be changed via the downlink command.
Heating System	W1/W2/E/AUX + G	Select a furnace or boiler.
Fan Control during Heating		Select a thermostat or furnace/boiler.
Auxiliary Heating Duration	AUX	When current temperature does not reach the target temperature even heating for auxiliary heating duration, report an Auxiliary Heating Timeout Alarm packet and switch back to lower stage heating mode.
Emergency Heating Duration	E	When the emergency heating time reaches this duration, report an Emergency Heating Timeout Alarm packet and switch back to Heat mode.
Freeze Protection		When current temperature is lower than the protection temperature, switch control mode to EM Heat to adjust to protection temperature, then change back to the original control mode. If the control system is off, this feature will turn on the system EM Heat mode temporarily and only System On/Off button can work.
Compressor Protection	Y1/Y2+G	Only when the minimum running duration passes, the compressor can start or stop working.
Room Card Settings	CL&CN	When a key card switch is connected to CL and CN of WT201, set the triggering action when a room key card is inserted or removed. Default: **System On/Off:** insert card - system on, remove card - system off; **Insert an Event:** insert card - Home plan, remove card - Away plan. The event can be changed via downlink commands.

5.3 LoRaWAN® Settings

5.3.1 Basic Settings

WT201 supports to configure AppEUI, Join Type, Application Key, and other basic LoRaWAN® information. You can also keep all settings by default.



Parameters	Description
Device EUI	Unique ID of the device which can also be found on the label.
App EUI	The default App EUI is 24E124C0002A0001.
Application Port	The port is used for sending and receiving data, the default port is 85.
Join Type	OTAA and ABP modes are available.
Application Key	Appkey for OTAA mode, the default is 5572404C696E6B4C6F52613230313823.
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, the default is the 5th to 12th digits of the SN.
LoRaWAN® Version	V1.0.2 and V1.0.3 are available.
Work Mode	It's fixed as Class C.
RX2 Data Rate	RX2 data rate to receive downlinks or Milesight D2D commands.
RX2 Frequency	RX2 frequency to receive downlinks or Milesight D2D commands. Unit: Hz
Confirmed Mode	If the device does not receive an ACK packet from the network server, it will resend data once.

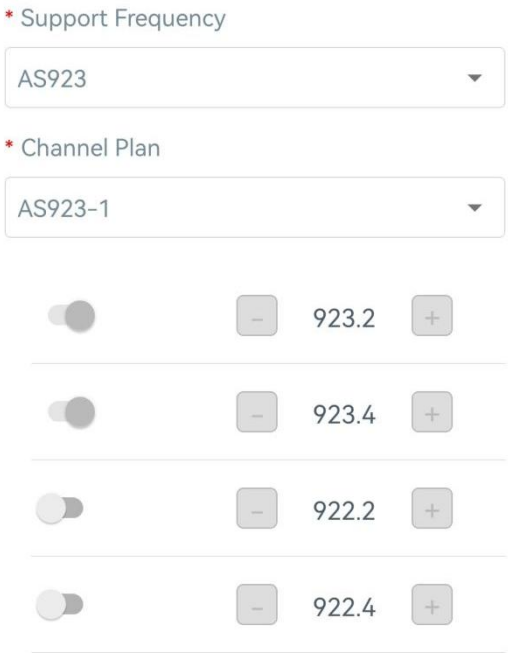
Rejoin Mode	Reporting interval ≤ 35 mins: the device will send a specific number of LinkCheckReq MAC packets to the network server every reporting interval or every double reporting interval to validate connectivity; If there is no response, the device will re-join the network. Reporting interval > 35 mins: the device will send a specific number of LinkCheckReq MAC packets to the network server every reporting interval to validate connectivity; If there is no response, the device will re-join the network.
Set the number of packets sent	When the rejoin mode is enabled, set the number of LinkCheckReq packets to send. Note: the actual sending number is **Set the number of packet sent** + 1.
ADR Mode	Allow network server to adjust data rate of the device.
Spread Factor	If ADR is disabled, the device will send data via this spread factor.
Tx Power	Transmit power of the device.

Note:

1) Please contact sales for device EUI list if there are many units.
2) Please contact sales if you need random App keys before purchase.
3) Select OTAA mode if you use Milesight IoT cloud or Milesight Development Platform to manage devices.
4) Only OTAA mode supports rejoin mode.

5.3.2 Frequency Settings

Select supported frequency and channels to send uplinks. Make sure the channels match the LoRaWAN® gateway.



If device frequency is AU915 or US915, you can enter the index of the channel that you want to enable in the input box, making them separated by commas.

Examples:

1, 40: Enabling Channel 1 and Channel 40

1-40: Enabling Channel 1 to Channel 40

1-40, 60: Enabling Channel 1 to Channel 40 and Channel 60

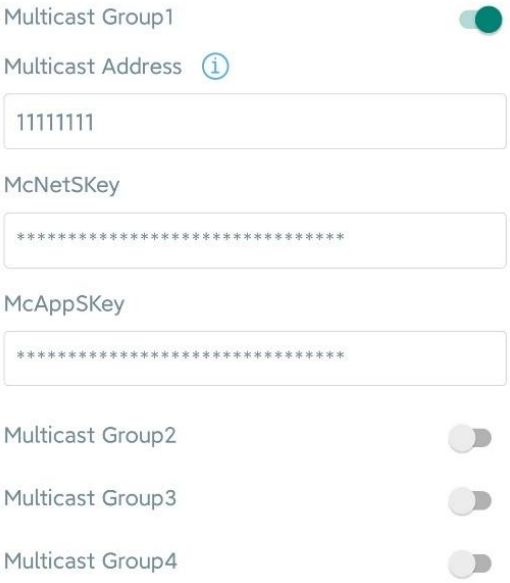
All: Enabling all channels

Null: Indicates that all channels are disabled

5.3.3 Multicast Settings

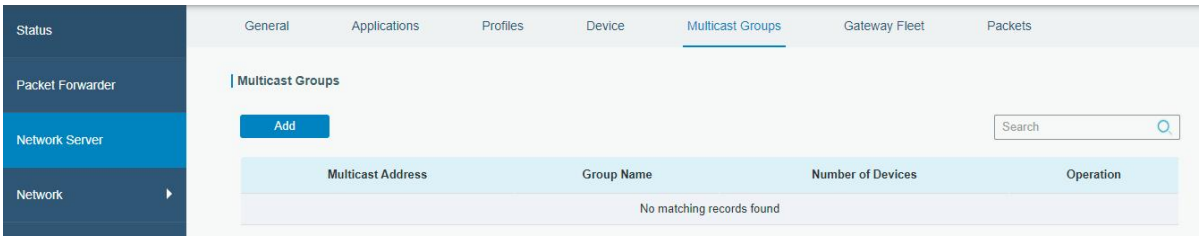
WT201 supports setting up several multicast groups to receive multicast commands from the network server, then users can use this feature to control devices in bulks.

1. Enable Multicast Group, and set an unique multicast address and keys to distinguish other groups. You can also keep these settings by default.

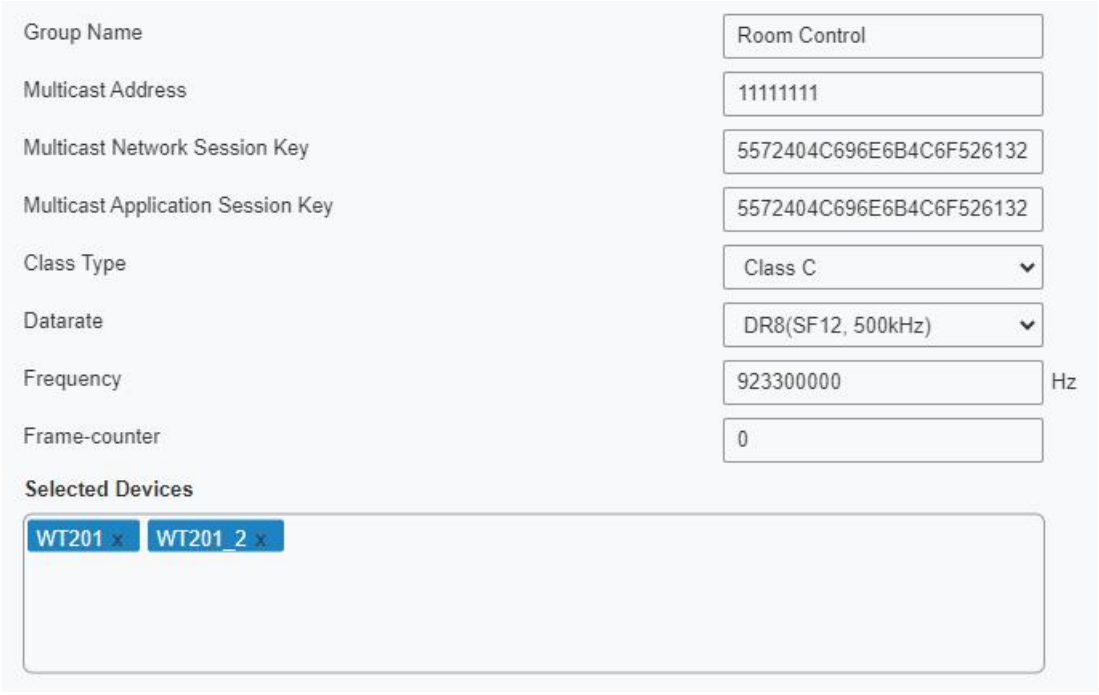


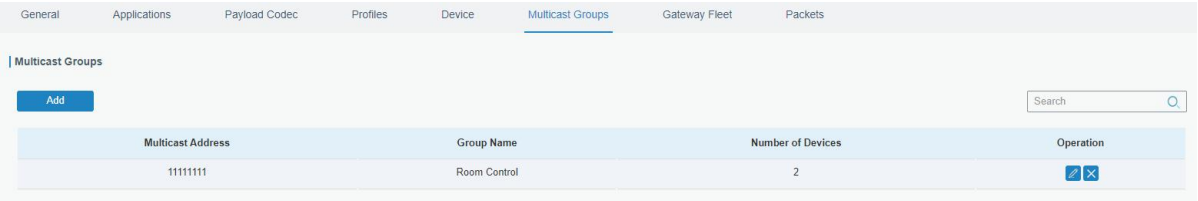
Parameters	Description
Multicast Address	Unique 8-digit address to distinguish different multicast groups.
Multicast McNetSkey	32-digit key. Default values: Multicast Group 1: 5572404C696E6B4C6F52613230313823 Multicast Group 2: 5572404C696E6B4C6F52613230313824 Multicast Group 3: 5572404C696E6B4C6F52613230313825 Multicast Group 4: 5572404C696E6B4C6F52613230313826
Multicast McAppSkey	32-digit key. Default values: Multicast Group 1: 5572404C696E6B4C6F52613230313823 Multicast Group 2: 5572404C696E6B4C6F52613230313824 Multicast Group 3: 5572404C696E6B4C6F52613230313825 Multicast Group 4: 5572404C696E6B4C6F52613230313826

2. Add a multicast group on the network server. Take Milesight UG6x gateway as example, go to **Network Server > Multicast Groups**, click **Add** to add a multicast group.



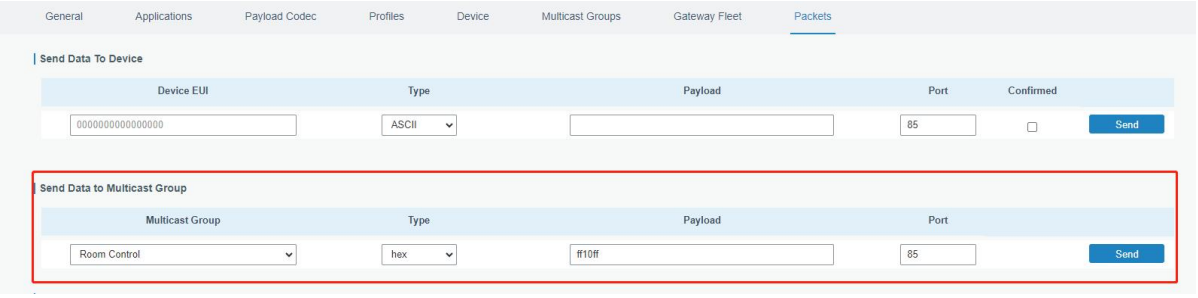
Fill in the multicast group information the same as WT201 settings, and select the devices which you need to control, then click **Save**.



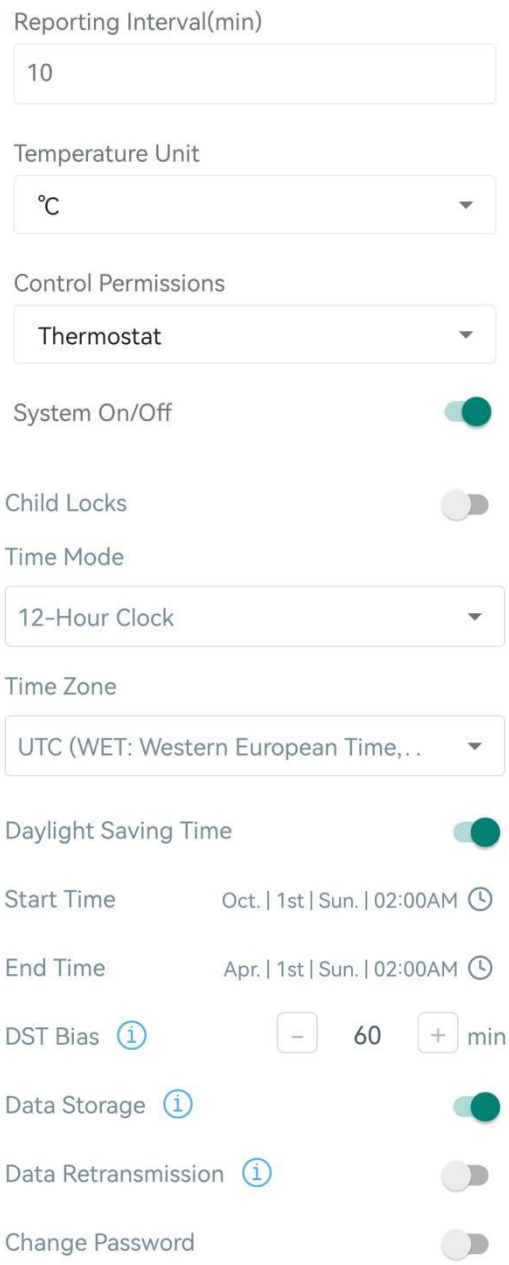


3. Go to **Network Server > Packets**, select the multicast group and fill in the downlink command, click **Send**. The network server will broadcast the command to devices that belong to this multicast group.

Note: ensure all devices' application ports are the same.



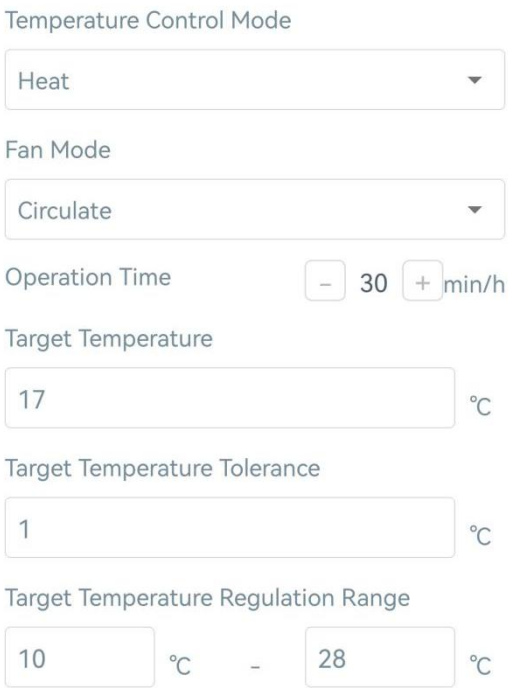
5.4 General Settings

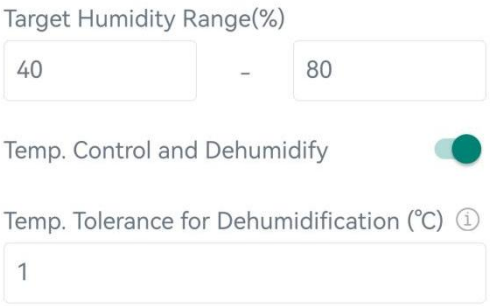


Parameters	Description
Reporting Interval	The interval of reporting data to network server. Default: 10 min, Range: 1 - 1440 min
Temperature Unit	Set the unit of temperature displayed on the screen and configuration page.
Control Permissions	Select the control permission as **Thermostat** or **Remote Control.**
System On/Off	Turn on or off the temperature control system, it can also be controlled by button. When the system is off, the screen will only show current temperature and humidity.
Child Locks	Enable to lock the button. After enabled, the device can only control

	these features via ToolBox or downlink commands. 
Time Mode	Set the time display mode as 24-Hour Clock or 12-Hour Clock.
Time Zone	Set the time zone to display on the screen. When you click **Sync** button of ToolBox App or ToolBox software to sync time, the device will also sync the time zone from smartphone or computer 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 setting.
Data Storage	Disable or enable data storage locally.
Data Retransmission	Disable or enable data retransmission.
Change Password	Change the password for ToolBox App to write this device or ToolBox software to login the device.

Thermostat: control the temperature according to the settings of thermostat.





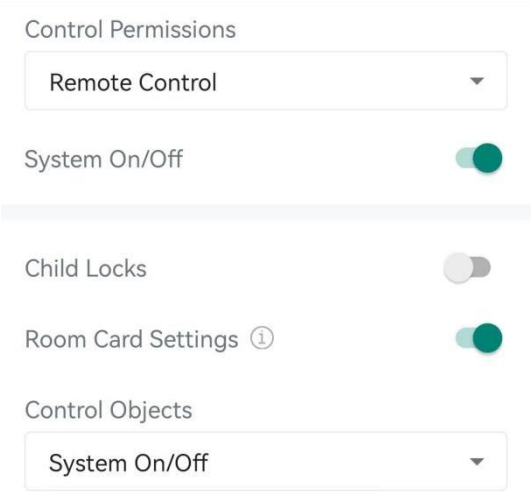
Parameters	Description
Temperature Control Mode	Select from Cool, Heat, EM Heat and Auto, this mode can also be switched by button or downlink command. These options are supported according to connected and selected wires. The working condition of every mode depends on the target temperature and tolerance settings of below parameters. **Cool:** start working when current temp. > (target temp. + target temp. tolerance). **Heat:** start working when current temp. < (target temp. - target temp. tolerance). **Auto:** start cooling when current temp. > (target temp. + target temp. tolerance + temp. control tolerance); start heating when current temp. < (target temp. - target temp. tolerance - temp. control tolerance).
Fan Mode	Select from Auto, On and Circulate. This mode is only supported when G wire is connected and can also be switched by button or downlink command. **Auto:** open when the system is cooling or heating. This mode supports to set the duration of the fan's deferred closing after the system stops working. Besides, this mode supports to enable Regulate Humidity feature working with dehumidifier or humidifier. When not reaching target humidity range, the device will turn on the fan for some minutes hourly. **On:** the fan is normally open. **Circulate:** open the fan to circulate when the system stops working. This mode supports to set the operation time hourly.
Target Temperature	Set target environment temperature.
Target Temperature Tolerance	Set the tolerance value between target temperature and current temperature.

Temperature Control Tolerance	When temperature control mode is Auto, set the tolerance value between target temperature range and current temperature.
Target Temperature Regulation Range	Set the range for buttons to adjust the target temperature. Max range: 16 - 35 °C (60 - 95 °F), min range: 5 - 15 °C(41 - 59 °F).
Target Humidity Range	Set target environment humidity range.
Temp. Control and Dehumidify	When reaching the target temperature range but not reaching the target humidity range, the device will keep cooling or heating to dehumidify.
Temp. Tolerance for Dehumidification	When reaching this tolerance over target temperature range, the device will stop heating or cooling even it is not reaching the target humidity range.

Configuration Example:
Target temperature(T) = 23,
target temperature tolerance(TO)=1,
temperature control tolerance(TC)=2,
temp. Tolerance for dehumidification(TD)=1.
The expected start and stop cooling or heating temperature is:

Temperature Control Mode	Start Temperature	Stop Temperature	Stop Temperature (Temp. Control and Dehumidify Enabled)
Heat	22 (T-TO)	24 (T+TO)	25 (T+TO + TD)
Cool	24 (T+TO)	22 (T-TO)	21 (T - TO - TD)
Auto	Start Heat: 20 (T- TO - TC) Start Cool: 26 (T+TO+TC)	Stop Heat: 24(T+TO) Stop Cool: 22(T-TO)	Stop Heat: 25(T+TO+TD) Stop Cool: 21(T - TO -TD)

Remote Control: users can write the programs to control the relay output status directly to achieve the temperature control. Under this permission, the screen will only show temperature, humidity, time, child lock, and network status.



Parameters	Description
Room Card Settings	Enable or disable the CL&CN control feature.
Control Objects	When a room key card switch is connected to CL and CN of WT201, set the triggering action when a room key card is inserted or removed. Default: **System On/Off:** insert card - system on, remove card - system off

5.5 Advanced Settings

5.5.1 Calibration Settings

Temperature Calibration: set the calibration value, the device will add calibration value to the current temperature value and report the final value.

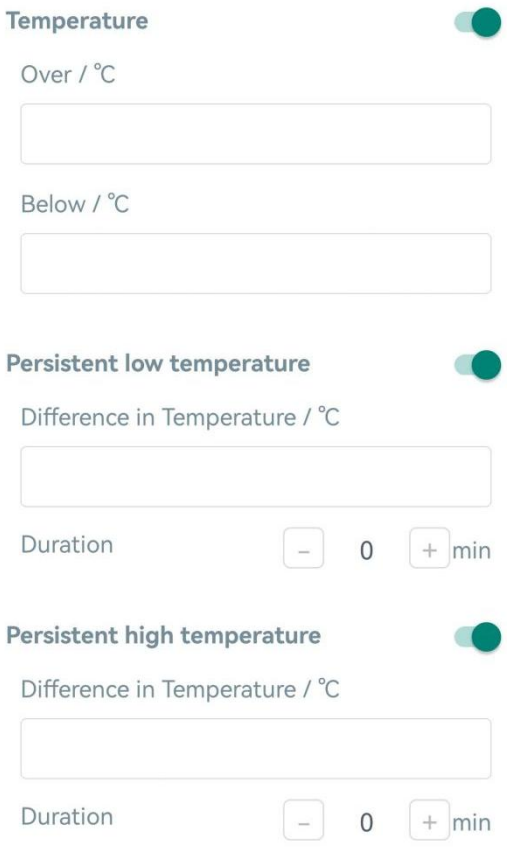
Humidity Calibration: set the calibration value, the device will add calibration value to the current humidity value and report the final value.

5.5.2 Threshold Settings

WT201 supports 2 types of temperature threshold alarms:

Temperature threshold: when current temperature is over or below the threshold value, the device will report the threshold alarm packet instantly. Only when the threshold is released and re-triggered, will the device report the alarm again.

Persistent low/high temperature threshold: when current temperature is lower or higher than the target temperature for difference value and specific duration, the device will report the threshold alarm packet instantly. When the threshold is released, it will also report the alarm release packet.



5.5.3 Schedule Settings

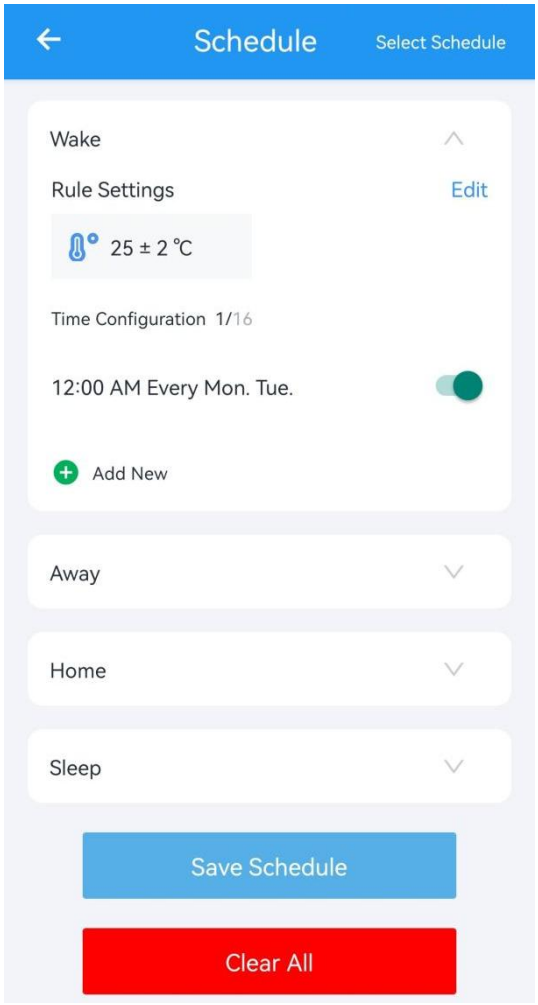
Note: Below settings only take effect when control permission is Thermostat.

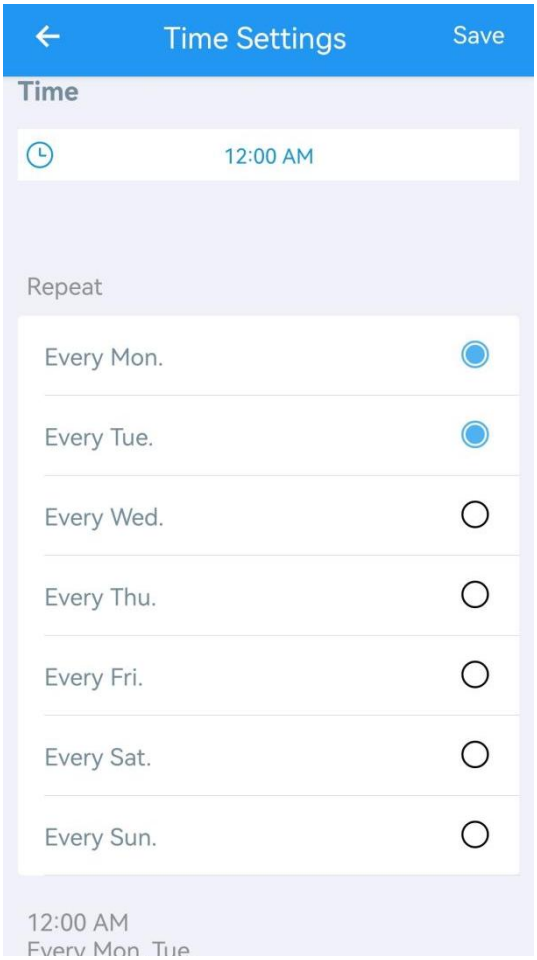
WT201 supports to set 4 kinds of schedule plan: Wake, Away, Home, and Sleep.

1. Click **Edit** to set the target temperature range of every schedule, then add the time period to execute this schedule. Every schedule plan supports to add 16 time periods at most.

Note: if the repeat date is not selected, the schedule plan will only execute once.

2. Click **Write** to save the schedule settings.





3. Click **Save Schedule** to export above settings as a schedule file. And click **Select Schedule** to import the schedule file to another device.

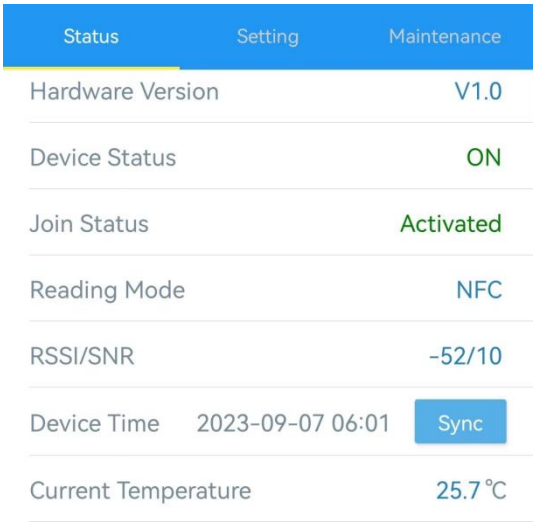
5.5.4 Data Storage

WT201 supports storing 1000 data records locally and exporting data via ToolBox. The device will record the data according to the reporting interval even if it is disconnected from the network.

Note:

1) When control permission is set to Remote control, the device will stop storing data.
2) The device does not store humidity data.

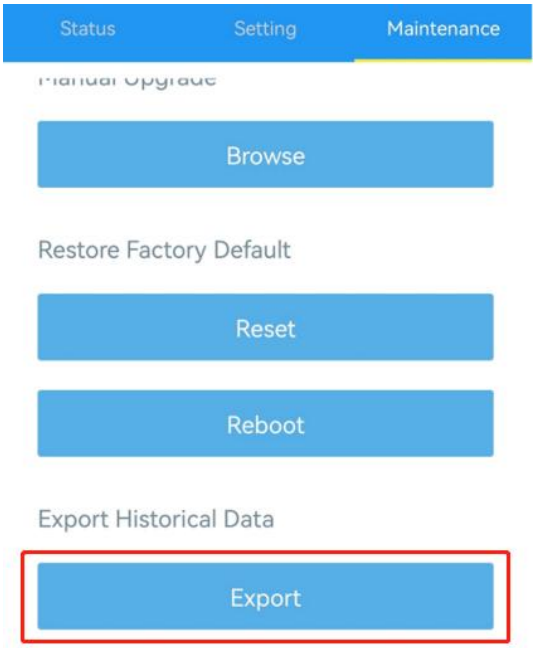
1. Sync the device time via ToolBox.

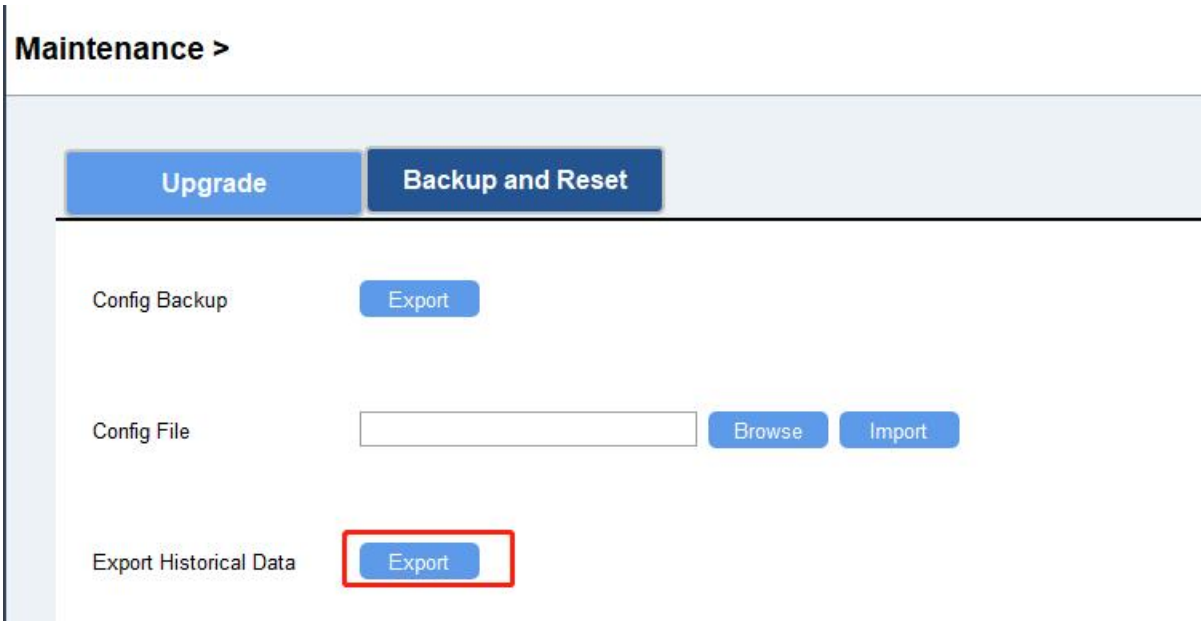


Besides, when device LoRaWAN® version is set as 1.0.3, the device will send MAC commands to ask the network server everytime when it joins the network.

2. Enable the data storage feature.

3. Click **Export**, then select the data time range to export data. The maximum export data period on ToolBox App is 14 days.





5.5.5 Data Retransmission

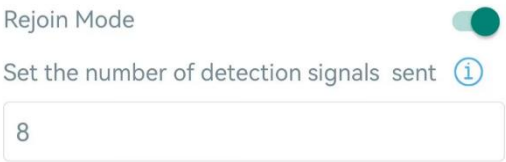
WT201 supports data retransmission to ensure that the network server can receive all data even if the network is down for some time. There are two ways to receive the lost data:

- Network server sends downlink commands to enquire the historical data for a specified time range, refer to ***WT201 Communication Protocol;***
- When network is down and the device receives no response of LinkCheckReq MAC packets for a period of time, the device will record during the disconnection period and retransmit the lost data after the device is reconnected to the network.

Here are the steps of data retransmission:

1. Enable the data storage feature and data retransmission feature.

2. Enable rejoin mode feature and set the number of packets sent in LoRaWAN® settings. For example, the device will send LinkCheckReq MAC packets to the network server regularly to check any network disconnection; if there is no response for 8+1 times, the join status will change to de-active and the device will record a data lost time point (the time it reconnected to the network).



3. After reconnecting to the network, the device will send the lost data from the point of time when the data was lost according to the data re-transmission reporting interval.

Note:

1) If the device is rebooted or re-powered during the data retransmission process, the device will re-send interrupted retransmission data again after the device is reconnected back to the network.

2) If the network is disconnected again during data retransmission, the device will only send the latest disconnected data.

3) The retransmission data format starts with "20ce", please refer to ***WT201 Communication Protocol***.

5.6 Milesight D2D Settings

Milesight D2D protocol is developed by Milesight and used for connection among Milesight devices without gateway. When D2D setting is enabled, WT201 can work as the Milesight D2D agent device to receive commands from Milesight D2D controller devices or work as Milesight D2D controller device to send commands to trigger D2D agent devices.

5.6.1 Milesight D2D Controller

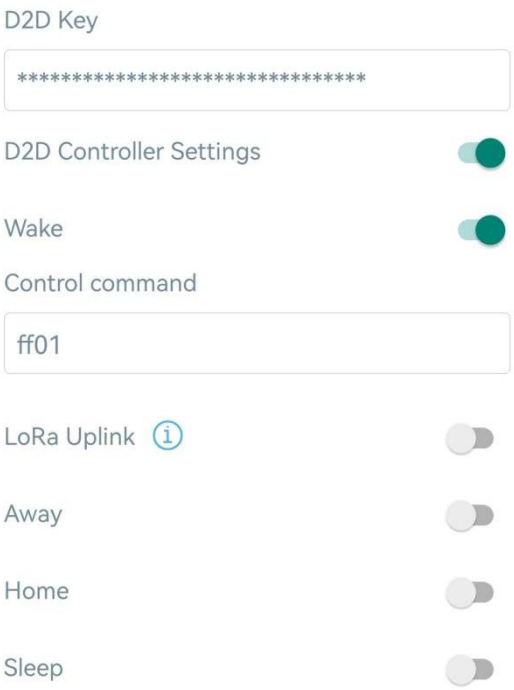
Note: Below settings only take effect when control permission is Thermostat.

1. Configure RX2 datarate and RX2 frequency in LoRaWAN® settings. It is suggested to change the default RX2 frequency to avoid conflicts with other D2D devices.

2. Enable D2D Controller Settings, and define a unique D2D key to be the same as D2D agent devices. (Default D2D Key: 5572404C696E6B4C6F52613230313823)

3. Select any of button to define a 2-byte hexadecimal control command (0x0000 to 0xffff). When the WT201 switches to the schedule, it will send the control command to corresponding D2D agent devices.

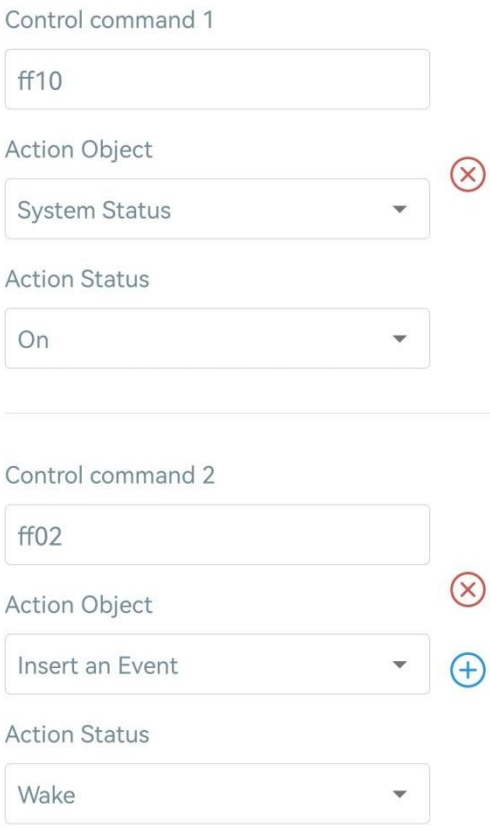
Note: If **LoRa Uplink** is enabled, a LoRa Uplink packet that contains the schedule switch status will be sent to the network server after sending the D2D control command packet.



5.6.2 Milesight D2D Agent

1. Ensure the RX2 datarate and RX2 frequency in LoRaWAN settings are the same as the D2D controller device.
2. Enable D2D Agent Settings, and define a unique D2D key to be the same as the setting in D2D controller device. (Default D2D Key: 5572404C696E6B4C6F52613230313823)
3. Define a 2-byte hexadecimal control command (0x0000 to 0xffff) and command action. For example, when WT201 receives a control command ff10, it will turn the temperature control system to on; when WT201 receives a control command ff02, it will switch the schedule as Wake. WT201 supports at most 16 control commands.

Note: when control permission is set to Remote Control, the action does not support to insert a plan event.



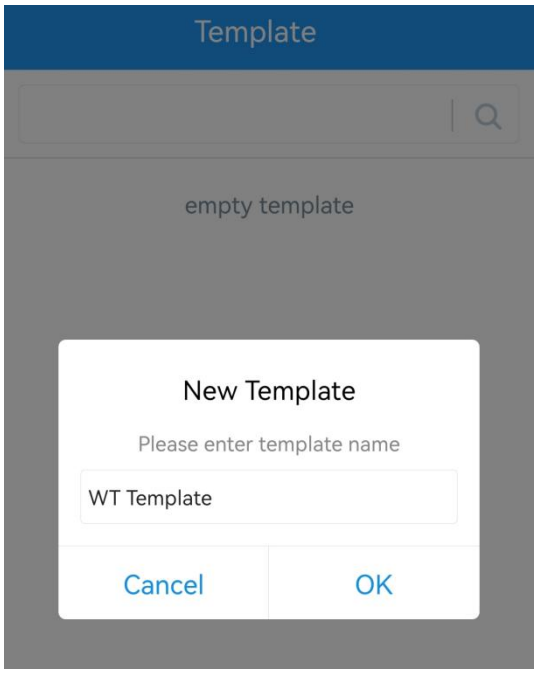
5.7 Maintenance

5.7.1 Backup

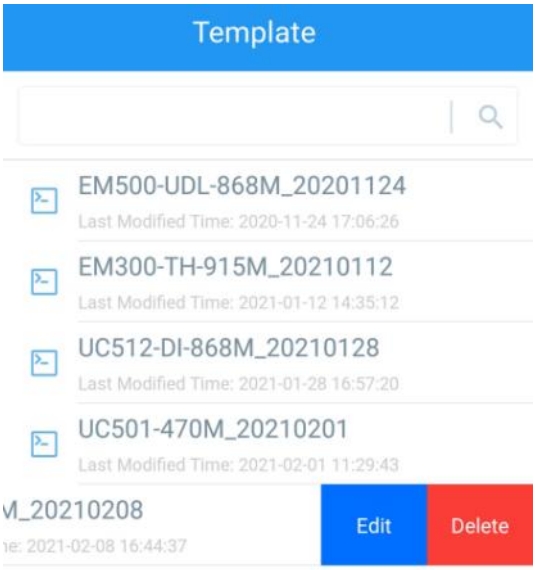
WT201 supports backup templates for easy and quick configuring devices in bulk. The backup feature is only for devices with the same model and LoRaWAN® frequency band.

1. Go to **Template** page on the App and save the current settings as a template. The saved templates are also editable.

2. Select one saved template and click **Write**, then attach the smartphone to another device via NFC to reuse the template.



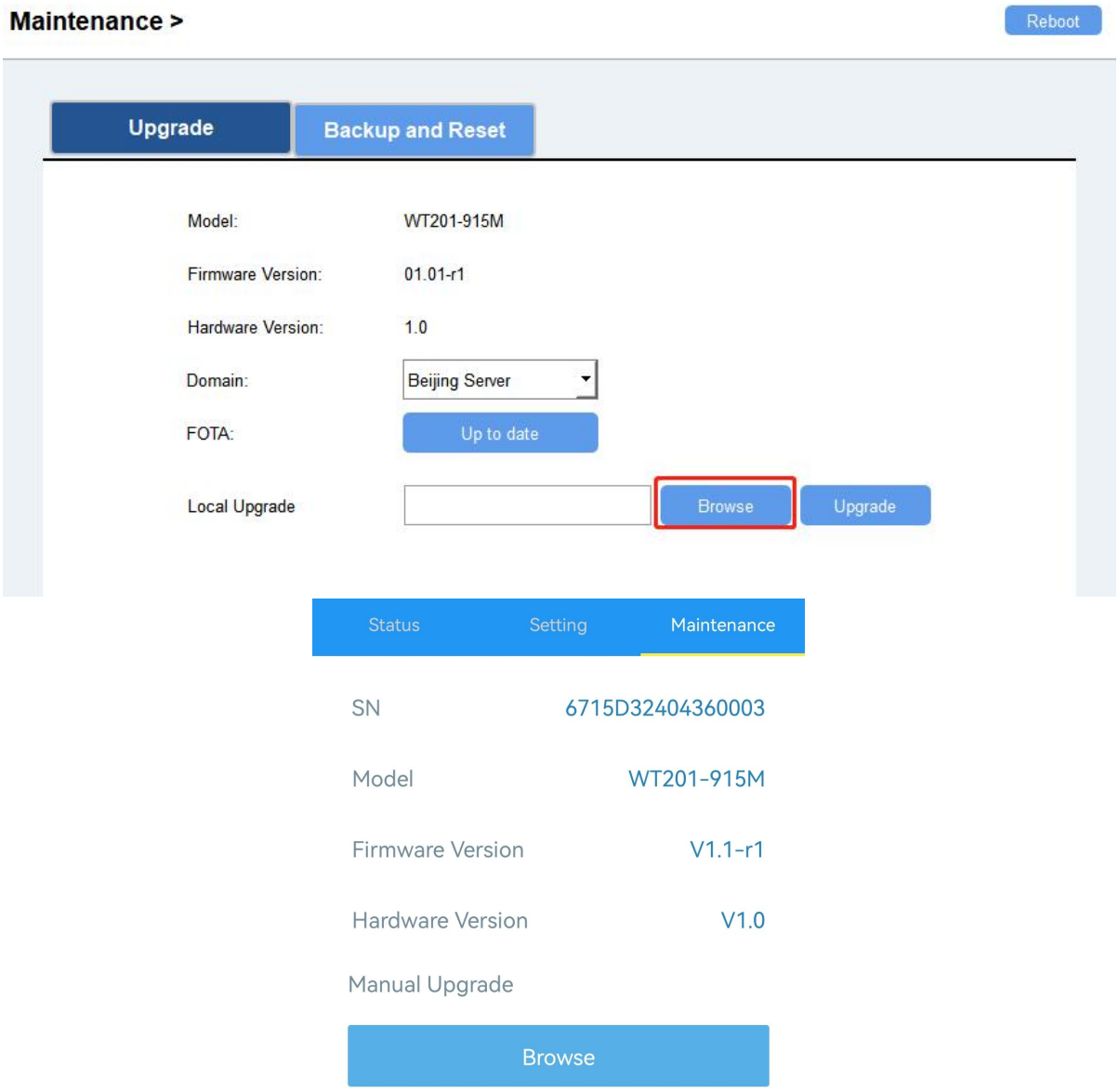
Note: Slide the template item to the left to edit or delete the template. Click the template to edit the configurations.



5.7.2 Upgrade

1. Download firmware from the Milesight website to your smartphone or computer.
2. Click **Browse** to import firmware and upgrade the device.

Note: Operation on ToolBox is not supported during the upgrade.

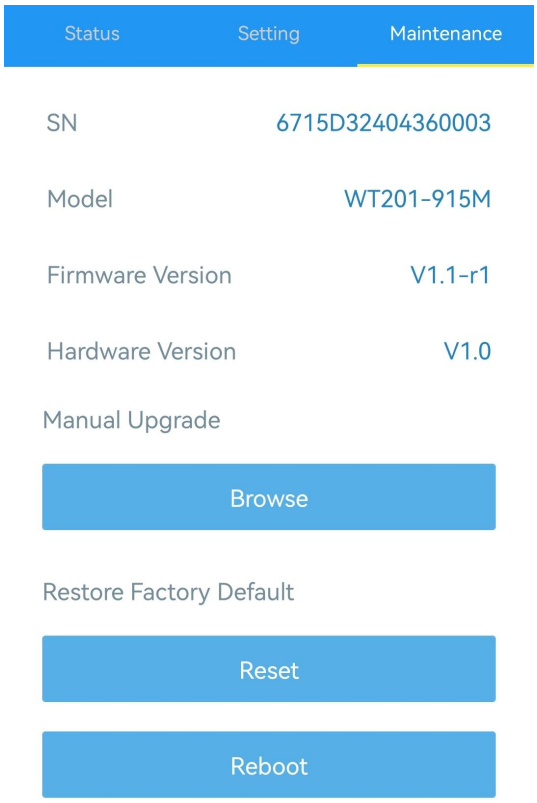


5.7.3 Reboot and Reset

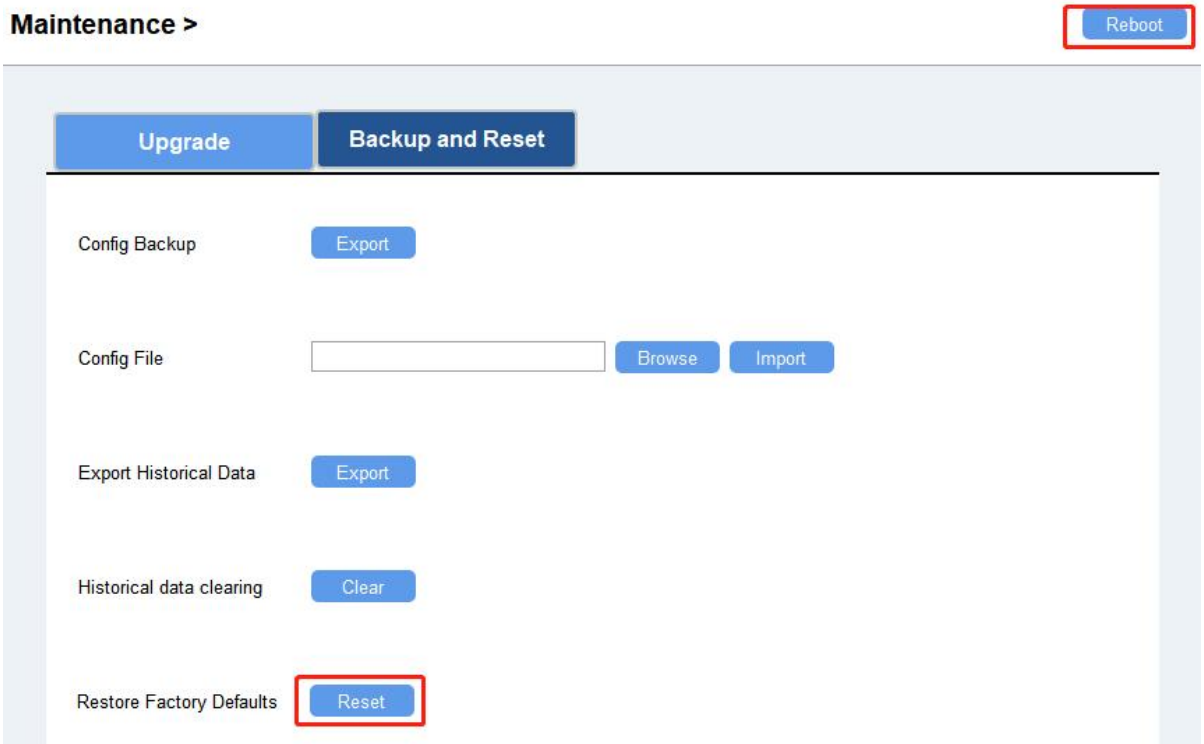
WT201 supports below methods to reboot or reset the device which are as following:

Via Hardware: Press and hold the system on/off and temperature control mode button for more than 3s until the screen blinks slowly to reboot. Press and hold the system on/off and temperature control mode button for more than 10s until the screen blinks quickly to reset. This can be disabled via child lock settings.

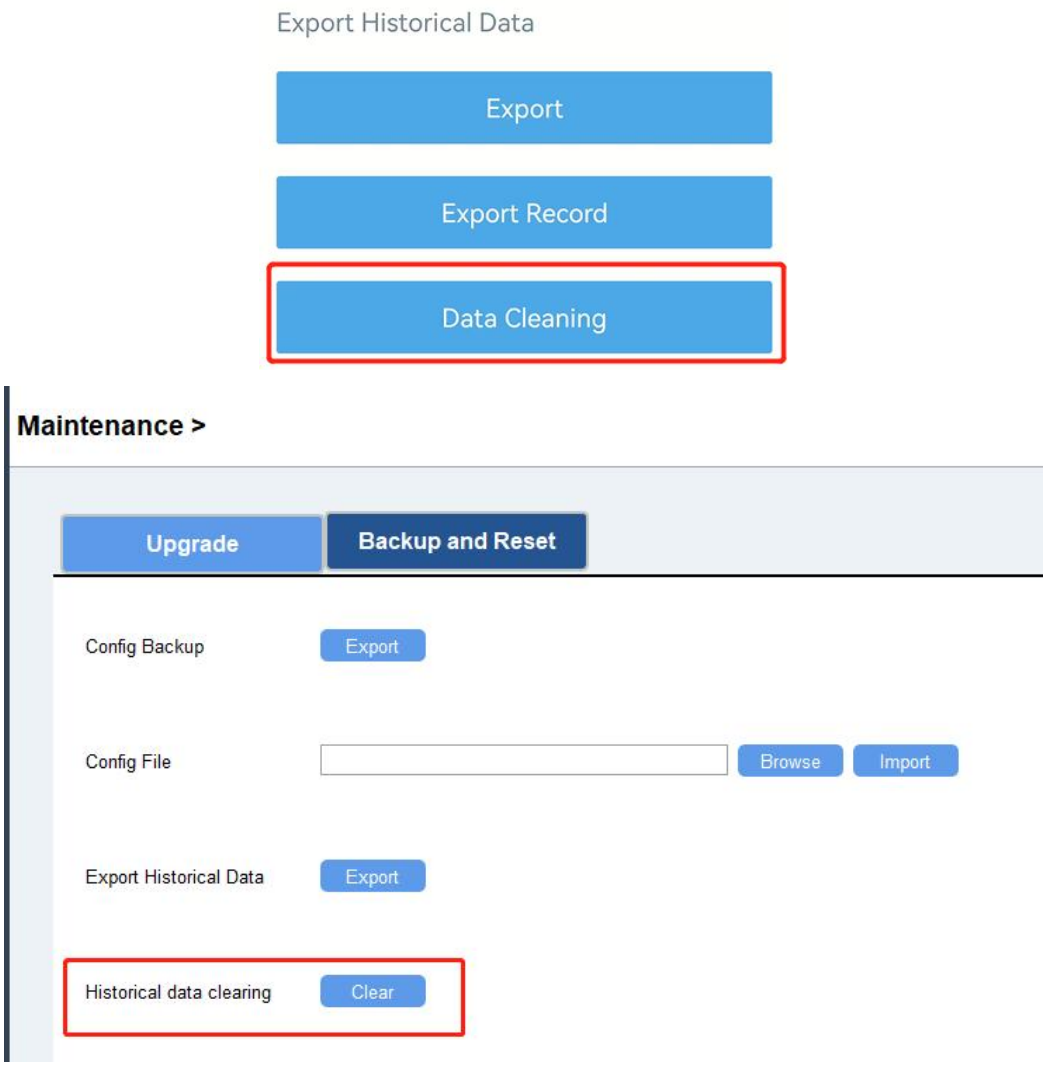
Via ToolBox App: Go to **Device > Maintenance** to tap **Reboot** or **Reset**, then attach the smartphone to the device via NFC to complete the operation.



Via ToolBox software: Go to **Maintenance > Backup and Reset** to click **Reboot** or **Reset**.



Note: Reset operation will not clean the stored data, please click **Data Cleaning** to clear data if necessary.



6. Communication Protocol

WT201 uses the standard Milesight IoT payload format based on IPSO. Please refer to the ***WT201 Communication Protocol***; for decoder and encoders of Milesight IoT products please click here.

7. BACnet Control Point List

When WT201 is integrated to BACnet system via Milesight gateway or Milesight default decoder and encoder, please refer to below list to read and write BACnet objects.

Note:

1) **The reference parameters points the objects to be written together, otherwise the parameters will be failed to change. When users write multiple reference parameters via**

Milesight gateway, ensure these values are sent within 60s.

2) ●=Read only, ●=Read and Write, ●=Write Only.

Parameter	LoRa Object	Object Type	Description	Reference
Protocol Version	ipso_version	characterString Value		
Hardware Version	hardware_version	characterString Value		
Firmware Version	firmware_version	characterString Value		
TSL Version	tsl_version	characterString Value		
Power On Status	device_status	Binary Input	1: Power on	
Class Type	lorawan_class	Multistate Value	1: Class A 2: Class B 3: Class C 4: Class C to B	
Device SN	sn	characterString Value		
Temperature	temperature	Analog Input	Unit: °C(62)	
Target Temperature	temperature_target	Analog Value	Unit: °C(62)	temperature_control_mode, temperature_unit
Humidity	humidity	Analog Input	Unit: %r.h(29)	
Temperature Exception	temperature_exception	Multistate Value	1: Read failed 2: Out of range	
Humidity Exception	humidity_exception	Multistate Value	1: Read failed 2: Out of range	
Temperature Control Mode	temperature_control_mode	Multistate Value	1: Heat 2: Emergency Heat 3: Cool 4: Auto	temperature_target, temperature_unit
Temperature Control Status	temperature_control_status	Multistate Value	1: Standby 2:1-stage heat 3: 2-stage heat 4: 3-stage heat	

			5: 4-stage heat 6: emergency heat 7: 1-stage cool 8: 2-stage cool	
Fan Mode	fan_mode	Multistate Value	1: Auto 2: Always on 3: Circulate	
Fan Status	fan_status	Multistate Value	1: Off 2: High speed 3: Low speed 4: On	
Plan Enable	plan_enable	Binary Input	0: Disable, 1: Enable	
Plan Event	plan_event	Multistate Value	1: Not executed 2: Wake 3: Away 4: Home 5: Sleep	
System Status	system_status	Binary Input	0: Off, 1: On	
Control Permission	control_permissions	Multistate Value	1: Thermostat 2: Remote Control	
Temperature Alarm	temperature_alarm	Multistate Value	1: Emergency Heating Timeout Alarm 2: Auxiliary Heating Timeout Alarm 3: Persistent Low Temperature Alarm 4 : Persistent Low Temperature Alarm Release 5: Persistent High Temperature Alarm 6: Persistent High Temperature Alarm	

			Release 7: Freeze Protection Alarm 8: Freeze Protection Alarm Release 9: Temperature Threshold Alarm 10: Temperature Threshold Alarm Release	
Report Interval	report_interval	Analog Value	Unit: min(72)	
Collection Interval	collection_interval	Analog Value	Unit: s(73)	
System On/Off	temperature_control_enable	Binary Value	0: Disable, 1: Enable	
Temperature Unit	temperature_unit	Multistate Value	1: °C 2: °F	temperature_target, temperature_control_mode
Temperature Calibration Enable	temperature_calibration.enable	Binary Value	0: Disable, 1: Enable	Both objects should be written together
Temperature Calibration Value	temperature_calibration.temperature	Analog Value	Unit: °C(62)	
Humidity Calibration Enable	humidity_calibration.enable	Binary Value	0: Disable, 1: Enable	Both objects should be written together
Humidity Calibration Value	humidity_calibration.humidity	Analog Value	Unit: %r.h(29)	
Target Temperature Tolerance	temperature_tolerance.target_temperature_tolerance	Analog Value	Unit: °C(62)	Both objects should be written together
Temperature Control Tolerance	temperature_tolerance.auto_temperature_tolerance	Analog Value	Unit: °C(62)	

Fan Delay Enable	fan_delay_enable	Binary Value	0: Disable, 1: Enable	Both objects should be written together
Fan Delay Duration	fan_delay_time	Analog Value	Unit: min(72)	
Fan Circulate Operation Time	fan_execute_time	Analog Value	Unit: min(72)	
Fan Regulate Humidity Enable	fan_dehumidify.enable	Binary Value	0: Disable, 1: Enable	Both objects should be written together
Fan Regulate Humidity Interval	fan_dehumidify.execute_time	Analog Value	Unit: min(72)	
Target Humidity Range Min.	humidity_range.min	Analog Value	Unit: %r.h(29)	Both objects should be written together
Target Humidity Range Max.	humidity_range.max	Analog Value	Unit: %r.h(29)	
Temperature Control and Dehumidify Enable	temperature_dehumidify.enable	Binary Value	0: Disable, 1: Enable	Both objects should be written together
Temperature Control and Dehumidify Tolerance	temperature_dehumidify.temperature_tolerance	Analog Value	Unit: °C(62)	
Temperature Control Condition Type	temperature_level_up_condition.type	Multistate Value	1: Heat 2: Cool	These objects should be written together
Temperature Control Condition Time	temperature_level_up_condition.time	Analog Value	Unit: min(72)	
Temperature Control Condition Temperature Change	temperature_level_up_condition.temperature_error	Analog Value	Unit: °C(62)	
External Temperature Sensor Enable	outside_temperature_control_config.enable	Binary Value	0: Disable, 1: Enable	Both objects should be written together
External Temperature Sensor Timeout	outside_temperature_control_config.timeout	Analog Value	Unit: min(72)	

Send External Temperature Value	outside_temperature	Analog Input	Unit: °C(62)	
Freeze Protection Enable	freeze_protection_config.enable	Binary Value	0: Disable, 1: Enable	Both objects should be written together
Freeze Protection Temperature	freeze_protection_config.temperature	Analog Value	Unit: °C(62)	
Child Lock-System On/Off	child_lock_config.power_button	Binary Value	0: Disable, 1: Enable	
Child Lock-Temperature +	child_lock_config.up_button	Binary Value	0: Disable, 1: Enable	
Child Lock-Temperature-	child_lock_config.down_button	Binary Value	0: Disable, 1: Enable	
Child Lock-Fan Mode	child_lock_config.fan_button	Binary Value	0: Disable, 1: Enable	
Child Lock-Temperature Control Mode	child_lock_config.mode_button	Binary Value	0: Disable, 1: Enable	
Child Lock-Reset and Reboot	child_lock_config.reset_button	Binary Value	0: Disable, 1: Enable	
Wire Relay Y1	wires_relay_config.y1	Binary Value	0: Disable, 1: Enable	
Wire Relay Y2/GL	wires_relay_config.y2_gl	Binary Value	0: Disable, 1: Enable	
Wire Relay W2	wires_relay_config.w1	Binary Value	0: Disable, 1: Enable	
Wire Relay AUX	wires_relay_config.w2_aux	Binary Value	0: Disable, 1: Enable	
Wire Relay E	wires_relay_config.e	Binary Value	0: Disable, 1: Enable	
Wire Relay G	wires_relay_config.g	Binary Value	0: Disable, 1: Enable	
Wire Relay OB	wires_relay_confi	Binary Value	0: Disable, 1: Enable	

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Remote Control Offline Mode	offline_control_mode	Multistate Value	1: keep (current status) 2: Thermostat control 3: All off	
Screen Display	screen_display_mode	Multistate Value	1: Enable 2: Disable plan display 3: Disable	

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