



# Smart Thermostat

WT201 & WT211

BACnet Object List

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# Chapter 1. Preface

## Readers

This guide provides the BACnet object list for the smart thermostats. It is intended for BMS system integrators, gateway/platform engineers, and project commissioning teams who need to read device status or write supported configuration parameters through BACnet objects.


This document does not describe physical installation, HVAC wiring, and configuration steps in detail. Please use it together with the related documents.

## Related Document

Document	Description
WT201 & WT211 User Guide	Provides introductions, compatibility check, wirings, installation and configuration steps.
WT201 & WT211 Payload Protocol (JSON)	Provides the decoded JSON format for uplink data and downlink commands when using the codec provided by Milesight.
WT201 & WT211 Payload Protocol (HEX)	Provides the raw HEX payload format for uplink data and downlink commands.

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## Revision History

Release Date	Version	Revision Content
Jan. 17, 2025	V2.0	Initial version based on hardware v2.x:

Release Date	Version	Revision Content
		<ol style="list-style-type: none"> <li>1. Change room card switch input type and name;</li> <li>2. Add compressor and auxiliary heat linkage feature;</li> <li>3. Add Temperature Control Mode Enable and Target Temperature Resolution feature;</li> <li>4. Add dual target temperature mode under Auto mode;</li> <li>5. Add downlink feature: Temporary unlock, W2/Y2 auxiliary mode, Relay change report, Send humidity data.</li> <li>6. Add schedule type: Occupied, Unoccupied, ECO.</li> <li>7. Update the definition of O/B;</li> <li>8. Update compressor protection to system protection.</li> </ol>
May 20, 2025	V2.1	Add downlink command to enable/disable screen display
May 31, 2026	V2.2	<p>Update the BACnet object list and add new features based on v1.5:</p> <ol style="list-style-type: none"> <li>1. Add occupancy mode, setpoint and adjustment tolerance parameters;</li> <li>2. Add timezone offset;</li> <li>3. Add offline unlock;</li> <li>4. Add commands: select data source, timezone index, time format, child lock enable, etc.</li> </ol>

# Chapter 2. Overview

## Introduction

When the device is integrated into a BACnet system through a Milesight gateway with the BACnet feature enabled, the BMS can read device status and write supported parameters via BACnet objects.

This document lists the supported BACnet objects, object types, default values, value ranges, engineering units, and remarks for WT201 and WT211 smart thermostats.

## Prerequisites

Before using the BACnet objects listed in this guide, ensure that the following prerequisites are met:

- The thermostat has been installed, powered on, and configured according to the user guide.
- The thermostat is added to a Milesight LoRaWAN<sup>®</sup> gateway and has joined the network.
- The Milesight gateway has updated the payload codec to the latest version.
- The Milesight gateway network server and BACnet features are enabled and configured correctly.
- The BMS can communicate with the Milesight gateway through BACnet/IP.
- The required BACnet objects have been enabled or added on the gateway BACnet object page.



### Important:

The thermostat does not connect directly to a BACnet network by itself. BACnet integration is implemented through a Milesight LoRaWAN<sup>®</sup> gateway with the BACnet feature enabled.

## How to Read the Object List

Column	Description
Object Name	Name of the BACnet object displayed or configured in the gateway/BMS.
Object Type	BACnet object type. See <a href="#">BACnet Object Type</a> below.
Default Value	Default value of the object after the device is reset or initialized.
Range Value	Supported value range or enumerated values for writable objects. For objects with enumerated values, the BMS should write the numeric value rather than the text label.
Unit	Engineering unit. The number in brackets indicates the BACnet engineering unit identifier used by the gateway, such as °C (62).
Remark	Additional description, functional note, or related parameter name.

## BACnet Object Type and Access Mode

The following BACnet object type abbreviations and corresponding access modes are used in this guide.

Abbreviation	BACnet Object Type	Access Mode
AI	Analog Input	R
AO	Analog Output	W
AV	Analog Value	RW
BI	Binary Input	R
BO	Binary Output	W
BV	Binary Value	RW
CSV	Character String Value	R
MSI	Multi-state Input	R
MSO	Multi-state Output	W
MSV	Multi-state Value	RW

Access Mode	Description
R	Read-only. The BMS can read the object value.
W	Write-only. The BMS can write a value to trigger an action or configure a parameter.
RW	Read/Write. The BMS can read the current value and write a supported value.



### Note:

Write operations may change HVAC operation. Verify the target object, value range, engineering unit, and current control permission before writing any value from the BMS.

## Chapter 3. Uplink Data

This section describes the uplink data reported by the device.

### Basic Information

Object Name	Object Type	Range Value	Unit	Remark
IPSO Version	CSV	6 characters	-	Protocol version
Hardware Version	CSV			
Firmware Version	CSV			
TSL Version	CSV			
SN	CSV	16 characters		Serial Number
LoRaWAN Class Type	MSI	3=Class C		

### Periodic Report

Object Name	Object Type	Range Value	Unit	Remark
Celsius Ambient Temperature	AI	-20-60	°C(62)	
Fahrenheit Ambient Temperature	AI	-40-140	°F(64)	
Humidity	AI	5-100	%r.h (29)	
System Status	BV	0=Off, 1=On	-	
<b>When control permission is Thermostat</b>				
Temperature Control Status	MSI	1=Standby, 2=Stage-1 heat, 3=Stage-2 heat, 4=Stage-3 heat, 5=Stage-4 heat, 6=EM heat, 7=Stage-1 cool, 8=Stage-2 cool, 9=Stage-5 heat, 10=Stage-3 cool	-	
Fan Control Status (Value)	MSI	1=Off, 2=High speed, 3=Low speed, 4=On	-	

Object Name	Object Type	Range Value	Unit	Remark
Current Temperature Humidity Source (Value)	MSI	1=Embedded, 3=LoRa, 3=D2D	-	
<b>When control permission is Remote Control</b>				
Relay operation status	CSV	1-22 characters	-	Enabled relays

# Chapter 4. Downlink Commands

## Downlink Commands for Temperature Control Parameters

This section describes the downlink commands for temperature control related parameters.

### Configure Data Source

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Temperature Humidity Source (Value)	MSV	1	1=Embedded, 3=LoRa, 4=D2D	-	

### Configure System Status

Object Name	Object Type	Default Value	Range Value	Unit	Remark
System Status	BV	-	0=Off, 1=On	-	

## Downlink Commands for Thermostat Parameters

This section describes the supported control objects when control permission is **Thermostat**.

### Configure Installation Parameters

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Reversing Valve (Value)	MSV	2	1=Energize on heat, 2=Energize on cool	-	

### Configure Temperature Control Basic Parameters

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Temperature Control Enable Setting (Value)	MSV	1	1=Heat/EM Heat/Cool/Auto, 2=Heat/Cool/Auto, 3=Heat, 4=Cool, 5=Heat/Cool	-	Temperature Control Mode Enable
Temperature Control Mode (Value)	MSV	1	1=Heat, 2=EM Heat, 3=Cool, 4=Auto	-	

### Configure Occupancy Mode Parameters

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Occupied Mode (Value)	MSO	1	1=Off, 2=Occupied, 3=Unoccupied	-	Occupancy Mode
Occupied Delay (Value)	MSV	1	1=disable, 2=5, 3=10, 4=20, 5=30, 6=40, 7=50, 8=60	min (72)	
Celsius Target Deadband	AV	5	1 ~ 10	°C (62)	
Fahrenheit Target Deadband	AV	9	1.8 ~ 18	°F(64)	
<b>Occupancy Mode is Occupied</b>					
Celsius Occupied Cooling Setpoint	AV	28	5 ~ 35	°C (62)	
Fahrenheit Occupied Cooling Setpoint	AV	82	41 ~ 95	°F(64)	
Celsius Occupied Cooling Setpoint Tolerance	AV	1	0.1 ~ 5	K (121)	
Fahrenheit Occupied Cooling Setpoint Tolerance	AV	1.8	0.2 ~ 9	$\Delta T^{\circ}F$ (120)	
Celsius Occupied Heating Setpoint	AV	17	5 ~ 35	°C (62)	
Fahrenheit Occupied Heating Setpoint	AV	62	41 ~ 95	°F(64)	
Celsius Occupied Heating Setpoint Tolerance	AV	1	0.1 ~ 5	K (121)	
Fahrenheit Occupied Heating Setpoint Tolerance	AV	1.8	0.2 ~ 9	$\Delta T^{\circ}F(120)$	

Object Name	Object Type	Default Value	Range Value	Unit	Remark
<b>Occupancy Mode is Unoccupied</b>					
Celsius Unoccupied Cooling Setpoint	AV	30	5 ~ 35	°C (62)	
Fahrenheit Unoccupied Cooling Setpoint	AV	85	41 ~ 95	°F(64)	
Celsius Unoccupied Cooling Setpoint Tolerance	AV	2	0.1 ~ 5	K (121)	
Fahrenheit Unoccupied Cooling Setpoint Tolerance	AV	3.6	0.2 ~ 9	ΔT°F(120)	
Celsius Unoccupied Heating Setpoint	AV	15	5 ~ 35	°C (62)	
Fahrenheit Unoccupied Heating Setpoint	AV	59	41 ~ 95	°F(64)	
Celsius Unoccupied Heating Setpoint Tolerance	AV	2	0.1 ~ 5	K (121)	
Fahrenheit Unoccupied Heating Setpoint Tolerance	AV	3.6	0.2 ~ 9	ΔT°F(120)	
<b>Target Temperature Regulation Range = Set point +/- Adjust Tolerance</b>					
Celsius Cooling Setpoint	AV	29	5 ~ 35	°C (62)	
Fahrenheit Cooling Setpoint	AV	84.2	41 ~ 95	°F(64)	
Celsius Heating Setpoint	AV	14.5	5 ~ 35	°C (62)	
Fahrenheit Heating Setpoint	AV	58	41 ~ 95	°F(64)	

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Celsius Cooling Adjust Tolerance	AV	6	0.5 ~ 16	K (121)	
Fahrenheit Cooling Adjust Tolerance	AV	10.8	0.5 ~ 30	$\Delta T^{\circ}\text{F}$ (120)	
Celsius Heating Adjust Tolerance	AV	4.5	0.5 ~ 16	K (121)	
Fahrenheit Heating Adjust Tolerance	AV	8	0.5 ~ 30	$\Delta T^{\circ}\text{F}$ (120)	

### Configure Fan Mode Parameters

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Fan Control Mode (Value)	MSV	2	2=Auto, 3=Always on, 4=Circulate	-	Fan Mode
Fan Delay Config Enable	BV	0	0=Disable, 1=Enable	-	
Fan Delay Config Delay Time	AV	60	1-3600	s (73)	

### Temperature Control Stage Switch

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Celsius Temperature Control Delta 1	AV	3	1-10	$^{\circ}\text{C}$ (62)	
Fahrenheit Temperature Control Delta 1	AV	5.4	1.8 ~ 18	$^{\circ}\text{F}$ (64)	
Celsius Temperature Control Delta 2	AV	5	1 ~ 10	$^{\circ}\text{C}$ (62)	
Fahrenheit Temperature Control Delta 2	AV	9	1.8 ~ 18	$^{\circ}\text{F}$ (64)	

## Downlink Commands for Auxiliary Features

This chapter describes the downlink commands for auxiliary features.

### Configure General Parameters

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Report Interval	AV	10	1-1440	min (72)	
Temperature Unit	MSV	2	1=°C, 2=°F		

### Configure Time Parameters

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Synchronize Time	AO	-	255	-	Sync Time from LNS
Timezone Index (Value)	MSV	15	1=UTC-12, ..., 4=UTC-9:30, ..., 15=UTC, ..., 19=UTC +3:30, ..., 21=UTC +4:30, ..., 23=UTC +5:30, 24=UTC +5:45, ... 37=UTC+14	-	
Timezone Offset	AV	0	-1440 ~1440	min (72)	

### Configure Screen Parameters

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Time Format (Value)	MSO	1	1=12-Hour Clock, 2=24-Hour Clock	-	

### Configure Child Lock Parameters

Child Lock:

Object Name	Object Type	Default Value	Range Value	Unit	Remark
Children Locks Enable	BO	0	0=Disable, 1=Enable	-	
Temporary Unlock Settings (Value)	MSO	1	see <a href="#">Temporary unlock range table</a>	-	
Heartbeat	AO	-	0 ~ 255	-	A different heartbeat value should be sent each time.
Offline Timeout	MSV	1	1=disable, 2=5, 3=10, 4=20, 5=30, 6=40, 7=50, 8=60	min (72)	Offline Unlock Timeout

Temporary Unlock Range:

Value	Option
1	disable
2	System On/Off&Temperature +
3	System On/Off&Temperature -
4	System On/Off&Fan Mode
5	System On/Off&Temperature Control Mode
6	Temperature +&Temperature -
7	Temperature +&Fan Mode
8	Temperature +&Temperature Control Mode
9	Temperature -&Fan Mode
10	Temperature -&Temperature Control Mode
11	Fan Mode&Temperature Control Mode
12	System On/Off&Temperature +&Temperature -
13	System On/Off&Temperature +&Fan Mode

Value	Option
14	System On/Off&Temperature +&Temperature Control Mode
15	System On/Off&Temperature -&Fan Mode
16	System On/Off&Temperature -&Temperature Control Mode
17	System On/Off&Fan Mode&Temperature Control Mode
18	Temperature +&Temperature -&Fan Mode
19	Temperature +&Temperature -&Temperature Control Mode
20	Temperature +&Fan Mode&Temperature Control Mode
21	Temperature -&Fan Mode&Temperature Control Mode
22	System On/Off&Temperature +&Temperature -&Fan Mode
23	System On/Off&Temperature +&Temperature -&Temperature Control Mode
24	System On/Off&Temperature +&Fan Mode&Temperature Control Mode
25	System On/Off&Temperature -&Fan Mode&Temperature Control Mode
26	Temperature +&Temperature -&Fan Mode&Temperature Control Mode
27	System On/Off&Temperature +&Temperature -&Fan Mode&Temperature Control Mode

## Chapter 5. Services

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