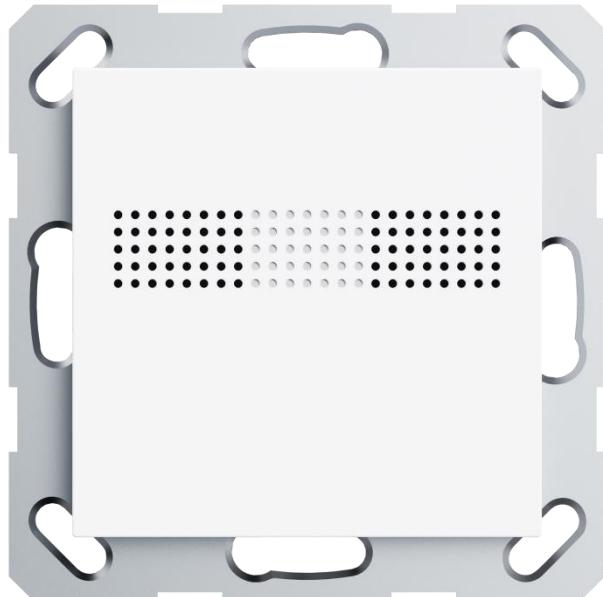


# 使用手册

## **K-BUS KNX Thermostat Lite,55mm\_V1.2**

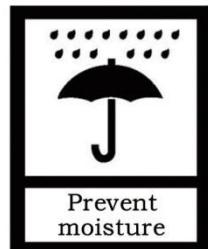
**CHTL-02/00.2.00 (White matt finish)**



**KNX/EIB Home and Building Control System**

# Attentions

**1. Please keep devices away from strong magnetic field, high temperature, wet environment;**



**2. Do not fall the device to the ground or make them get hard impact;**



**3. Do not use wet cloth or volatile reagent to wipe the device;**



**4. Do not disassemble the devices.**

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## Chapter 1 Summary

KNX Thermostat Lite,55mm is mainly applied in building control system, connected to the bus via KNX connection terminals and installed together with other devices on the bus to become a system. It's functionally simple and intuitive to operate. Users can plan according to their own needs to performs these functions in the system.

KNX Thermostat Lite,55mm is designed based on the European standard 55mm system as any other European KNX manufacturers, which means it can be used as a thermostat that limits operation in common areas.

The manual provides detailed technical information about the Thermostat Lite,55mm, including installation and programming details, and explains how to use the panel in conjunction with examples in actual use.

KNX Thermostat Lite,55mm is power via KNX bus, mounted in a standard 80 or 86-box wall mount. The physical address assignment and parameter settings can be used with the engineering tool software ETS (version ETS5.7 or above) with the .knxprod file.

The functions are summarized as followed:

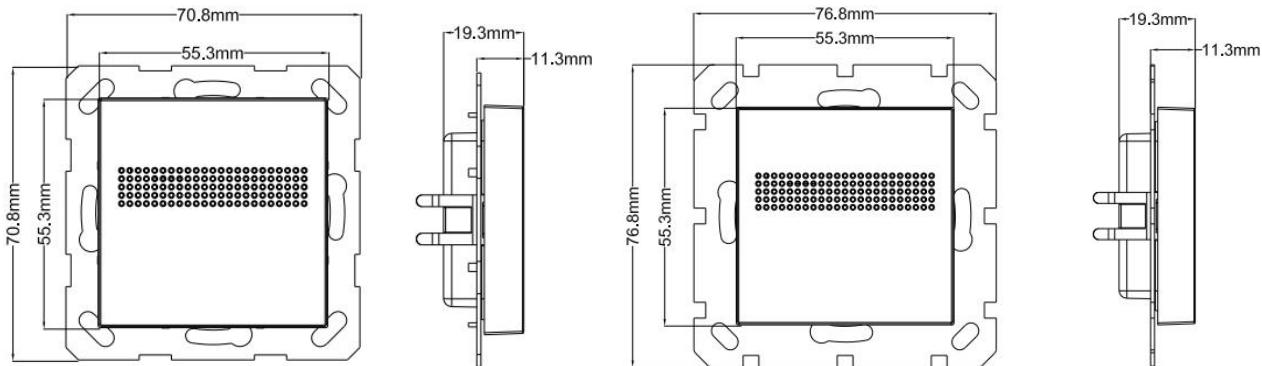
- Internal temperature / humidity sensor
- Control modes: heating, cooling, heating and cooling, with 2-pipes or 4pipes system
- HVAC operation modes: comfort, standby, economy, protection
- Temperature logic algorithm supports 2-point and PI control
- Fan auto.control
- 2 external input interfaces, used as dry contact detection (Switch, Scene, String send) or NTC temperature detection
- Compatible with European 55mm-system push button standard design
- Support KNX secure

## Chapter 2 Technical Data

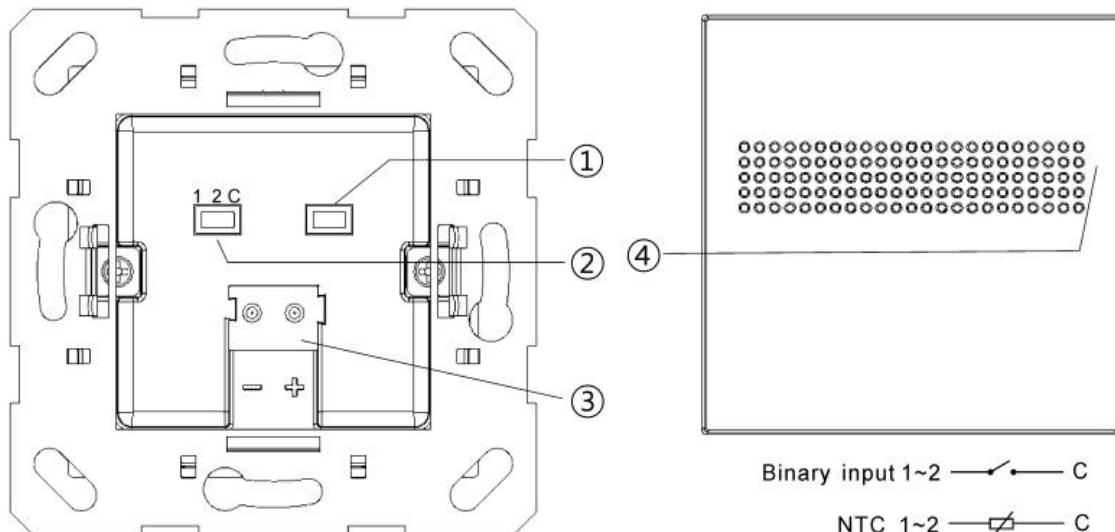
<b>Power Supply</b>	Bus voltage	21-30V DC, via the KNX bus
	Bus current	<6mA, 24V; <5.5mA, 30V
	Bus consumption	<165mW
<b>Input</b>	2 external inputs, as dry contact input or 10K NTC input	
<b>Connection</b>	KNX	Bus connection terminal
	Input	A three-wires connection terminal, cable length <5m
<b>Operation and display</b>	Programming button and red LED	For assigning the physical address, LED off after download
<b>Temperature</b>	Operation	– 5 °C ... 45 °C
	Storage	– 25 °C ... 55 °C
	Transport	– 25 °C ... 70 °C
<b>Environment</b>	Humidity	<93%, except dewing
<b>Dimension</b>	70.8 x 70.8 x 19.3 mm (80 mm wring box) 76.8 x 76.8 x 19.3 mm (86 mm wring box)	
<b>Mounting</b>	In a conventional 80 or 86 mm wring box	
<b>Mounting</b>	0.05kg	

## Chapter 3 Dimension and Structural Diagram

### 3.1. Dimension Diagram



### 3.2. Structural Diagram



① Programming button and LED

② Input terminals

③ KNX bus connection terminal

④ Internal temperature / humidity sensor

## Chapter 4 Project Design and Programming

Application	Maximum of communication objects	Maximum number of group addresses	Maximum number of associations	Secure group addresses
KNX Thermostat Lite,55mm/1.0	49	100	100	100

### General function

General function includes device In operation setting and request device status after voltage recovery.

### Internal temperature and humidity measurement

Internal temperature and humidity measurement value is sent to the bus: respond after read only and respond after change.

Set temperature and humidity calibration, and send alarm telegram when the preset range of threshold value for temperature alarm is exceeded.

### External input interface function

Up to support 2 channels, enable/disable each channel functions. Optional dry contact detection or NTC temperature detection.

When selecting dry contact detection, only supports the basic functions, including switch, scene send strings (press/release, short/long, send after voltage recovery, disable function).

When selecting NTC temperature detection, the external temperature probe can be connected to detect the external temperature and the B value data of temperature sensing probe needs to be set.

### Room temperature controller

Support to functions, including control mode input, heating/cooling system, operation mode and setpoint temperature, fan speed, window contact, presence detector, temperature threshold, 2 points and PI control algorithm and etc; At relative adjustment, extra optional whether to enable setpoint temperature offset value, with threshold option (-10~10°C), send the offset value to bus when enable.

## Chapter 5 Parameter setting description in the ETS

### 5.1.KNX Secure

Thermostat Lite,55mm is a KNX device that complies with the KNX secure standard. That is, you can run the device in safe way.

--- Thermostat Lite, 55mm > KNX Secure

KNX Secure	KNX Data Secure
General setting	KNX Data Secure is available in this device,it effectively protects user data against unauthorised access and manipulation by means of encryption and authentication for the installation.
Internal temperature meas...	ETS can active or deactivate security function.Detailed specialist knowledge is required.
+ Input	
+ Room temperature contro...	The device certificate label stick called FDSK is attached beside the device, and must use for security function, make sure keep securely.

Fig.5.1 (1) "KNX Secure" parameter window

The device with KNX secure will be displayed notes on ETS, as shown as Fig.5.1(1).

If secure commissioning is activated in ETS project, the following information must be considered during device debugging:

Secure Commissioning

Activated
Add Device Certificate

❖ It is essential to assign a project password as soon as a KNX Secure device is imported into a project. This will protect the project against unauthorized access.

**The password must be kept in a safe place – access to the project is not possible without it (not even the KNX Association or device manufacturer will be able to access it)!**

**Without the project password, the commissioning key will not be able to be imported.**

❖ A commissioning key is required when commissioning a KNX Secure device (first download). This key (FDSK = Factory Default Setup Key) is included on a sticker on the side of the device, and it must be imported into the ETS prior to the first download:

❖ On the first download of the device, a window pops up in the ETS to prompt the user to enter the key, as shown in Fig.5.1 (2) below.

❖

The certificate can also be read from the device using a QR scanner (recommended).

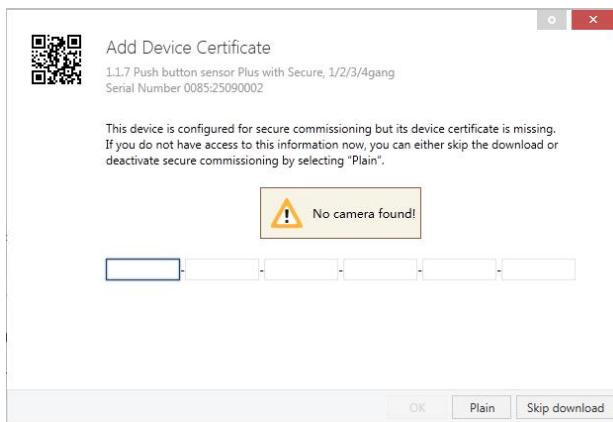


Fig.5.1(2) Add Device Certificate window

◊ Alternatively, the certificates of all Secure devices can be entered in the ETS beforehand.

This is done on the “Security” tab on the project overview page, as shown in Fig.5.1(3) below.

The certificates can be also added to the selected device in the project, as shown in Fig.5.1(4).

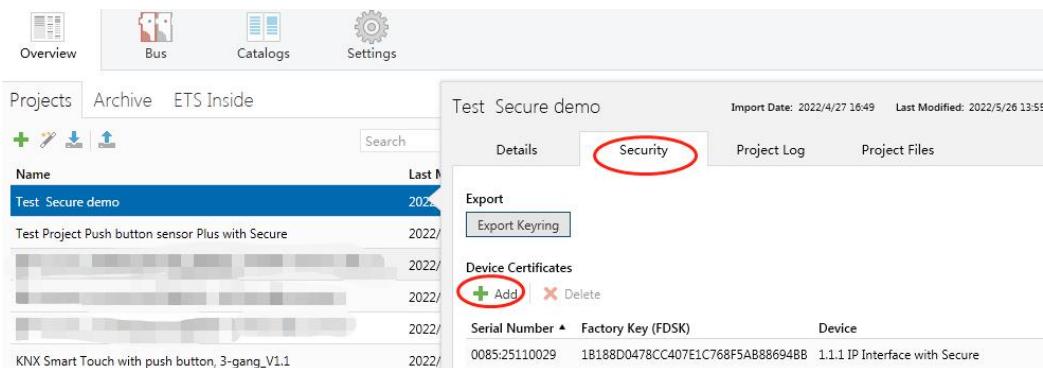


Fig.5.1(3) Add Device Certificate

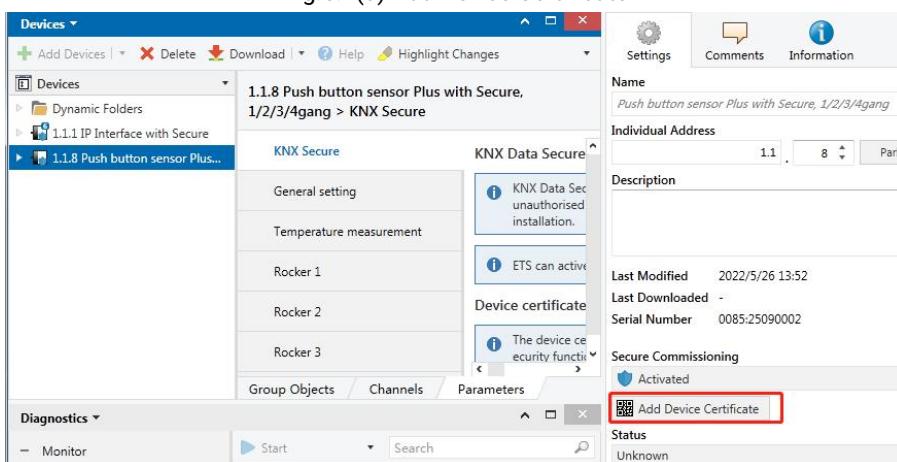


Fig.5.1(4) Add Device Certificate

◊ There is a FDSK sticker on the device, which is used for viewing FDSK number.

**Without the FDSK, it will no longer be possible to operate the device in KNX Secure mode after a reset.**

The FDSK is required only for initial commissioning. After entering the initial FDSK, the ETS will assign a new key, as shown in Fig.5.1(5) below.

The FDSK will be required again only if the device was reset to its factory settings (e.g. If the device is to be used in a different ETS project).

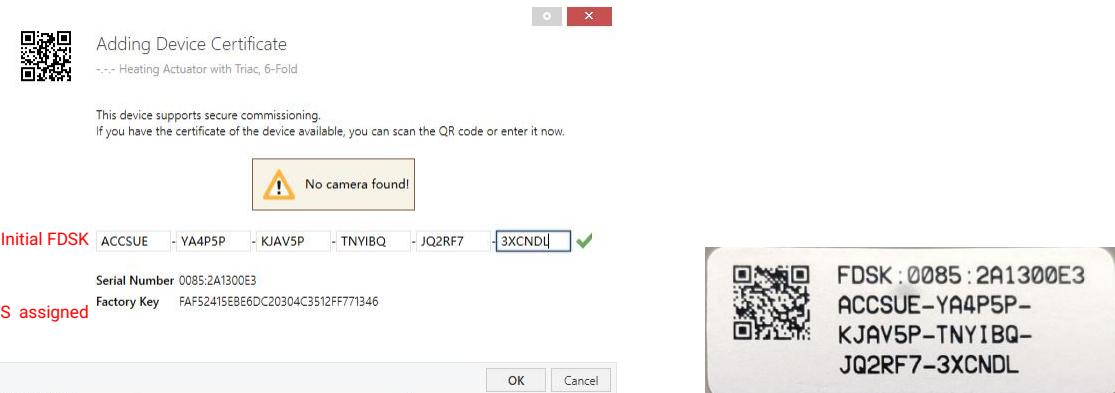


Fig.5.1(5)

Example:

If this application in the project needs to be tried with another device, it is no longer the original device. When the application is downloaded to a new device, the following prompt will appear on the left of Fig.5.1(6), click yes, the Add Device Certificate window will appear, then enter the initial FDSK of the new device, and you need to reset the device to the factory settings (it is not required if the device is still factory default; If it has been used, it will be required to reset, otherwise the following error message will appear on the right of Fig.5.1(6)), and then the device can be successfully downloaded again.

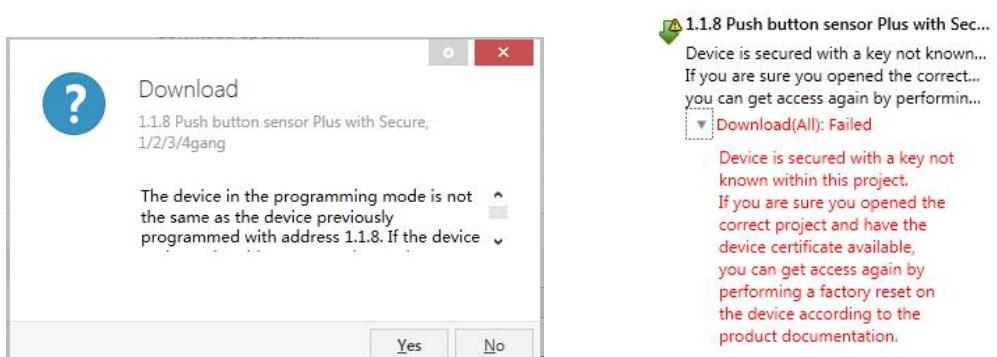


Fig.5.1(6) Example

Whether the device is replaced in the same project, or the device is replaced in a different project, the processing is similar: **Reset the device to the factory settings, then reassign the FDSK.**

After the device is downloaded successfully, the label Add Device Certificate turns gray, indicating that the key for this device has been assigned successfully, as shown in Fig.5.1(7) below.

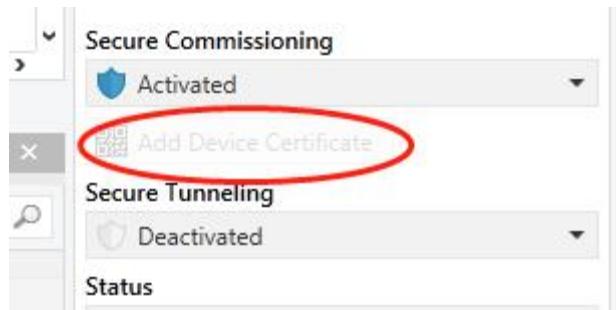


Fig.5.1(7)

ETS generates and manages keys:

Keys and passwords can be exported as needed to the use of security keys outside of the associated ETS projects. As shown in Fig.5.1(8) below, the file extension is .knxkeys.

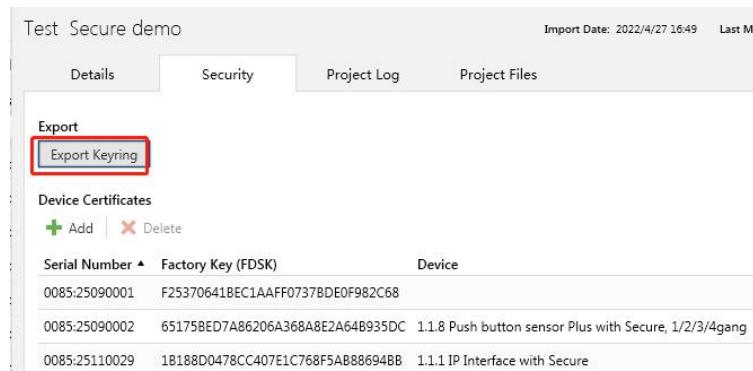


Fig.5.1(8)

**Note: Any USB interface used for programming a KNX Secure device must support "long frames".**

**Otherwise ETS will report a download failure information, as shown below.**

## 5.2. Parameter window “General setting”

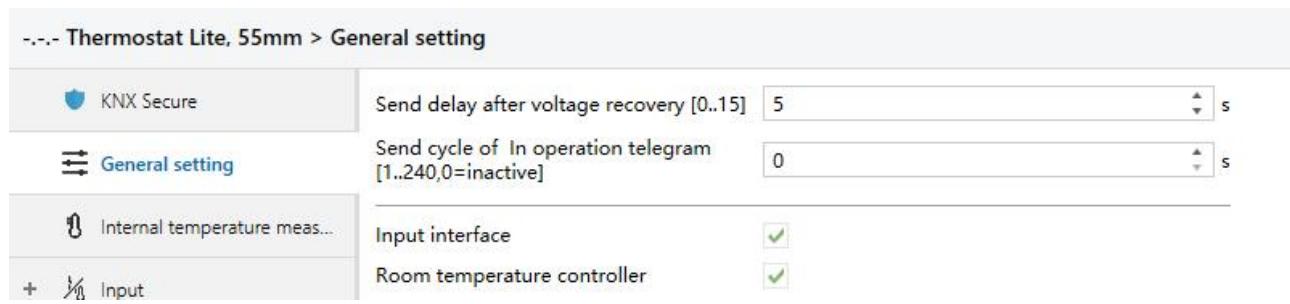


Fig.5.2 “General setting” parameter window

### Parameter “Send delay after voltage recovery [0..15s]”

This parameter is for setting the delay time to send to bus after the device voltage recovery.

Options: **0..15**

The setting dose not contain the device initialization time, and bus telegrams received during delay time will be recorded.

### Parameter “Send cycle of “In operation” telegram [1..240,0=inactive]”

This parameter is for setting the time interval when cyclically send telegrams through the bus to indicate this device in normal operation. When set to “0”, the object “In operation” will not send a telegram. If the setting is not “0”, the object “In operation” will send a telegram according to the setting period time with logic “1” to the bus. Options: **0...240s,0= inactive**

As to reduce the bus load as much as possible, the maximum time interval should be selected according to actual application requirement.

### Parameter “Status object read request after restart”

This parameter is for setting whether to send status read request telegram when the device starts up. The sending time interval is fixed to 100ms.

### Parameter “Input interface”

Setting page of input interface is visible after this parameter enabled.

### Parameter “Room temperature controller”

Setting page of room temperature controller interface is visible after this parameter enabled.

### 5.3. Parameter window “Internal sensor measurement”

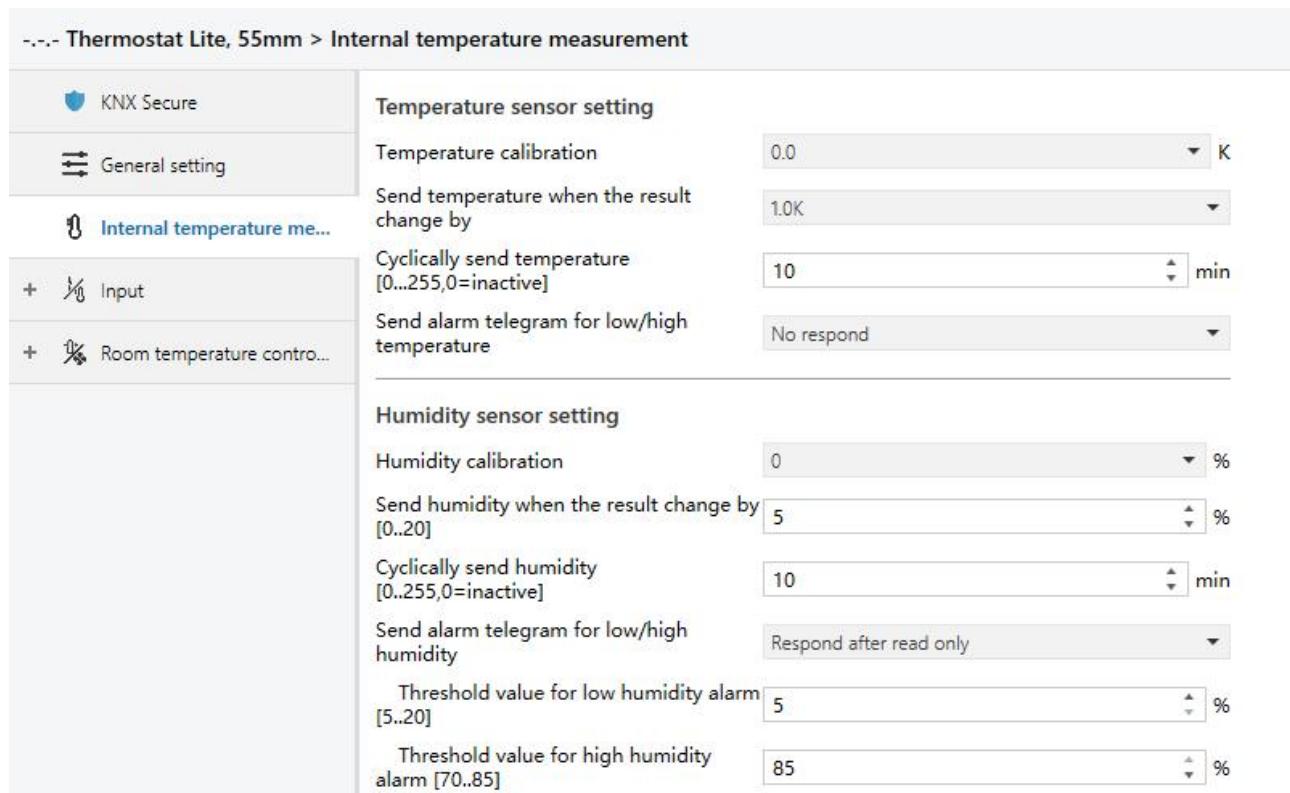


Fig.5.3 “Internal sensor measurement” parameter window

These parameters as follow are used for setting the calibration value, sending condition and error report of internal sensor, if room temperature controller select to use internal sensor, refer to the settings here.

#### Temperature sensor setting

##### Parameter “Temperature calibration”

This parameter is for setting the temperature calibration value of the internal sensor, that is, to calibrate the measured value of internal sensor to make it closer to the current ambient temperature.

Options:

**-5.0K**

...

**0.0K**

...

**5.0K**

Note: after the device is powered on, the stability time of internal sensor detection will take 30 minutes, therefore, the detected temperature value in the early stage of device work may be inaccurate.

**Parameter "Send temperature when the result change by"**

This parameter is for setting when temperature turns to a certain value, whether to enable to send the current temperature value to the bus. No telegram is sent when Disable is selected. Options:

**Disable****0.5K****1.0K****...****10.0K****Parameter "Cyclically send temperature [0..255,0=inactive]min"**

Setting the time for cyclically sending the temperature detection value to the bus. Options: **0..255**

This period is independent and starts time counting after programming completion or reset. Transmission change has no affect on this period.

**Parameter "Send alarm telegram for low/high temperature"**

This parameter is for setting condition of sending telegram when low/high temperature alarm.

Options:

**No respond****Respond after read only****Respond after change**

Respond after read only: only when the device receives a read alarm from other bus device or bus will the object "Low temperature alarm"/" High temperature alarm" send the alarm status to the bus;

Respond after change: the object "Low temperature alarm"/"High temperature alarm" will immediately send the telegram to the bus to report the alarm value when the alarm status has changed.

These two parameters as follow are visible when "Respond after read only" or "Respond after change" are selected.

**—Parameter "Threshold value for low temperature alarm [0..15]°C"**

This parameter is for setting the threshold value for low temperature alarm. When the temperature lower than low threshold, low temperature alarm object will send telegram. Options:

**0°C****1°C**

...

**15°C****—Parameter “Threshold value for high temperature alarm [30..45]°C”**

This parameter is for setting the threshold value for high temperature alarm. When the temperature higher than high threshold, high temperature alarm object will send telegram. Options:

**30°C****31°C**

...

**45°C****Humidity sensor setting****Parameter “Humidity calibration”**

This parameter is for setting the humidity calibration value of the internal sensor, that is, to calibrate the measured value of internal sensor to make it closer to the current ambient humidity.

Options: **-20% / -15% / -10% / -5% / -3% / -1% / 0% / 1% / 3% / 5% / 10% / 15% / 20%**

**Parameter “Send humidity when the result change by [0..20]%”**

This parameter is for setting when humidity turns to a certain value, whether to enable to send the current humidity value to the bus. Not send when value is 0. Options: **0..20**

**Parameter “Cyclically send humidity [0..255,0=inactive]min”**

Setting the time for cyclically sending the humidity detection value to the bus. Options: **0..255**

This period is independent and starts time counting after programming completion or reset. Transmission change has no affect on this period.

**Parameter “Send alarm telegram for low/high humidity”**

This parameter is for setting condition of sending telegram when low/high humidity alarm. Options:

**No respond****Respond after read only****Respond after change**

Respond after read only: only when the device receives a read alarm from other bus device or bus will the object " Low humidity alarm"/" High humidity alarm" send the alarm status to the bus;

Respond after change: the object "Low humidity alarm"/"High humidity alarm" will immediately send the telegram to the bus to report the alarm value when the alarm status has changed.

These two parameters as follow are visible when "Respond after read only" or "Respond after change" are selected.

#### —Parameter "Threshold value for low humidity alarm [5..20]%"

This parameter is for setting the threshold value for low humidity alarm. When the humidity lower than low threshold, low humidity alarm object will send telegram. Options: **5..20**

#### —Parameter "Threshold value for high humidity alarm [70..85]%"

This parameter is for setting the threshold value for high humidity alarm. When the humidity higher than high threshold, high humidity alarm object will send telegram. Options: **70..85**

## 5.4.Parameter window "Input"

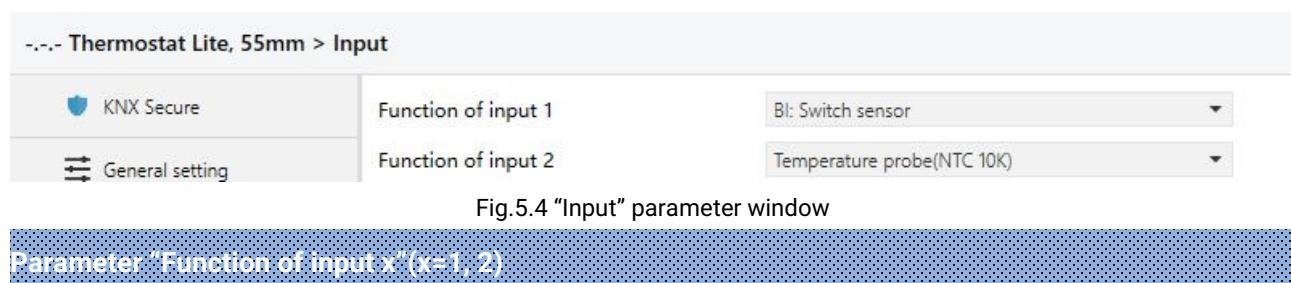


Fig.5.4 "Input" parameter window

This parameter is for setting the function of external input interface. Support temperature detection and dry contact input (BI), setting page will be visible when select corresponding chosen. Also can be disable this channel function. Options:

**Disable**

**Temperature probe(NTC 10K)**

**BI: Switch sensor**

**BI: Scene control**

**BI: Send String(14bytes)**

When select Temperature probe(NTC 10K), can detect external temperature, which needs set B value of temperature probe.

When select dry contact input (BI), only supports the basic functions, including switch, scene control, send strings (press/release operation, short/long operation, send after voltage recovery, disable function).

Chapters as follow explain the functions of external input interface separately.

#### 5.4.1.Temperature probe

-.- Push Button Sensor with LCD,55mm > Input > Input 1 - Temperature probe

<input checked="" type="checkbox"/> KNX Secure	Description (max 30char.)	<input type="text"/>
+  General	B value of temperature sensor (must refer to the characteristic of component)	3950
Internal sensor measurement...	Temperature calibration	0.0
-  Input	Send temperature when the result change by	1.0K
Input 1 - Temperature probe		
+  Function setting	Cyclically send temperature [0...255]	0
+  Logic function	Reply error of sensor measurement	Respond after read only
+  Scene Group function	Object value of error	<input checked="" type="radio"/> 0=no error/1=error <input type="radio"/> 1=no error/0=error
	Lower threshold value for error report	0
	Upper threshold value for error report	60

Fig.5.4.1 Parameter setting of temperature probe

Parameter "Description (max 30char.)"

This parameter is for setting the name description of temperature probe.

Parameter "B value of temperature sensor(must refer to the characteristic of component)"

This parameter is for setting the B value of temperature sensor. Options:

**3275**

**3380**

...

**4200**

**Note:** This value must refer to the characteristic of component, available from the instruction manual. If selected B value is different from used sensor, it will effect detection result directly.

**Parameter "Temperature calibration"**

This parameter is for setting the temperature calibration value of the temperature sensor, that is, to calibrate the measured value of sensor to make it closer to the current ambient temperature. Options:

**-5.0K**

...

**0.0K**

...

**5.0K****Parameter "Send temperature when the result change by"**

This parameter is for setting when temperature turns to a certain value, whether to enable to send the current temperature value to the bus. No telegram is sent when Disable is selected. Options:

**Disable****0.5K****1.0K**

...

**10.0K****Parameter "Cyclically send temperature [0...255.0-inactive]min"**

Setting the time for cyclically sending the temperature detection value to the bus. No telegram is sent when value is 0.

Options: **0..255****Parameter "Reply error of sensor measurement"**

This parameter for setting the condition of sending error status report when temperature exceeds the valid detection. options:

**No respond****Respond after read only****Respond after change**

Respond after read only: only when the device receives a read error from other bus device or bus will the object " Temperature error report, Sensor" send the error status to the bus;

---

Respond after change: the object "Temperature error report, Sensor" will immediately send the telegram to the bus to report the error value when the error status has changed.

These three parameters as follow are visible when "Respond after read only" or "Respond after change" are selected.

—Parameter "Object value of error"

This parameter for defining object value of error. Options:

**0=no error/1=error**

**1=no error/0=error**

0=no error/1=error: the object value for which sensor no error occurs is 0, and the object value for which sensor error occurs is 1;

1=no error/0=error: it has the opposite meaning.

—Parameter "Upper threshold value for error report"

This parameter is for setting the upper threshold value for temperature error. When the temperature higher than the threshold, temperature error object will send telegram.

Options: **40°C / 45°C / 50°C / 55°C / 60°C / 70°C**

—Parameter "Lower threshold value for error report"

This parameter is for setting the lower threshold value for temperature error. When the temperature lower than the threshold, temperature error object will send telegram.

Options: **10°C / 5°C / 0°C / -5°C / -10°C / -20°C**

### 5.4.2.Binary input

...- Thermostat Lite, 55mm > Input > Input 1 - Switch sensor

KNX Secure	Description (max 30char.)	<input type="text"/>
General setting	Distinction between short and long operation	<input checked="" type="radio"/> No <input type="radio"/> Yes
Internal temperature meas...	Reaction on close the contact	<input type="text"/> ON
- Input	Reaction on open the contact	<input type="text"/> OFF
Input 1 - Switch sensor	Send object value after voltage recovery (valid if reaction is not toggle)	<input checked="" type="radio"/> No <input type="radio"/> Yes
Input 2 - Temperature probe	Number of objects	<input checked="" type="radio"/> 1 <input type="radio"/> 2
	Disable function	<input type="text"/> Disable

Fig.5.4.2(1) Parameter setting of switch sensor

...- Thermostat Lite, 55mm > Input > Input 1 - Scene control

KNX Secure	Description (max 30char.)	<input type="text"/>
General setting	Distinction between short and long operation	<input type="radio"/> No <input checked="" type="radio"/> Yes
Internal temperature meas...	Long operation after [3..25]	<input type="text"/> 5 *0.1s
- Input	Connected contact type	<input checked="" type="radio"/> Normally open <input type="radio"/> Normally closed
Input 1 - Scene control	Reaction on short operation	<input type="text"/> Recall scene
Input 2 - Temperature probe	8 bit scene number	<input type="text"/> Scene No.1
+ Room temperature contro...	Reaction on long operation	<input type="text"/> Store scene
	8 bit scene number	<input type="text"/> Scene No.1
	Number of objects	<input checked="" type="radio"/> 1 <input type="radio"/> 2
	Disable function	<input type="text"/> Disable

Fig.5.4.2(2) Parameter setting of scene control

...- Thermostat Lite, 55mm > Input > Input 1 - Send String

KNX Secure	Description (max 30char.)	<input type="text"/>
General setting	Distinction between short and long operation	<input checked="" type="radio"/> No <input type="radio"/> Yes
Internal temperature meas...	Reaction on close the contact	<input type="radio"/> No reaction <input checked="" type="radio"/> Send Value
- Input	String (14byte) value	<input type="text"/> Hello, world !
Input 1 - Send String	Reaction on open the contact	<input checked="" type="radio"/> No reaction <input type="radio"/> Send Value
Input 2 - Temperature probe	Send object value after voltage recovery	<input checked="" type="radio"/> No <input type="radio"/> Yes
	Disable function	<input type="text"/> Disable

Fig.5.4.2(3) Parameter setting of sending sting

**Parameter "Description (max 30char.)"**

This parameter is for setting the name description for binary input function.

**Parameter "Distinction between short and long operation"**

This parameter is for setting whether to distinction between short and long operation. Options:

**No**

**Yes**

**—Parameter "Long operation after [3..25]\*0.1s"**

This parameter is visible when distinction between short and long operation. Set the effective time of long operation. When button operation out of the setting time, it is a long operation, otherwise it is a short operation.

Options: **3..25**

**—Parameter "Connected contact type"**

This parameter is visible when distinction between short and long operation. Set the connected contact type.

Options:

**Normally open**

**Normally closed**

**When function is selected "BI: Switch sensor", the following parameters are visible, for setting switch sensor.**

**—Parameter "Reaction on short/long operation"**

This parameter is visible when distinction between short and long operation, performing the action according to the settings of the short and long operations. Set the switch value to send when button operation. Options:

**No reaction**

**OFF**

**ON****TOGGLE**

No action: No telegrams have been sent.

ON: Send the on telegram.

OFF: Send the off telegram.

TOGGLE: Each operation will switch between on and off.

**—Parameter “Reaction on close/open the contact”**

This parameter is visible when no distinction between short and long operation. Judge the close and open operations, and perform the actions according to the settings. Set the switch value to send when button operation. Options:

**No reaction****OFF****ON****TOGGLE****—Parameter “Send object value after voltage recovery (valid if reaction is not toggle)”**

This parameter is visible when no distinction between short and long operation. This parameter is valid if not select “TOGGLE” or “No reaction”, set whether to send object value after voltage recovery. Options:

**No****Yes**

**When function is selected “BI: Scene control”, the following parameters are visible, for setting scene control.**

**—Parameter “Reaction on short/long operation”**

This parameter is visible when distinction between short and long operation, performing the action according to the settings of the short and long operations. Set the scene command to send when button operation. Options:

**No reaction****Recall scene****Store scene****—Parameter “Reaction on close/open the contact”**

This parameter is visible when no distinction between short and long operation. Judge the close and open operations, and send or storage scenes according to the settings. Set the scene command to send when button operation. Options:

**No reaction****Recall scene****Store scene****—Parameter “8 bit scene number”**

This parameter is visible when “Recall scene” or “Store scene” is selected. Set the scene number, range: **Scene NO.1~64, corresponding telegram is 0~63**

**When function is selected “BI: Send String(14bytes)”, the following parameters are visible, for setting string sending.**

**—Parameter “Reaction on short/long operation”**

This parameter is visible when distinction between short and long operation, performing the action according to the settings of the short and long operations.Options:

**No reaction****Send Value****—Parameter “Reaction on close/open the contact”**

This parameter is visible when no distinction between short and long operation. Judge the close and open operations, and send strings according to the settings. Options:

**No reaction****Send Value****—Parameter “String (14byte) value”**

---

This parameter is visible when “Send Value” is selected. Input the strings to send.

**—Parameter “Send object value after voltage recovery”**

This parameter is visible when no distinction between short and long operation. Set whether to send object value after voltage recovery. Options:

**No**

**Yes**

**Parameter “Number of objects”**

This parameter is visible when the parameter “Reaction on long/open operation” is not selected “No reaction”. Set whether to use a common object or two separate objects when open/close and long/short operations. Options:

**1**

**2**

**Parameter “Disable function”**

This parameter is visible when binary input functions are selected. Set trigger value to disable/enable contacts. Options:

**Disable**

**Disable=1/Enable=0**

**Disable=0/Enable=1**

## 5.5. Parameter window “Room temperature controller”

-.- Thermostat Lite, 55mm > Room temperature controller

KNX Secure	Room temperature reference from	Internal sensor combine with External sensor
General setting	Combination ratio	50% Internal to 50% External
Internal temperature meas...	Time period for request room temperature sensor [0...255]	10 min
+ Input	Send temperature when the result change by	1.0K
- Room temperature contr...	Cyclically send temperature [0...255]	0 min
Setpoint	Control value after temp. error[0..100] (if 2-point control, set value '0'=0, set value '>0'=1)	0 %
Heating/Cooling control	Room temperature control mode	Heating and Cooling
Fan auto.control	Heating/Cooling switchover	<input checked="" type="radio"/> Via object <input type="radio"/> Automatic changeover
	Heating/Cooling status after download	<input checked="" type="radio"/> Heating <input type="radio"/> Cooling
	Heating/Cooling status after voltage recovery	As before voltage failure
	Room temperature control system	<input checked="" type="radio"/> 2 pipes system <input type="radio"/> 4 pipes system
Operation mode		<input checked="" type="checkbox"/>
	Controller status after download	Comfort mode
	Controller status after voltage recovery	As before voltage failure
	Extended comfort mode [0..255,0=inactive]	0 min
	1 bit object function for operation mode	<input checked="" type="checkbox"/>
	1 bit object for standby mode	<input checked="" type="checkbox"/>
Fan speed auto.control function		<input checked="" type="checkbox"/>
Window contact input function		<input checked="" type="checkbox"/>
	Delay for window contact [0..65535]	15 s
	Controller mode for open window	<input type="radio"/> Economy mode <input checked="" type="radio"/> Frost/heat protection
	Bus presence detector function	<input checked="" type="checkbox"/>

Fig.5.5.5 “Room temperature controller” parameter window

### Parameter “Room temperature reference from”

This parameter is for setting the resource of the RTC function temperature reference. Options:

**Internal sensor**

**External sensor**

**Internal sensor combine with External sensor**

---

When selecting the reference internal sensor, the temperature is determined by the setting of the "Internal sensor measurement" in the parameter interface, more details refer to chapter 5.3.

—Parameter "Time period for request room temperature sensor [0...255]min"

This parameter is visible when "...External sensor" is selected. Set the time period for read request external temperature sensor. Options: **0..255**

Parameters as follow are visible when "Internal sensor combine with External sensor" is selected.

—Parameter "Combination ratio"

This parameter is for setting the internal sensor and the external sensor to measure the specific gravity of the temperature. Options:

**10% Internal to 90% External**

**20% Internal to 80% External**

...

**90% Internal to 10% External**

For example, if the option is "40% internal to 60% external", then the internal sensor accounts for 40%, the external sensor accounts for 60%, and the control temperature = (internal sensor's temperature  $\times$  40%) + (external sensor's temperature  $\times$  60%), the RTC function of the device will control and display the temperature according to the calculated temperature.

When two sensors are combined for detection, when one sensor is in error, the temperature value detected by the other sensor is used.

—Parameter "Send temperature when the result change by"

This parameter is for setting when temperature turns to a certain value, whether to enable to send the current temperature value to the bus. Not send when disable. Options:

**Disable**

**0.5K**

**1.0K**

...

**10K**

**—Parameter “Cyclically send temperature [0...255]min”**

Setting the time for cyclically sending the temperature detection value to the bus. Not send when value is 0.

Options: **0..255**

**Note: cyclically sending and change sending are independent of each other.**

**Parameter “Control value after temp. error[0..100]% (if 2-point control, set value '0'=0, set value >0=1)”**

This parameter is for setting the control value when temperature error occur. Options: **0..100**

If 2-Point control, then the parameter value is 0, as well as the control value; if the parameter value is more than 0, then the control value will be 1.

**Parameter “Room temperature control mode”**

This parameter is for setting room temperature control mode. Options:

**Heating**

**Cooling**

**Heating and Cooling**

**Parameters as follow are visible when “Heating and Cooling” is selected.**

**—Parameter “Heating/Cooling switchover”**

This parameter is for setting the switchover way of Heating/Cooling. Options:

**Via object**

**Automatic changeover**

**—Parameter “Heating/Cooling status after download”**

This parameter is for setting the heating/cooling control mode of device after download.

Options:

**Heating**

**Cooling**

**—Parameter “Heating/Cooling status after voltage recovery”**

This parameter is for setting the heating/cooling control mode of device after voltage recovery.

Options:

**Heating**

**Cooling**

**As before voltage failure**

As before voltage failure: When the device is reset after power on, the control mode will recover as before voltage failure. If it is the first time the device is used or a newly enabled function page, the control mode after the device is started is in an uncertain state, and it needs to be manually selected at this time.

#### —Parameter “Room temperature control system”

This parameter is for setting the type of RTC control system, that is, pipe types of fan coil water inlet/outlet. Options:

**2 pipes system**

**4 pipes system**

2 pipes system: Shares an inlet and outlet pipe for heating and cooling, that is, both hot and cold water are controlled by a valve.

4 pipes system: Has its own inlet and outlet pipes for heating and cooling, and two valves are needed to control the entry and exit of hot water and cold water respectively.

#### Parameter “Operation mode”

This parameter is for setting whether to enable RTC operation mode.

When enable, support 4 modes with comfort, standby, economy and frost/heat protection. Support datatype of 1bit and 1byte, and preset a operation mode when download and voltage recovery.

**Parameters as follow are visible when operation mode enabled.**

#### —Parameter “Controller status after download”

This parameter is for setting the operation mode after download. Options:

**Comfort mode**

**Standby mode**

**Economy mode****—Parameter “Controller status after voltage recovery”**

This parameter is for setting the operation mode after voltage recovery. Options:

**Comfort mode**

**Standby mode**

**Economy mode**

**Frost/heat protection**

**As before voltage failure**

**—Parameter “Extended comfort mode [0..255,0=inactive]min”**

When the work mode is “Slave”, this parameter is not visible.

Set the extended time of comfort mode. When value >0, activate the extended, and 1 bit object “Extended comfort mode” is visible. Options: **0..255**

When object receives telegram 1, comfort mode is activated. If receive telegram 1 again during the delay time, the time is retiming. And comfort mode will return to previous operation mode once finish the timing. Exit the comfort mode when a new operation mode in delay time.

Change the operation mode will quit the timing, and heating/cooling switchover will not.

**—Parameter “1 bit object function for operation mode”**

This parameter is for setting whether to enable 1 bit objects of operation mode are visible. Corresponding mode activation when objects send telegram 1; Perform standby mode when object values of comfort, economy, protection received from the bus are 0.

**—Parameter “1 bit object for standby mode”**

This parameter is visible when previous parameter enabled. Set whether to enable 1 bit object of standby mode is visible.

**Parameters as follow are visible when operation mode disabled.**

**—Parameter “Initial setpoint temperature (°C)”**

This parameter is for setting the initial value of setpoint temperature. Options:

**10.0****10.5****...****35.0**

When initial setpoint temperature is less than the min. setpoint temperature, display following warning:

 The setpoint is less than minimum, so minimum will regard as setpoint in fact

When initial setpoint temperature is greater than the max. setpoint temperature, display following warning:

 The setpoint is greater than maximum, so maximum will regard as setpoint in fact

#### **Automatic H/C mode changeover dead zone**

##### **—Parameter “Upper/Lower dead zone”**

These two parameters are visible when control mode is selected “Heating and Cooling”, and “Automatic changeover” is selected. Setting the dead zone range of auto switchover heating/cooling. Options:

**0.5K****1.0K****...****10K**

Under heating control, when the actual temperature(T) greater than or equal to the setpoint temperature + the upper dead zone, then mode heating switch to cooling;

Under cooling control, when the actual temperature(T) less than or equal to the setpoint temperature + the upper dead zone, then mode cooling switch to heating.

##### **Parameter “Fan speed auto control function”**

This parameter is for setting whether to enable fan auto control interface is visible.

**Parameter "Window contact input function"**

This parameter is visible when operation mode enabled. Set whether to link to window contact status.

**—Parameter "Delay for window contact [0..65535]s"**

This parameter is visible when operation mode and window contact input function are enabled. Set the delay time to window contact detection. That is, when receive a telegram "Open window", the controller will regard that as a valid signal and execute the behaviour after this delay time. Options:

**0..65535**

**—Parameter "Controller mode for open window"**

If window status is open, perform corresponding operation according to configuration. (Other control telegram receiving will be record during window is open and performed after receiving the telegram "Close window". If there is no telegram receiving when window is open, return to the mode before opening the window). Options:

**Economy mode**

**Frost/heat protection**

**Parameter "Bus presence detector function"**

This parameter is visible when operation mode is enabled. Set whether to link to bus presence detector status.

If presence is detected, enter the comfort mode and it will be restored to original mode after leaving. If there is a telegram/manual operation to adjust the mode during the period, the telegram is logged in the background, and it will be exited comfort mode and restored to this mode after leaving. If there is no telegram receiving during timing, return to original mode. (If receive the presence status cyclically, comfort mode can not be re-triggered, and only can be after leaving.)

**Parameter "Min./Max. setpoint temperature [5..37] °C"**

These parameters are visible when operation mode disabled. Set to limit the adjustable range of the setpoint temperature. If the setpoint temperature beyond the limited range, the will output the limited temperature.

Options:

5°C

6°C

...

37°C

These parameters are display below the parameters settings interface "Setpoint" when enable operation mode.

**For setpoint temperature, the Min. value must less than the Max., if not, it can not be modified on ETS.**

### 5.5.1.Parameter window "Setpoint"

--- Thermostat Lite, 55mm > Room temperature controller > Setpoint

KNX Secure	Setpoint method for operating mode	<input checked="" type="radio"/> Relative <input type="radio"/> Absolute
General setting	Base setpoint temperature	20.0 <input type="button" value="▼"/> °C
Internal temperature meas...	Additional setpoint offset for setpoint adjustment	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
+ Input	Step of setpoint offset	<input checked="" type="radio"/> 0.5K <input type="radio"/> 1K
- Room temperature contro...	Min. setpoint offset [-10..0]	-5 <input type="button" value="▼"/> K
	Max. setpoint offset [0..10]	5 <input type="button" value="▼"/> K
<b>Setpoint</b>		
<b>Heating</b>		
Heating/Cooling control	Reduced heating in standby mode [0..10]	2 <input type="button" value="▼"/> K
Fan auto.control	Reduced heating in economy mode [0..10]	4 <input type="button" value="▼"/> K
	Setpoint temperature in frost protection mode [5..10]	7 <input type="button" value="▼"/> °C
<b>Cooling</b>		
	Increased cooling in standby mode [0..10]	2 <input type="button" value="▼"/> K
	Increased cooling in economy mode [0..10]	4 <input type="button" value="▼"/> K
	Setpoint temperature in heat protection mode [30..37]	35 <input type="button" value="▼"/> °C
	Min. setpoint temperature [5..37]	16 <input type="button" value="▼"/> °C
	Max. setpoint temperature [5..37]	32 <input type="button" value="▼"/> °C
Parameter setting of relative adjustment		

--- Thermostat Lite, 55mm > Room temperature controller > Setpoint

KNX Secure	Setpoint method for operating mode	<input type="radio"/> Relative <input checked="" type="radio"/> Absolute
General setting		
Internal temperature meas...	Setpoint temperature in comfort mode [5..37]	21 <input type="button" value="▼"/> °C
+ Input	Setpoint temperature in standby mode [5..37]	19 <input type="button" value="▼"/> °C
- Room temperature contro...	Setpoint temperature in economy mode [5..37]	17 <input type="button" value="▼"/> °C
	Setpoint temperature in frost protection mode [5..10]	7 <input type="button" value="▼"/> °C
<b>Setpoint</b>		
<b>Heating</b>		
Heating/Cooling control	Setpoint temperature in comfort mode [5..37]	23 <input type="button" value="▼"/> °C
Fan auto.control	Setpoint temperature in standby mode [5..37]	25 <input type="button" value="▼"/> °C
	Setpoint temperature in economy mode [5..37]	27 <input type="button" value="▼"/> °C
<b>Cooling</b>		
	Parameter setting of absolute adjustment (1)	

--- Thermostat Lite, 55mm > Room temperature controller > Setpoint

KNX Secure

General setting

Internal temperature meas...

Input

Room temperature contro...

**Setpoint**

Setpoint method for operating mode  Relative  Absolute

**Heating**

Setpoint temperature in comfort mode [5..37] 21 °C

Setpoint temperature in standby mode [5..37] 19 °C

Setpoint temperature in economy mode [5..37] 17 °C

Setpoint temperature in frost protection mode [5..10] 7 °C

Parameter setting of absolute adjustment (2)  
Fig.5.5.2.1.1 "Setpoint" parameter window

This parameter window is visible when operation mode is enabled, and display according to control mode.

#### Parameter "Setpoint method for operating mode"

This parameter is for setting the setpoint method for operating mode. Options:

**Relative**

**Absolute**

Relative: relative adjustment, the setpoint temperature of economy mode and standby mode will refer to the defined temperature setpoint.

Absolute: absolute adjustment, each mode has its independent temperature setpoint.

**Parameters as follow are visible when the setpoint temperature adopts the relative adjustment method.**

#### Parameter "Base setpoint temperature (°C)"

This parameter is for setting the base setpoint temperature, from which the setpoint temperature of the room comfort mode is obtained. Options:

**10.0**

**10.5**

...

**35.0**

The setpoint value will be modified through object "Base temperature setpoint, status", then the new value will be stored after the device power off.

When base setpoint temperature is less than the min. setpoint temperature, display following warning:

- ✖ The setpoint is less than minimum,so minimum will regard as setpoint in fact

When base setpoint temperature is greater than the max. setpoint temperature, display following warning:

- ✖ The setpoint is greater than maximum,so maximum will regard as setpoint in fact

The setpoint value will be modified through object "Base setpoint adjustment", then the new value will be stored after the device power off.

Current basic setpoint temperature = modified basic setpoint temperature +/- accumulated offset(if existence)

When adjusting the setpoint temperature of current operation mode, the setpoint value will be changed with it, but the relative temperature of each mode is unchanged. Relative temperature of standby, economy and comfort mode is set by the parameters as follows.

#### Parameter "Additional setpoint offset for setpoint adjustment"

This parameter is for setting whether to enable additional setpoint offset function for setpoint adjustment, mainly used to adjust setpoint temperature by 1 bit object. Options:

**Disable**

**Enable**

Increase/decrease offset by 1 bit object "Setpoint offset", adjust the setpoint temperature indirectly, and send offset value to the bus by 2 byte object "Float offset value". Also reset the offset value by 1 bit object "Setpoint offset reset", modified the offset value by 2 byte object "Float offset value". Save the offset value when control mode and operation mode changed.

Three parameters as follow are visible when offset function enabled.

**—Parameter “Step of setpoint offset”**

This parameter is for setting step value of setpoint offset increased/decreased when receiving telegrams. Telegram 1- increase, telegram 0- decrease. Accumulated offset can be saved when power off. Options:

**0.5K****1K**

Setpoint temperature of current mode = base temperature + fix offset of mode + accumulated additional offset

**Note: Fix offset of mode is the offset of standby and economy modes compared to comfort mode, which is decided by the follow parameters of heating/cooling. Accumulated additional offset is adjusted by 1bit object “Setpoint offset”, or directly modified the offset value by 2 byte object “Float offset value”.**

**—Parameter “Min. setpoint offset [-10..0]K”**

This parameter is for setting the maximum offset allowed when negative offset (setpoint temperature is decreased). Options: **-10..0**

**—Parameter “Max. setpoint offset [0..10]K”**

This parameter is for setting the maximum offset allowed when forward offset (setpoint temperature is increased). Options: **0..10**

**For offset, the Min. value and the Max. can not equal to 0 at the same time, if not, it can not be modified on ETS.**

**Automatic H/C mode changeover dead zone (only for comfort mode)****Parameter “Upper/Lower dead zone”**

These two parameters are visible when control mode “Heating and Cooling” is selected, and “Automatic changeover” is selected. Setting the dead zone range of auto switchover heating/cooling. Options:

**0.5K****1.0K**

...

**10K**

Under heating control, when the actual temperature(T) is greater than or equal to the setpoint temperature + the upper dead zone, then mode heating switch to cooling;

Under cooling control, when the actual temperature(T) is less than or equal to the setpoint temperature + the upper dead zone, then mode cooling switch to heating.

**Parameter "Reduced heating in standby mode [0...10]K"****Parameter "Increased cooling in standby mode [0...10]K"**

These two parameters are for setting the setpoint of economy mode. Options:

**0K****1K**

...

**10K**

Heating: The setpoint of economy mode is the temperature setpoint minus the reference value;

Cooling: The setpoint of economy mode is the temperature setpoint plus the reference value.

**Parameter "Reduced heating in economy mode [0...10]K"****Parameter "Increased cooling in economy mode [0...10]K"**

These two parameters are for setting the setpoint of economy mode. Options:

**0K****1K**

...

**10K**

Heating: The setpoint of economy mode is the temperature setpoint minus the reference value;

Cooling: The setpoint of economy mode is the temperature setpoint plus the reference value.

**Parameter "Setpoint temperature in frost protection mode [5...10]°C"**

This parameter is for setting the setpoint of frost protection mode. Options:

**5°C****6°C**

...

**10°C**

Under the frost protection mode, when room temperature reduce to the setpoint, the controller will trigger a control telegram so that related heating controller will output heating control to prevent the temperature from being too low.

**Parameter "Setpoint temperature in heat protection mode [30...37]°C"**

This parameter is for setting the setpoint of heat protection mode. Options:

**30°C****31°C****...****37°C**

Under the heat protection mode, when room temperature raise to the setpoint, the controller will trigger a control telegram so that related cooling controller will output cooling control to prevent the temperature from being too high.

**Parameters as follow are visible when the setpoint temperature adopts the absolute adjustment method.**

**Parameter "Setpoint temperature in comfort mode [5...37]°C"****Parameter "Setpoint temperature in standby mode [5...37]°C"**

These parameters are for setting the setpoint temperature in comfort, standby and economy mode when heating or cooling. Options:

**5°C****6°C****...****37°C****Parameter "Setpoint temperature in frost protection mode [5...10]°C"**

This parameter is for setting the setpoint temperature in frost protection mode when heating.

Options:

**5°C****6°C****...****10°C**

## Parameter "Setpoint temperature in heat protection mode [30...37] °C"

This parameter is for setting the setpoint temperature in heat protection mode when cooling.

Options:

30°C

31°C

...

37°C



Note: The heating setpoint must be always less than the cooling setpoint.

**For absolute adjustment mode, when "Heating and Cooling" is selected, whether it is manual changeover, either bus changeover or automatic changeover, the heating setpoint value must be less than or equal to the cooling of the same operation mode. At the same time, these setpoint temperatures can not exceed the configured range of maximum and minimum values. If not, it can not be modified on ETS. Please consider the limitations of multiple conditions when configuring.**

1. When the ambient temperature is higher than the setpoint temperature of current mode in cooling, it is changed to cooling mode; When the ambient temperature is lower than the setpoint temperature of current mode in heating, it is changed to heating mode.

2. In the same operation mode, the setpoint temperature difference between cooling and heating remains constant, whether it is written on the bus or adjusted on the panel. That is, when adjust the setpoint temperature, it need to update cooling and heating setpoint temperature of current operation mode at the same time.

3. When the bus is received setpoint temperature, it is still necessary to limit the value according to the high and low thresholds, that is heating and cooling temperature neither can not be lower than the min., or can not be higher than the max.

**Note: for relative/absolute adjustment, in protection mode, the setpoint temperature is only configured via ETS, and not limited with the min./max. value. When the received setpoint value from bus is different from the ETS configuration, the value is not updated and returned to the current setpoint temperature, to update synchronously to other devices on the bus.**

### 5.5.2.Parameter window “Heating/Cooling control”

...- Thermostat Lite, 55mm > Room temperature controller > Heating/Cooling control

 KNX Secure  General setting  Internal temperature meas... +  Input -  Room temperature contro... Setpoint <b>Heating/Cooling control</b> Fan auto.control	Type of heating/cooling control	Switching on/off(use 2-point control)	
	Invert control value	<input checked="" type="radio"/> No <input type="radio"/> Yes	
	<b>Heating</b>		
	Lower Hysteresis [0..200]	10	
	Upper Hysteresis [0..200]	10	
	<b>Cooling</b>		
	Lower Hysteresis [0..200]	10	
	Upper Hysteresis [0..200]	10	
Cyclically send control value [0..255]	10		
Parameter setting of “Switching on/off(use 2-point control)”			
 KNX Secure  General setting  Internal temperature meas... +  Input -  Room temperature contro... 	Type of heating/cooling control	Switching PWM(use PI control)	
	Invert control value	<input checked="" type="radio"/> No <input type="radio"/> Yes	
	PWM cycle time [1..255]	15	
	Heating speed	Hot water heating(5K/150min)	
	Cooling speed	Cooling ceiling (5K/240min)	
	Cyclically send control value [0..255]	10	
	Parameter setting of “Switching PWM(use PI control)”		
	Type of heating/cooling control	Continuous control(use PI control)	
Invert control value	<input checked="" type="radio"/> No <input type="radio"/> Yes		
Heating speed	Hot water heating(5K/150min)		
Cooling speed	Cooling ceiling (5K/240min)		
Send control value on change by [0..100,0=inactive]	4		
Cyclically send control value [0..255]	10		
Parameter setting of “Continuous control(use PI control)”			

Fig.5.5.2.1.2(1) “Heating/Cooling control” parameter window

Parameters of this window display according to control mode and control system(2 pipe or 4pipe).

#### Parameter “Type of heating/cooling control”

This parameter is for setting the type of heating/cooling control. Different control types are suitable for controlling different temperature controllers. Options:

**Switching on/off(use 2-point control)**

**Switching PWM(use PI control)**

**Continuous control(use PI control)****Parameter "Invert control value"**

This parameter is for setting whether to invert control value or normal sending control value, so that the control value will be suitable for the valve type. Options:

**No****Yes**

Yes: Sending the control value to the bus through objects after inverting the control value.

**Two parameters as follow are suitable for 2 point control:****—Parameter "Lower Hysteresis [0...200]\*0.1K"****—Parameter "Upper Hysteresis [0...200]\*0.1K "**

These two parameters are for setting the lower/upper hysteresis temperature in FCU heating or cooling.

Options: **0..200**

**Under heating control,**

**When the actual temperature(T) > the setpoint temperature + the upper hysteresis temperature, then will stop heating;**

**When the actual temperature(T) < the setpoint temperature - the lower hysteresis temperature, then will start heating.**

For example, the lower hysteresis temperature is 1K, the upper hysteresis temperature is 2K, the setpoint temperature is 22°C, if T is higher than 24°C, then it will stop heating; if T is lower than 24°C, then it will start heating; if T is between 21~24°C, then it will maintain the previous status.

**Under the cooling control,**

**When the actual temperature (T) < the setpoint temperature -the lower hysteresis temperature, then will stop cooling;**

**When the actual temperature (T) > the setpoint temperature +the upper hysteresis temperature, then will start cooling.**

For example, the lower hysteresis temperature is 1K, the upper hysteresis temperature is 2K, the

**setpoint** temperature is 26°C, if T is lower than 25°C, then it will stop cooling; if T is lower than 28°C, then it will start cooling; if T is between 28~25°C, then it will maintain the previous status.

**2-point control mode** is a very simple control mode. When adopting this control mode, it is necessary to set the upper hysteresis temperature and the lower hysteresis temperature through parameters. When setting the hysteresis temperature, the following effects need to be considered

1. When hysteresis interval is small, the temperature range will be small, however, frequent sending of control value will bring large load to the bus;
2. When hysteresis interval is large, the switch switching frequency will be low, but it is easy to cause uncomfortable temperature change.

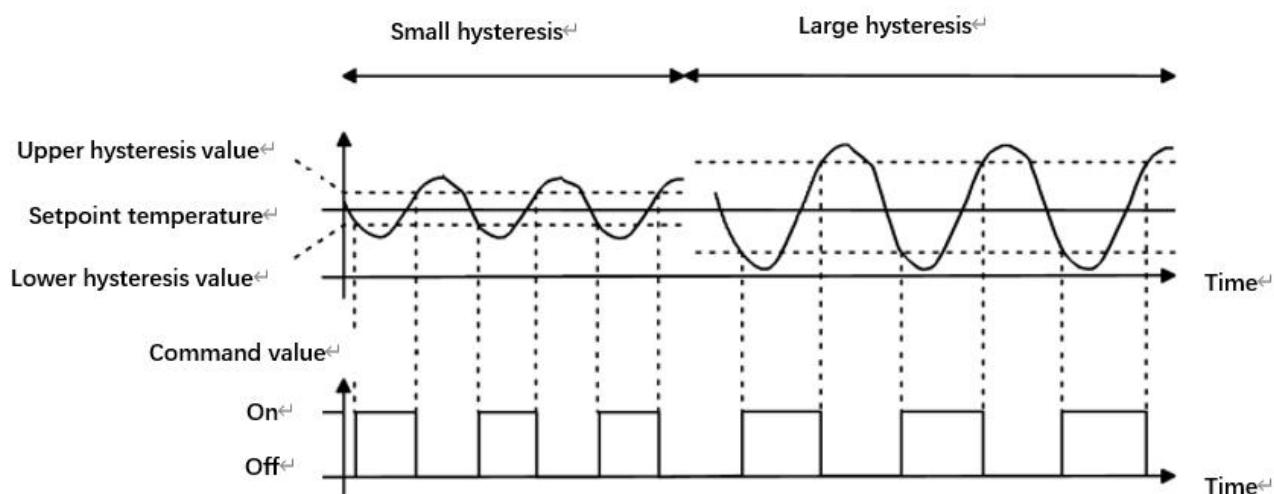


Fig.5.5.2 (2) Effects of hysteresis on control value switch action(heating) under 2-point control mode

These two parameters as follow are suitable for PI control:

—Parameter “Heating speed”

—Parameter “Cooling speed”

These two parameters are for setting the responding speed of heating or cooling controller. Different responding speeds are suitable for different environments.

Options:

**Hot water heating (5K/150min)**

**Underfloor heating (5K/240 min)**

**Electrical heating (4K/100min)**

**Split unit (4K/90min)**

**Fan coil unit (4K/90min)**

**User defined**

Options

**Cooling ceiling (5K/240min)**

**Split unit (4K/90min)**

**Fan coil unit(4K/90min)**

**User defined**

**—Parameter “Proportional range [10..100]\*0.1K”(P value)**

**—Parameter “Reset time [0..255]min”(I value)**

These two parameters are visible when “User defined” is selected. Set the PI value of PI controller.

Options: **10..100 (P value)**

Options: **0..255 (I value)**

**— Parameter “PWM cycle time [1..255]min”**

This parameter is only visible when the control type is “Switching PWM(use PI control)”. Set the period of the control object cycle to send the switch value, the object sends the switch value according to the duty cycle of the control value. For example, if the set period is 10 min and the control value is 80%, then the object will send an open telegram for 8 min. If the control value is changed, the time duty ratio of the on/ off telegram of the object will also change, but the period is still the time of parameter setting.

Options: **1..255**

The PI values of “Switching PWM (use PI control)” and “Continuous control (use PI control)” are the same, only different in control objects, the control object of “Continuous control” output PI value(1byte) directly, while the control value of “Switching PWM” output a “on/off” telegram according to the duty cycle of the control value.

——Parameter “Send control value on change by [0..100,0=inactive] %”

This parameter is visible when control type is “Continuous control (use PI control)”, for setting the changing value of the control value to be sent to the bus. Options: **0..100, 0=inactive**

Parameter “Cyclically send control value [0..255]min”

This parameter is for setting the period for cyclically sending the control value to the bus. Options: **0..255**

**In PI control mode, the predefined control parameters of each PI controller in heating or cooling system are recommended as follows:**

#### (1) Heating

Heating type	P value	I value(integration time)	Recommended PI control type	Recommended PWM period
Hot water Heating	5K	150min	Continuous/PWM	15min
Underfloor heating	5K	240min	PWM	15-20min
Electrical heating	4K	100min	PWM	10-15min
Split unit	4K	90min	PWM	10-15min
Fan coil unit	4K	90min	Continuous	--

#### (2) Cooling

Cooling type	P value	I value(integration time)	Recommended PI control type	Recommended PWM period
Cooling ceiling	5K	240min	PWM	15-20min
Split unit	4K	90min	PWM	10-15min
Fan coil unit	4K	90min	Continuous	--

#### (3) User defined

When the parameter “Heating/Cooling speed” is set to “User defined”, the parameter value of P (scale factor) and I (integration time) can be set through the parameter. When adjusting the parameters, refer to the fixed PI value mentioned in the above table. Even if the control parameters are adjusted slightly, the control behavior will be significantly different.

In addition, the integration time should be set properly. If the integration time is too long, the adjustment will be slow, and the oscillation will not be obvious; if the integration time is too small, the adjustment will be fast, but the oscillation will occur. 0 means the integral term is not used.

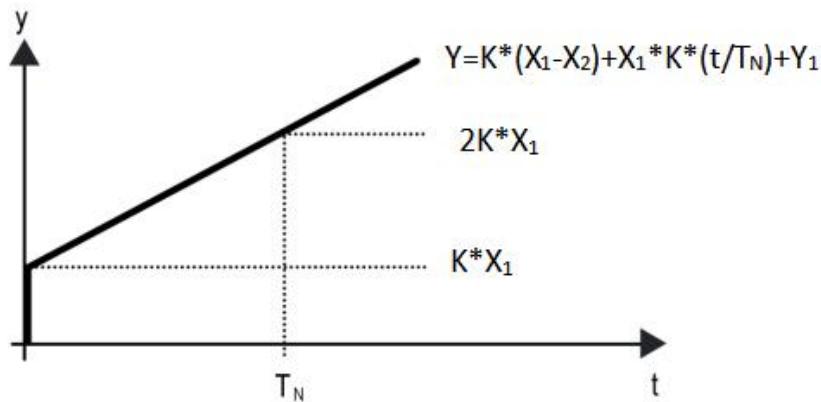


Fig.5.5.2 (3) control value of PI control mode

Y: control value

Y1: last control value

X1: temperature deviation = set temperature - actual temperature

X2: last temperature deviation = set temperature - actual temperature

T<sub>N</sub>: integration time

K: scale factor (the scale factor is not zero)

PI control algorithm:  $Y = K * (X1 - X2) + X1 * K * t / T_N + Y1$

When the integration time is set to zero, the PI control algorithm is:  $Y = K (X1 - X2) + Y2$

#### Setting and influence of user-defined parameters:

Parameter setting	Effect
K: If the scale range is too small	Quick adjustment, and overshoot will occur
K: If the scale range is too large	Slow adjustment, but no overshoot
T <sub>N</sub> : If the integration time is too short	Quick adjustment, but there will be oscillation
T <sub>N</sub> : If the integration time is too long	Slow adjustment, no obvious oscillation

### 5.5.3.Parameter window “Fan auto.control”

.... Thermostat Lite, 55mm > Room temperature controller > Fan auto.control

<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> KNX Secure</li> <li><input type="checkbox"/> General setting</li> <li><input type="checkbox"/> Internal temperature meas...</li> <li>+ <input type="checkbox"/> Input</li> <li>- <input type="checkbox"/> Room temperature contro...</li> <li>Setpoint</li> <li>Heating/Cooling control</li> </ul>	Auto. operation on object value	
	<input checked="" type="radio"/> Auto=1/Man.=0 <input type="radio"/> Auto=0/Man.=1	
	Fan speed output setting	
	Object datatype of 1byte fan speed	<input type="radio"/> Fan stage (DPT_5.100) <input checked="" type="radio"/> Percentage (DPT_5.001)
	Output value for fan speed low	33
	Output value for fan speed medium	67
	Output value for fan speed high	100
Fan speed control setting		
Condition setting for using PI control		
Threshold value speed OFF<-->low [1..255]	80	
Threshold value speed low<-->medium [1..255]	150	
Threshold value speed medium<-->high [1..255]	200	
Hysteresis threshold value in +/-[0..50]	10	
Condition setting for using 2-point control		
Temperature difference speed OFF<-->low [1..200]	20	*0.1K
Temperature difference speed low<-->medium [1..200]	30	*0.1K
Temperature difference speed medium<-->high [1..200]	40	*0.1K
Hysteresis temperature difference in [0..50]	10	*0.1K
Minimum time in fan speed [0..65535]	60	s

Fig.5.3.2.3 “Fan” parameter window

Parameters of this window are visible when fan auto control enabled.

#### Parameter “Auto operation on object value”

This parameter is for setting the telegram value to activate automatic operation. Options:

**Auto=1/Man.=0**

**Auto=0/Man.=1**

Auto=1/Man.=0: When the object “Fan automatic operation” receives the telegram value “0”, activate the automatic operation, when receive “1”, exit the automatic operation.

Auto=0/Man.=1: When the object "Fan automatic operation" receives the telegram value "1", activate the automatic operation, when receive "0", exit the automatic operation.

**After power-on, automatic operation is not activated by default.**

## Fan speed output setting

### Parameter "Object datatype of 1byte fan speed"

This parameter is for setting the object datatype of 1 byte fan speed. Options:

**Fan stage (DPT 5.100)**

**Percentage (DPT 5.001)**

### ---Parameter "Output value for fan speed low/medium/high"

These three parameters are for setting the value sent for each fan speed switchover. Fan speed off when value is 0. Options according to fan object datatype: 1..255 /1..100

**Note: the output value and status value must meet the condition low<medium<high, if not, they can not be modified on ETS, and display red box warning, as shown as follow:**

Output value for Fan speed low

33

Output value for Fan speed medium

32

Output value for Fan speed high

100

### Parameter "1bit object function for fan speed"

This parameter is for setting whether to enable 1 bit object function for fan speed. 1 bit control objects of each fan speed are visible when enabled.

### ---Parameter "1 bit object for fan speed off"

This parameter is visible when previous parameter is enabled. Set whether to enable 1 bit object of fan speed off .

## Fan speed control setting

### Condition setting for using PI control

Under PI control, control value is PI operated within program, controller will power on/off fan or switch fan speed according to the threshold range of the control values.

## Parameter "Threshold value speed OFF&lt;-&gt;low [1..255]"

Define threshold value for speed OFF<->low, options: **1..255**

If the control value is greater than or equal to this setting threshold value, start to run low fan speed; if the control value is less than this setting threshold value, the fan will be turned off.

## Parameter "Threshold value speed low&lt;-&gt;medium [1..255]"

Define the threshold for speed low<->medium, if the control value is greater than or equal to this setting threshold, start to run medium fan speed. Options: **1..255**

## Parameter "Threshold value speed medium&lt;-&gt;high [1..255]"

Define the threshold for speed medium<->high, if the control value is greater than or equal to this setting threshold, start to run high fan speed. Options: **1..255**

**Tip: The controller evaluates the threshold in ascending order.**

First check →OFF <->low fan speed threshold →low fan speed <->medium fan speed →medium fan speed <->high fan speed.

If not meet the condition, they can not be modified on ETS, and display red box warning, as shown as follow:

Threshold value speed OFF<->low  
[1..255]

150

Threshold value speed low<->medium  
[1..255]

150

Threshold value speed medium<->high  
[1..255]

200

**The correctness of functional execution is guaranteed only in this case:**

The threshold of OFF <-> low fan speed is lower than that of low fan speed <-> medium fan speed, and the threshold of low fan speed <-> medium fan speed is lower than that of medium fan speed <-> high fan speed.

## Parameter "Hysteresis threshold value int [% [0..50]"

This parameter is for setting the hysteresis value of the threshold value, which can avoid the unnecessary action of the fan when the control value fluctuates near the threshold. Options: **0..50**

If value is 0, no hysteresis. Fan switch to speed once control value greater than threshold value;

Suppose that hysteresis value is 10 and the threshold is 50, then the upper limit threshold 60 (Threshold value+Hysteresis value) and the lower limit threshold 40 (Threshold value-Hysteresis value). When the control value is between 40 ~60, fan action will not be caused, and the previous status will still be maintained. Only less than 40 or greater than or equal to 60 will change the running status of the fan.

### **Condition setting for using 2-point control**

Under 2-point control, controller will decide the fan power on/off or fan speed according to the temperature difference between the actual temperature and setpoint temperature.

Cooling: Temperature difference = actual temperature - setpoint temperature;

Heating: Temperature difference = setpoint temperature - actual temperature.

#### **Parameter "Temperature difference speed OFF<-->low [1..200]\*0.1K"**

This parameter is for setting the temperature difference for speed OFF<-->low.

Options: **1..200**

If the temperature difference is greater than or equal to this setting temperature difference, start to run low fan speed; if less than this setting temperature difference, the fan will be turned off.

#### **Parameter "Temperature difference speed low<-->medium [1..200]\*0.1K"**

Define the temperature difference for speed low<-->medium, if the control value is greater than or equal to this setting temperature difference, start to run medium fan speed. Options: **1..200**

#### **Parameter "Temperature difference speed medium<-->high [1..200]\*0.1K"**

Define the temperature difference for speed medium<-->high, if the control value is greater than or equal to this setting temperature difference, start to run high fan speed. Options: **1..200**

**Tip: The controller evaluates the temperature difference in ascending order.**

**First check →OFF <->low fan speed temperature difference →low fan speed <->medium fan speed →medium fan speed <->high fan speed.**

**If not meet the condition, they can not be modified on ETS, and display red box warning, as shown as follow:**

Temperature difference speed OFF<->low [1..200]  \*0.1°C

Temperature difference speed low<->medium [1..200]  \*0.1°C

Temperature difference speed medium<->high [1..200]  \*0.1°C

**Parameter "Hysteresis temperature difference in [0..50] \*0.1K"**

This parameter is for setting the hysteresis value of the temperature difference, which can avoid the unnecessary action of the fan when the control value fluctuates near the temperature difference.

Options: **0..50**

If value is 0, no hysteresis. Fan switch to speed once control value greater than temperature difference;

Suppose that hysteresis value is 0.5°C and the temperature difference is 1°C, then the upper limit temperature difference 1.5°C (Temperature difference+Hysteresis value) and the lower limit temperature difference 0.5°C (Temperature difference-Hysteresis value). When the control value is between 0.5°C~1.5°C, fan action will not be caused, and the previous status will still be maintained. Only less than 0.5°C or greater than or equal to 1.5°C will change the running status of the fan.

**Parameter "Minimum time in fan speed [0..65535]s"**

Defines the residence time of the fan from the current fan speed to a higher fan speed or lower fan speed, that is, the minimum time for a fan speed operation.

If you need to switch to another fan speed, you need to wait for this period of time before switching.

If the current fan speed has been running long enough, the fan speed can be changed quickly.

Options: **0..65535**

0: there is no minimum running time, but the delay switching time of fan speed still needs to be considered.

**Note: The residence time for this parameter setting is only enabled in Auto mode.**

## Chapter 6 Description of Communication Object

The communication object is the medium to communicate other device on the bus, namely only the communication object can communicate with the bus.

**NOTE: "C" in "Flag" column in the below table means enable the communication function of the object; "W" means value of object can be written from the bus; "R" means the value of the object can be read by the other devices; "T" means the object has the transmission function; "U" means the value of the object can be updated.**

### 6.1. "General" Communication object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
1	General	In operation			1 bit	C	R	-	T	-	switch	Low

Fig.6.1 "General" communication object

NO.	Object Function	Name	Data Type	Flag	DPT
1	In operation	General	1bit	C,R,T	1.001 switch

The communication object is used to periodically send a telegram "1" to the bus to indicate this device in normal operation. The period is set by the parameter.

Table 6.1 "General" communication object table

## 6.2. "Internal sensor measurement" Communication object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
5	Internal sensor	Temperature value			2 bytes	C	R	-	T	-	temperature (°C)	Low
6	Internal sensor	Low temperature alarm			1 bit	C	R	-	T	-	alarm	Low
7	Internal sensor	High temperature alarm			1 bit	C	R	-	T	-	alarm	Low
8	Internal sensor	Humidity value			2 bytes	C	R	-	T	-	humidity (%)	Low
9	Internal sensor	Low humidity alarm			1 bit	C	R	-	T	-	alarm	Low
10	Internal sensor	High humidity alarm			1 bit	C	R	-	T	-	alarm	Low

Fig.6.2 "Internal sensor measurement" communication object

NO.	Object Function	Name	Data Type	Flag	DPT
5	Temperature value	Internal sensor	2byte	C,R,T	9.001 temperature
The communication object is used for transmitting the temperature value detected by the built-in temperature sensor of the device to the bus. Range:-50~99.8°C					
6	Low temperature alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the low temperature alarm signal to bus, when temperature lower than low threshold that defined by parameter.					
7	High temperature alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the high temperature alarm signal to bus, when temperature higher than high threshold that defined by parameter.					
8	Humidity value	Internal sensor	2byte	C,R,T	9.007 humidity
The communication object is used to receive humidity measurements sent from the humidity sensor on the bus. Range:0~100%					
9	Low humidity alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the low humidity alarm signal to bus, when humidity lower than low threshold that defined by parameter.					
10	High humidity alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the high humidity alarm signal to bus, when humidity higher than high threshold that defined by parameter.					

Table 6.2 "Internal sensor measurement" communication object table

### 6.3. "Input" Communication object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
11	Input 1 - Temperature probe	Actual temperature, Sensor			2 bytes	C	R	-	T	-	temperature (°C)	Low
12	Input 1 - Temperature probe	Temperature error report, Sensor			1 bit	C	R	-	T	-	alarm	Low
Temperature probe												
Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
11	Input 1 - Switch sensor	Switch			1 bit	C	R	W	T	U	switch	Low
11	Input 1 - Switch sensor	Close, Switch			1 bit	C	R	W	T	U	switch	Low
12	Input 1 - Switch sensor	Open, Switch			1 bit	C	R	W	T	U	switch	Low
11	Input 1 - Switch sensor	Short, Switch			1 bit	C	R	W	T	U	switch	Low
12	Input 1 - Switch sensor	Long, Switch			1 bit	C	R	W	T	U	switch	Low
13	Input 1 - Switch sensor	Disable			1 bit	C	-	W	-	-	enable	Low
BI: Switch sensor												
Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
11	Input 1 - Scene control	Scene			1 byte	C	-	-	T	-	scene control	Low
11	Input 1 - Scene control	Close, Scene			1 byte	C	-	-	T	-	scene control	Low
12	Input 1 - Scene control	Open, Scene			1 byte	C	-	-	T	-	scene control	Low
11	Input 1 - Scene control	Short, Scene			1 byte	C	-	-	T	-	scene control	Low
12	Input 1 - Scene control	Long, Scene			1 byte	C	-	-	T	-	scene control	Low
13	Input 1 - Scene control	Disable			1 bit	C	-	W	-	-	enable	Low
BI: Scene control												
Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
11	Input 1 - Send String	String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low
11	Input 1 - Send String	Close, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low
12	Input 1 - Send String	Open, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low
11	Input 1 - Send String	Short, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low
12	Input 1 - Send String	Long, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low
13	Input 1 - Send String	Disable			1 bit	C	-	W	-	-	enable	Low
BI: Send string												

Fig.6.3 "Input" communication object

NO.	Object Function	Name	Data Type	Flag	DPT
11	Actual temperature, Sensor	Input 1 - {{Temperature probe}}	2byte	C,R,T	9.001 temperature

The communication object is used for transmitting the temperature value detected by the external temperature sensor of the device to the bus. Range:-50~99.8°C

The name in parentheses changes with the parameter "Description (max 30 char.)". If description is empty, display "Input x - ..." by default. The same below.

12	Temperature error report, Sensor	Input 1 - {{Temperature probe}}	1bit	C,R,T	1.005 alarm
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The communication object is used to send the error report of the external temperature sensor, and the object value is defined according to the parameters.

11	Switch	Input 1 - {{Switch sensor}}	1bit	C,R,W,T,U	1.001 switch
11	Close/Short, Switch	Input 1 - {{Switch sensor}}	1bit	C,R,W,T,U	1.001 switch
12	Open/Long, Switch	Input 1 - {{Switch sensor}}	1bit	C,R,W,T,U	1.001 switch

These communication objects are used to trigger a switching operation. Use a common object or two separate objects is according to the parameter setting.

Only the object "Switch" is visible when use a common object. If use two separate objects, "Close/Open" is visible when there is no distinction for short/long operation; "Short/Long" is visible when there is distinction for short/long operation. Telegrams:

0—Off

1—On

11	Scene	Input 1 - {{Scene control}}	1byte	C,T	18.001 scene control
11	Close/Short, Scene	Input 1 - {{Scene control}}	1byte	C,T	18.001 scene control
12	Open/Long, Scene	Input 1 - {{Scene control}}	1byte	C,T	18.001 scene control

These communication objects are used to send a 8 bit command to recall or storage scene. Use a common object or two separate objects is according to the parameter setting.

Only the object "Scene" is visible when use a common object. If use two separate objects, "Close/Open" is visible when there is no distinction for short/long operation; "Short/Long" is visible when there is distinction for short/long operation.

Detailed 8bit the meaning of the directive.

Set up a 8bit Orders for the (Binary code): FXNNNNNN

F: '0' recall scene; '1' for storage scene;

X : 0 ;

NNNNNN: Scene number( 0... 63).

As follows:

Object message value	Description
0	Recall scene 1
1	Recall scene 2
2	Recall scene 3
...	...
63	Recall scene 64
128	Store scene 1
129	Store scene 2
130	Store scene 3
...	...
191	Store scene 64

Parameter setting Options are 1~64, actually communication object "Scene" corresponds to the telegram received is 0~63 . Such as parameter settings is the scene 1, communication object "Scene" sends the telegram 0.

11	String	Input 1 - {{Send String}}	14byte	C,T	16.001 character string (ISO 8859-1)
11	Close/Short, String	Input 1 - {{Send String}}	14byte	C,T	16.001 character string (ISO 8859-1)
12	Open/Long, String	Input 1 - {{Send String}}	14byte	C,T	16.001 character string (ISO 8859-1)

These communication objects are used to send the sting to bus. Use a common object or two separate objects is according to the parameter setting.

Only the object "String" is visible when use a common object. If use two separate objects, "Close/Open" is visible when there is no distinction for short/long operation; "Short/Long" is visible when there is distinction for short/long operation.

13	Disable	Input 1 - {{...}}	1bit	C,W	1.003 enable
The communication object is used to disable/enable the function of contact input, apply to binary input function, including switch, scene and send string.					

Table 6.3 "Input" communication object table

#### 6.4. "Room temperature controller" Communication object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
17	Room temperature controller	Power on/off			1 bit	C	R	W	-	-	switch	Low
18	Room temperature controller	External temperature sensor			2 bytes	C	-	W	T	U	temperature (°C)	Low
19	Room temperature controller	Base setpoint adjustment			2 bytes	C	-	W	-	-	temperature (°C)	Low
20	Room temperature controller	Setpoint offset			1 bit	C	-	W	-	-	step	Low
21	Room temperature controller	Float offset value			2 bytes	C	-	W	-	-	temperature difference (K)	Low
22	Room temperature controller	Setpoint offset reset			1 bit	C	-	W	-	-	reset	Low
23	Room temperature controller	Heating/Cooling mode			1 bit	C	-	W	-	-	cooling/heating	Low
24	Room temperature controller	Operation mode			1 byte	C	-	W	-	-	HVAC mode	Low
25	Room temperature controller	Comfort mode			1 bit	C	-	W	-	-	enable	Low
26	Room temperature controller	Economy mode			1 bit	C	-	W	-	-	enable	Low
27	Room temperature controller	Frost/Heat protection mode			1 bit	C	-	W	-	-	enable	Low
28	Room temperature controller	Standby mode			1 bit	C	-	W	-	-	enable	Low
29	Room temperature controller	Extended comfort mode			1 bit	C	-	W	-	-	acknowledge	Low
30	Room temperature controller	Fan automatic operation			1 bit	C	-	W	-	-	enable	Low
31	Room temperature controller	Window contact			1 bit	C	-	W	-	U	window/door	Low
32	Room temperature controller	Presence detector			1 bit	C	-	W	-	U	occupancy	Low
33	Room temperature controller	Actual temperature, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
34	Room temperature controller	Base temperature setpoint, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
35	Room temperature controller	Setpoint offset, status			2 bytes	C	R	-	T	-	temperature difference (K)	Low
36	Room temperature controller	Current temperature setpoint, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
37	Room temperature controller	Heating/Cooling mode, status			1 bit	C	R	-	T	-	cooling/heating	Low
38	Room temperature controller	Operation mode, status			1 byte	C	R	-	T	-	HVAC mode	Low
39	Room temperature controller	Comfort mode, status			1 bit	C	R	-	T	-	enable	Low
40	Room temperature controller	Economy mode, status			1 bit	C	R	-	T	-	enable	Low
41	Room temperature controller	Frost/Heat protection mode, status			1 bit	C	R	-	T	-	enable	Low
42	Room temperature controller	Standby mode, status			1 bit	C	R	-	T	-	enable	Low
43	Room temperature controller	Heating control value			1 bit	C	R	-	T	-	switch	Low
44	Room temperature controller	Cooling control value			1 bit	C	R	-	T	-	switch	Low
45	Room temperature controller	Fan speed			1 byte	C	-	-	T	-	percentage (0..100%)	Low
46	Room temperature controller	Fan speed low			1 bit	C	-	-	T	-	switch	Low
47	Room temperature controller	Fan speed medium			1 bit	C	-	-	T	-	switch	Low
48	Room temperature controller	Fan speed high			1 bit	C	-	-	T	-	switch	Low
49	Room temperature controller	Fan speed off			1 bit	C	-	-	T	-	switch	Low

Fig.6.4 "Room temperature controller" communication object

NO.	Object Function	Name	Data Type	Flag	DPT
17	<b>Power on/off</b>	<b>Room temperature controller</b>	<b>1bit</b>	<b>C,W,R</b>	<b>1.001 switch</b>
The communication object is used to receive the telegram from the bus to control RTC power on/off.					
Telegrams: 1---On 0---Off					
18	<b>External temperature sensor</b>	<b>Room temperature controller</b>	<b>2byte</b>	<b>C,W,T,U</b>	<b>9.001 temperature</b>
The communication object is used to receive the temperature value detected by the temperature sensor of the device from the bus. Range:-50~99.8°C					
19	<b>Current setpoint adjustment</b> <b>Base setpoint adjustment</b>	<b>Room temperature controller</b>	<b>2byte</b>	<b>C,W</b>	<b>9.001 temperature</b>
"Current setpoint adjustment" is visible when operation mode is not enabled, and under absolute adjustment. Used to modify the base value of the set temperature; and to modify set temperature value of current room operation mode when absolute adjustment.					
"Base setpoint adjustment" is visible only when relative adjustment, used to modify the base value of the set temperature, that is, the temperature setting value of the comfort mode, and the setting temperature of the standby mode and the economy mode changes according to the relative change. In the protection mode, only the temperature setting value of the protection mode is modified.					
20	<b>Setpoint offset</b>	<b>Room temperature controller</b>	<b>1bit</b>	<b>C,W</b>	<b>1.007 step</b>
The communication object is visible only when absolute adjustment, and offset function enabled. Used to adjust the offset to adjust setpoint temperature indirectly. The step value set according to the parameter.					
Telegrams: 1---Increase the offset 0---Decrease the offset					

21	<b>Float offset value</b>	Room temperature controller	2byte	C,W	9.002 temperature difference
<p>The communication object is visible only when absolute adjustment, and offset function enabled.</p> <p>Used to modify the accumulated offset via 2 byte float value.</p>					
22	<b>Setpoint offset reset</b>	Room temperature controller	1bit	C,W	1.015 reset
<p>The communication object is visible only when absolute adjustment, and offset function enabled.</p> <p>Reset offset value when telegram is 1.</p>					
23	<b>Heating/Cooling mode</b>	Room temperature controller	1bit	C,W	1.100 cooling/heating
<p>The communication object is used for changing the heating and cooling via the bus. Telegrams:</p> <p>1—Heating</p> <p>0—Cooling</p>					
24	<b>Operation mode</b>	Room temperature controller	1byte	C,W	20.102 HVAC mode
25	<b>Comfort mode</b>	Room temperature controller	1bit	C,W	1.003 enable
26	<b>Economy mode</b>	Room temperature controller	1bit	C,W	1.003 enable
27	<b>Frost/Heat protection mode</b>	Room temperature controller	1bit	C,W	1.003 enable
28	<b>Standby mode</b>	Room temperature controller	1bit	C,W	1.003 enable
<p>These communication objects are used to control the RTC operation mode via the bus.</p> <p>When 1 byte: object 24 is visible, telegrams: 1-comfort, 2-standby, 3-economy, 4-protection, other reserved.</p> <p>When 1bit:</p> <p>Object 25— Comfort mode</p>					

Object 26— Standby mode

Object 27— Economy mode

Object 28— Protection mode

When the object receives the telegram “1”, the corresponding mode is activated. When 1 bit standby object is not enable, and the telegrams of comfort, economy, protection mode are 0, is standby mode. When 1 bit standby object is enable, standby object receives “1” activates standby mode, 0 is ignored.

29	<b>Extended comfort mode</b>	Room controller	temperature	1bit	C,W	1.016 acknowledge
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The communication object is used for triggering time to extended comfort mode. Telegrams:

1—Activate comfort mode

0—No sense

Activate comfort mode when the object receives telegram 1. If receive again telegram 1 during delay time, time will be reset again. And return the previous operation mode from comfort mode once finish timing. If there is a new operation mode during delay time, exit the comfort mode.

If change the operation mode, exit the timing, but switch the heating/cooling will not.

30	<b>Fan automatic operation</b>	Room controller	temperature	1bit	C,W	1.003 enable
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The communication object is used to activate the fan automatic operation via the bus. Telegram:

1—Auto

0—Exit auto

31	<b>Window contact</b>	Room controller	temperature	1bit	C,W,U	1.019 Window/door
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The communication object is used to receive the switch status of window contact. Telegrams:

1—Open window

0—Close window

32	Presence detector	Room temperature controller	1bit	C,W,U	1.018 occupancy
The communication object is used to receive the room occupancy status from presence detector.					
Telegrams:					
1—Occupied					
0—No occupied					
33	Actual temperature, status	Room temperature controller	2byte	C,R,T	9.001 temperature
The communication object is visible when temperature reference of RTC function is combination of internal and external sensor. Used to send the actual temperature after the combination to the bus.					
34	Base temperature setpoint, status	Room temperature controller	2byte	C,R,T	9.001 temperature
The communication object is visible only when relative adjustment. Used to send the current base set temperature to the bus.					
Current base set temperature value = parameter set value (or object 19 base value)+accumulated offset value					
35	Setpoint offset, status	Room temperature controller	2byte	C,R,T	9.002 temperature difference
The communication object is visible only when relative adjustment. Used to send the accumulated offset value of base set temperature to the bus.					
36	Current temperature setpoint, status	Room temperature controller	2byte	C,R,T	9.001 temperature
The communication object is used to send current set temperature to the bus.					
37	Heating/Cooling mode, status	Room temperature controller	1bit	C,R,T	1.100 cooling/heating
The communication object is used to feedback the telegram of changing cooling and heating function to the bus.					
38	Operation mode, status	Room temperature controller	1byte	C,R,T	20.102 HVAC mode

39	Comfort mode, status	Room temperature controller	1bit	C,R,T	1.003 enable
40	Economy mode, status	Room temperature controller	1bit	C,R,T	1.003 enable
41	Frost/Heat protection mode, status	Room temperature controller	1bit	C,R,T	1.003 enable
42	Standby mode, status	Room temperature controller	1bit	C,R,T	1.003 enable

These communication objects are used to send RTC operation mode status to the bus.

When 1 byte: object 38 is visible, telegrams: 1-comfort, 2-standby, 3-economy, 4-protection, other reserved.

When 1bit:

Object 39— Comfort mode

Object 40— Economy mode

Object 41— Protection mode

Object 42— Standby mode

When a mode is activated, the corresponding object only sends telegram "1". When 1 bit standby object is not enable, activate standby mode when comfort, economy, protection objects send telegram 0 together. When 1 bit standby object is enable, activate standby mode only when standby object send 1.

**Note: no requirement to send mode status to the bus when switchover via bus. The same is fan speed and other operation.**

43	Heating/Cooling control value Heating control value	Room temperature controller	1bit 1byte	C,R,T	1.001 Switch 5.001 percentage
44	Cooling control value	Room temperature controller	1bit 1byte	C,R,T	1.001 Switch 5.001 percentage

The communication object is used to send control value of heating or cooling function to the bus. Object datatype is according to parameter setting.

45	Fan speed	Room temperature controller	1byte	C,T	5.001 percentage 5.100 fan stage
46	Fan speed low	Room temperature controller	1bit	C,T	1.001 switch
47	Fan speed medium	Room temperature controller	1bit	C,T	1.001 switch

48	Fan speed high	Room temperature controller	1bit	C,T	1.001 switch
49	Fan speed off	Room temperature controller	1bit	C,T	1.001 switch

These communication objects are used to send control telegrams of the fan speed to the bus.

1bit object is visible according to the parameter setting :

Object 46—Low fan speed

Object 47—Medium fan speed

Object 48—High fan speed

Object 49—Fan speed off

Only the corresponding object sends telegram “1” when a certain fan speed is selected. When 1bit-off object is not enable, all objects send telegrams “0” when fan speed off is selected (The situation apply to connect with fan actuator of GVS);

When 1bit-off object is enable, only 1bit-off object send telegram “1” (The situation apply to connect with fan actuator of other manufacturers).

1byte: the corresponding telegram value of each fan speed is defined by the parameter. Activate the corresponding fan speed, and object 45 sends the corresponding telegram value of the fan speed to the bus.

Table 6.4 “Room temperature controller” communication object table