



Smart Thermostat

Featuring LoRaWAN[®]

WT201

User Guide



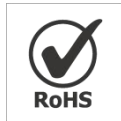
Safety Precautions

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 should not be responsible 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.

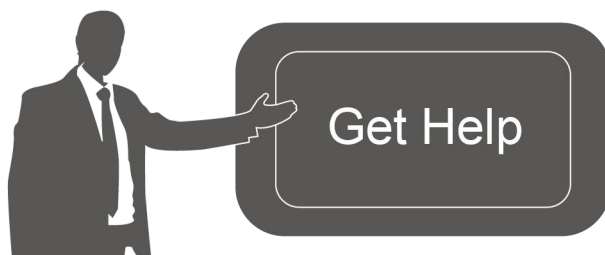
Declaration of Conformity

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



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Revision History

| Date | Doc Version | Description |
|---------------|-------------|--|
| Jan. 17, 2025 | V 2.0 | Initial version based on hardware v2.x |

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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, WT201 continuously displays the room status while monitoring the ambient temperature and humidity. 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 Development Platform solution, users can control the room temperature as well as trigger other sensors or appliances easily via a webpage remotely.

1.2 Key Features

- Support most 24VAC HVAC system, including furnaces and air conditioners (2H/2C), heat pumps (4H/2C or 3H/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 7 working modes and allow up to 16 schedules for each mode
- Enabling real-time monitoring ensures timely alerts for sudden temperature changes
- Built-in temperature and humidity sensor, enabling environmental detection and accurate control
- Store locally 1000 historical records and support retransmission to prevent data loss
- Support flexible adjustments based on time zones and summer/winter time catering to region differences

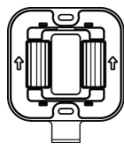
- Compatible with hotel room card systems for convenient remote management
- Equips with RTC to keep time correct for 72 hours even without power supply
- Equipped with NFC for one touch configuration
- Function well with standard LoRaWAN® gateways and network servers
- Compatible with BACnet system via Milesight LoRaWAN® gateways
- Compatible with Milesight Development Platform
- Supports Milesight D2D protocol to enable ultra-low latency control without gateway
- Supports multicast for control in bulk
- Support Firmware Update Over the Air (FUOTA) feature

2. Hardware Introduction

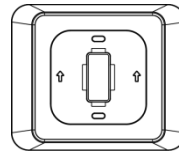
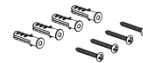
2.1 Packing List



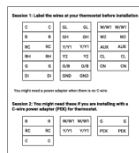
1 × WT201 Device



1 × Wiring Backplate

1 × Decorative
Cover Plate4 × Wall
Mounting Kits

1 × Fixing Screw

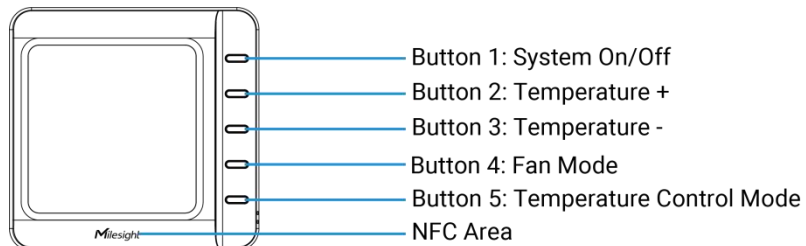
1 × Thermostat Wire
Label Sticker1 × Quick Start
Guide

1 × Warranty Card

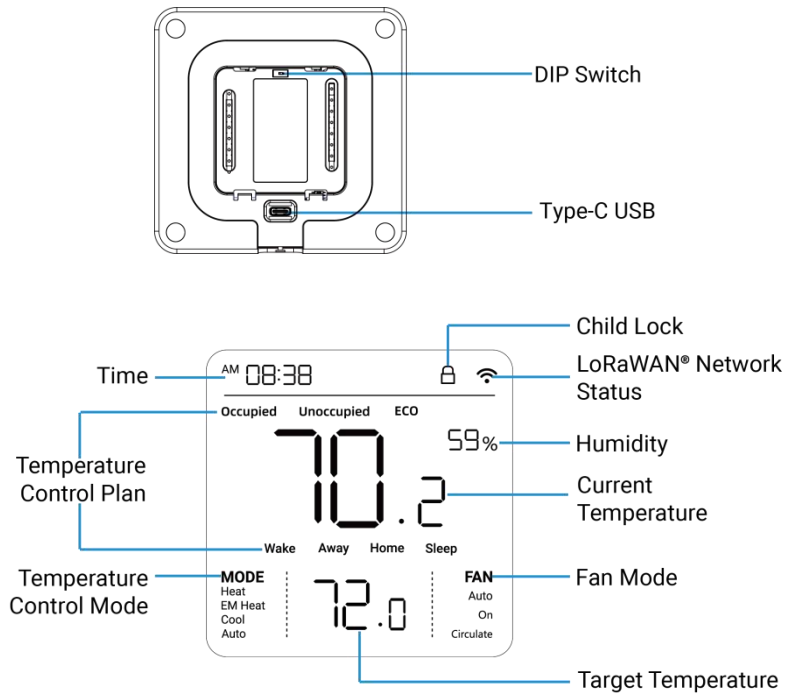


If any of the above items are missing or damaged, please contact your sales representative.

2.2 Hardware Overview






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



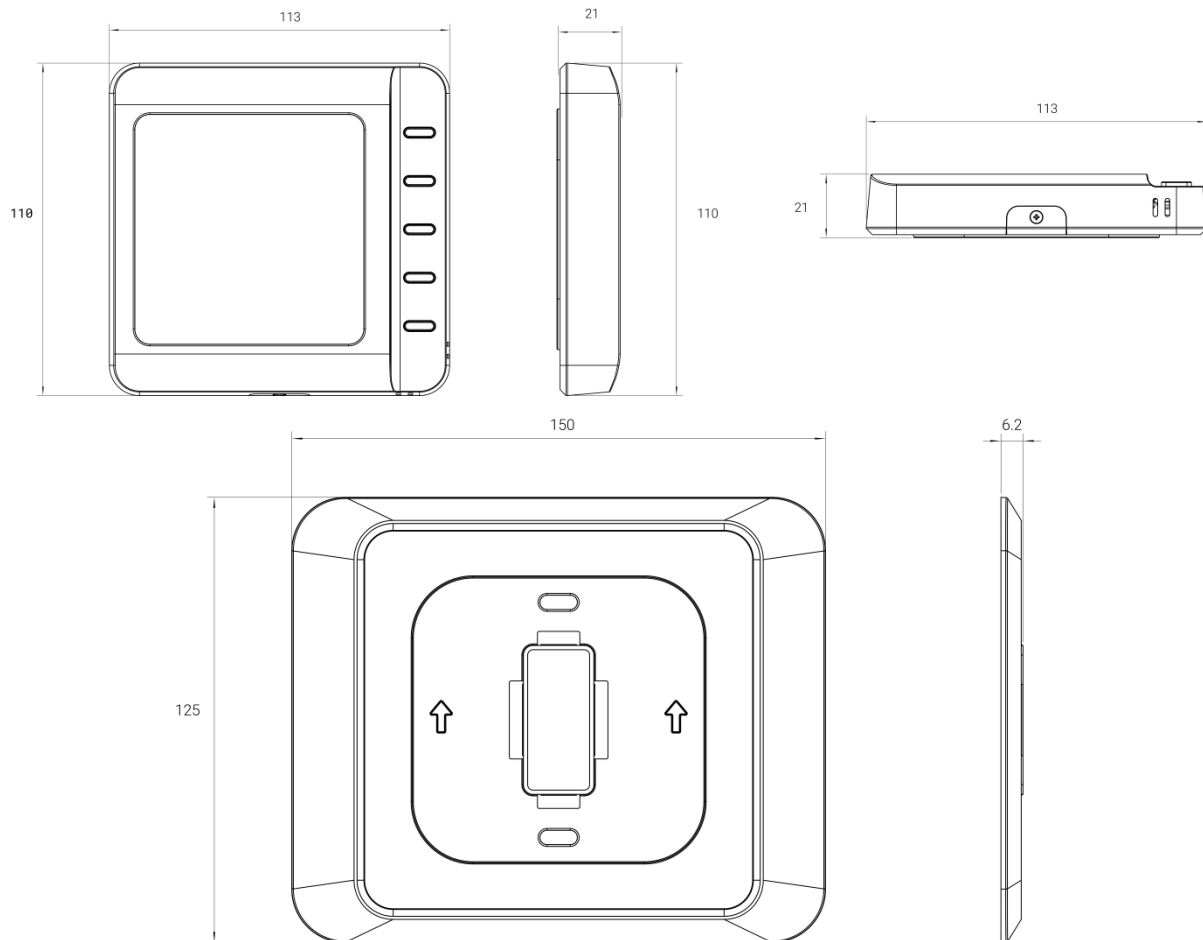
Note:

- 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 sensors by default. If the external sensor values are required to display, please enable D2D Data Receiving Settings or set external sensor mode via downlink commands in WT201 Communication Protocol . |

2.3 Dimensions (mm)



3. Wiring Diagrams

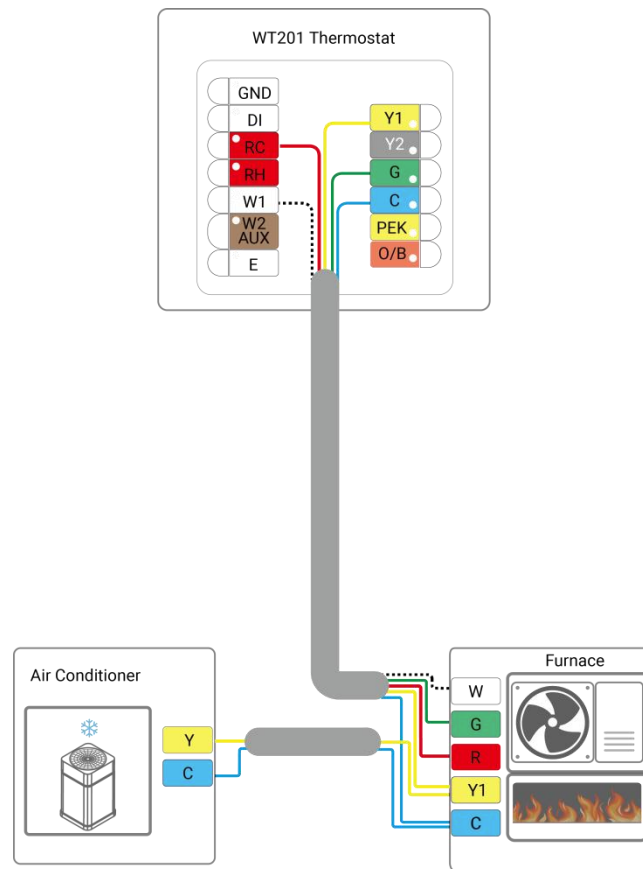
3.1 Wiring Descriptions

| Wire | Description |
|--------|--|
| GND | GND of Digital Input |
| DI | Dry contact for keycard switches, magnet switches, etc. |
| RC | Power of cooling system and heating system(24VAC) |
| RH | Power of heating system(24VAC) |
| W1 | Heating/The first stage of heating. |
| W2/AUX | Either W2 or AUX can be selected. W2: The second stage of heating AUX: Auxiliary heating which supports Auxiliary Heating Duration and Compressor and Auxiliary Heating Duration |
| E | Emergency heating used on very cold days for freeze protection |
| Y1 | The first stage of cooling on cooling system or compressor on heat pump system |

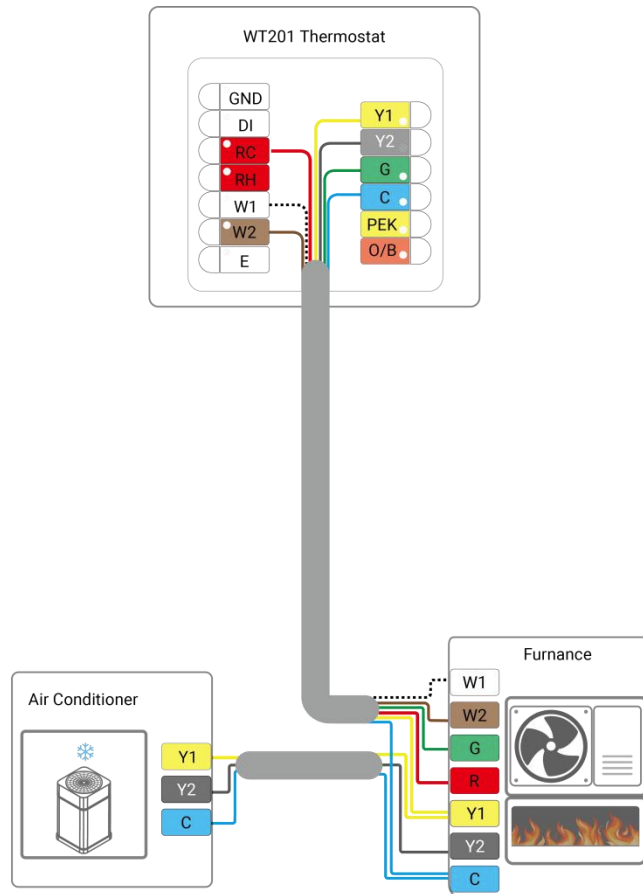
| | |
|-------|--|
| Y2/GL | <p>Either Y2 or GL can be selected.</p> <p>Y2: The second stage of cooling on cooling system or compressor on heat pump system</p> <p>GL: Control fan to low speed.</p> |
| G/GH | <p>G: Control fan</p> <p>GH: Control fan to high speed</p> |
| C | Common of 24VAC power. It also might be labeled as X or B wire. |
| PEK | Connect Power Extender Kit when there is no C wire. |
| O/B | <p>Switch between heating and cooling on the heat pump system.</p> <p>Note: If you only have O wire or B wire, please connect to O/B terminal and enable it by configuring Reversing Valve.</p> |

3.2 Wiring Examples

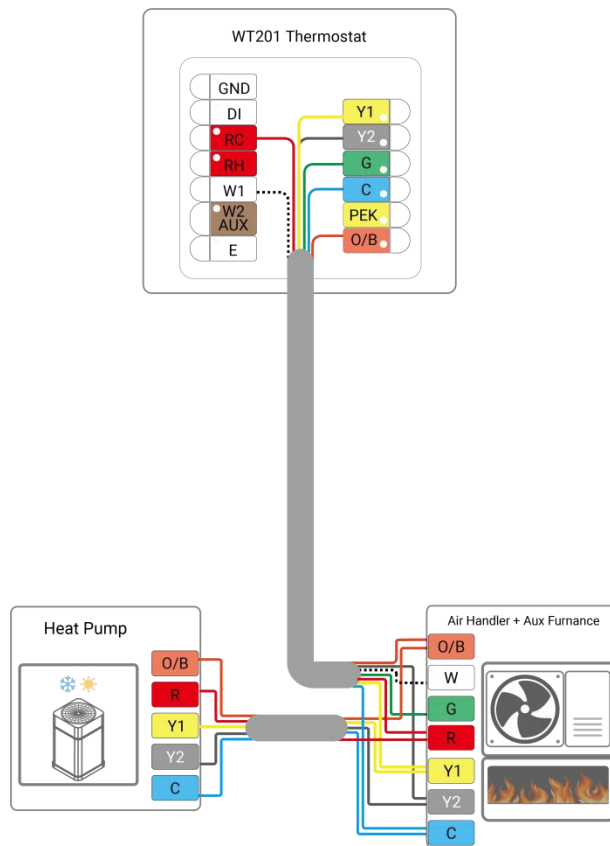
1. Furnace + Air Conditioner



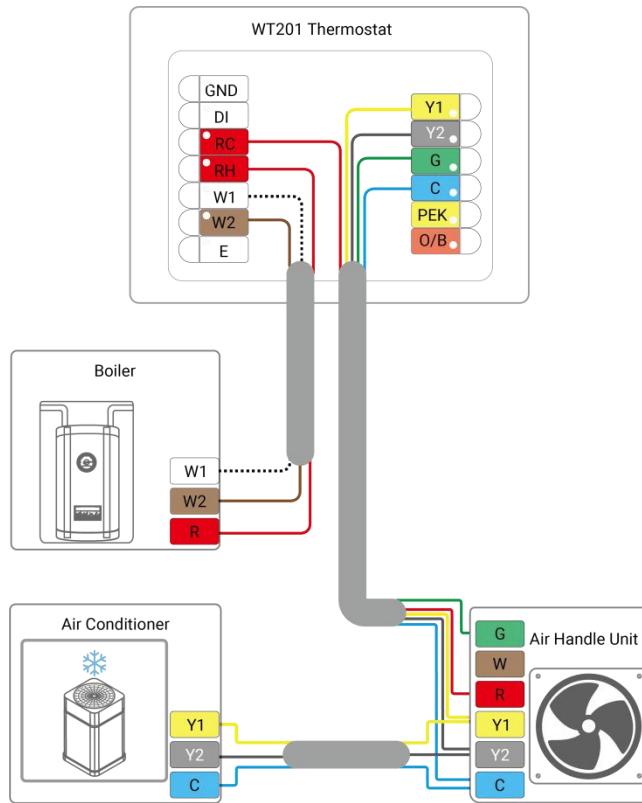
2. Furnace (2-stage) + Air Conditioner (2-stage)



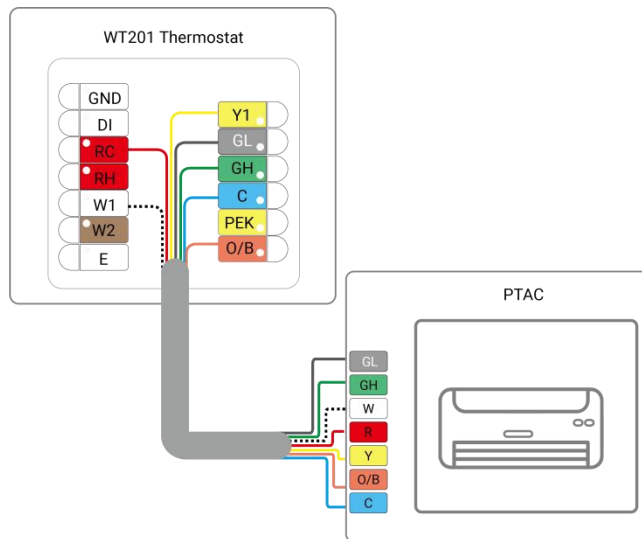
3. Heat Pump with Auxiliary Heat



4. Boiler + Air Conditioner



5. PTAC



3.3 Power Extension Kit (PEK)

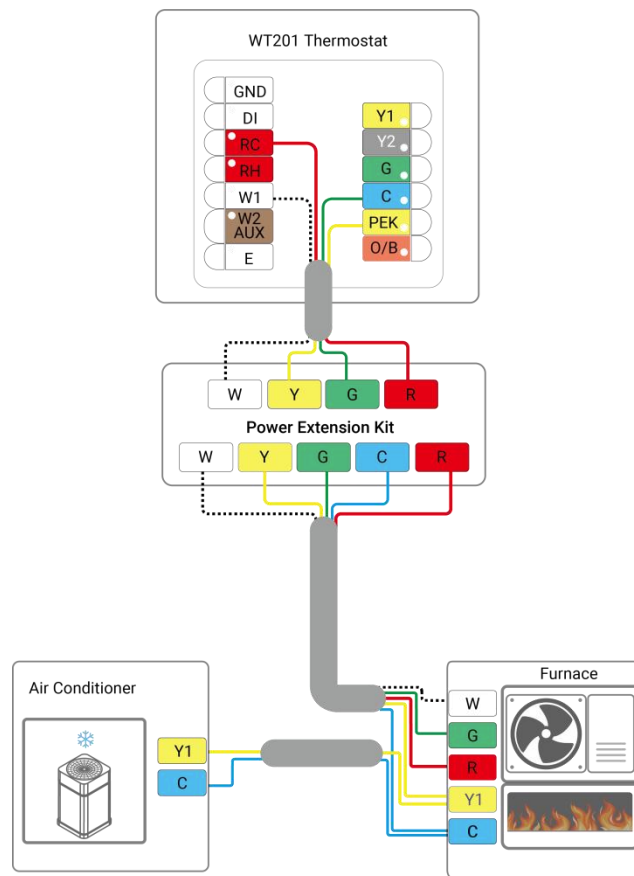
If there is no C or common wire and at least 4 wires are used on the old thermostat, it is necessary to add a Power Extension Kit (PEK), which is able to create a C wire using the existed thermostat wiring by combining the functions of Y and G to one wire Y.

Installation Steps

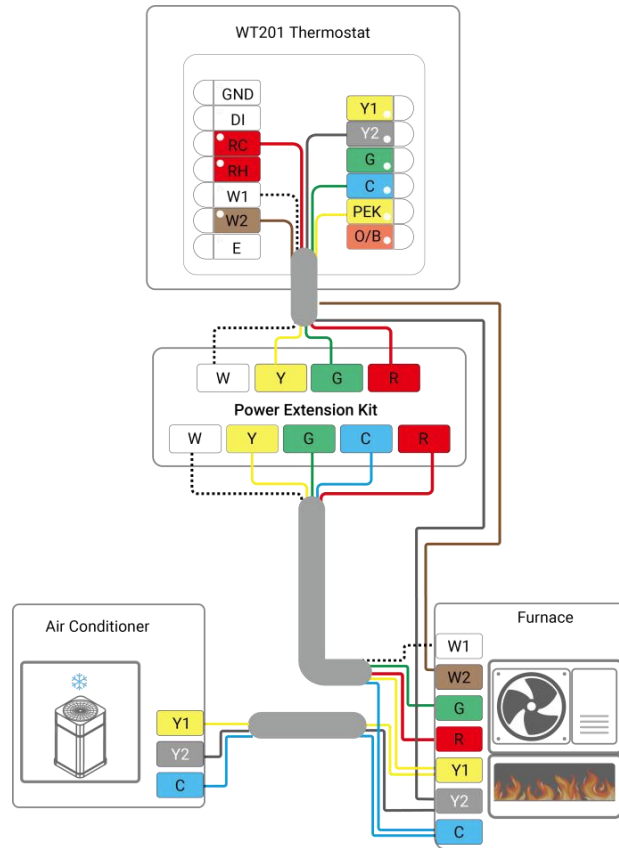
1. Ensure the circuit of all related systems are shut off before installation.
2. Remove the wires W, Y, G, R from HVAC system and the old thermostat and label these wires with stickers.
3. Connect one side (W, Y, G, C, R) of PEK to the HVAC system with PEK matched wires.
4. Connect the other side (W, Y, G, R) of PEK to the WT201 device with the wires removed from Step 2.

Wiring Examples

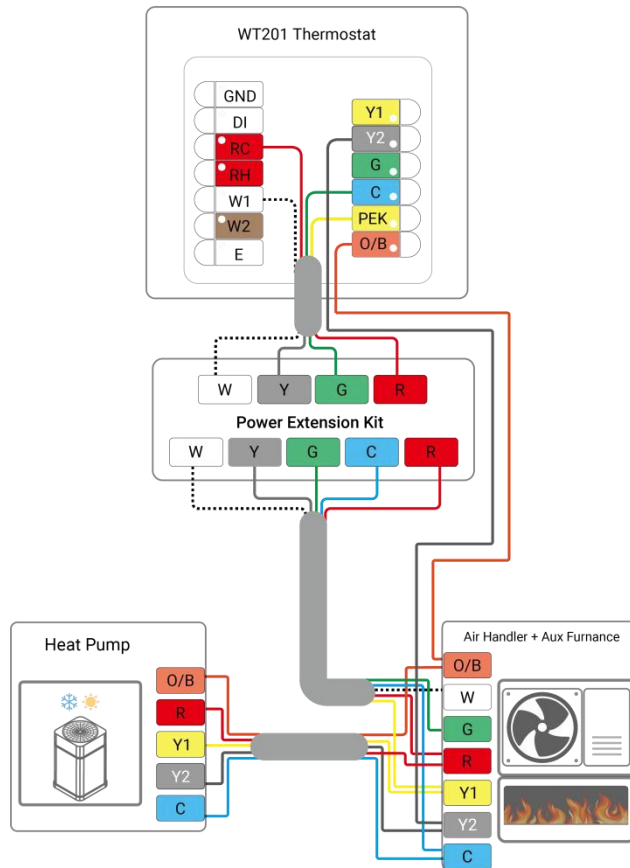
1. Furnace + Air Conditioner



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



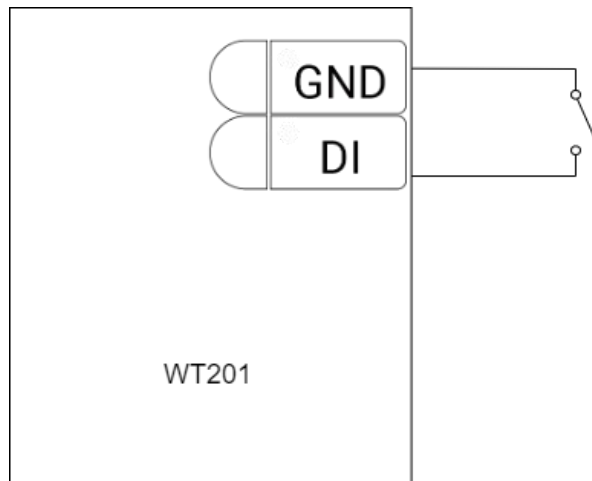
3. Heat Pump with Auxiliary Heat



3.4 DI Wiring

Low level: DI and GND is closed;

High level: DI and GND is open.

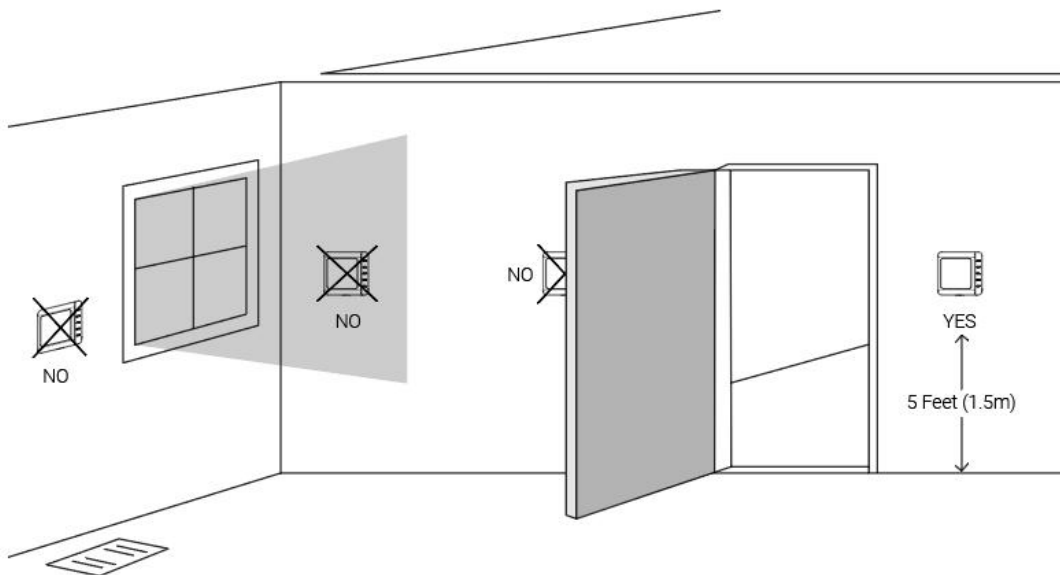


4. Installation

Installation Locations

When using built-in temperature sensor, 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.

Note: if installation in an appropriate location is not possible, please send downlink commands to enable to receive external sensor data from network server or other Milesight D2D devices.



Do not install the device where:

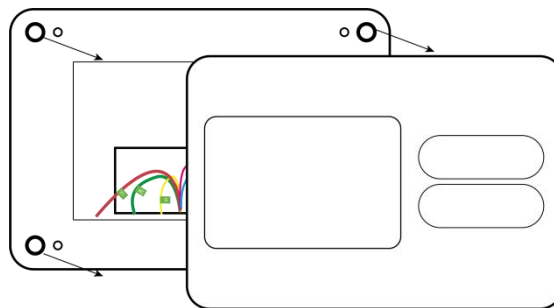
- Close to hot or cold sources like hot or cold air ducts;
- The place in direct sunlight;

- 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.

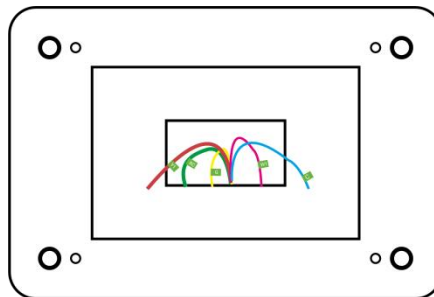
Installation Steps

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 (150mA) for long time, which will damage the device.

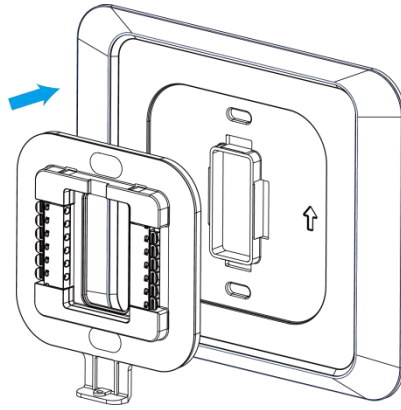


3. Disconnect the wires from old thermostat and label the wires with stickers. It is suggested to take a photo of the connected wires on the old thermostat for reference.

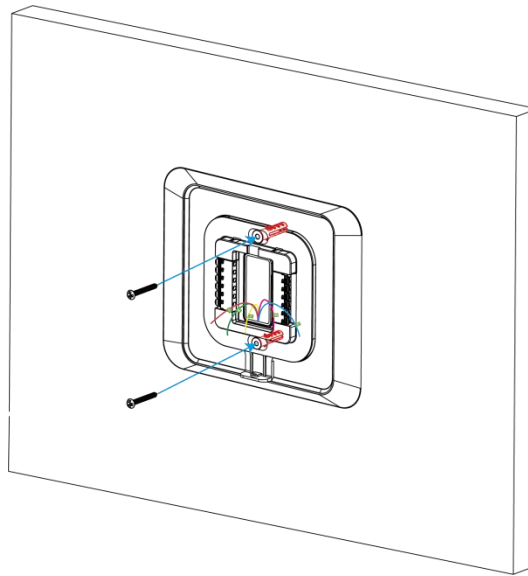


4. Remove the mounting plate of old thermostat. When removing, ensure that the wires do not fall into the holes.
5. Press the wiring backplate to decorative cover plate to fix them together. Ignore this step if you are not using a decorative cover plate.

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.



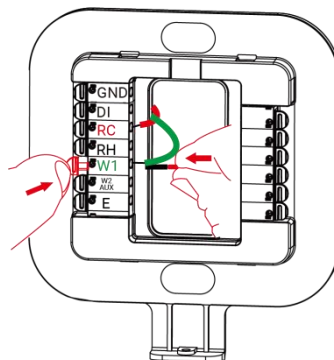
6. Pass the wires through the hole in the middle of the wiring backplate, then fix the wiring backplate (and decorative cover plate) to the wall using wall plugs and wall mounting screws.



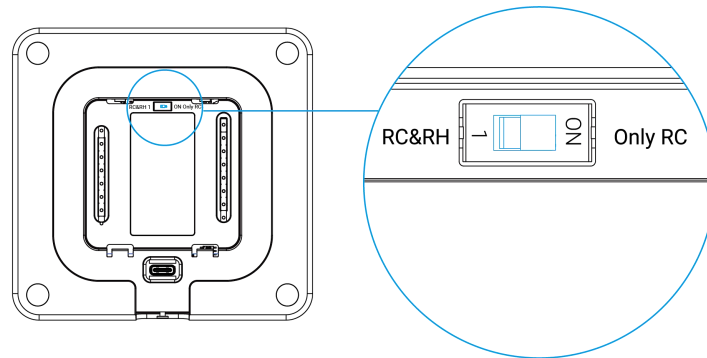
7. Hold the tabs and insert the wires into the holes of the corresponding terminals on the wiring backplate until they are firmly in place. Gently tug the wires to ensure that they are securely connected. If you need to release the wires again, take off the terminal tabs.

8. Push the remaining wires back into the hole on the wall.

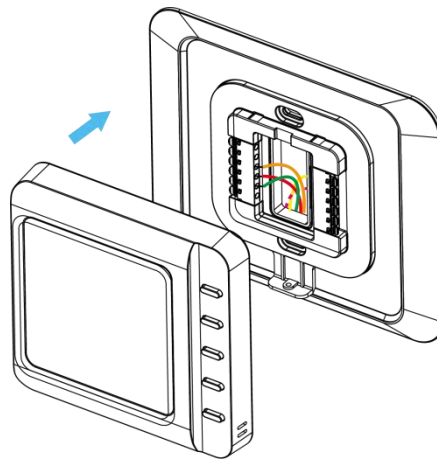
Note: Unused cables must be insulated and secured.



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.

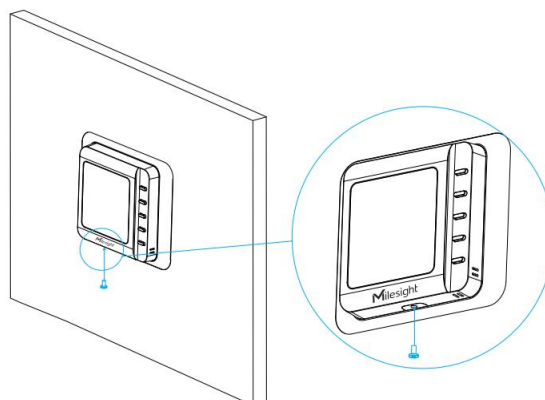


10. Push the WT201 device into the wiring backplate gently and ensure that both parts are securely fixed.



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.

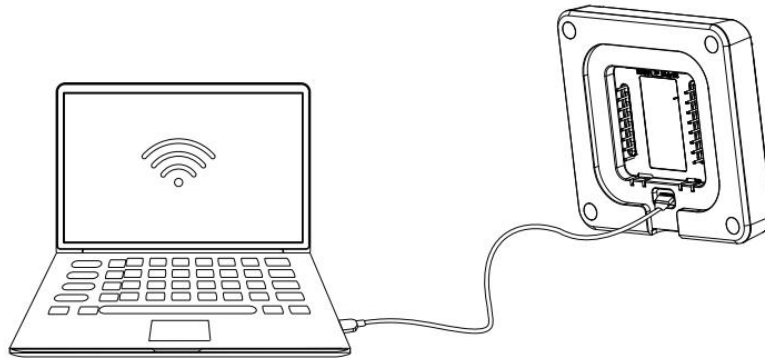


5. Operation Guide

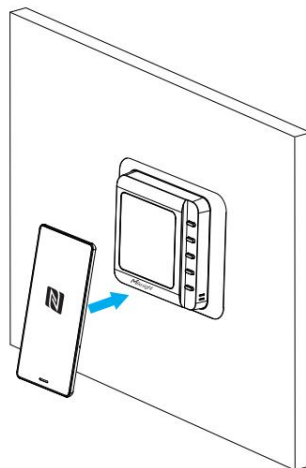
5.1 ToolBox Login

WT201 can be configured via NFC.

1. Remove the WT201 device from the backplate, connect the device to a computer or other power supply via the Type-C port.



2. Download and install the Milesight ToolBox App from Google Play or Apple App Store.
3. Enable NFC on the smartphone and launch Milesight ToolBox.
4. Select the reading mode as NFC and attach the NFC area of a smartphone to the device. 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.

5.2 LoRaWAN® Settings

5.2.1 Basic Settings

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

Device
Network

LoRaWAN D2D

Device EUI

24E124408E527738

APP EUI

24e124c0002a0001

* Application Port

85

LoRaWAN Version

V1.0.3 ▼

| 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. |
| LoRaWAN® Version | V1.0.2 and V1.0.3 are available. |
| Work Mode | It's fixed as Class C. |
| Confirmed Mode | If the device does not receive an ACK packet from the network server, it will resend data once. |
| 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 | Appskey for ABP mode, the default is |

| | | | | | | | | | | | | | |
|--------------------------------|---|-------|-------------------------------------|-------|-------------------------------------|-------|-------------------------------------|-------|--------------------------|-------|--------------------------|-----|--------------------------|
| Session Key | 5572404C696E6B4C6F52613230313823. | | | | | | | | | | | | |
| Device Address | DevAddr for ABP mode, the default is the 5th to 12th digits of the SN. | | | | | | | | | | | | |
| Rejoin Mode | <p>Reporting interval \leq 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.</p> <p>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.</p> <p>Note: Only OTAA mode supports rejoin mode.</p> | | | | | | | | | | | | |
| Set the number of packets sent | <p>When the rejoin mode is enabled, set the number of LinkCheckReq packets to send.</p> <p>Note: the actual sending number is Set the number of packet sent + 1.</p> | | | | | | | | | | | | |
| Support Frequency | <p>Select the channel plan and the frequency to send uplinks.</p> <p>* Support Frequency</p> <p>EU868</p> <p>Frequency/MHz</p> <table border="1"> <tr> <td>868.1</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>868.3</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>868.5</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>867.1</td> <td><input type="checkbox"/></td> </tr> <tr> <td>867.3</td> <td><input type="checkbox"/></td> </tr> <tr> <td>...</td> <td><input type="checkbox"/></td> </tr> </table> <p>If frequency is one of AU915/US915, enter the index of the channel that you want to enable and make them separated by commas.</p> <p>Examples:</p> <p>1, 40: Enabling Channel 1 and Channel 40</p> <p>1-40: Enabling Channel 1 to Channel 40</p> <p>1-40, 60: Enabling Channel 1 to Channel 40 and Channel 60</p> <p>All: Enabling all channels</p> <p>Null: Indicates that all channels are disabled</p> | 868.1 | <input checked="" type="checkbox"/> | 868.3 | <input checked="" type="checkbox"/> | 868.5 | <input checked="" type="checkbox"/> | 867.1 | <input type="checkbox"/> | 867.3 | <input type="checkbox"/> | ... | <input type="checkbox"/> |
| 868.1 | <input checked="" type="checkbox"/> | | | | | | | | | | | | |
| 868.3 | <input checked="" type="checkbox"/> | | | | | | | | | | | | |
| 868.5 | <input checked="" type="checkbox"/> | | | | | | | | | | | | |
| 867.1 | <input type="checkbox"/> | | | | | | | | | | | | |
| 867.3 | <input type="checkbox"/> | | | | | | | | | | | | |
| ... | <input type="checkbox"/> | | | | | | | | | | | | |

| | <p>* Support Frequency</p> <p>US915</p> <p>Enable Channel Index ⓘ</p> <p>0-71</p> <table border="1"> <thead> <tr> <th>Index</th> <th>Frequency/MHz ⓘ</th> </tr> </thead> <tbody> <tr> <td>0 - 15</td> <td>902.3 - 905.3</td> </tr> <tr> <td>16 - 31</td> <td>905.5 - 908.5</td> </tr> <tr> <td>32 - 47</td> <td>908.7 - 911.7</td> </tr> <tr> <td>48 - 63</td> <td>911.9 - 914.9</td> </tr> <tr> <td>64 - 71</td> <td>903 - 914.2</td> </tr> </tbody> </table> | Index | Frequency/MHz ⓘ | 0 - 15 | 902.3 - 905.3 | 16 - 31 | 905.5 - 908.5 | 32 - 47 | 908.7 - 911.7 | 48 - 63 | 911.9 - 914.9 | 64 - 71 | 903 - 914.2 |
|---------------|--|-------|-----------------|--------|---------------|---------|---------------|---------|---------------|---------|---------------|---------|-------------|
| Index | Frequency/MHz ⓘ | | | | | | | | | | | | |
| 0 - 15 | 902.3 - 905.3 | | | | | | | | | | | | |
| 16 - 31 | 905.5 - 908.5 | | | | | | | | | | | | |
| 32 - 47 | 908.7 - 911.7 | | | | | | | | | | | | |
| 48 - 63 | 911.9 - 914.9 | | | | | | | | | | | | |
| 64 - 71 | 903 - 914.2 | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |

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 Development Platform to manage devices.

5.2.2 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 bulk.

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

Multicast Group1

Multicast Address (i)

McNetSKey

McAppSKey

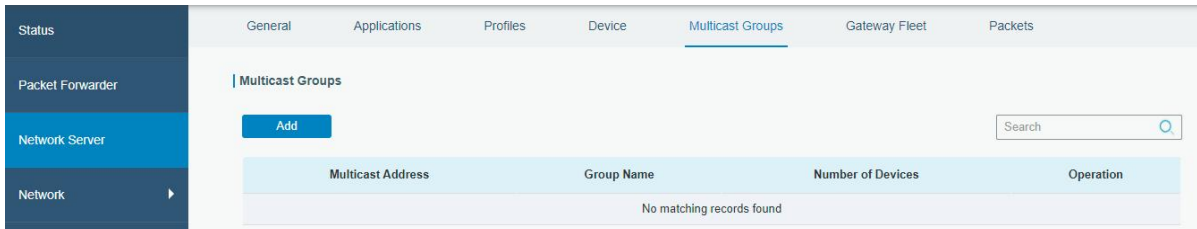
Multicast Group2

Multicast Group3

Multicast Group4

| 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**.

| | |
|-----------------------------------|---|
| Group Name | Room Control |
| Multicast Address | 11111111 |
| Multicast Network Session Key | 5572404C696E6B4C6F526132 |
| Multicast Application Session Key | 5572404C696E6B4C6F526132 |
| Class Type | Class C <input type="button" value="v"/> |
| Datarate | DR8(SF12, 500kHz) <input type="button" value="v"/> |
| Frequency | 923300000 Hz |
| Frame-counter | 0 |
| Selected Devices | <div style="border: 1px solid #ccc; padding: 5px;"> WT201 x WT201_2 x </div> |

| Multicast Address | Group Name | Number of Devices | Operation |
|-------------------|--------------|-------------------|---|
| 11111111 | Room Control | 2 | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |

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.

| Device EUI | Type | Payload | Port | Confirmed | Send |
|------------------|--|---------|------|--------------------------|-------------------------------------|
| 0000000000000000 | ASCII <input type="button" value="v"/> | | 85 | <input type="checkbox"/> | <input type="button" value="Send"/> |

| Multicast Group | Type | Payload | Port | Send |
|---|--------------------------------------|---------|------|-------------------------------------|
| Room Control <input type="button" value="v"/> | hex <input type="button" value="v"/> | #f0f | 85 | <input type="button" value="Send"/> |

5.3 General Settings

Reporting Interval(min)

Temperature Unit

Control Permissions

System On/Off

Child Locks

Time Mode

Time Zone

Daylight Saving Time

Start Time Oct. | 1st | Sun. | 02:00AM

End Time Apr. | 1st | Sun. | 02:00AM

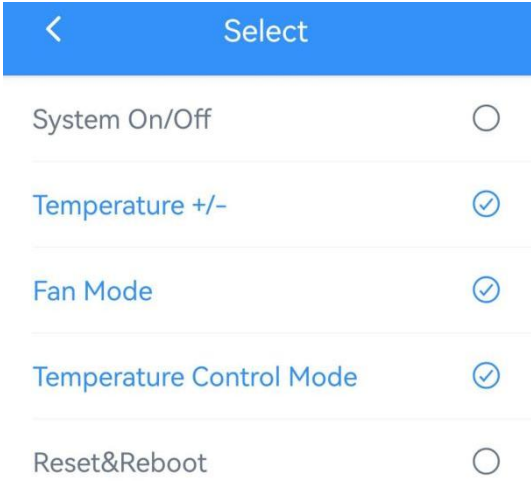
DST Bias 60 min

Data Storage

Data Retransmission

Change Password

| 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. Note: reported unit is fixed as °C. |
| Control Permissions | Select the control permission as Thermostat or Remote Control . Thermostat: control the temperature according to the settings and programs of WT201. Remote Control: control the temperature by controlling the relay output |

| | |
|-------------------------------------|--|
| | statuses directly. |
| 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 Lock | <p>Enable to lock the button features. After enabled, the device can only control these features via ToolBox or downlink commands.</p>  |
| 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 to sync time, the device will also sync the time zone from smartphone automatically. |
| Daylight Saving Time | <p>Enable or disable Daylight Saving Time (DST).</p> <p>Start Time: the start time of DST time range.</p> <p>End Time: the end time of DST time range.</p> <p>DST Bias: the DST time will be faster according to this bias setting.</p> |
| 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. |

5.3.1 Thermostat Settings

WT201 provides detailed settings to achieve the temperature control via the algorithm developed by Milesight. Before configuration, ensure the corresponding wires are connected, and correct wires are selected in the [Installation Settings](#).

Temperature Control Mode Enable

Heat, EM Heat, Cool, Auto ▼

Temperature Control Mode

Auto ▼

Target Temperature Mode

Single Target Temperature ▼

Target Temperature Resolution

0.5 ▼

Target Temperature(°C)

23

Target Temperature Tolerance(°C)

1

Temperature Control Tolerance(°C)

2

Target Temperature Regulation
Range(°C)

10 - 35

Target Humidity Range(%)

40 - 80

Temp. Control and Dehumidify

Temp. Tolerance for
Dehumidification(°C) ⓘ

Fan Mode

Auto

Fan Delay ⓘ

The Duration of Delay(s)

60

Regulate Humidity ⓘ

Regulate Interval(min/h)

30

| Parameters | Description |
|---------------------------------|--|
| Temperature Control Mode Enable | Select the control mode range for the button, ToolBox or downlink command to switches. These mode options are supported according to connected and selected wires. |
| Temperature Control Mode | Select the current mode from the control mode range, this mode can also be switched by button or downlink command. The working condition of every mode depends on the target temperature and tolerance settings of below parameters. |
| Target Temperature Mode | When Temperature Control Mode is Auto, set the target temperature mode. Single Target Temperature: Heat and Cool modes use the same target temperature and tolerance. Dual Target Temperature: Heat and Cool modes use different target temperatures and tolerances. |
| Target Temperature Resolution | Set the resolution of target temperature displayed on the screen and configuration page. |
| Target Temperature | Set target environment temperature. Under Dual Target Temperature mode, it requires to set cool and heat target temperatures. About the setting rule please refer to configuration examples below. |
| Target Temperature Tolerance | Set the tolerance value between target temperature and current temperature. |

| | |
|--------------------------------------|---|
| | Under Dual Target Temperature mode, it requires to set cool and heat target temperature tolerances. |
| Temperature Control Tolerance | When temperature control mode is Auto and under Single Target Temperature mode, 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. Range: 5-35°C (41-95°F) Note: the maximum range value should be larger than the minimum range value. |
| 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. |
| Fan Mode | Select from Auto, On and Circulate. Fan mode is only supported when G wire is connected and can also be switched by button or downlink commands. Auto: open when the system is cooling or heating. 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. |
| Fan Delay | Enable to delay the close of fan after the heating or cooling control stops. The Duration of Delay: Set the duration of the fan's deferred closing after the heating or cooling control stops. |
| Regulate Humidity | This feature supports to work with dehumidifier or humidifier. When not reaching target humidity range, the device will turn on the fan for some times. This feature only works when fan mode is Auto. Regulate Interval (min/h): set the interval to turn on the fan per hour. |

Configuration Examples:

(1) Temperature control mode is Heat or Cool.

Target temperature (T) = 23,

target temperature tolerance(ΔT)=1,
temp. Tolerance for dehumidification(ΔT_d)=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 ($T - \Delta T$) | 24 ($T + \Delta T$) | 25 ($T + \Delta T + \Delta T_d$) |
| Cool | 24 ($T + \Delta T$) | 22 ($T - \Delta T$) | 21 ($T - \Delta T - \Delta T_d$) |

(2) Temperature control mode is Auto (Single Target).

Target temperature(T) = 23,
target temperature tolerance(ΔT)=1,
temperature control tolerance(ΔT_a)=2,
temp. Tolerance for dehumidification(ΔT_d)=1.

The expected start and stop cooling or heating temperature is:

| Mode | Start Temperature | Stop Temperature | Stop Temperature (Temp. Control and Dehumidify Enabled) |
|------|------------------------------------|-----------------------|---|
| Heat | 20 ($T - \Delta T - \Delta T_a$) | 24 ($T + \Delta T$) | 25 ($T + \Delta T + \Delta T_d$) |
| Cool | 26 ($T + \Delta T + \Delta T_a$) | 22 ($T - \Delta T$) | 21 ($T - \Delta T - \Delta T_d$) |

(3) Temperature control mode is Auto (Dual Target).

Cool target temperature(T_{ac}) = 23,
cool target temperature tolerance (ΔT_{ac})=1,
heat target temperature(T_{ah}) = 19,
heat target temperature tolerance (ΔT_{ah})=2,
temp. Tolerance for dehumidification(ΔT_d)=1.

The expected start and stop cooling or heating temperature is:

| Mode | Start Temperature | Stop Temperature | Stop Temperature (Temp. Control and Dehumidify Enabled) |
|------|---------------------------------|---------------------------------|---|
| Heat | 17 ($T_{ah} - \Delta T_{ah}$) | 21 ($T_{ah} + \Delta T_{ah}$) | 22 ($T_{ah} + \Delta T_{ah} + \Delta T_d$) |
| Cool | 24 ($T_{ac} + \Delta T_{ac}$) | 22 ($T_{ac} - \Delta T_{ac}$) | 21 ($T_{ac} - \Delta T_{ac} - \Delta T_d$) |

Note: the heat start temperature should be less than the cool stop temperatures; the heat stop temperatures should be less than the cool start temperature.

5.3.2 Remote Control Settings

WT201 supports to receive downlink commands to control the relay outputs directly to achieve the temperature control. This permission mode is applicable to users which have its own

temperature control programs. Under this permission, the screen will only show temperature, humidity, time, child lock, and network status.

Control Permissions

Remote Control ▼

System On/Off

Child Locks

Room Card Settings ⓘ

Control Objects

System On/Off ▼

| Parameters | Description |
|--------------------|---|
| Room Card Settings | Enable or disable the DI control feature. |
| Control Objects | When a room key card switch is connected to DI and GND of WT201, set the triggering action when DI and GND is closed or open. Default: insert card (DI and GND closed) - system on, remove card (DI and GND open) - system off |

5.4 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](#).

on Threshold Plan **Installation** ...

Wiring Settings

Y1 G(GH) O/B W1

E DI PEK

W2 AUX Y2 GL

Power Settings ⓘ

RC Only ▼

| 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. Energize on Cool: cooling when O/B is closed Energize on Heat: heating when O/B is closed |
| Heating System | W1/W2/AU X/E + G | Select a furnace or boiler. |
| Fan Control during Heating | | Select a thermostat or furnace/boiler to control the fan during heat. |
| 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. |
| Compressor and Auxiliary Heat Linkage | Y1/Y2+O/B +AUX | When the highest heating level of compressor (Y) is not able to reach the target temperature, open the AUX heat. |
| 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. |
| System Protection | Y1/Y2/W1/ W2/AUX/E/ G | Only when the minimum running duration passes, the heating or cooling system can start or stop working. Note: 1) The minimum running duration will not take effect when switching between Y1 and Y2, or GH and GL. 2) The minimum running duration will not take effect when the system on/off or any schedule executes. |
| Room Card Settings | DI | When a key card switch is connected to DI and GND of WT201, set the triggering action when DI and GND is closed or open. The detailed settings can be changed via downlink |

| | |
|--|---|
| | <p>commands.</p> <p>Default:</p> <p>System On/Off: insert card (DI and GND closed) - system on, remove card (DI and GND open) - system off;</p> <p>Insert an Event: insert card (DI and GND closed) - Home plan, remove card (DI and GND open) - Away plan.</p> |
|--|---|

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.

Temperature

| | |
|-------------------|-----------------|
| Current Value(°C) | Final Value(°C) |
| 17.6 | 27.6 |

Calibration Value(°C)

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

Humidity

| | |
|------------------|----------------|
| Current Value(%) | Final Value(%) |
| 19.5 | 37.5 |

Calibration 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.

Temperature

Over / °C

Below / °C

Persistent Low Temperature

Difference in Temperature / °C

Duration(min)

Persistent High Temperature

Difference in Temperature / °C

Duration(min)

5.5.3 Schedule Settings

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

WT201 supports to set 7 kinds of schedule plan: Wake, Away, Home, Sleep, Occupied, Unoccupied and ECO.

1. Select the required plan and click **Edit** to configure the temperature mode, fan mode, target temperature and target temperature tolerance, click **Confirm**.

Threshold **Schedule** Inst: ...

Reset All Schedules

Wake ^

Rule Settings [Edit](#)

Auto Auto

25 ± 3 °C

11:04 AM Everyday

+ Add New 1/16

2. Click **Add** to add the time period to execute this schedule plan. 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.

Time

12:00 AM

Repeat

| | |
|-------------|--------------------------|
| Every Mon. | <input type="checkbox"/> |
| Every Tues. | <input type="checkbox"/> |
| Every Wed. | <input type="checkbox"/> |
| Every Thur. | <input type="checkbox"/> |
| Every Fri. | <input type="checkbox"/> |
| Every Sat. | <input type="checkbox"/> |
| Every Sun. | <input type="checkbox"/> |

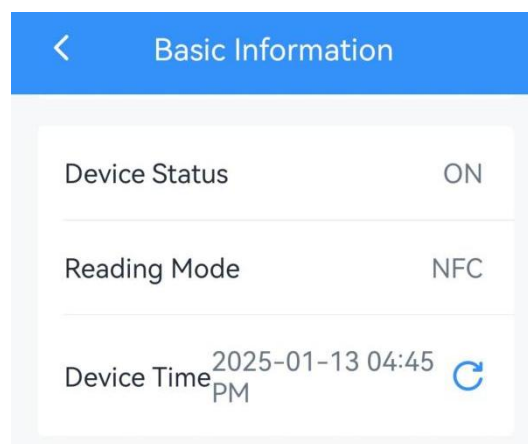
3. Click **Write** to save the schedule settings.

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: When control permission is set to Remote control, the device will stop storing data.

1. Ensure the device time is correct, go to **Device > Basic Information**, click  to sync the time.

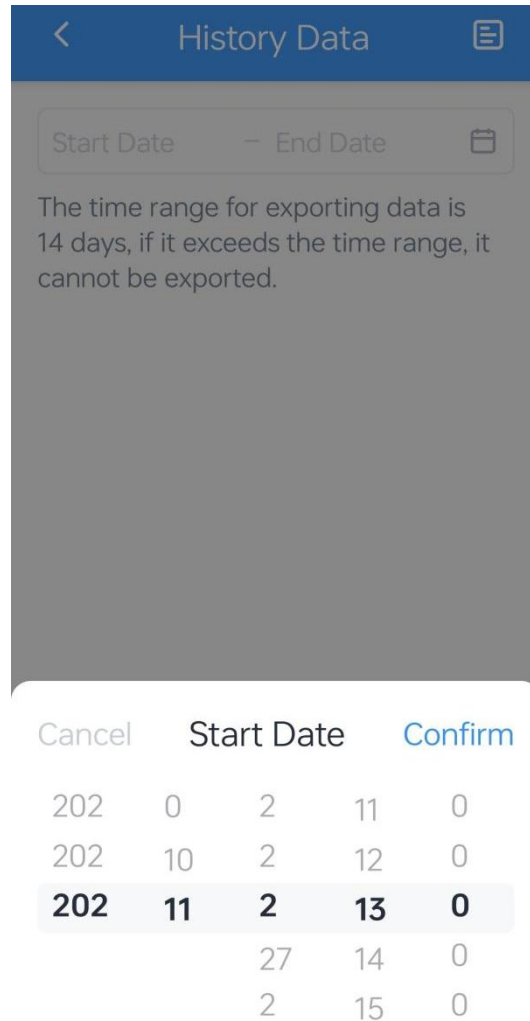


Besides, when device LoRaWAN® version is set as 1.0.3, the device will send MAC commands to ask the network server everytime when it joins the network.

2. Enable the data storage feature.



3. Go to **Maintenance**, click **History Data**, then select the data period and click **Confirm** 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:

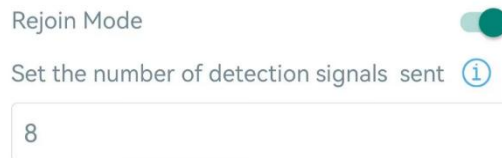
- Network server sends downlink commands to enquire the historical data for a specified time range, refer to **WT201 Communication Protocol**;
- When network is down and the device receives no response of LinkCheckReq MAC packets for a period of time, the device will record during the disconnection period 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, which is able to reduce the latency and achieve the quick control.

5.6.1 Sensor Data Receive Settings

WT201 supports to receive temperature and humidity sensor data from Milesight sensors directly via Milesight D2D to display on the screen and achieve the accurate temperature control.

Note:

- 1) **Below settings only take effect when control permission is Thermostat.**
- 2) **It is necessary for Milesight sensors to upgrade to corresponding firmwares to support this feature.**

1. Ensure the RX2 datarate and RX2 frequency in LoRaWAN settings are the same as the data sending devices.

LoRaWAN D2D

RX2 Data Rate ⓘ

DR8(SF12, 500 kHz) ▼

RX2 Frequency ⓘ

923300000

2. Enable **D2D Data Receiving Settings**, and set the D2D key to be the same as data sending devices. (Default D2D Key: 5572404C696E6B4C6F52613230313823)
3. Click **Add**, then attach the smartphone to NFC areas of data sending devices (not WT201) to add the devices. If you require to replace the devices, click **Replace** then attach the smartphone to another data sending device. One WT201 device supports to add 5 devices at most.

LoRaWAN D2D

D2D Key

D2D Data Receiving Settings ⓘ

Pairing List

Please ensure devices in the list have enabled D2D data sending settings

 Add 0/5

4. Click **Write**, then attach the smartphone to WT201 device to save the settings. When the WT201 receives the D2D data from Milesight sensors, it will display the data on the screen and use it for temperature control.

Note:

- 1) Ensure the Milesight sensors also enable the D2D data sending settings.
- 2) If a WT201 receives the data from multiple sensors, it will use the average values of multiple sensors.
- 3) When this feature is enabled, WT201 will use the data from Milesight sensors in priority. If it

does not receive the data for 10 minutes, it will switch to internal sensors. These settings can be changed via downlink commands.

D2D Data Receiving Settings ⓘ

Pairing List

Please ensure devices in the list have enabled D2D data sending settings



Model: EM300

[Replace](#)

Device EUI:

24e124136c270731

Read

Write

5.6.2 Milesight D2D Controller

WT201 supports to work as Milesight D2D controller device to send commands to trigger D2D agent devices when switching to the preset schedule plan.

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.

LoRaWAN D2D

RX2 Data Rate ⓘ

DR8(SF12, 500 kHz) ▼

RX2 Frequency ⓘ

923300000

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 the required plan 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.

D2D Controller Settings

Wake

Control command

ff01

LoRa Uplink ⓘ

Away

Home

Sleep

Occupied

Unoccupied

ECO

5.6.3 Milesight D2D Agent

WT201 supports to work as the Milesight D2D agent device to receive commands from Milesight D2D controller devices to trigger the system on/off or switch the schedule plans.

1. Ensure the RX2 datarate and RX2 frequency in LoRaWAN settings are the same as the D2D controller devices.

LoRaWAN D2D

RX2 Data Rate ⓘ

DR8(SF12, 500 kHz) ▾

RX2 Frequency ⓘ


923300000


2. Enable **D2D Agent Settings**, and set the 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 ff01, it will turn the temperature control system to off; when WT201 receives a control command ff10, it will switch the schedule as Wake. WT201 supports to add 16 control actions at most.

Note: when [control_permission](#) is set to Remote Control, the action does not support to insert a plan event.


D2D Agent Settings 


 Control command

Action Object


Insert an Event 

Action Status


Wake 


 Control command

Action Object

System Status 

Action Status

Off 

 Add New 2/16

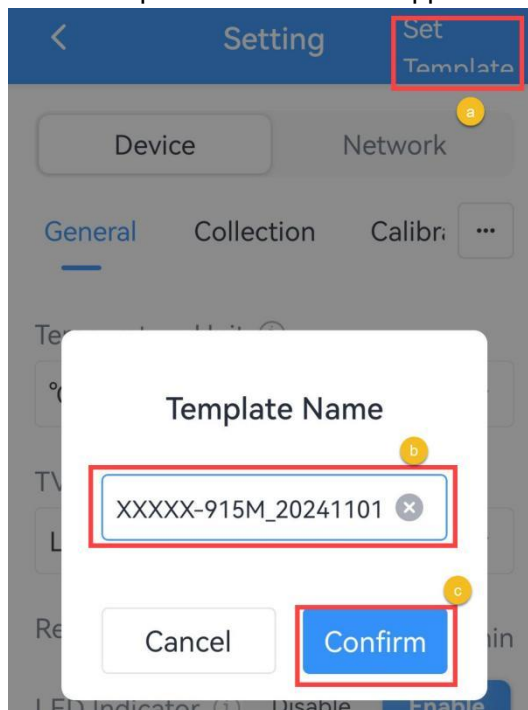
5.7 Maintenance

5.7.1 Backup and Restore

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.

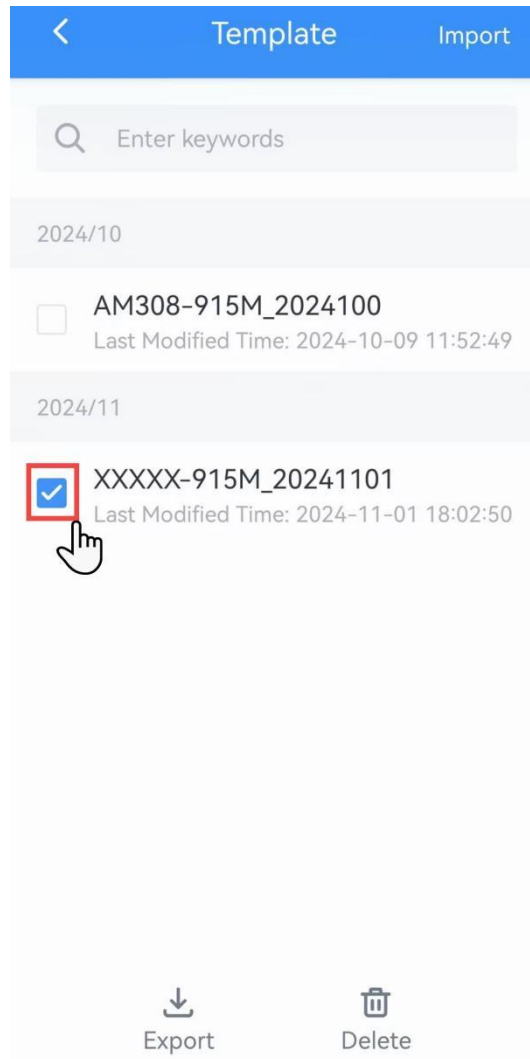
1. Attach the NFC area of smartphone to the device to read the device.
2. Go to **Settings** page on the App to edit the configuration as required, click **Set Template** to save current configuration as the template in the ToolBox App.



3. Go to **Template** page, select and click the target template, then click **Write** and attach the NFC area of smartphone to the target device to import the configuration.

The screenshot displays the Milesight mobile application interface. At the top, there is a blue header with a back arrow, the word "Template", and an "Import" button. Below the header is a search bar with the placeholder text "Enter keywords". The main content area shows a list of templates grouped by month. The "2024/10" group contains one template: "AM308-915M_2024100" with a last modified time of "2024-10-09 11:52:49". The "2024/11" group contains one template: "XXXXX-915M_20241101" with a last modified time of "2024-11-01 18:02:50". A red rectangular box highlights the template name "XXXXX-915M_20241101", and a hand cursor is positioned over it. At the bottom of the screen, there is a navigation bar with three icons: a blue square with a white "M" (Device), a blue circle with a white signal icon (selected), and a grey square with a white wrench icon (Maintenance).

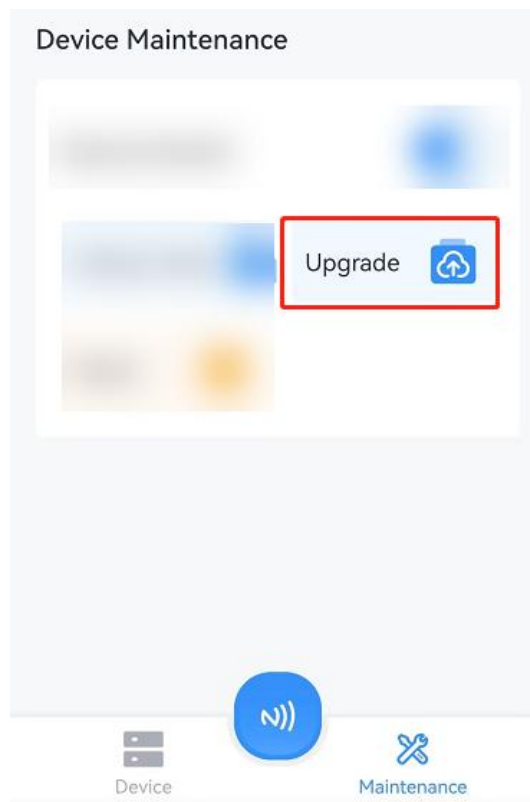
Note: Check the box of target template to delete it, or export this template as JSON format file and save it to the smartphone.



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:

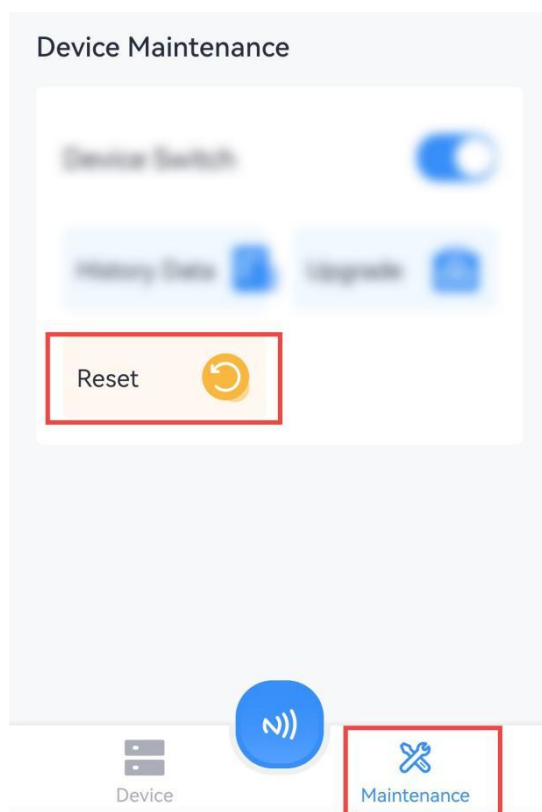
Via Hardware:

Reboot: Press and hold the Button 1: system on/off and Button 5: temperature control mode for more than 3s until the screen blinks slowly to reboot.

Reset: 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 **Restart**, then attach the smartphone to the device via NFC to complete the operation.



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.

7.1 Uplink Data

| Parameter | LoRa Object | Object Type | Description |
|-----------|-------------|-------------|-------------|
|-----------|-------------|-------------|-------------|

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|------------------------------|----------------------------|-----------------------|--|
| 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 | |
| Reset Event | reset_event | Binary Input | 1: Reset |
| Temperature | temperature | Analog Value | Unit: °C(62) |
| (Heating) Target Temperature | target_temperature | Analog Value | Unit: °C(62) |
| Cooling Target Temperature | target_temperature_2 | Analog Input | Unit: °C(62) |
| Humidity | humidity | Analog Value | Unit: %r.h(29) |
| Temperature Exception | temperature_sensor_status | Multistate Value | 1: Read failed 2: Out of range |
| Humidity Exception | humidity_sensor_status | 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 5: Auto Heat 6: Auto Cool |
| Temperature Control Status | temperature_control_status | Multistate Value | 1: Standby 2: 1-stage heat 3: 2-stage heat |

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| | | | <p>4: 3-stage heat</p> <p>5: 4-stage heat</p> <p>6: emergency heat</p> <p>7: 1-stage cool</p> <p>8: 2-stage cool</p> <p>9: 5-stage heat</p> |
| Fan Mode | fan_mode | Multistate Value | <p>1: Auto</p> <p>2: Always on</p> <p>3: Circulate</p> <p>4: Disable</p> |
| Fan Status | fan_status | Multistate Value | <p>1: Off</p> <p>2: High speed</p> <p>3: Low speed</p> <p>4: On</p> |
| System Status | system_status | Binary Value | 0: Off, 1: On |
| Control Permission | control_permission | Multistate Value | <p>1: Thermostat</p> <p>2: Remote Control</p> |
| Temperature Alarm | temperature_alarm | Multistate Value | <p>1: Emergency Heating Timeout Alarm</p> <p>2: Auxiliary Heating Timeout Alarm</p> <p>3: Persistent Low Temperature Alarm</p> <p>4: Persistent Low Temperature Alarm Release</p> <p>5: Persistent High Temperature Alarm</p> <p>6: Persistent High Temperature Alarm Release</p> <p>7: Freeze Protection Alarm</p> <p>8: Freeze Protection Alarm Release</p> <p>9: Temperature Threshold Alarm</p> <p>10: Temperature Threshold Alarm Release</p> |
| Relay Status | wires_relay.y1 | Binary Input | 0: Off, 1: On |
| | wires_relay.y2_gl | | |
| | wires_relay.w1 | | |
| | wires_relay.w2_aux | | |

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|--------------------------------------|---|--------------|-----------------------|
| | wires_relay.e | | |
| | wires_relay.g | | |
| | wires_relay.ob | | |
| Supported Temperature Control Mode | temperature_control_support_mode.heat | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_mode.cool | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_mode.auto | Binary Input | 0: Disable, 1: Enable |
| Supported Temperature Control Status | temperature_control_support_status.stage_1_heat | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_status.stage_2_heat | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_status.stage_3_heat | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_status.stage_4_heat | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_status.stage_5_heat | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_status.stage_1_cool | Binary Input | 0: Disable, 1: Enable |
| | temperature_control_support_status.stage_2_cool | Binary Input | 0: Disable, 1: Enable |

7.2 Downlink Command

Basic Settings

| Parameter | LoRa Object | Object Type | Description | Reference |
|--------------------------|--------------------------------|------------------|--|--|
| Reboot | reboot | Binary Output | 1: reboot | |
| System Status | system_status | Binary Value | 0: Off, 1: On | |
| Control Permission | control_permission | Multistate Value | 1: Thermostat 2: Remote Control | |
| Enquiry Status | report_status | Multistate Value | 1: Plan 2: Periodic Report 3: Target Temperature Range | |
| Report Interval | report_interval | Analog Value | Unit: min(72) | |
| Collection Interval | collection_interval | Analog Value | Unit: s(73) | |
| UTC Time Zone | timezone | Multistate Value | Time zone*60 | |
| Daylight Saving Time | dst_config.enable | Binary Value | 0: Disable, 1: Enable | These objects should be written together |
| | dst_config.offset | Analog Value | Unit: min(72) | |
| | dst_config.start_month | Multistate Value | 1-12 | |
| | dst_config.start_week_num | Analog Value | | |
| | dst_config.start_week_day | Multistate Value | 1-7 | |
| | dst_config.start_time | Analog Value | Unit: min(72) | |
| | dst_config.end_month | Multistate Value | 1-12 | |
| | dst_config.end_week_num | Analog Value | | |
| | dst_config.end_week_day | Multistate Value | 1-7 | |
| dst_config.end_time | Analog Value | Unit: min(72) | | |
| Temperature Unit | temperature_unit | Multistate Value | 1: °C 2: °F | |
| Child Lock-System On/Off | child_lock_config.power_button | Binary Value | 0: Disable, 1: Enable | These objects should be written |

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|--|---|--------------|-----------------------|--|
| Child Lock-Temperature + | child_lock_config.up_button | Binary Value | 0: Disable, 1: Enable | together |
| 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 | |
| Temporary Child Lock Release Time | unlock_config.time | Analog Value | Unit: s(73) | These objects should be written together |
| Temporary Child Lock Release | unlock_config.power_button | Binary Value | 0: Disable, 1: Enable | |
| | unlock_config.temperature_up_button | | | |
| | unlock_config.temperature_down_button | | | |
| | unlock_config.fan_mode_button | | | |
| | unlock_config.temperature_control_mode_button | | | |
| | temperature_control_forbidden_config.em_heat_enable | | | |
| | temperature_control_forbidden_config.cool_enable | | | |
| temperature_control_forbidden_config.auto_enable | | | | |

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| Screen Display | screen_display_mode | Multistate Value | 1: Enable 2: Disable plan display 3: Disable | |
| Multicast Group Enable | multicast_group_conf ig.group1_enable | Binary Value | 0: Disable, 1: Enable | These objects should be written together |
| | multicast_group_conf ig.group2_enable | | | |
| | multicast_group_conf ig.group3_enable | | | |
| | multicast_group_conf ig.group4_enable | | | |
| D2D Controller | d2d_master_enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| D2D Agent | d2d_slave_enable | Binary Value | 0: Disable, 1: Enable | |

Calibration & Threshold Settings

| Parameter | LoRa Object | Object Type | Description | Reference |
|-----------------------------|-------------------------------------|------------------|--|--|
| Temperature Calibration | temperature_calibration.enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| | temperature_calibration.temperature | Analog Value | Unit: °C(62) | |
| Humidity Calibration | humidity_calibration.enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| | humidity_calibration.humidity | Analog Value | Unit: %r.h(29) | |
| Temperature Alarm Type | temperature_alarm_config.alarm_type | Multistate Value | 1: Threshold 2: Persistent Low 3: Persistent High | These objects should be written together |
| Temperature Alarm Condition | temperature_alarm_config.condition | Multistate Value | 1: Disable 2: Below 3: Over 4: Within 5: Below or Over | |
| Below | temperature_alarm | Analog Value | Unit: °C(62) | |

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|---|--|--------------|---------------------|--|
| Threshold/Persistent Low Difference | _config.min | | | |
| Over Threshold/Persistent High Difference | temperature_alarm_config.max | Analog Value | Unit: °C(62) | |
| Lock Time | temperature_alarm_config.lock_time | Analog Value | Any value (Invalid) | |
| Duration | temperature_alarm_config.continue_time | Analog Value | Unit: s(73) | |

External Sensor Setting

| Parameter | LoRa Object | Object Type | Description | Reference |
|----------------------|-----------------------------------|------------------|---|---|
| Sensor Mode | temperature_source_config.source | Multistate Value | 1: Internal Sensors 2: From LNS 3: From D2D Device | Both objects should be written together |
| | temperature_source_config.timeout | Analog Value | Unit: min(72) | |
| Temperature | temperature | Analog Value | Unit: °C(62) | |
| Humidity | humidity | Analog Value | Unit: %r.h(29) | |
| Offline Control Mode | offline_control_mode | Multistate Value | 1: Keep (current status) 2: Use internal sensors 3: All off | |

Remote Control Settings

| Parameter | LoRa Object | Object Type | Description | Reference |
|-------------------|---------------------------|------------------|-----------------------|--|
| Room Card Setting | card_config.enable | Binary Value | 0: Disable, 1: Enable | These objects should be written together |
| | card_config.action_type | Multistate Value | 1: System On/Off | |
| | card_config.in_plan_type | Multistate Value | Any Value (Invalid) | |
| | card_config.out_plan_type | | | |

| | | | | |
|----------------------|---------------------------|------------------|---|--|
| | card_config.invert | Binary Value | 0: DI Low=Insert 1: DI High=Insert | |
| Wire Relay Y1 | wires_relay_config.y1 | Binary Value | 0: Disable, 1: Enable | These objects should be written together |
| 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_config.ob | Binary Value | 0: Disable, 1: Enable | |
| Offline Control Mode | offline_control_mode | Multistate Value | 1: Keep (current status) 2: Thermostat control 3: All off | |

Thermostat Settings

| Parameter | LoRa Object | Object Type | Description | Reference |
|---------------------------------|---|--------------|-----------------------|--|
| Temperature Control Mode Enable | temperature_control_forbidden_config.heat_enable | Binary Value | 0: Disable, 1: Enable | These objects should be written together |
| | temperature_control_forbidden_config.em_heat_enable | | | |
| | temperature_control_forbidden_config.cool_enable | | | |
| | temperature_control_forbidden_config.a | | | |

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|--|--|------------------|--|--|
| | uto_enable | | | |
| Temperature Control Mode | temperature_control_mode | Multistate Value | 1: Heat 2: Emergency Heat 3: Cool 4: Auto 5: Auto Heat 6: Auto Cool | |
| Target Temperature Mode | target_temperature_dual_enable | Binary Value | 0: Single Target 1: Dual Target | |
| Target Temperature | target_temperature | Analog Value | Unit: °C(62) | temperature_control_mode |
| Target Temperature Resolution | target_temperature_resolution | Multistate Value | 1: 0.5 2: 1 | |
| 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) | |
| Dual Target Temperature Heat Tolerance | dual_temperature_tolerance.heat_tolerance | Analog Value | Unit: °C(62) | Both objects should be written together |
| Dual Target Temperature Cool Tolerance | dual_temperature_tolerance.cool_tolerance | Analog Value | Unit: °C(62) | |
| Target Temperature Regulation Range | target_temperature_range_config.temperature_control_mode | Multistate Value | 1: Heat 2: Emergency Heat 3: Cool 4: Auto | These objects should be written together |
| | target_temperature_range_config.min | Analog Value | Unit: °C(62) | |
| | target_temperature_range_config.max | Analog Value | Unit: °C(62) | |

| | | | | |
|------------------------------------|--|------------------|---|--|
| Target Humidity Range | humidity_range.min | Analog Value | Unit: %r.h(29) | Both objects should be written together |
| | humidity_range.max | Analog Value | Unit: %r.h(29) | |
| Temperature Control and Dehumidify | temperature_dehumidify.enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| | temperature_dehumidify.temperature_tolerance | Analog Value | Unit: °C(62) | |
| Fan Mode | fan_mode | Multistate Value | 1: Auto 2: Always on 3: Circulate | |
| Fan Delay Enable | fan_delay_config.enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| Fan Delay Duration | fan_delay_config.delay_time | Analog Value | Unit: s(73) | |
| 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) | |
| Cool/Heat High Level Switch | temperature_level_up_condition.type | Multistate Value | 1: Heat 2: Cool | These objects should be written together |
| | temperature_level_up_condition.time | Analog Value | Unit: min(72) | |
| | temperature_level_up_condition.temperature_control_tolerance | Analog Value | Unit: °C(62) | |
| Set Forward | temperature_up_down_enable.forward_enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| Set Backward | temperature_up_down_enable.backward_enable | Binary Value | 0: Disable, 1: Enable | |

| | | | | |
|------------------------------|---|------------------|---|---|
| Setback/Setforward Threshold | temperature_level_up_down_delta_delta_1 | Analog Value | Unit: °C(62) | Both objects should be written together |
| | temperature_level_up_down_delta_delta_2 | Analog Value | Unit: °C(62) | |
| Switch Schedule Plan | plan_type | Multistate Value | 1: Wake 2: Away 3: Home 4: Sleep 5: Occupied 6: Vacant 7: ECO | |

Installation Settings

| Parameter | LoRa Object | Object Type | Description | Reference |
|-------------------|--------------------|------------------|--|--|
| Wire Settings | wires.y1 | Binary Value | 0: Disable, 1: Enable | These objects should be written together |
| | wires.gh | | | |
| | wires.ob | | | |
| | wires.w1 | | | |
| | wires.e | | | |
| | wires.di | | | |
| | wires.pek | | | |
| | wires.aux | | | |
| | wires.y2 | | | |
| wires.gl | | | | |
| Reversing Valve | ob_mode | Multistate Value | 1: O/B on cool 2: O/B on heat 3: keep original setting | |
| Freeze Protection | freeze_protection_ | Binary Value | 0: Disable, 1: Enable | Both objects should be |

| | | | | |
|---------------------------------------|--------------------------------------|---------------------------------------|---|--|
| Enable | config.enable | | | written together |
| Freeze Protection Temperature | freeze_protection_config.temperature | Analog Value | Unit: °C(62) | |
| Compressor and Auxiliary Heat Linkage | compressor_aux_combine_enable | Binary Value | 0: Disable, 1: Enable | |
| System Protection | system_protect_config.enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| | system_protect_config.duration | Analog Value | Unit: min(72) | |
| Fan Control During Heating | fan_control_during_heating | Multistate Value | 1: Furnace or Boiler 2: Thermostat | |
| Room Card Setting | card_config.enable | Binary Value | 0: Disable, 1: Enable | These objects should be written together |
| | card_config.action_type | Multistate Value | 1: System On/Off 2: Insert Event | |
| | card_config.in_plan_type | Multistate Value | 1: Wake 2: Away 3: Home 4: Sleep 5: Occupied 6: Vacant 7: ECO | |
| | card_config.out_plan_type | | | |
| card_config.invert | Binary Value | 0: DI Low=Insert 1: DI High=Insert | | |
| Relay Change Report | wires_relay_change_report_enable | Binary Value | 0: Disable, 1: Enable | |
| Y2 Auxiliary Mode | aux_control_config.y2_enable | Binary Value | 0: Disable, 1: Enable | Both objects should be written together |
| W2 Auxiliary Mode | aux_control_config.w2_enable | Binary Value | 0: Disable, 1: Enable | |

-END-