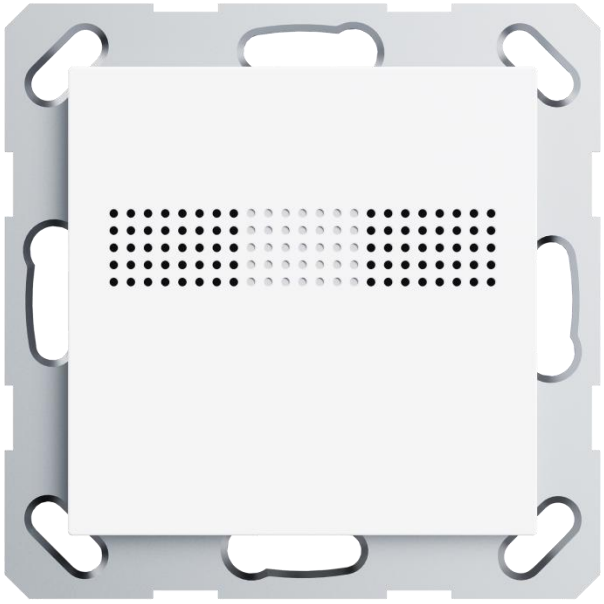
User manual

K-BUS® KNX CO2 sensor,55mm_V1.3

CHAQ-03/55.2.00 (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.

Contents

Chapter 1 Summary

KNX CO2 sensor,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.

The device is designed based on the European standard 55mm system as any other European KNX manufacturers, support to measure CO2, relative humidity and temperature, which means it can be used as CO2, humidity and temperature controllers that limits operation in common areas. In addition, support to level configuration, which reminds user to ventilate, dehumidify when measurement value arrive to the setting level, and also display or indicate the sensor data and level on the control terminal which is with screen or indication LED.

The manual provides detailed technical information about the KNX CO2 sensor,55mm, including installation and programming details, and explains how to use the panel in conjunction with examples in actual use.

KNX CO2 sensor,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:

- Alarm function
- Internal temperature, humidity and CO2 sensor
- Relative humidity level output
- CO2 level output
- Humidity controller, support step control
- CO2 controller, support step control and PI control
- Room temperature controller, support heating, cooling control modes, and HVAC modes, with 2-pipes or 4pipes system, Temperature logic algorithm supports 2-point and PI control,

and Fan auto.control

●2 external input interfaces, used as dry contact detection (Switch, Scene, String send) or NTC temperature measurement

●Compatible with European 55mm-system push button standard design

●Support the KNX Data Secure

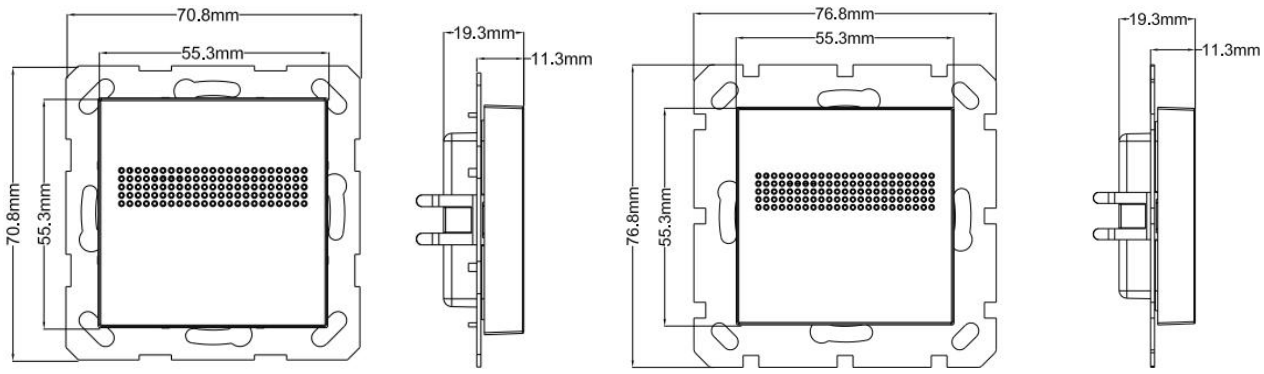
Chapter 2 Technical Data

Power Supply	Bus voltage	21-30V DC, via the KNX bus
	Bus current	<17mA/24V, <14.5mA/30V
	Dynamic current	<25mA/24V, <20mA/30V
	Bus consumption	<600mW
Detection range	CO2	400-2000ppm *
	Temperature	0-40℃ *
	Relative humidity	20-90% *
Input	2 external inputs, as dry contact input or 10K NTC input	
Connection	KNX	Bus connection terminal
	Input	A three-wires connection terminal, cable length <5m
Operation and display	Programming button and red LED	For assigning the physical address, LED off after download
Temperature	Operation	– 5 °C ... 45 °C
	Storage	– 25 °C ... 55 °C
	Transport	– 25 °C ... 70 °C
Environment	Humidity	<93%, except dewing
Dimension	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)	
Mounting	In a conventional 80 or 86 mm wring box	
Weight	0.07kg	

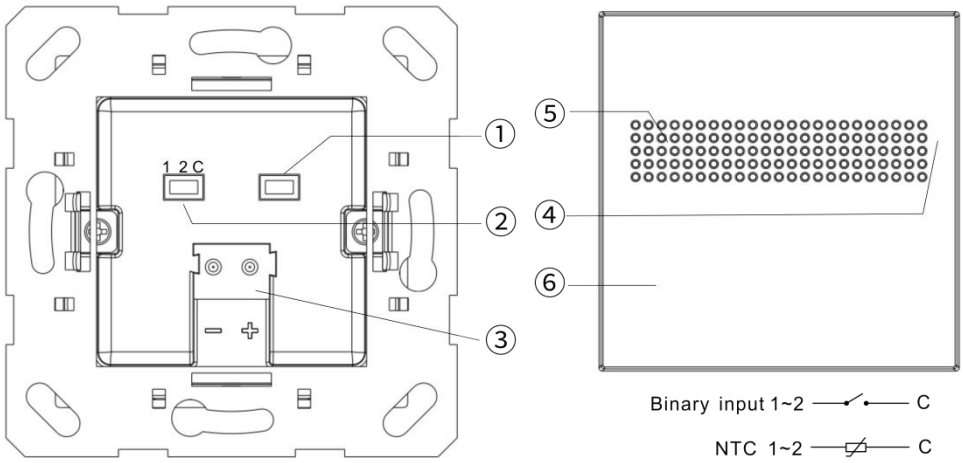
*** These are more accurate detection ranges, while the actual ranges are: the total range of CO2 sensor is 0-40000ppm, temperature sensor is -40-100°C, and relative humidity sensor is 0-99.9%.**

Chapter 3 Dimension and Structural Diagram

3.1.Dimension Diagram



3.2.Structural Diagram



①Programming button and LED ②Input terminals

③KNX bus connection terminal ④ Internal temperature, humidity sensor

⑤Internal CO2 sensor ⑥Alarm buzzer

Reset the device to the factory configuration: press the programming button and hold for 4 seconds then release, repeat the operation for 4 times, and the interval between each operation is less than 3 seconds.

Chapter 4 Project Design and Programming

Application	Maximum of communication objects	Maximum number of group addresses	Maximum number of associations	Secure group addresses
Temperature/Humidity/CO2 sensor with controller/1.0	**197**	**300**	**300**	**300**

General function

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

Internal sensor measurement

Internal temperature, humidity and CO2 measurement values are sent to the bus: respond after read only and respond after change.

Set their calibrations, and send alarm telegrams when the preset range of threshold values for alarm is exceeded. In addition, support to send the error report of CO2 sensor to the bus.

External input interface function

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

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 measurement, the external temperature probe can be connected to measure the external temperature and the B value data of temperature sensing probe needs to be set.

Room temperature controller

Up to set 3 room temperature controllers.

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.

As well as support additional heating/cooling, to increase the response of temperature control.

Air Quality Level

Support the Level output function of CO2 and relative humidity, and independent setting.

The reference of measurement value is optional internal, external, multiple sensors proportional mixing, the final result can be calculated by Average or Weight average, or take the maximum/minimum value. The result is fed back to bus. The external sensors are optional 1~3.

Up to 4 Level outputs, and the control type can be set to 1bit, 1byte unsigned value, percent, scene or RGB.

Configure the threshold value of each Level, and the measurement value is compared with the threshold values, then output the Level telegrams, and you can customizes alarm massage when type is 1byte or RGB.

If the internal sensor failure or external sensor cannot request data, it is determined to be a sensor error, and you can set the output value for sensor failure.

Air Quality Controller

Support the Controller function of CO2 and relative humidity, and independent setting. CO2 controller supports step control and PI control, while relative humidity only support the step control, which can be set 3 levels control, control type can be set 1byte unsigned value or percent.

The reference of measurement value is optional internal, external, proportional mixing internal+external, the mixing data is fed back to bus.

If the internal sensor failure or external sensor cannot request data, it is determined to be a sensor error, and you can set the control value for sensor failure.

Support to stop function. When it is necessary to stop the CO2 or humidity control, manually send the control command to interrupt via other devices, the controller will be inactive after receiving the command. After stopping, you can also set a delay to activate the controller automatically.

Chapter 5 Parameter setting description in the ETS

5.1.KNX Secure

KNX CO2 sensor,55mm is a KNX device that complies with the KNX secure standard. That is, you can run the device in data secure mode.

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 actived in ETS project, the following information must be considered during device debugging:

❖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).

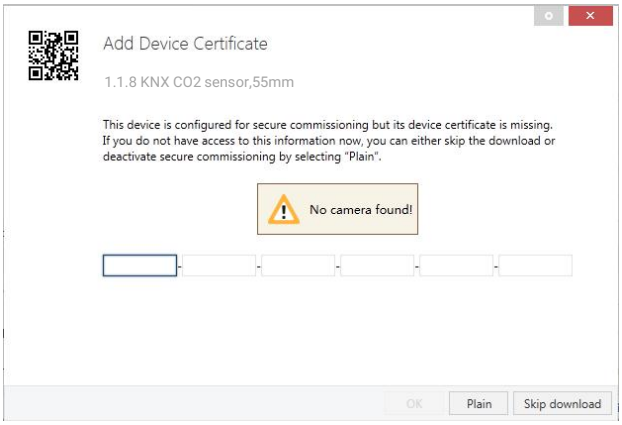


Fig.5.1(2) Add Device Certificate window

✧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).

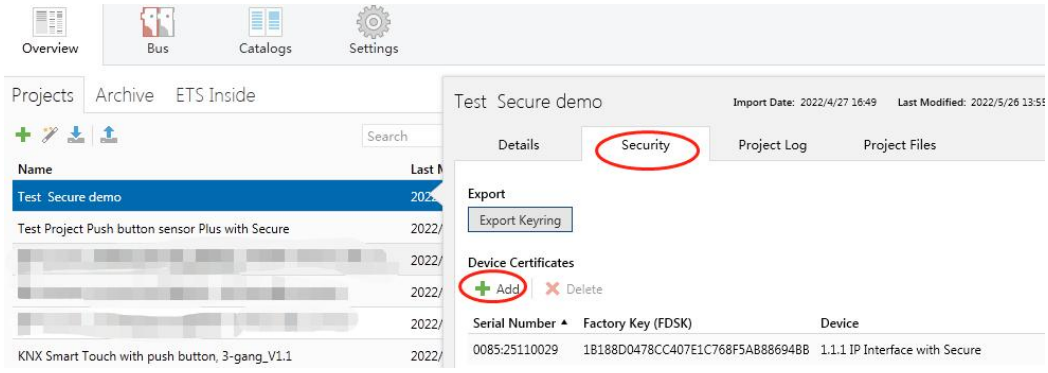


Fig.5.1(3) Add Device Certificate

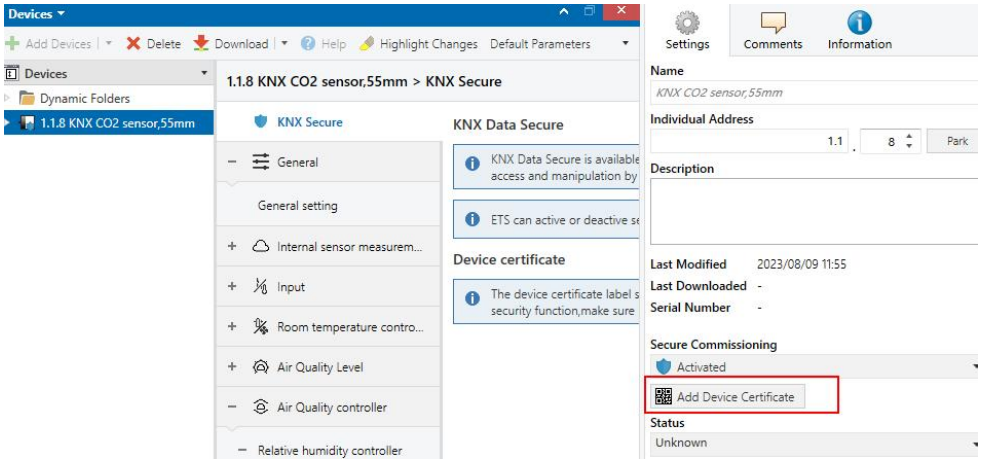


Fig.5.1(4) Add Device Certificate

✧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).

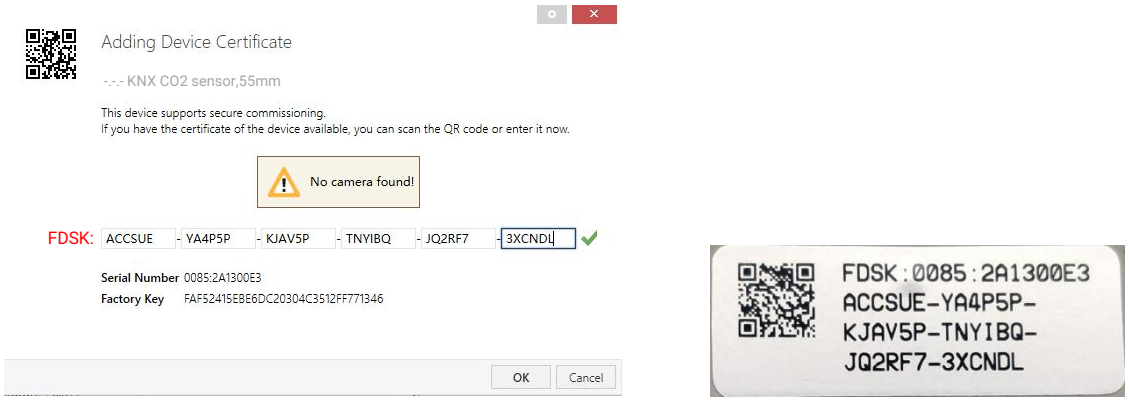


Fig.5.1(5)

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.

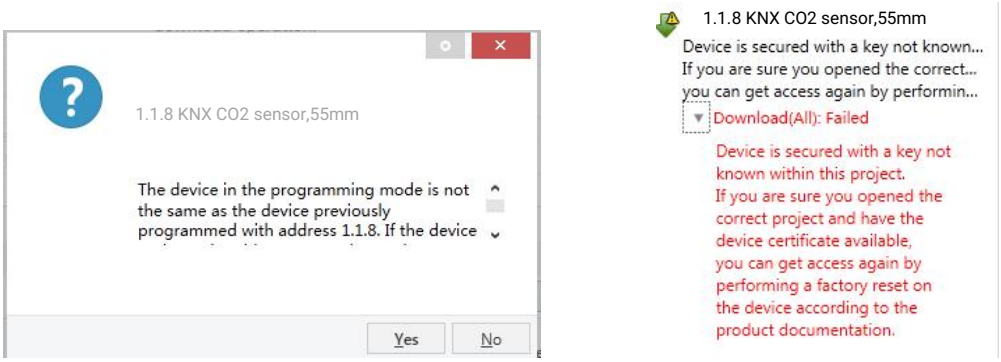


Fig.5.1(6) Example

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.

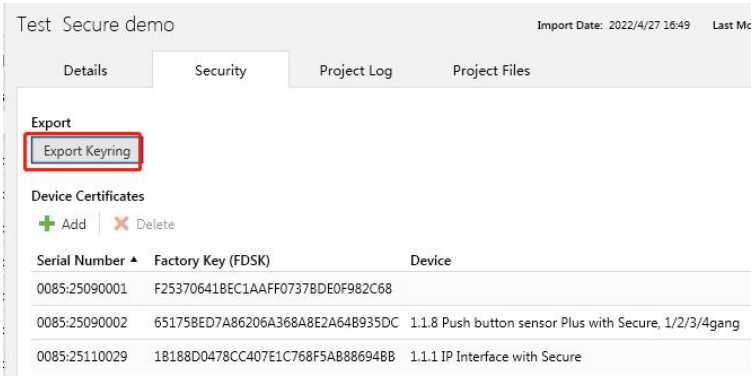


Fig.5.1(8)

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”

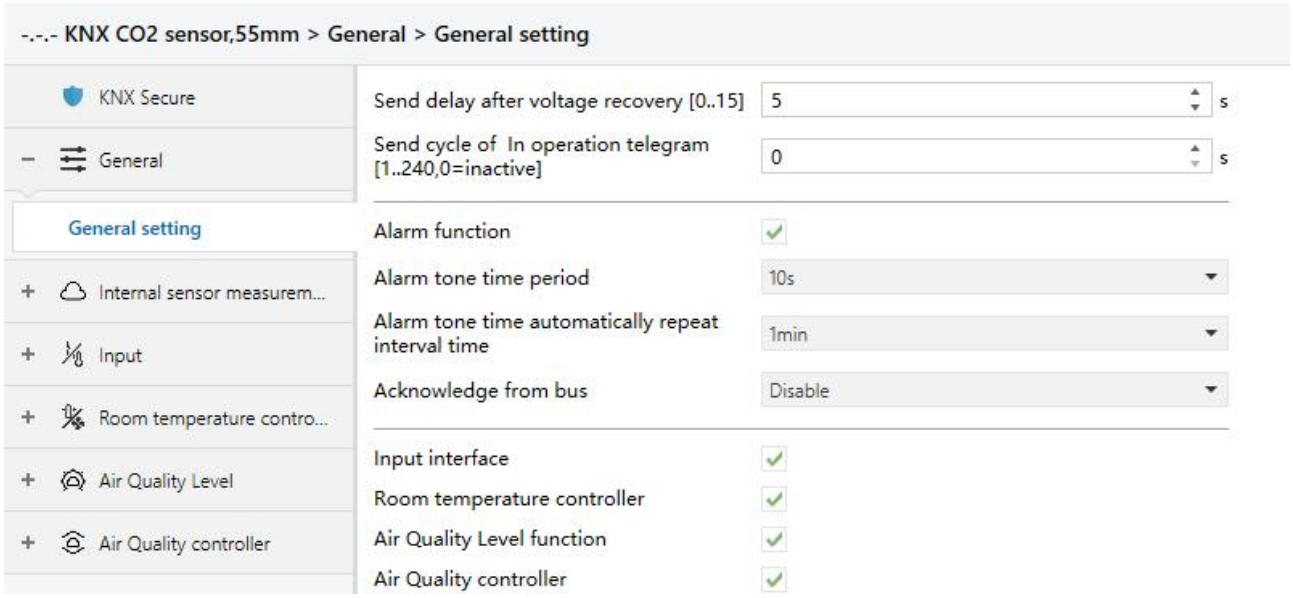


Fig.5.2 “General setting” parameter window

Parameter "Send delay after voltage recovery [0..15]"

This parameter is for setting the delay time to send to bus after the device voltage recovery. Options: **0..15 s**

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…240 s, 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 "Alarm function"

This parameter is for setting whether to enable alarm buzzer function. When it is enabled, following three parameters are visible.

Parameter “Alarm tone time period”

This parameter is for setting the time period of alarm tone. Options:

Disable

10s

20s

...

25min

30min

Disable: not play alarm tone when receive the alarm telegram.

Other options: set the playing period of alarm tone. When receive the alarm telegram, play alarm tone immediately, if currently playing and it will not be interrupted and the timing is not reset. If receive the cancel alarm telegram when playing, it will be interrupted immediately.

Parameter "Alarm tone time automatically repeat interval time"

This parameter is for setting the interval at which alarm tone time automatically repeat. Options:

Disable

10s

20s

...

25min

30min

Disable: disable the alarm tone repeat function.

Other options: set the interval of automatically repeat. When a playing period complete, it will automatically play again after a delay of the setting time.

Parameter "Acknowledge from bus"

This parameter is for setting whether enable the acknowledge telegram sent by other device on the bus. Options:

Disable

Ack=1

Ack=0

When receiving telegram is same as the setting option, it means that user has confirmed the alarm

massage from other device and the alarm tone is stopped, then prepare the timing for the next repeat alarm (if set).

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.

Parameter "Air Quality Level function"

Setting page of Air Quality Level function interface is visible after this parameter enabled.

Parameter "Air Quality controller"

Setting page of Air Quality controller function interface is visible after this parameter enabled.

5.3.Parameter window “Internal sensor measurement”

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

5.3.1.Temperature sensor

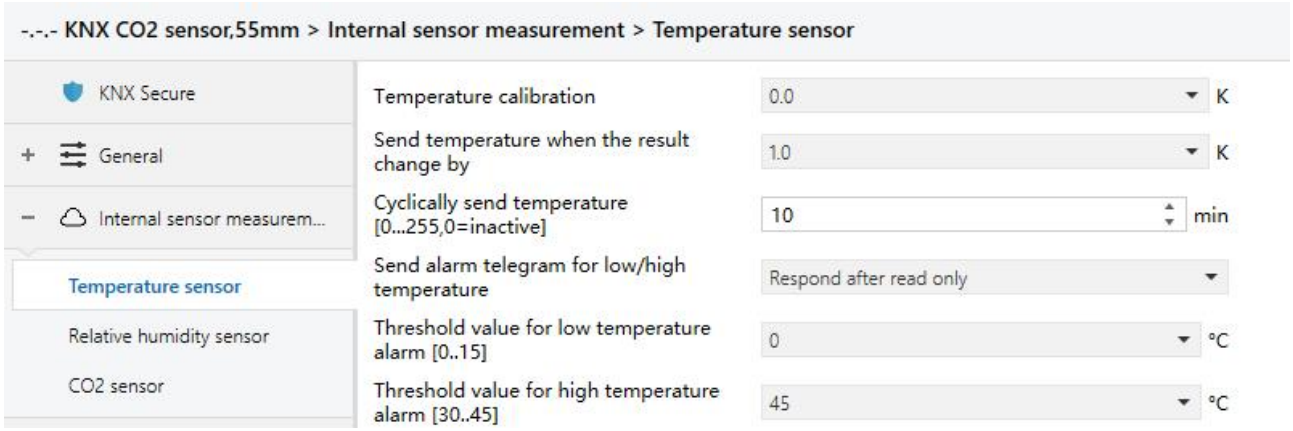


Fig.5.3.1 “Temperature sensor” parameter window

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 measurement will take 30 minutes, therefore, the measured 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 measurement value changes, 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]"

Setting the time for cyclically sending the temperature measurement value to the bus.

Options: **0..255 min**

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 request 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]"

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]"

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

5.3.2.Relative humidity sensor

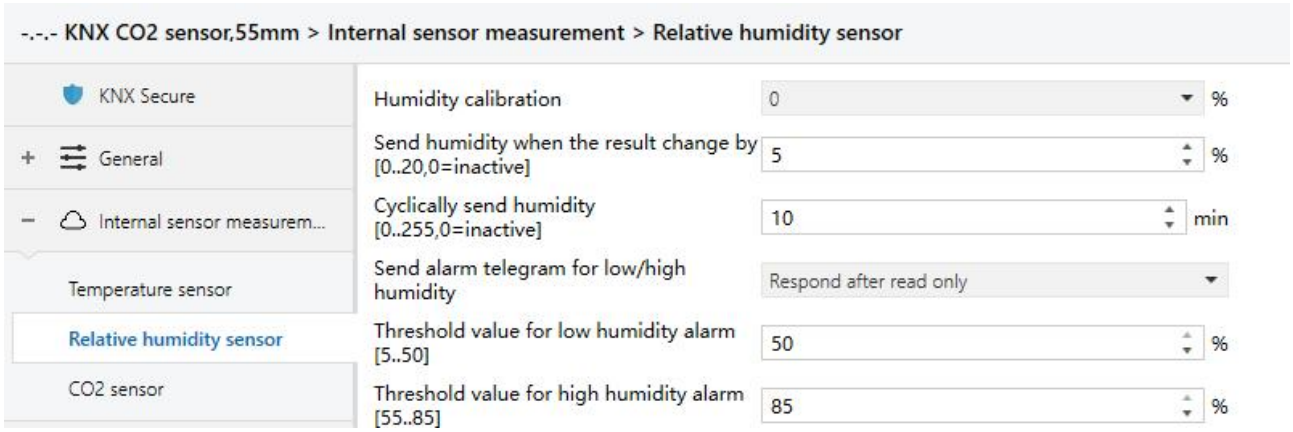


Fig.5.3.2 “Relative humidity sensor” parameter window

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 measurement value changes, 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]"

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

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 request 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..50]"

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..50 %**

——Parameter "Threshold value for high humidity alarm [55..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: **55..85 %**

5.3.3.CO2 sensor

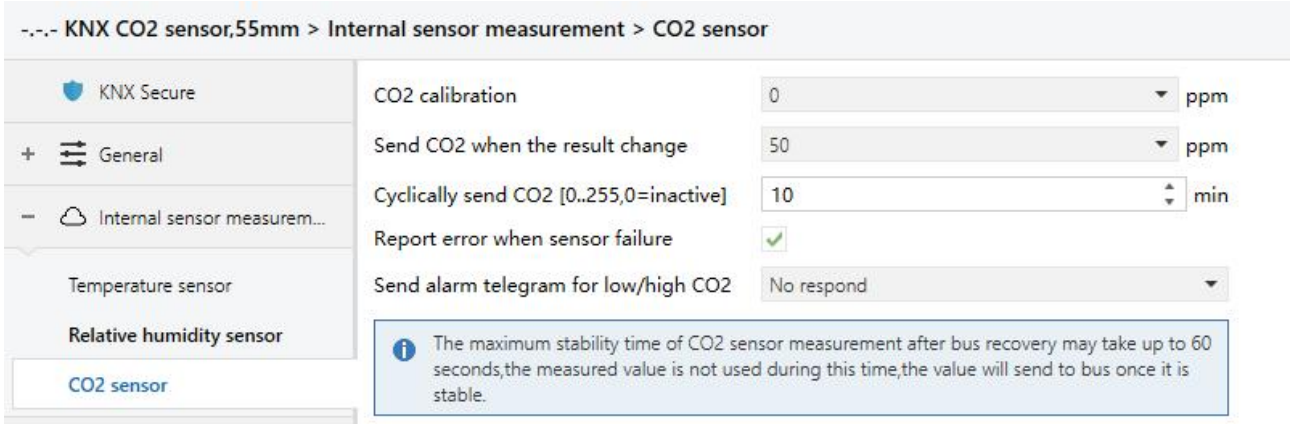


Fig.5.3.3 "CO2 sensor" parameter window

Parameter "CO2 calibration"

This parameter is for setting the CO2 calibration value of the internal sensor, that is, to calibrate the measured value of internal sensor to make it closer to the current ambient CO2. Options:

-500K

...

0K

...

500K

Note: the maximum stability time of CO2 sensor measurement after bus recovery may take up to 60 seconds, the measured value is not used during this time, the value will send to bus once it is stable.

Parameter "Send CO2 when the result change"

This parameter is for setting when CO2 measurement value changes, whether to enable to send the current CO2 value to the bus. No telegram is sent when Disable is selected. Options:

Disable

10ppm

20ppm

...

500ppm

Parameter "Cyclically send CO2 [0..255,0=inactive]"

This parameter is for setting the time for cyclically sending the CO2 measurement value to the bus.

Options: **0..255 min**

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

Parameter "Report error when sensor failure"

This parameter is for setting whether report error when sensor failure. When the sensor does not measure a value, it is generally handled as a sensor failure.

Parameter "Send alarm telegram for low/high CO2"

This parameter is for setting condition of sending telegram when low/high CO2 alarm.

Options:

No respond

Respond after read only

Respond after change

Respond after read only：only when the device receives a read request from other bus device or bus will the object “Low CO2 alarm”/ “ High CO2 alarm” send the alarm status to the bus;

Respond after change: the object “Low CO2 alarm”/ “High CO2 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 CO2 alarm [400..2000]”

This parameter is for setting the threshold value for low CO2 alarm. When the CO2 lower than low threshold, low CO2 alarm object will send telegram. Options: **400..2000 ppm**

——Parameter “Threshold value for high CO2 alarm [400..2000]”

This parameter is for setting the threshold value for high CO2 alarm. When the CO2 higher than high threshold, high CO2 alarm object will send telegram. Options: **400..2000 ppm**

The low CO2 alarm value must less than the high value, if not, it can not be modified on ETS.

5.4.Parameter window “Input”

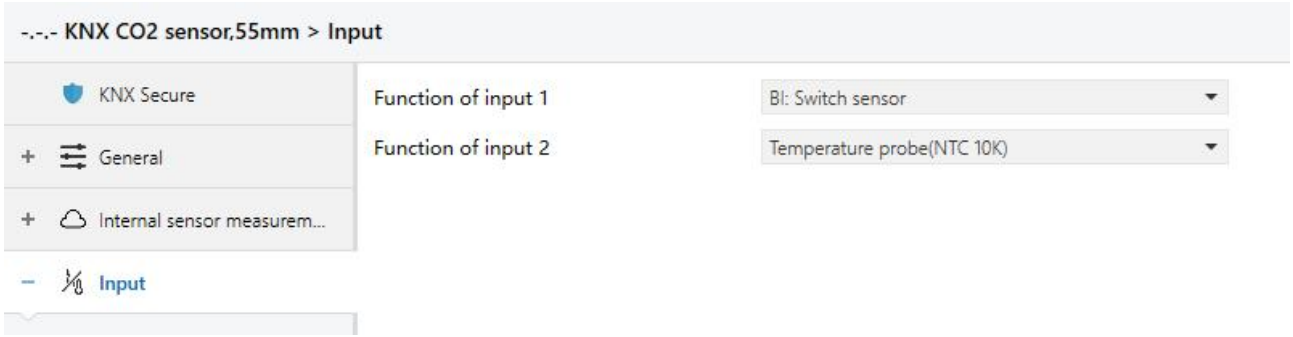


Fig.5.4 “Input” parameter window

Parameter "Function of input x"(x=1, 2)

This parameter is for setting the function of external input interface. Support temperature measurement 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 measure external temperature, which needs set B value of temperature probe.

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

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

5.4.1.5.3.1.Temperature probe

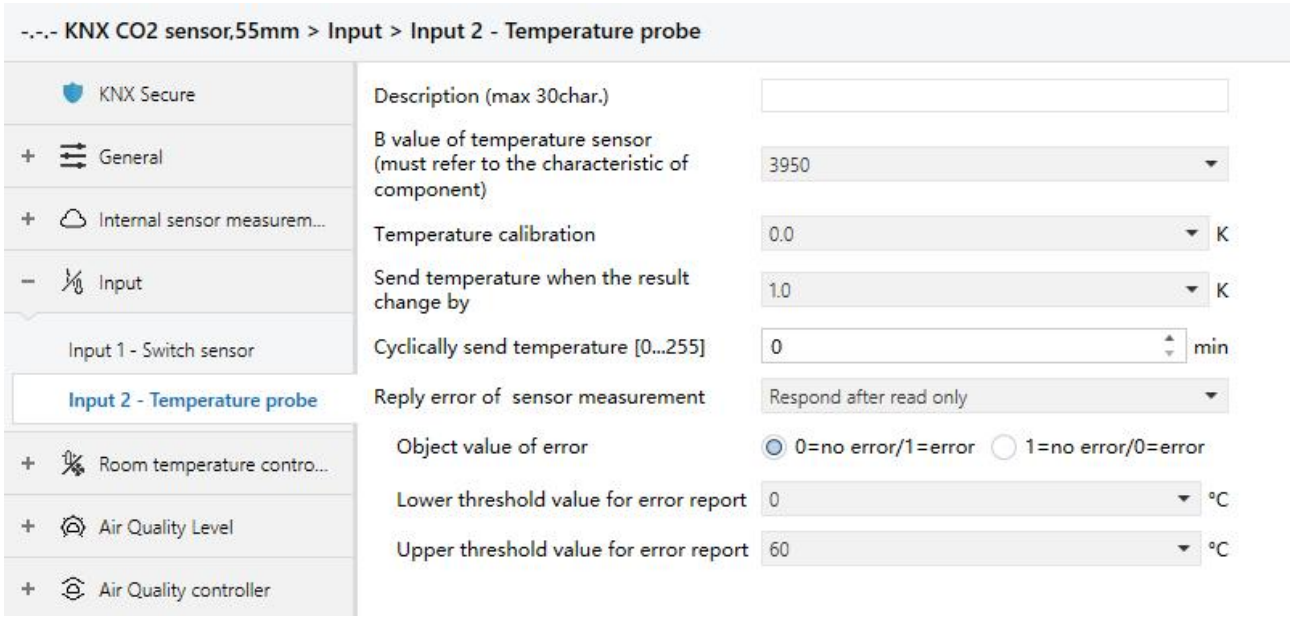


Fig.5.4.1 Parameter setting of temperature probe

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 measurement 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 measurement value changes, whether to enable to send the current temperature value to the bus. Not send when disable. Options:

Disable

0.5K

1.0K

...

10.0K

Parameter "Cyclically send temperature [0...255,0=inactive]"

Setting the time for cyclically sending the temperature measurement value to the bus. Not send when value is 0. Options: **0..255 min**

Parameter "Reply error of sensor measurement"

This parameter for setting the condition of sending error status report when temperature exceeds the valid measurement. 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 lower threshold value for temperature error. When the temperature lower 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**

5.4.2.5.3.2.Binary input

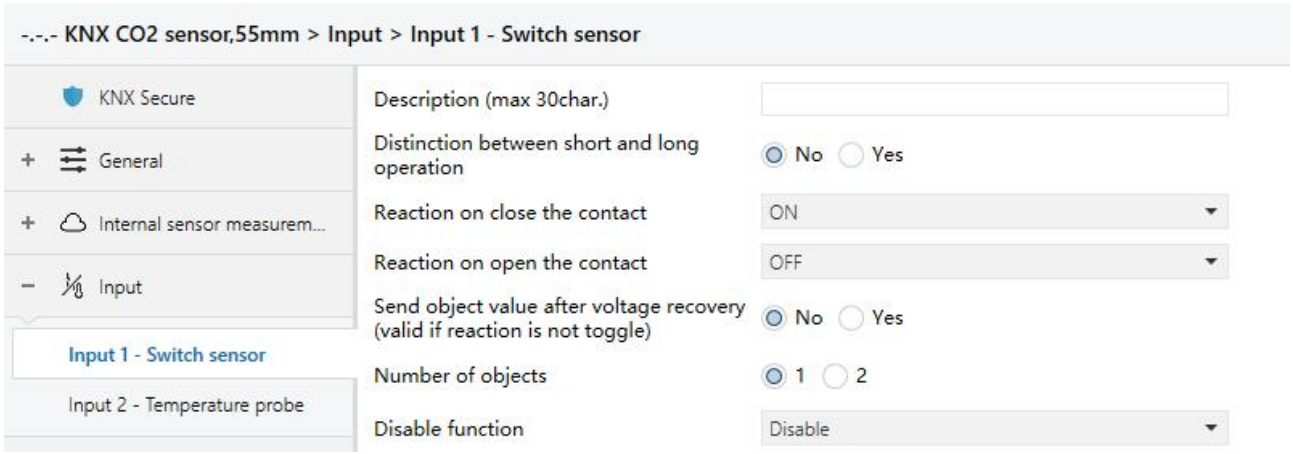


Fig.5.4.2(1) Parameter setting of switch sensor

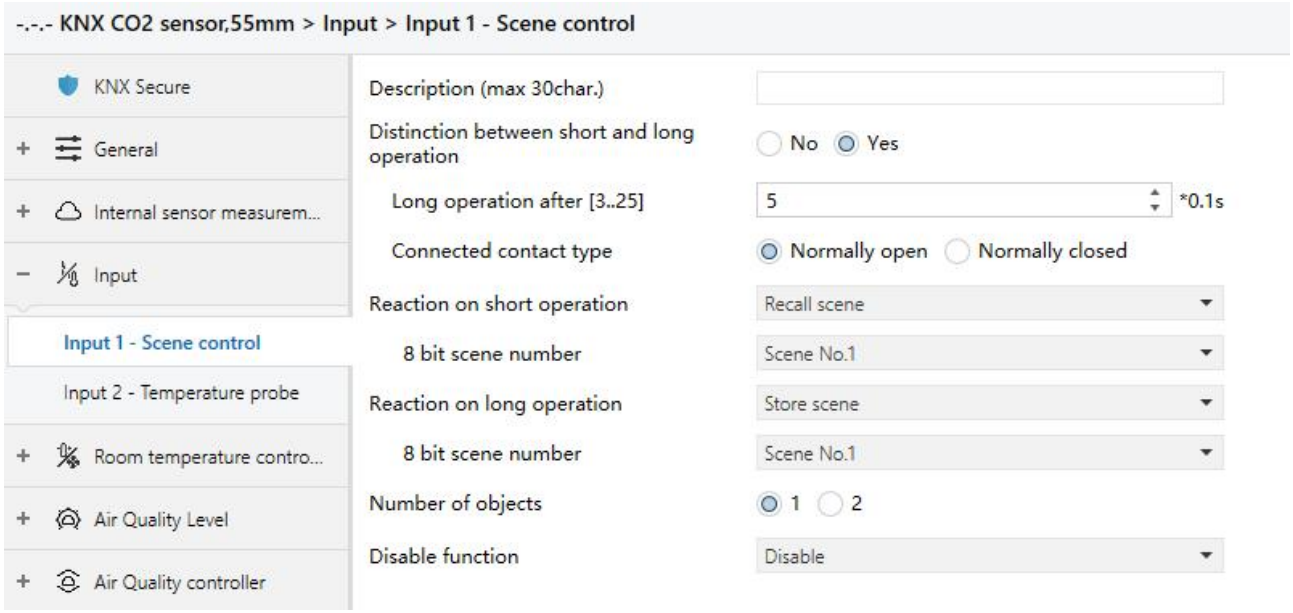


Fig.5.4.2(2) Parameter setting of scene control

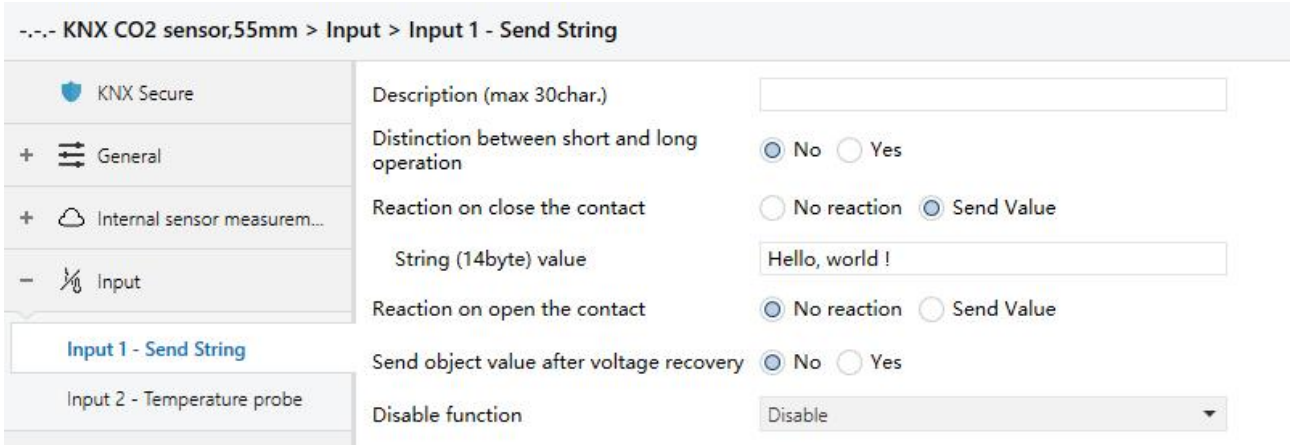


Fig.5.4.2(3) Parameter setting of sending sting

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]"

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 *0.1s**

——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”

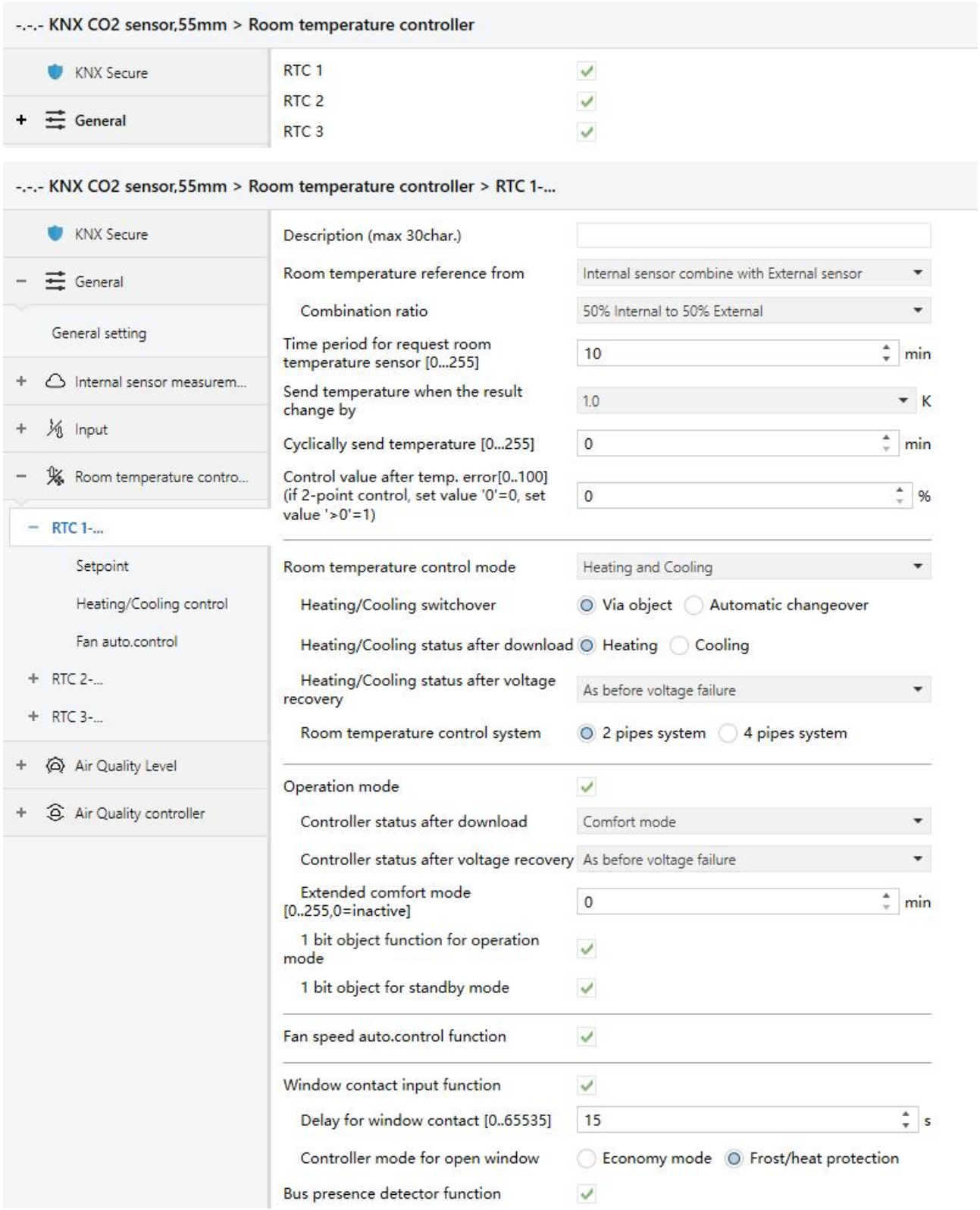


Fig.5.5 “Room temperature controller” parameter window

Parameter "RTC x"(x=1~3)

This parameter is for setting whether to enable function of room temperature controller, up to set 3 controllers.

Parameter "Description (max 30char.)"

This parameter is for setting the name description of room temperature controller.

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]"

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

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 actual temperature = (internal sensor's temperature × 40%) + (external sensor's temperature × 60%), the RTC function of the device will control according to the calculated temperature.

When two sensors are combined for measurement, when one sensor is in error, the temperature

value measured by the other sensor is used.

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

This parameter is for setting when temperature measurement value changes, 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]"

Setting the time for cyclically sending the temperature measurement value to the bus. Not send when value is 0. Options: **0..255 min**

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]"

This parameter is for setting the extended time of comfort mode. When value >0, activate the extended, and 1 bit object "Extended comfort mode" is visible. Options: **0..255 min**

When object receives telegram 1, comfort mode is activated. If receive telegram 1 again during the delay time, the time will be reset. 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"

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

10.0°C

10.5°C

...

35.0°C

The 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.

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]"

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 s**

——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]"

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

...

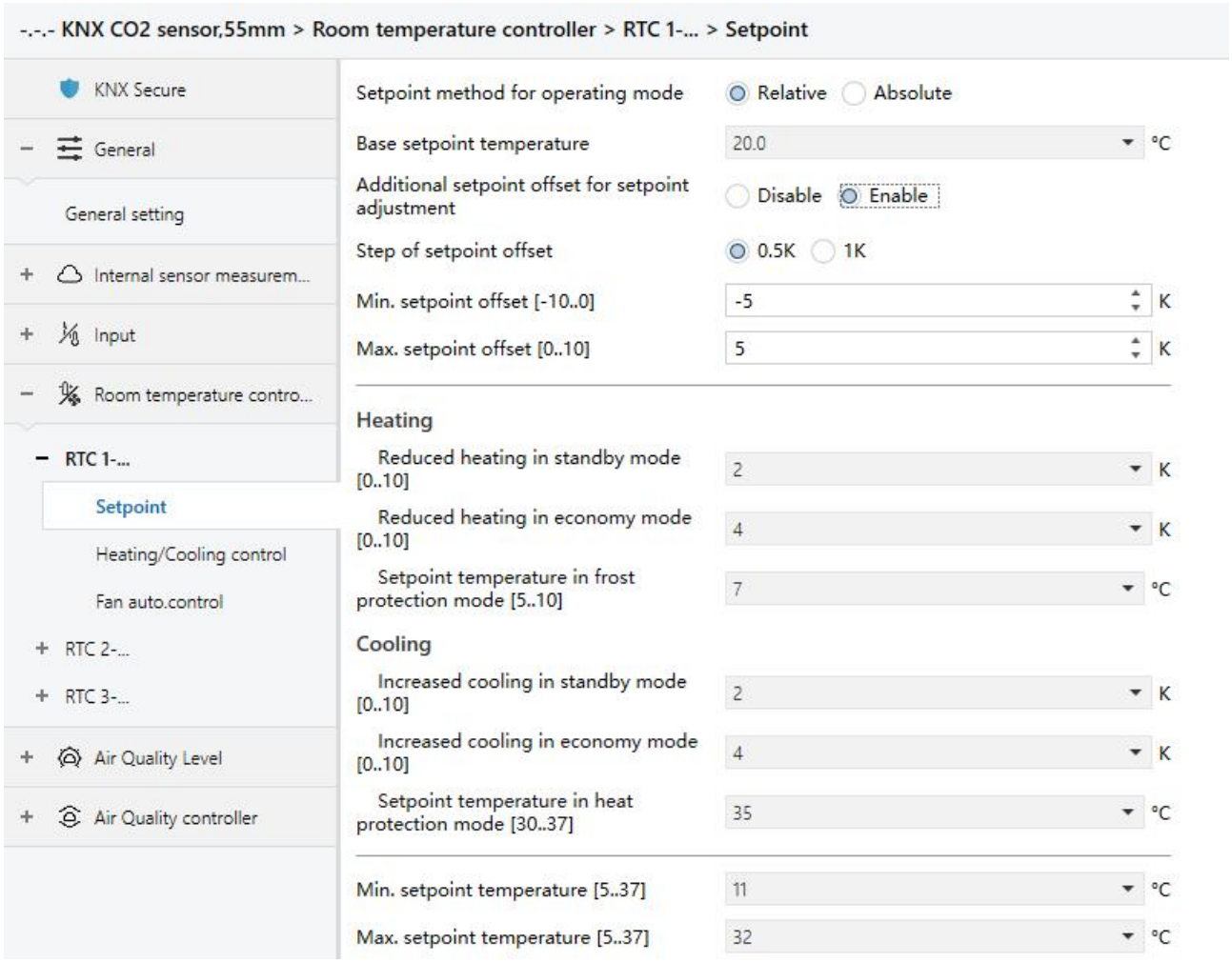
37°C

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

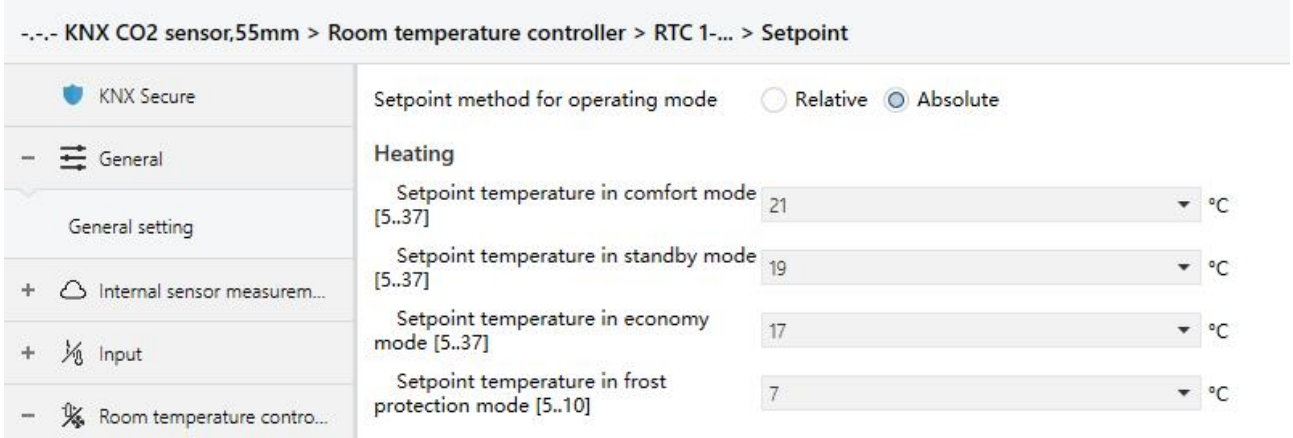
operation mode.

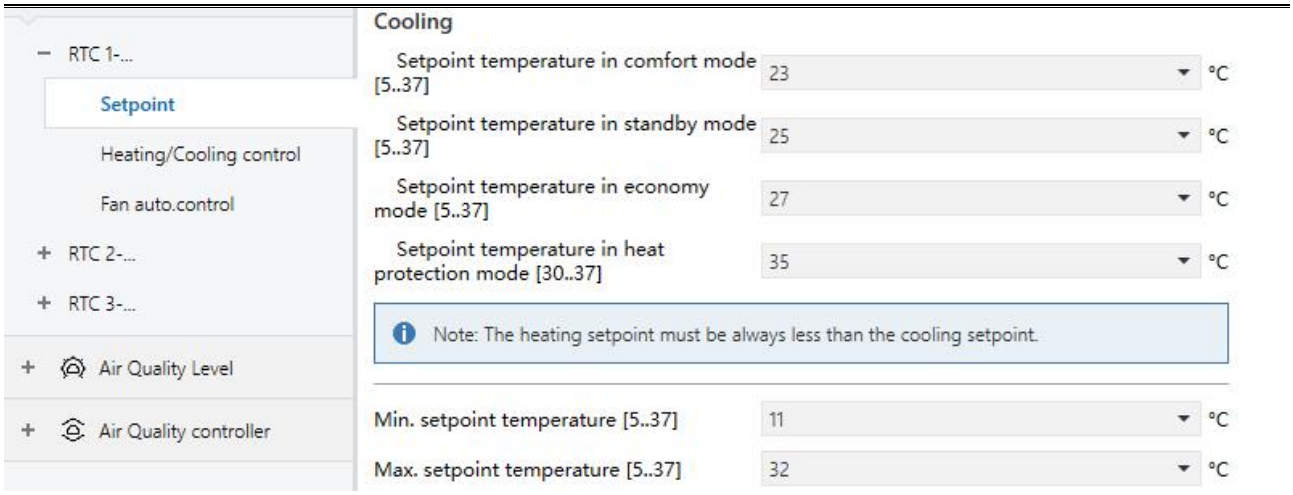
For setpoint temperature, the Min. value must less than the Max., if not, it can not be modified on ETS.

5.5.1.Parameter window “Setpoint”



Parameter setting of relative adjustment





Parameter setting of absolute adjustment

Fig.5.5.1 “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 base setpoint temperature.

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

5.5.1.1.Relative adjustment

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

Parameter "Base setpoint temperature"

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

10.0°C

10.5°C

...

35.0°C

Note: the base setpoint temperature 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.

The setpoint value will be modified through object "Base temperature setpoint, status", 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]"

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

——Parameter "Max. setpoint offset [0..10]"

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

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]"

Parameter "Increased cooling in standby mode [0...10]"

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

0K

1K

...

10K

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

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

Parameter "Reduced heating in economy mode [0...10]"

Parameter "Increased cooling in economy mode [0...10]"

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

0K

1K

...

10K

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

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

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

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]"

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.

5.5.1.2.Absolute adjustment

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

Parameter "Setpoint temperature in comfort mode [5...37]"

Parameter "Setpoint temperature in standby mode [5...37]"

Parameter "Setpoint temperature in economy mode [5...37]"

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]"

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]"

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

30°C

31°C

...

37°C

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.

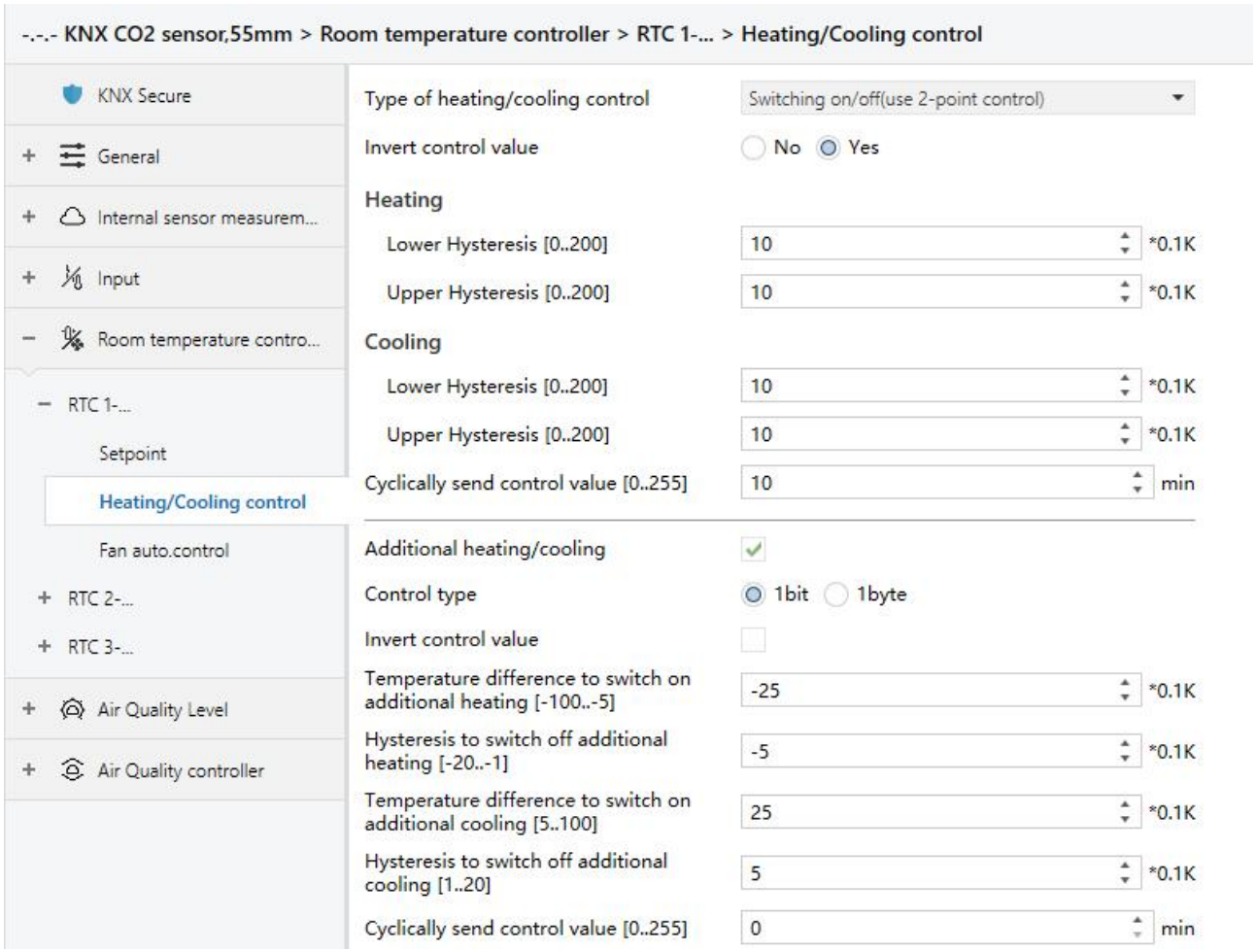
1.When the ambient temperature is higher than the setpoint temperature of current mode in cooling, it is changed to cooling mode; When the ambient temperature is lower than the setpoint temperature of current mode in heating, it is changed to heating mode.

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.

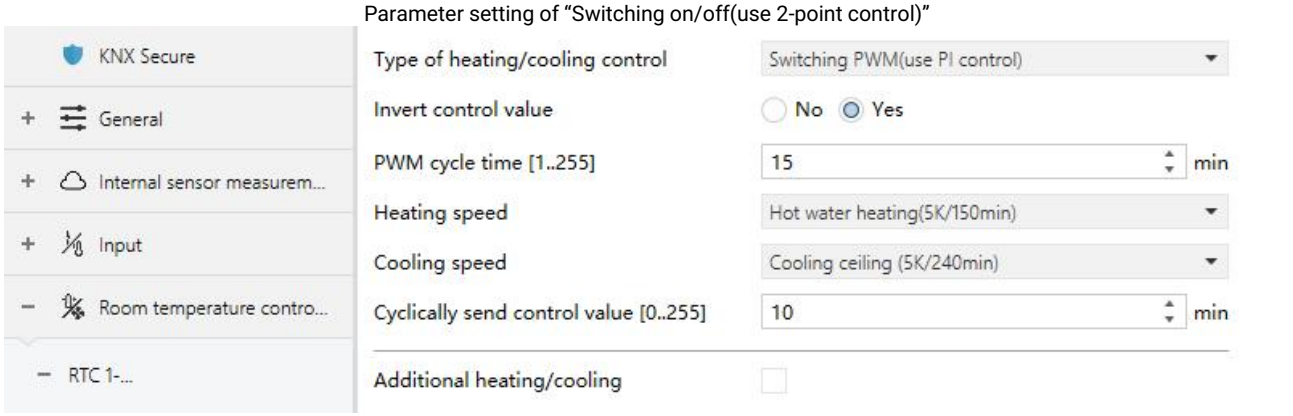
3.When the bus is received setpoint temperature, it is still necessary to limit the value according to the high and low thresholds, that is heating and cooling temperature neither can not be lower than the min., or can not be higher than the max.

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.

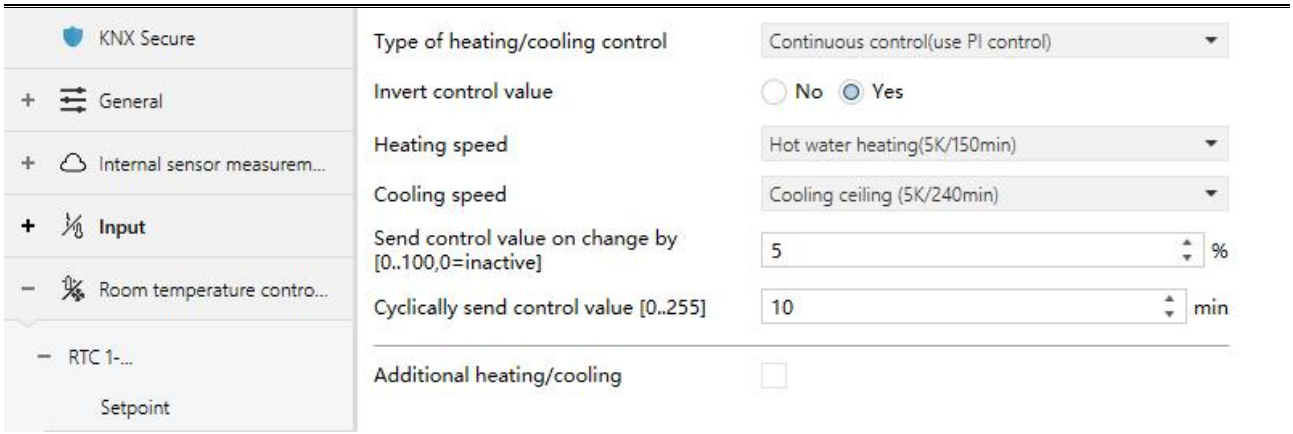
5.5.2.Parameter window “Heating/Cooling control”



Parameter setting of “Switching on/off(use 2-point control)”



Parameter setting of “Switching PWM(use PI control)”



Parameter setting of "Continuous control(use PI control)"

Fig.5.5.2(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] "

——Parameter "Upper Hysteresis [0...200] "

These two parameters are for setting the lower/upper hysteresis temperature in RTC heating or cooling. Options: **0..200 *0.1K**

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℃, if T is higher than 24℃, then it will stop heating; if T is lower than 24℃,then it will start heating; if T is between 21~24℃, 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℃, if T is lower than 25℃, then it will stop cooling; if T is lower than 28℃, then it will start cooling; if T is between 28~25℃, 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.

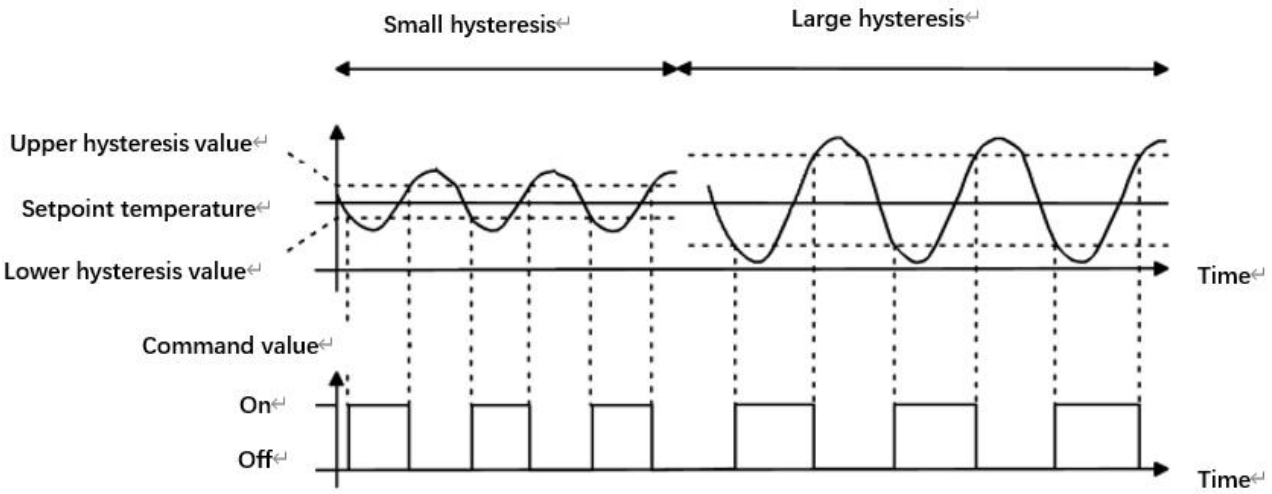


Fig.5.5.2(2) Effects of hysteresis on control value switch action(heating) under2-point control mode

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]”(P value)

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

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

Options: **10..100 *0.1K (P value)**

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

——Parameter "PWM cycle time [1...255]"

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 min**

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]"

This parameter is for setting the period for cyclically sending the control value to the bus.

Options: **0..255 min**

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.

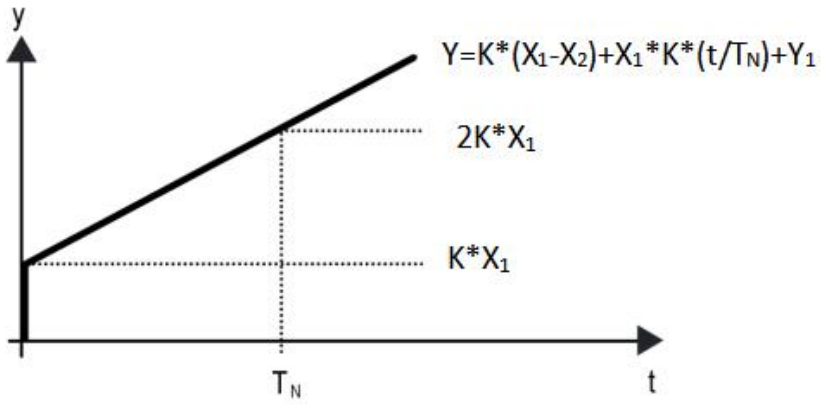


Fig.5.5.2(3) Control value of PI control mode

Y: control value

Y1: last control value

X1: temperature deviation = set temperature - actual temperature

X2: last temperature deviation = set temperature - actual temperature

TN: integration time

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

PI control algorithm: Y = K * (X1-X2) + X1 * K * t / TN + 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 small	Slow adjustment, but no overshoot
T_N: If the integration time is too short	Quick adjustment, but there will be oscillation
T_N: If the integration time is too long	Slow adjustment, no obvious oscillation

Parameter "Additional heating/cooling"

This parameter is for setting whether to activate additional control of heating/cooling valve. The control is applied to *Two valve unit in one system*, and is used to increase response of temperature control via additional coil system.

Following parameters are visible after additional control is activated:

Parameter "Control type"

This parameter is for setting the object datatype of control value for additional heating/cooling valve. Options:

1bit

1byte

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.

For additional heating valve:

Parameter "Temperature difference to switch on additional heating [-100..-5]"

This parameter is for setting the temperature difference value to switch on additional heating.

Options: **-100...-5 *0.1K**

Parameter "Hysteresis to switch off additional heating [-20..-1]"

This parameter is for setting the hysteresis valve to switch off additional heating.

Options: **-20...-1 *0.1K**

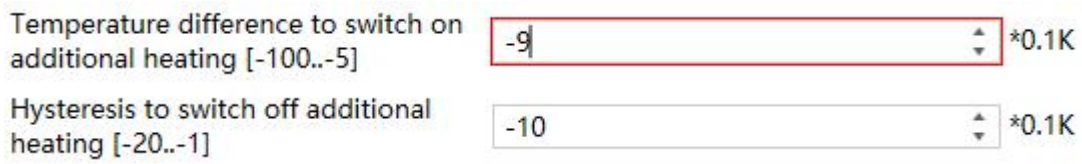
When the actual temperature (T) < (Setpoint temperature + Temperature difference), start heating.

When the actual temperature (T) > (Setpoint temperature + Temperature difference - Hysteresis), then will stop heating.

For example, the temperature difference is -10K, the hysteresis is -2K, the setting temperature is 25℃, if T is lower than 15℃, then it will start heating; if T is higher than 17℃, then it will stop heating; if T is between 15~17℃, then it will maintain the previous status.

Note: |Hysteresis| < |Temperature difference|, if not meet the condition, they can not be

configured in ETS, and display red box warning, as shown as follow:



For additional cooling valve:

Parameter "Temperature difference to switch on additional cooling [5..100]"

This parameter is for setting the temperature difference value to switch on additional cooling.

Options: **5...100 *0.1K**

Parameter "Hysteresis to switch off additional cooling [1..20]"

This parameter is for setting the hysteresis valve to switch off additional **cooling**.

Options: **1..20 *0.1K**

When the actual temperature (T) > (Setpoint temperature + Temperature difference), start cooling.

When the actual temperature (T) < (Setpoint temperature + Temperature difference - Hysteresis), then will stop cooling.

For example, the temperature difference is 10K, the hysteresis is 5K, the setting temperature is 15℃, if T is higher than 25℃, then it will start cooling; if T is lower than 20℃, then it will stop cooling; if T is between 20~25℃, then it will maintain the previous status.

Note: |Hysteresis| < |Temperature difference|, if not meet the condition, they can not be configured in ETS, and display red box warning, as shown as follow:

Parameter "Cyclically send control value [0...255]"

This parameter is for setting the period for cyclically sending the additional control value to the bus.

Options: **0..255 min**

5.5.3.Parameter window “Fan auto.control”

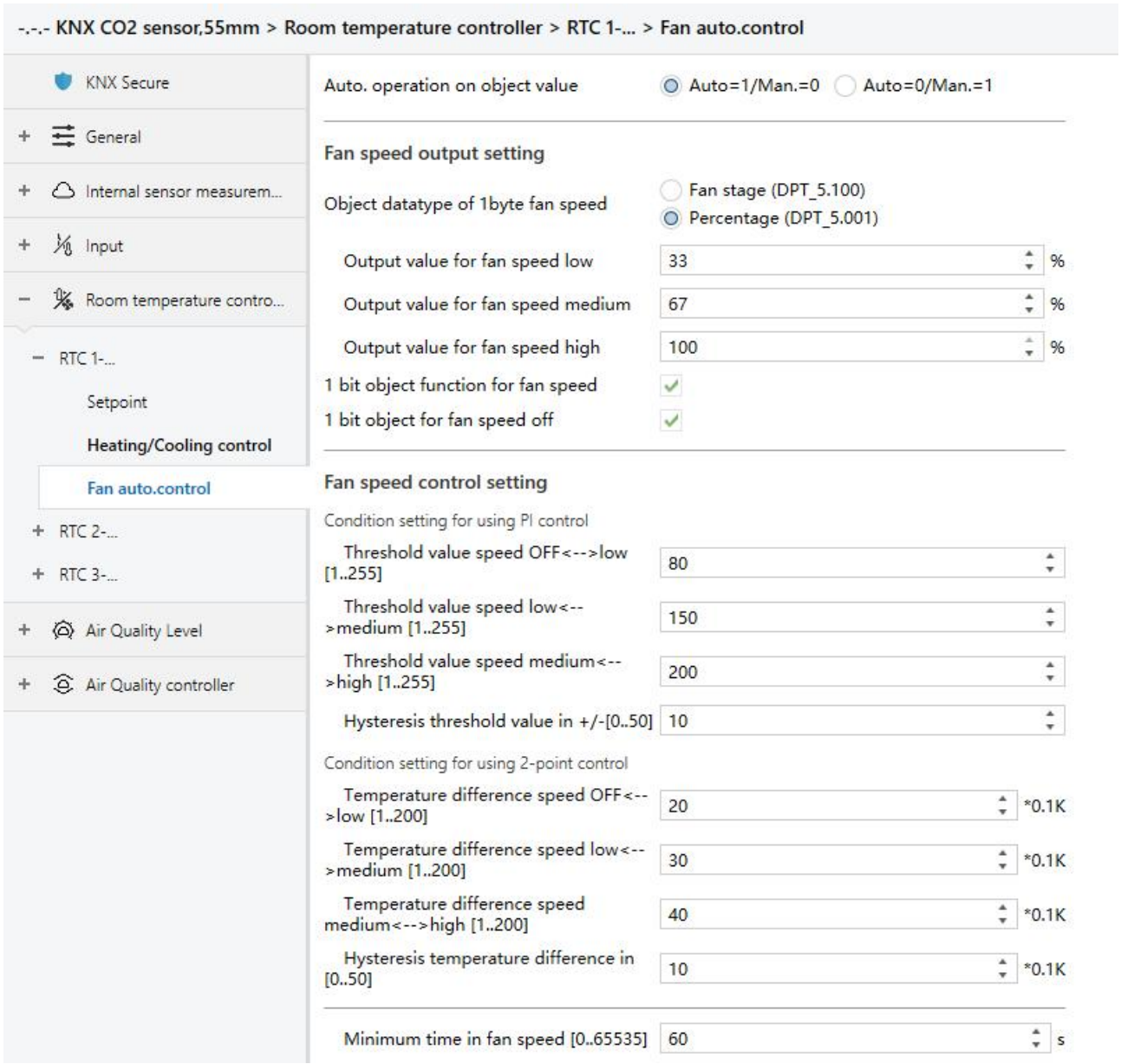


Fig.5.5.3 “Fan” parameter window

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:

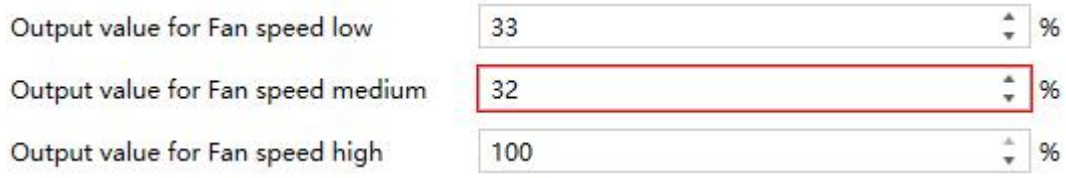
Fan stage (DPT 5.100)

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



Parameter “1 bit 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<->low [1..255]"

Define threshold value for off-fan and low-level fan speeds, options: **1..255**

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

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

Define the threshold value for switching the fan speed to medium fan speed, if the control value is greater than or equal to this setting threshold, the medium fan speed will start running. Options: **1..255**

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

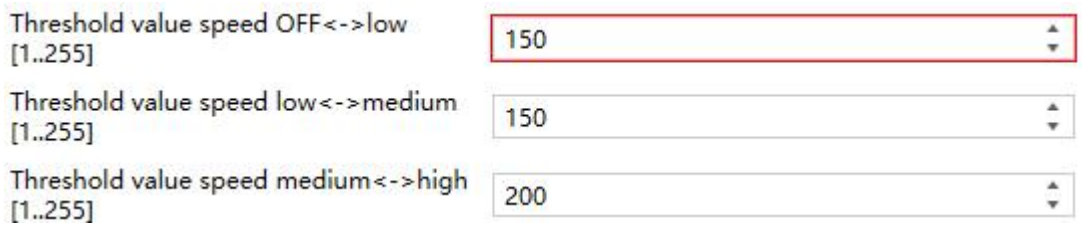
Define the threshold for switching the fan speed to high fan speed, if the control value is greater than or equal to this setting threshold, the high fan speed will start running. Options: **1..255**

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.

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. If not, they can not be configured on ETS, and display red box warning, as shown as follow:



Parameter "Hysteresis threshold value in +/-[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]"

This parameter is for setting the temperature difference between off-fan and low-level fan speeds.

Options: **1..200 *0.1K**

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

Parameter "Temperature difference speed low<-->medium [1..200]"

Define the temperature difference for switching the fan speed to medium fan speed, if the control value is greater than or equal to this setting temperature difference, the medium fan speed will start running. Options: **1..200 *0.1K**

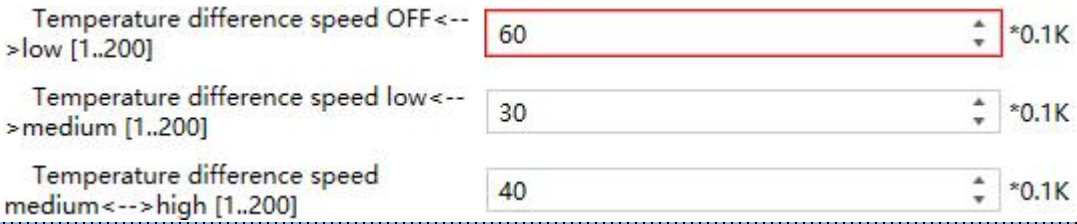
Parameter "Temperature difference speed medium<-->high [1..200]"

Define the temperature difference for switching the fan speed to high fan speed, if the control value is greater than or equal to this setting temperature difference, the high fan speed will start running. Options: **1..200 *0.1K**

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:



Parameter "Hysteresis temperature difference in [0..50]"

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 *0.1K**

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

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

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

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 s**

0: there is no minimum running time.

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

5.6.Parameter window “Air Quality Level”

Support independent setting of CO2 and relative humidity level output functions. Explained in detail in the following chapters.

5.6.1.Relative humidity Level

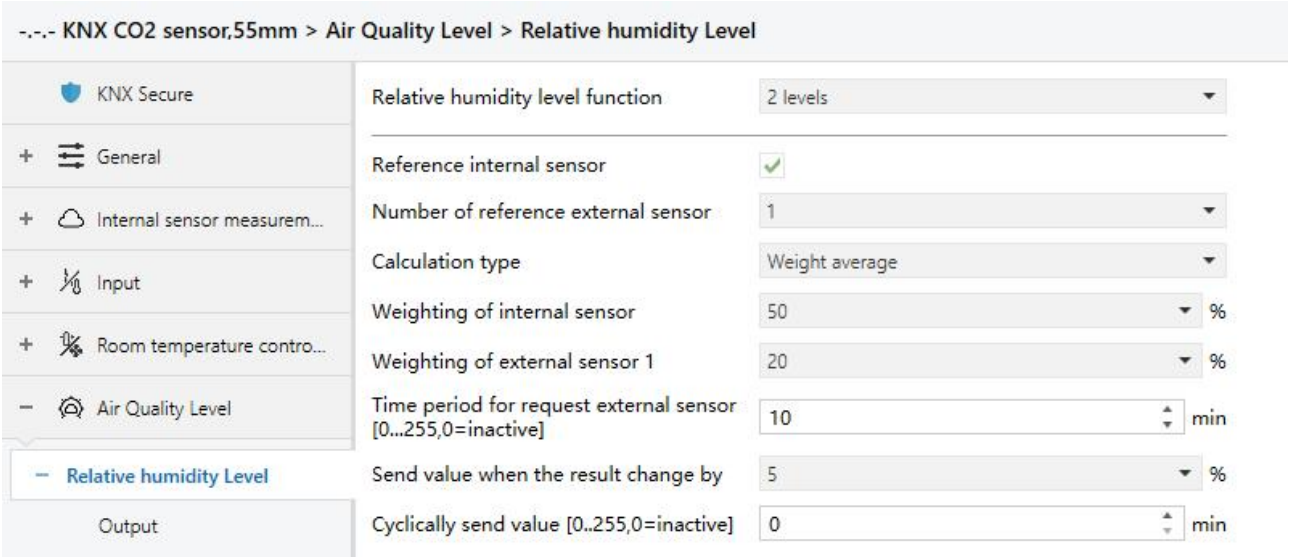


Fig.5.6.1 “Relative humidity Level” parameter window

Parameter "Relative humidity level function"

This parameter is for setting the number of levels for relative humidity. Options:

Disable

2 levels

3 levels

4 levels

Parameter "Reference internal sensor"

This parameter is for setting whether the relative humidity to reference internal sensor.

The reference of measurement value can be from internal sensor, external sensor or multiple sensors proportional mixing, the final result can be calculated by Average or Weight average, or take the maximum/minimum value. The result is fed back to bus. Up to 3 external sensors can be set.

Parameter "Number of reference external sensor"

This parameter is for setting the number of reference external sensors.

If the previous parameter is enabled, options: **0 / 1 / 2 / 3**

If the previous parameter is disabled, options: **1 / 2 / 3**

Parameter "Calculation type"

This parameter is visible when there are 2 referenced sensors or above. Set the calculation type of relative humidity. Options:

Average

Weight average

Minimum value

Maximum value

Average: take the average of measurement values from sensors.

Weight average: set the weight average of measurement values from each sensors, then take the calculation value.

Minimum value: take the minimum measurement value from sensors.

Maximum value：take the maximum measurement value from sensors.

Parameter "Weighting of internal sensor"

Parameter "Weighting of external sensor x" (x=1~3)

These parameters are visible when "Weight average" is selected. Set the Weighting of internal or external sensors. Options:

10%

20%

...

100%

The weighting of each sensor is setting independently by parameters, then add up these data as actual humidity value.

Note: when any one of these sensors went wrong (including internal sensor), still consider its weighting, however, because it is illegal data, it will not be actively sent to the bus, keeping the current status.

Parameter "Time period for request external sensor [0...255]"

This parameter is visible when there is External sensor. Used for setting the period for request relative humidity value from external sensor. Options: **0 ..255 min**

Send a read request to external sensor after bus recovery or finish programming.

Parameter "Send value when the result change by"

This parameter is visible when there are 2 referenced sensors or above. Used for setting when relative humidity measurement value changes, whether to enable to send the current relative humidity value to the bus. Not send when "Disable" is selected. Options:

Disable

1%

2%

3%

...

25%

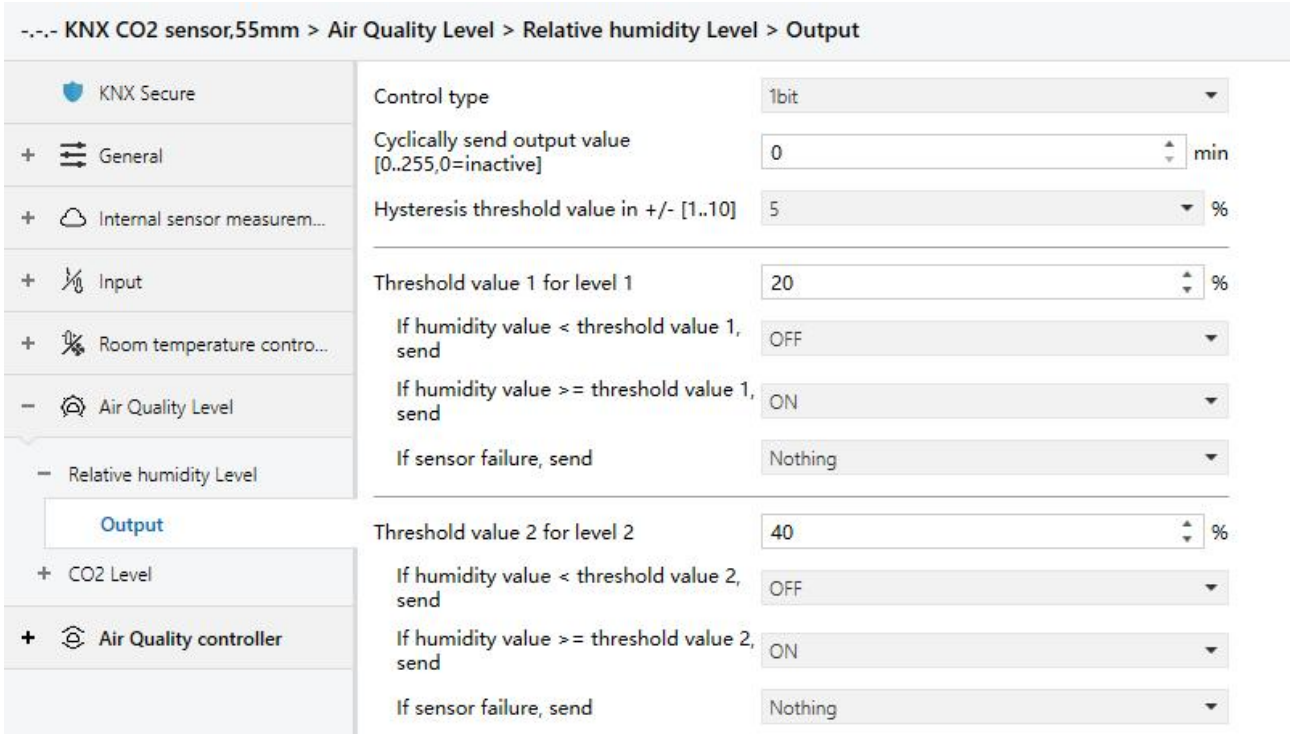
Parameter "Cyclically send value [0...255,0=inactive]"

This parameter is visible when there are 2 referenced sensors or above. Used for setting the time for cyclically sending the relative humidity measurement value to the bus. Not send when 0 is set.

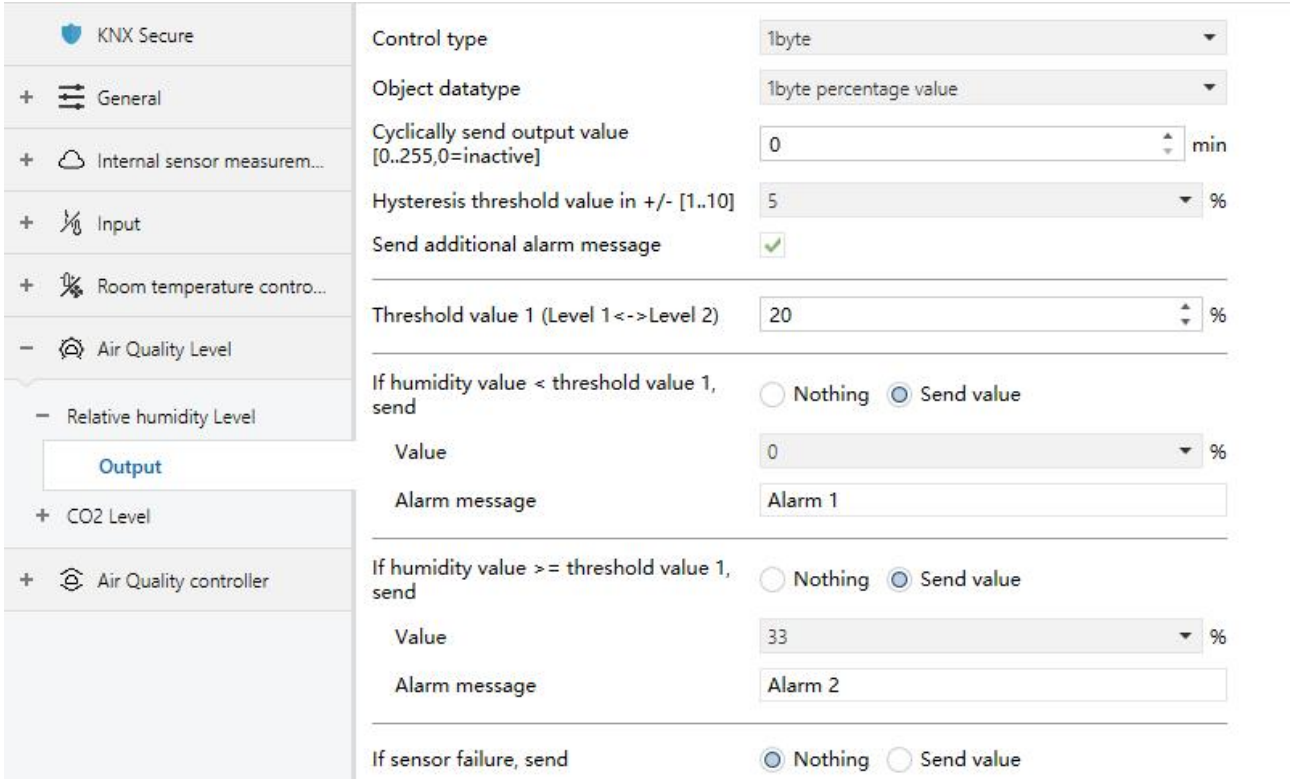
Options: **0..255 min**

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

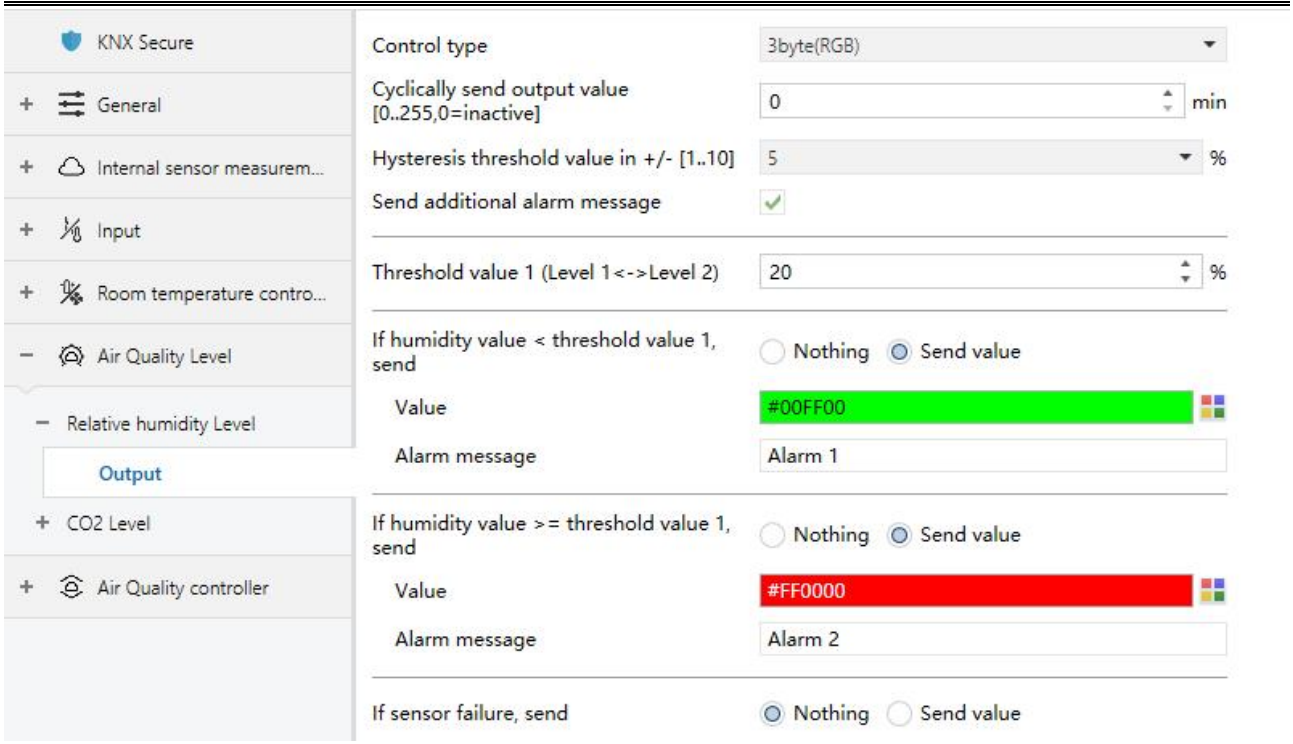
5.6.1.1.Output



1bit



1byte



3byte(RGB)

Fig.5.6.1.1 “Output” parameter window

Parameter ”Control type”

This parameter is for setting the control type of output levels. Options:

1bit

1byte

3byte(RGB)

Parameter ”Object datatype”

This parameter is visible when ”1byte” is selected for the previous parameter. Set the object datatype of 1byte. Options:

1byte percentage value

1byte unsigned value

Scene number

Parameter ”Cyclically send output value [0..255,0=inactive]”

This parameter is for setting the time for cyclically sending the output values of the levels to the bus. Not send when 0 is set. Options: **0..255 min**

This period is independent and starts time counting after programming or reset. Transmission

change has no affect on this period.

Parameter "Hysteresis threshold value in +/- [1..10]"

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

1%

2%

...

10%

Suppose that hysteresis value is 5% and the threshold is 20%, then the upper limit threshold 25% (Threshold value+Hysteresis value) and the lower limit threshold 15% (Threshold value-Hysteresis value). When the humidity is between 15%~25%, level switchover will not be caused, and the previous status will still be maintained. Only less than 15% or greater than or equal to 25% will change the output level.

Parameter "Send additional alarm message"

This parameter is visible when 1byte or 3byte is selected for control type. Set whether to send additional alarm message. You can customize the message if enabled the parameter.

If control type is 1bit:

Parameter "Threshold value x for level x"(x=1~4)

This parameter is for setting the threshold value x of level x, up to set 4 relative humidity levels, 4 corresponding threshold values need to be set for 1bit.

Options: **0..100 %**

Parameter "If humidity value < threshold value x, send"

This parameter is for setting the output value if humidity value is less than threshold value x.

Options:

Nothing

OFF

ON

Parameter "If humidity value >= threshold value x, send"

This parameter is for setting the output value if humidity value is greater than or equal to threshold value x. Options:

Nothing

OFF

ON

Parameter " If sensor failure, send"

This parameter is visible when there is external sensor. Set the output value if sensor failure.

Options:

Nothing

OFF

ON

If control type is 1byte or 3byte:

Parameter "Threshold value 1 (Level 1<->Level 2)"

This parameter is for setting the threshold value 1, change to level 2 if humidity is greater than or equal to this threshold; change to level 1 while it is less than this threshold. Options: **0..100 %**

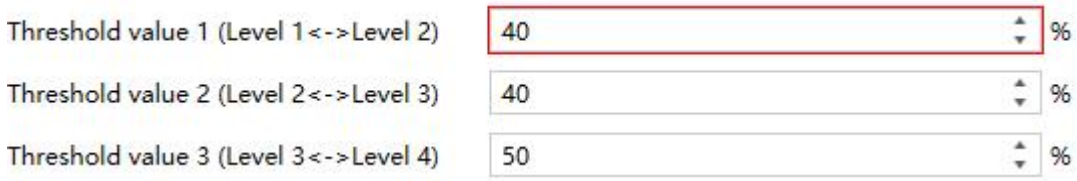
Parameter "Threshold value 2 (Level 2<->Level 3)"

This parameter is for setting the threshold value 2, change to level 3 if humidity is greater than or equal to this threshold. Options: **0..100 %**

Parameter "Threshold value 3 (Level 3<->Level 4)"

This parameter is for setting the threshold value 3, change to level 4 if humidity is greater than or equal to this threshold. Options: **0..100 %**

Note: these parameters are display according to the number of levels. And threshold value 1<threshold value 2<threshold value 3, if not, they can not be configured on ETS, and display red box warning, as shown as follow:



Parameters as follow are for setting the output values after the humidity is compare with threshold value 1~3:

Parameter "If humidity value < threshold value 1, send"

Parameter "If threshold value 1 <= humidity value < threshold value 2, send"

Parameter "If threshold value 2 <= humidity value < threshold value 3, send"

Parameter "If humidity value >= threshold value 3, send"

These parameters are for setting whether to send output value after the humidity is compare with threshold value 1~3. Options:

Nothing

Send value

Parameter "Value"

This parameter is visible when "Send value" is selected for previous parameter. Set the output value. Options are display according to the object datatype of 1byte and 3byte.

Parameter "Alarm message"

This parameter is visible when additional alarm message is enabled. Set the alarm message, up to 14 bytes allowed.

Parameter "If sensor failure, send"

This parameter is visible when there is external sensor. Set whether to send output value when external sensor is failure. Options:

Nothing

Send value

Parameter "Value"

This parameter is visible when "Send value" is selected for previous parameter. Set the output value for sensor failure. Options are display according to the object datatype of 1byte and 3byte.

5.6.2.CO2 Level

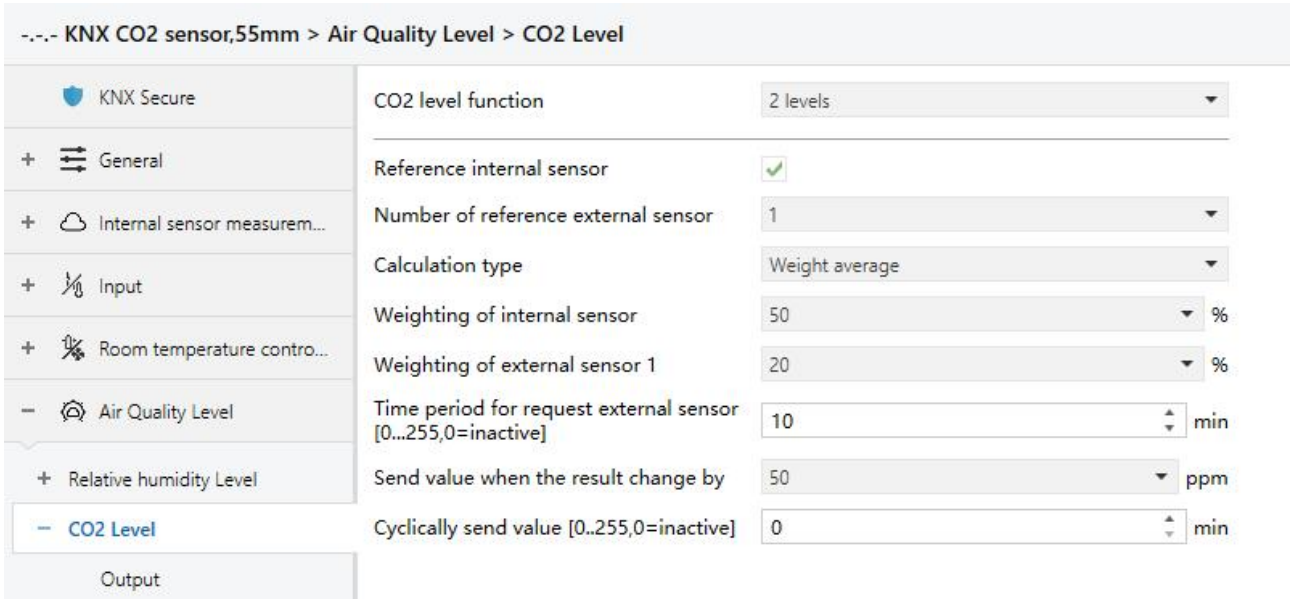


Fig.5.6.2 “CO2 Level” parameter window

Parameter "CO2 level function"

This parameter is for setting the number of levels for CO2. Options:

Disable

2 levels

3 levels

4 levels

Parameter "Reference internal sensor"

This parameter is for setting whether the CO2 to reference internal sensor.

The reference of measurement value is can be from internal sensor, external sensor or multiple sensors proportional mixing, the final result can be calculated by Average or Weight average, or take the maximum/minimum value. The result is fed back to bus. Up to 3 external sensors can be set.

Parameter "Number of reference external sensor"

This parameter is for setting the number of reference external sensors.

If the previous parameter is enabled, options: **0 / 1 / 2 / 3**

If the previous parameter is disabled, options: **1 / 2 / 3**

Parameter "Calculation type"

This parameter is visible when there are 2 referenced sensors or above. Set the calculation type of

CO2. Options:

Average

Weight average

Minimum value

Maximum value

Average: take the average of measurement values from sensors.

Weight average: set the weight average of measurement values from each sensors, then take the calculation value.

Minimum value: take the minimum measurement value from sensors.

Maximum value：take the maximum measurement value from sensors.

Parameter "Weighting of internal sensor"

Parameter "Weighting of external sensor x" (x=1~3)

These parameters are visible when "Weight average" is selected. Set the Weighting of internal or external sensors. Options:

10%

20%

...

100%

The weighting of each sensor is setting independently by parameters, then add up these data as actual CO2.

Note: when any one of these sensors went wrong (including internal sensor), still consider its weighting, however, because it is illegal data, it will not be actively sent to the bus, keeping the current status.

Parameter "Time period for request external sensor [0...255]"

This parameter is visible when there is External sensor. Used for setting the period for request CO2 value from external sensor. Options: **0 ..255 min**

Send a read request to external sensor after bus recovery or finish programming.

Parameter "Send value when the result change by "

This parameter is visible when there are 2 referenced sensors or above. Used for setting when CO2 measurement value changes, whether to enable to send the current CO2 value to the bus. Not send when "Disable" is selected. Options:

Disable

10ppm

20ppm

...

450ppm

500ppm

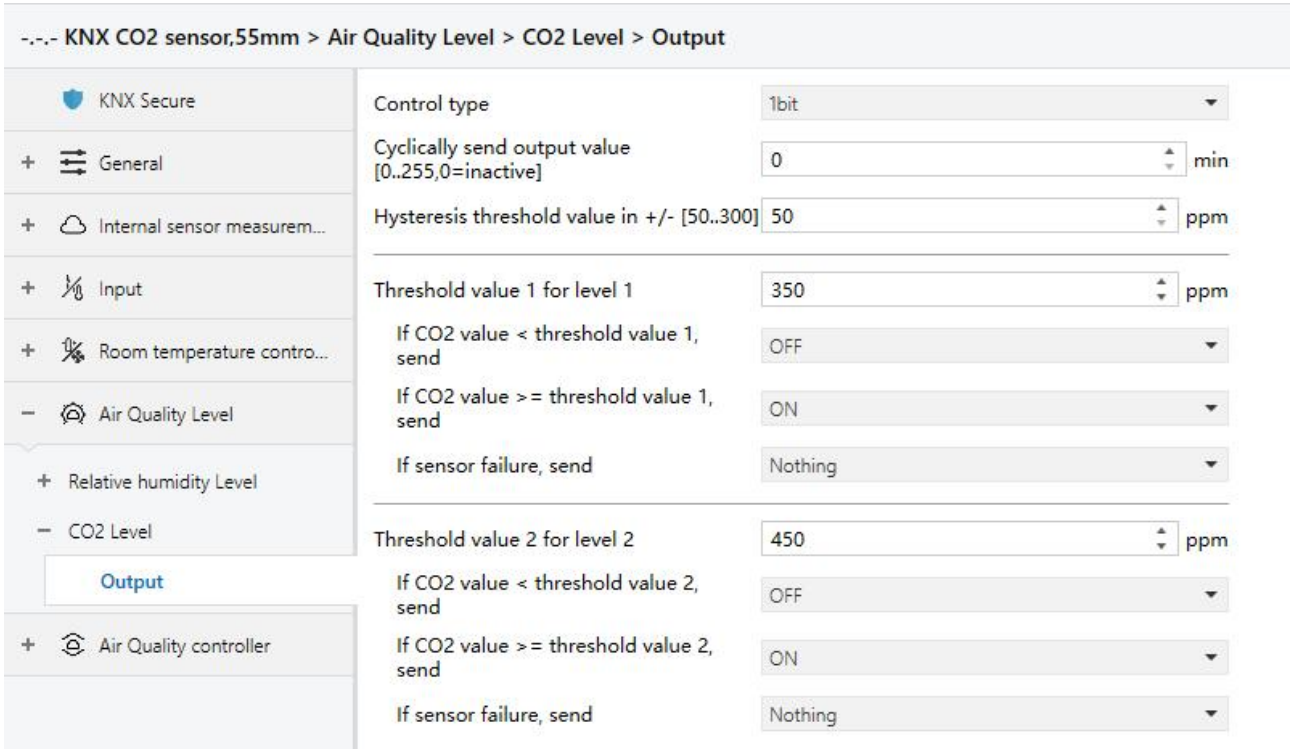
Parameter "Cyclically send value [0...255,0=inactive]"

This parameter is visible when there are 2 referenced sensors or above. Used for setting the time for cyclically sending the CO2 measurement value to the bus. Not send when 0 is set.

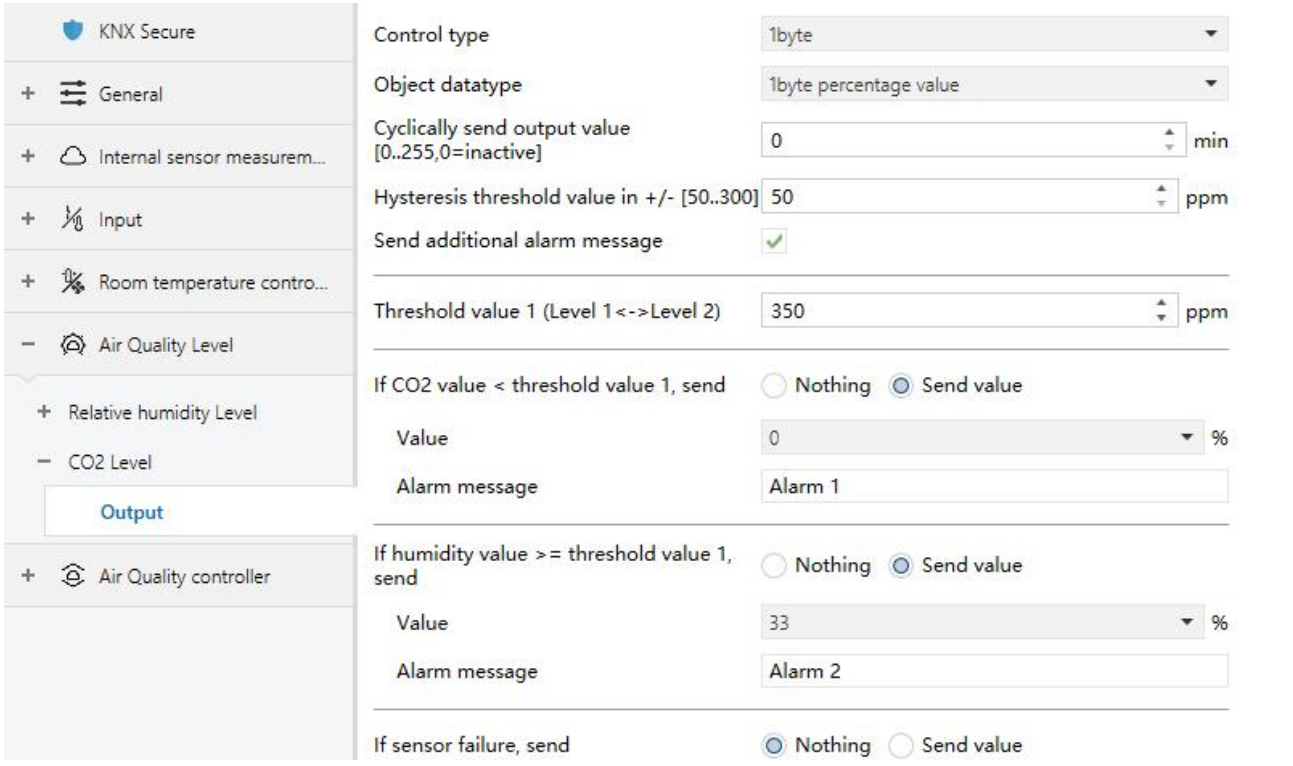
Options: **0..255 min**

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

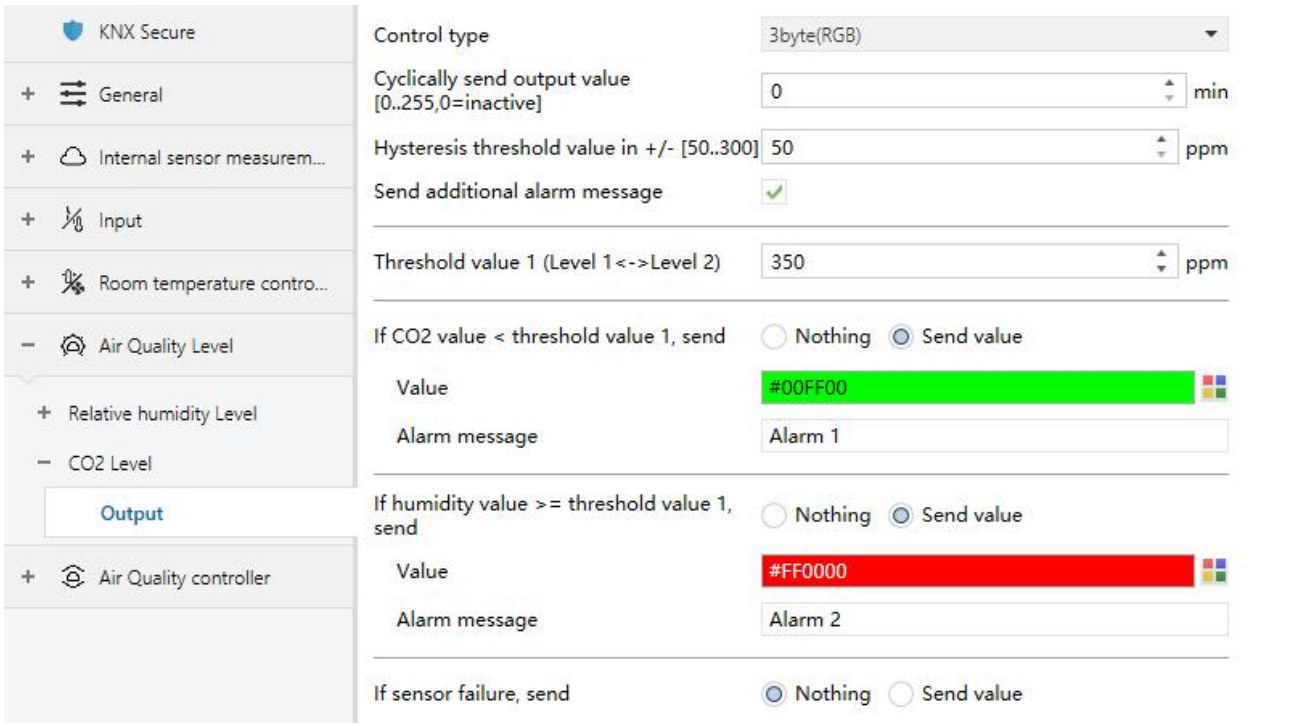
5.6.2.1.Output



1bit



1byte



3byte

Fig.5.6.2.1 “Output” parameter window

Parameter ”Control type”

This parameter is for setting the control type of output levels. Options:

1bit

1byte

3byte(RGB)

Parameter ”Object datatype”

This parameter is visible when ”1byte” is selected for the previous parameter. Set the object datatype of 1byte. Options:

1byte percentage value

1byte unsigned value

Scene number

Parameter ”Cyclically send output value [0..255,0=inactive]”

This parameter is for setting the time for cyclically sending the output values of the levels to the bus. Not send when 0 is set. Options: **0..255 min**

This period is independent and starts time counting after programming or reset. Transmission

change has no affect on this period.

Parameter "Hysteresis threshold value in +/- [50..300]"

This parameter is for setting the hysteresis value of the threshold value, which can avoid the unnecessary action when the control value fluctuates near the threshold. Options: **50..300 ppm**

Suppose that hysteresis value is 50ppm and the threshold is 350ppm, then the upper limit threshold 400ppm (Threshold value+Hysteresis value) and the lower limit threshold 300ppm (Threshold value-Hysteresis value). When the CO2 is between 300~400ppm, level switchover will not be caused, and the previous status will still be maintained. Only less than 300ppm or greater than or equal to 400ppm will change the output level.

Parameter "Send additional alarm message"

This parameter is visible when 1byte or 3byte is selected for control type. Set whether to send additional alarm message. You can customize the message if enabled the parameter.

If control type is 1bit:

Parameter "Threshold value x for level x"(x=1~4)

This parameter is for setting the threshold value x of level x, up to set 4 CO2 levels, 4 corresponding threshold values need to be set for 1bit.

Options: **1..2000 ppm**

Parameter "If CO2 value < threshold value x, send"

This parameter is for setting the output value if CO2 value is less than threshold value x. Options:

Nothing

OFF

ON

Parameter "If CO2 value >= threshold value x, send"

This parameter is for setting the output value if CO2 value is greater than or equal to threshold value x. Options:

Nothing

OFF

ON

Parameter " If sensor failure, send"

This parameter is for setting the output value if internal or external sensor failure. Options:

Nothing

OFF

ON

If control type is 1byte or 3byte:

Parameter "Threshold value 1 (Level 1<->Level 2)"

This parameter is for setting the threshold value 1, change to level 2 if CO2 is greater than or equal to this threshold; change to level 1 while it is less than this threshold. Options: **1..2000 ppm**

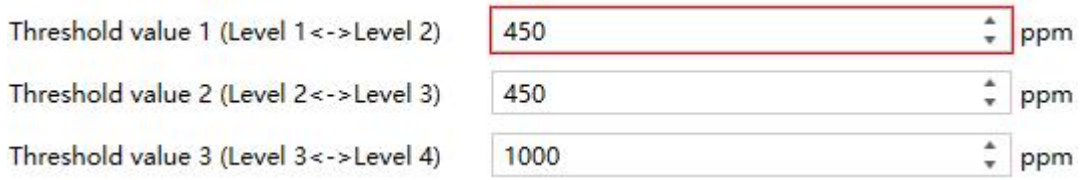
Parameter "Threshold value 2 (Level 2<->Level 3)"

This parameter is for setting the threshold value 2, change to level 3 if CO2 is greater than or equal to this threshold. Options: **1..2000 ppm**

Parameter "Threshold value 3 (Level 3<->Level 4)"

This parameter is for setting the threshold value 3, change to level 4 if CO2 is greater than or equal to this threshold. Options: **1..2000 ppm**

Note: these parameters are display according to the number of levels. And threshold value 1<threshold value 2<threshold value 3, if not, they can not be configured on ETS, and display red box warning, as shown as follow:



Parameters as follow are for setting the output values after the CO2 is compare with threshold value 1~3:

Parameter "If CO2 value < threshold value 1, send"

Parameter "If threshold value 1 <= CO2 value < threshold value 2, send"

Parameter "If threshold value 2 <= CO2 value < threshold value 3, send"

Parameter "If CO2 value >= threshold value 3, send"

These parameters are for setting whether to send output value after the CO2 is compare with threshold value 1~3. Options:

Nothing

Send value

Parameter "Value"

This parameter is visible when "Send value" is selected for previous parameter. Set the output value. Options are display according to the object datatype of 1byte and 3byte.

Parameter "Alarm message"

This parameter is visible when additional alarm message is enabled. Set the alarm message, up to 14 bytes allowed.

Parameter "If sensor failure, send"

This parameter is for setting whether to send output value when internal or external sensor is failure. Options:

Nothing

Send value

Parameter "Value"

This parameter is visible when "Send value" is selected for previous parameter. Set the output value for sensor failure. Options are display according to the object datatype of 1byte and 3byte.

5.7.Parameter window “Air Quality Controller”

Support independent setting of CO2 and relative humidity controller functions. Explained in detail in the following chapters.

5.7.1.Relative humidity controller

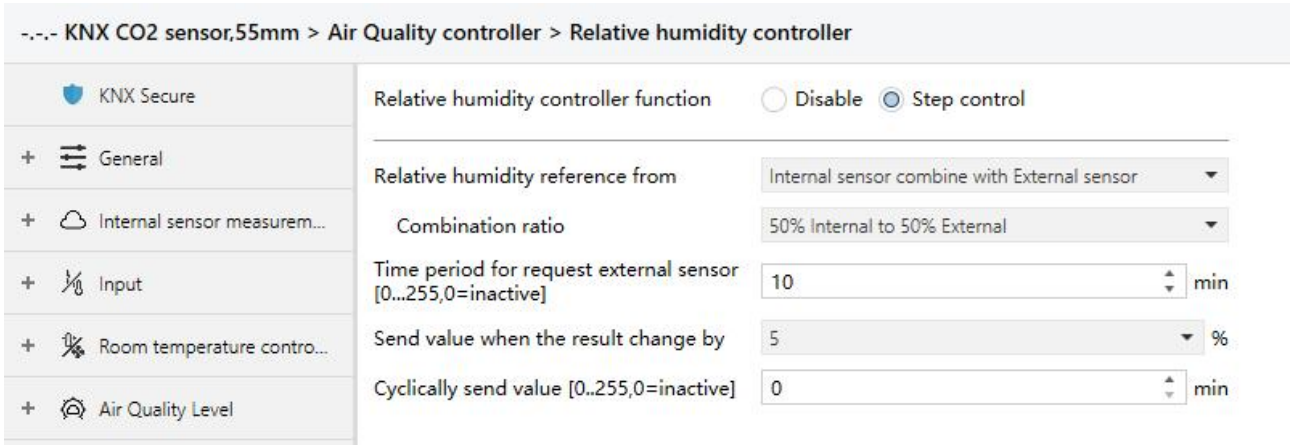


Fig.5.7.1 “Relative humidity controller” parameter window

Parameter “Relative humidity controller function”

This parameter is for setting the controller function of relative humidity. Options:

Disable

Step control

Disable: the humidity controller is not activated.

Step control: up to set 3 steps for controller, which can connect with fan control.

Parameter “Relative humidity reference from”

This parameter is for setting the resource of the humidity reference. Options:

Internal sensor

External sensor

Internal sensor combine with External sensor

When selecting the reference is internal sensor, the humidity 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 external sensor [0...255]”

This parameter is visible when “...External sensor” is selected. Set the time period for read request

external humidity sensor. Options: **0..255 min**

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 humidity. 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 actual humidity = (internal sensor's humidity × 40%) + (external sensor's humidity × 60%), the controller function of the device will control according to the calculated humidity.

When two sensors are combined for measurement, when one sensor is in error, the humidity value measured by the other sensor is used.

——Parameter "Send value when the result change by"

This parameter is for setting when humidity measurement value changes, whether to enable to send the current humidity value to the bus. Not send when disable. Options:

Disable

1%

2%

...

25%

——Parameter "Cyclically send value [0...255]"

Setting the time for cyclically sending the humidity measurement value to the bus. Not send when value is 0. Options: **0..255 min**

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

5.7.1.1.Output

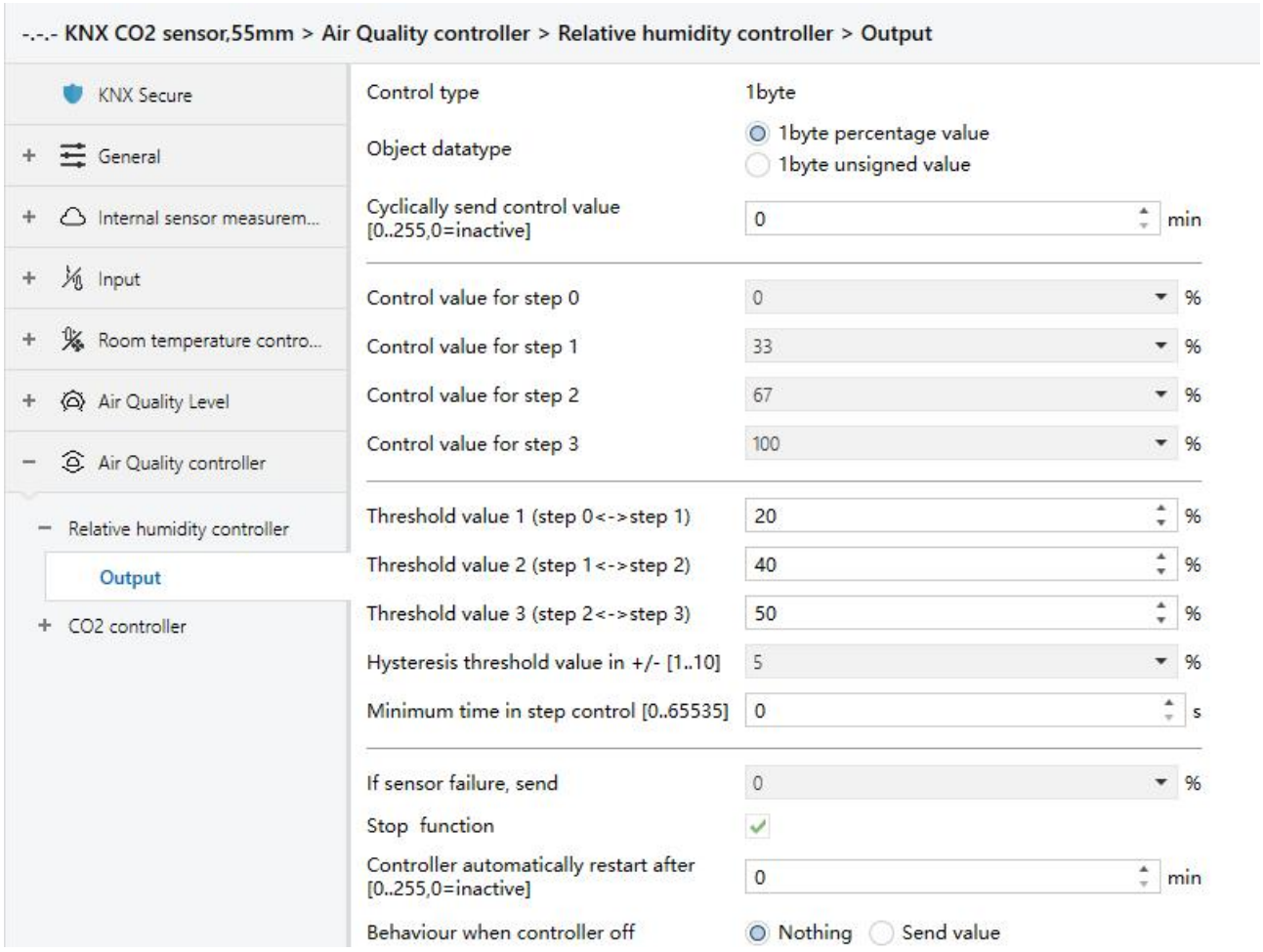


Fig.5.7.1.1 “Output” parameter window

Parameter "Control type"

This parameter is for setting the output type of control value. Option is only **1byte**

Parameter "Object datatype"

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

1byte percentage value

1byte unsigned value

Parameter "Cyclically send control value [0..255,0=inactive]"

This parameter is for setting the time for cyclically sending the control values to the bus. Not send when 0 is set. Options: **0..255 min**

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

Parameter "Control value for step 0"(x=0~3)

These parameters are for setting the control values for each steps. Options are displayed according to 1byte object datatype.

When it is 1byte percentage value, Options:

0%

1%

...

100%

When it is 1byte unsigned value, Options: **0..255**

Parameter "Threshold value 1 (step 0<->step 1)"

This parameter is for setting the threshold value 1, send the control value of step 1 if humidity is greater than or equal to this threshold; send the control value of step 0 while it is less than this threshold. Options: **0..100 %**

Parameter "Threshold value 2 (step 1<->step 2)"

This parameter is for setting the threshold value 2, send the control value of step 2 if humidity is greater than or equal to this threshold. Options: **0..100 %**

Parameter "Threshold value 3 (step 2<->step 3)"

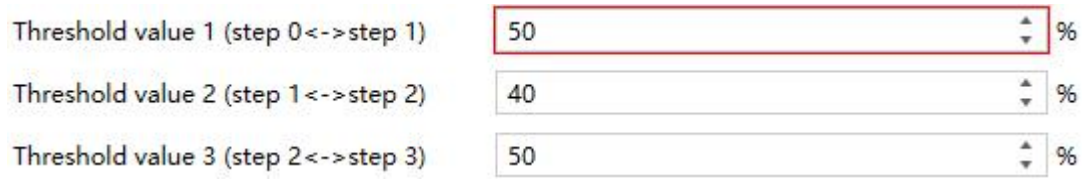
This parameter is for setting the threshold value 3, send the control value of step 3 if humidity is greater than or equal to this threshold. Options: **0..100 %**

Tip: The controller evaluates the threshold in ascending order.

First check →step 0<->step 1 threshold →step 1<->step 2 →step 2<->step 3.

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

The threshold of step 0<->step 1 is lower than that of step 1<->step 2, and the threshold of step 1<->step 2 is lower than that of step 2<->step 3. If not, they can not be configured on ETS, and display red box warning, as shown as follow:



Parameter "Hysteresis threshold value in +/- [1..10]"

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

1%

2%

...

10%

Suppose that hysteresis value is 5% and the threshold is 20%, then the upper limit threshold 25% (Threshold value+Hysteresis value) and the lower limit threshold 15% (Threshold value-Hysteresis value). When the humidity is between 15%~25%, device action will not be caused, and the previous status will still be maintained. Only less than 15% or greater than or equal to 25% will change the output level.

Parameter "Minimum time in step control [0..65535]"

This parameter is for setting the minimum running time for a step control, you need to wait at least until this period of time has elapsed before changing another step. 0 is no minimum running time.

Options: **0...65535 s**

Parameter "If sensor failure, send"

This parameter is visible when there is external sensor. Set whether to send control value when external sensor is failure (failure to request data). Options are display according to the object datatype of 1byte.

When it is 1byte percentage value, Options:

0%

1%

...

100%

When it is 1byte unsigned value, Options: **0..255**

Parameter "Stop function"

This parameter is for setting whether to enable stop function. When enabled, display 1byte object, when receive command, controller becomes off. (**Not send the control value, and only the controller status changes to OFF.**)

Parameter "Controller automatically restart after [0..255,0=inactive]"

This parameter is visible when previous parameter is enabled. Used for setting the delay time for controller automatically restart from stop status. 0 is not automatically turned on the controller, and you can turn on controller via external object. If there is a delay time, automatically return to active status.

Options: **0..255 min**

Parameter "Behaviour when controller off"

This parameter is for setting whether to send value when controller receives an off command from bus. Options:

Nothing

Send value

--Parameter "Value"

This parameter is visible when "Send value" is selected for previous parameter. Set the output value. Options are display according to the object datatype of 1byte.

When it is 1byte percentage value, Options:

0%

1%

...

100%

When it is 1byte unsigned value, Options: **0..255**

5.7.2.CO2 controller

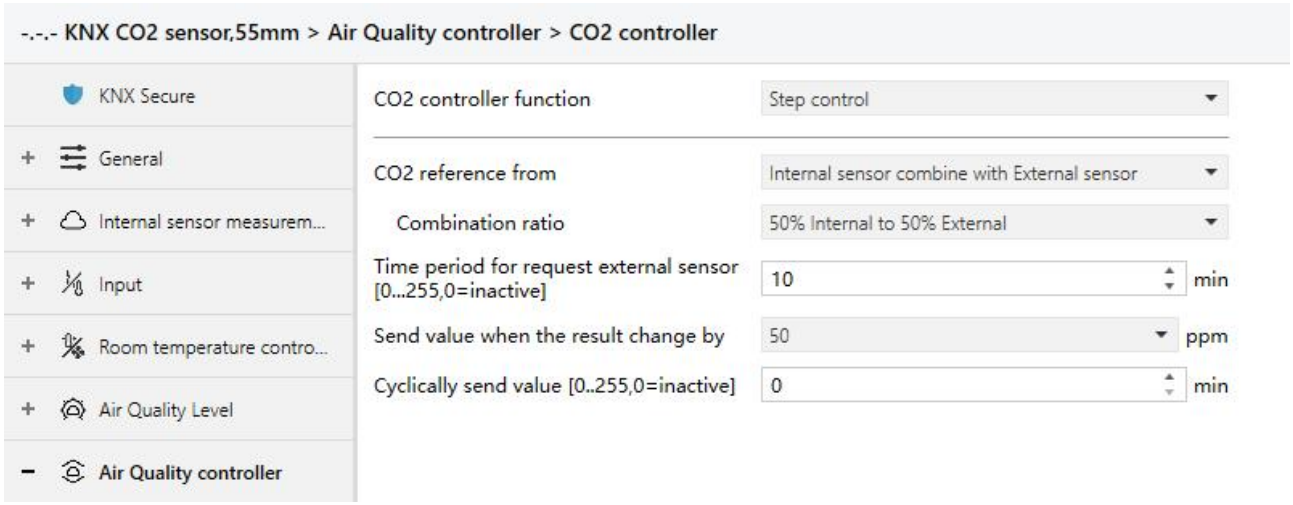


Fig.5.7.2 “CO2 controller” parameter window

Parameter "CO2 controller function"

This parameter is for setting the controller function of CO2. Options:

Disable

Step control

PI control

Disable: the CO2 controller is not activated.

Step control: up to set 3 steps for controller, which can connect with fan control.

PI control: use PI continue control.

Parameter "CO2 reference from"

This parameter is for setting the resource of the CO2 reference. Options:

Internal sensor

External sensor

Internal sensor combine with External sensor

When selecting the reference is internal sensor, the CO2 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 external sensor [0...255]”

This parameter is visible when “...External sensor” is selected. Set the time period for read request

external CO2 sensor. Options: **0..255 min**

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 CO2. 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 actual CO2 = (internal sensor's CO2 × 40%) + (external sensor's CO2 × 60%), the controller function of the device will control according to the calculated CO2.

When two sensors are combined for measurement, when one sensor is in error, the CO2 value measured by the other sensor is used.

——Parameter "Send value when the result change by"

This parameter is for setting when CO2 measurement value changes, whether to enable to send the current CO2 value to the bus. Not send when disable. Options:

Disable

10ppm

20ppm

50ppm

...

450ppm

500ppm

——Parameter "Cyclically send value [0...255]"

Setting the time for cyclically sending the CO2 measurement value to the bus. Not send when value is 0. Options: **0..255 min**

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

5.7.2.1.Output

There are step control and PI control for CO2 output setting, Explained in detail in the following.

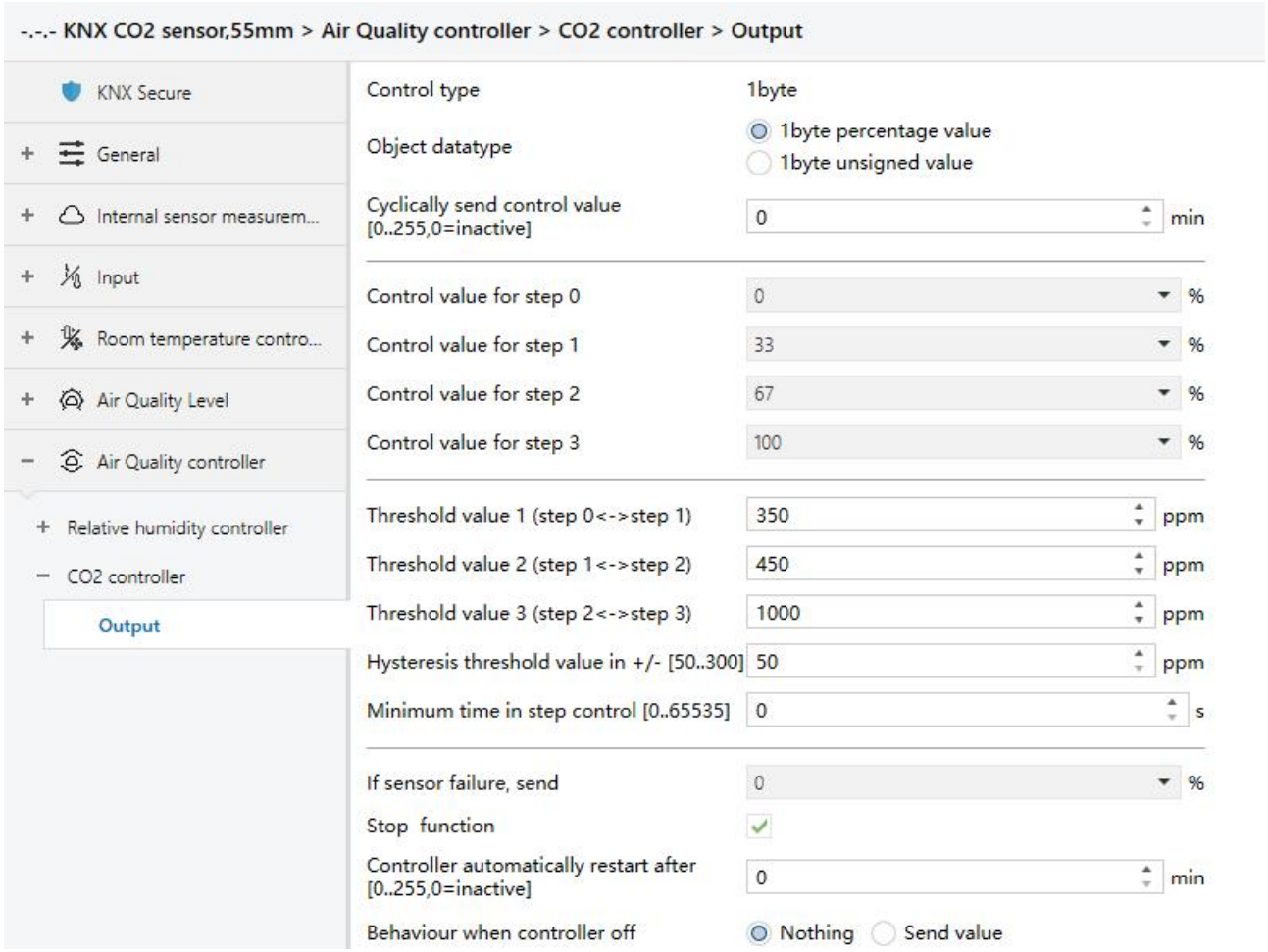


Fig.5.7.2.1(1) “Output”-Step control parameter window

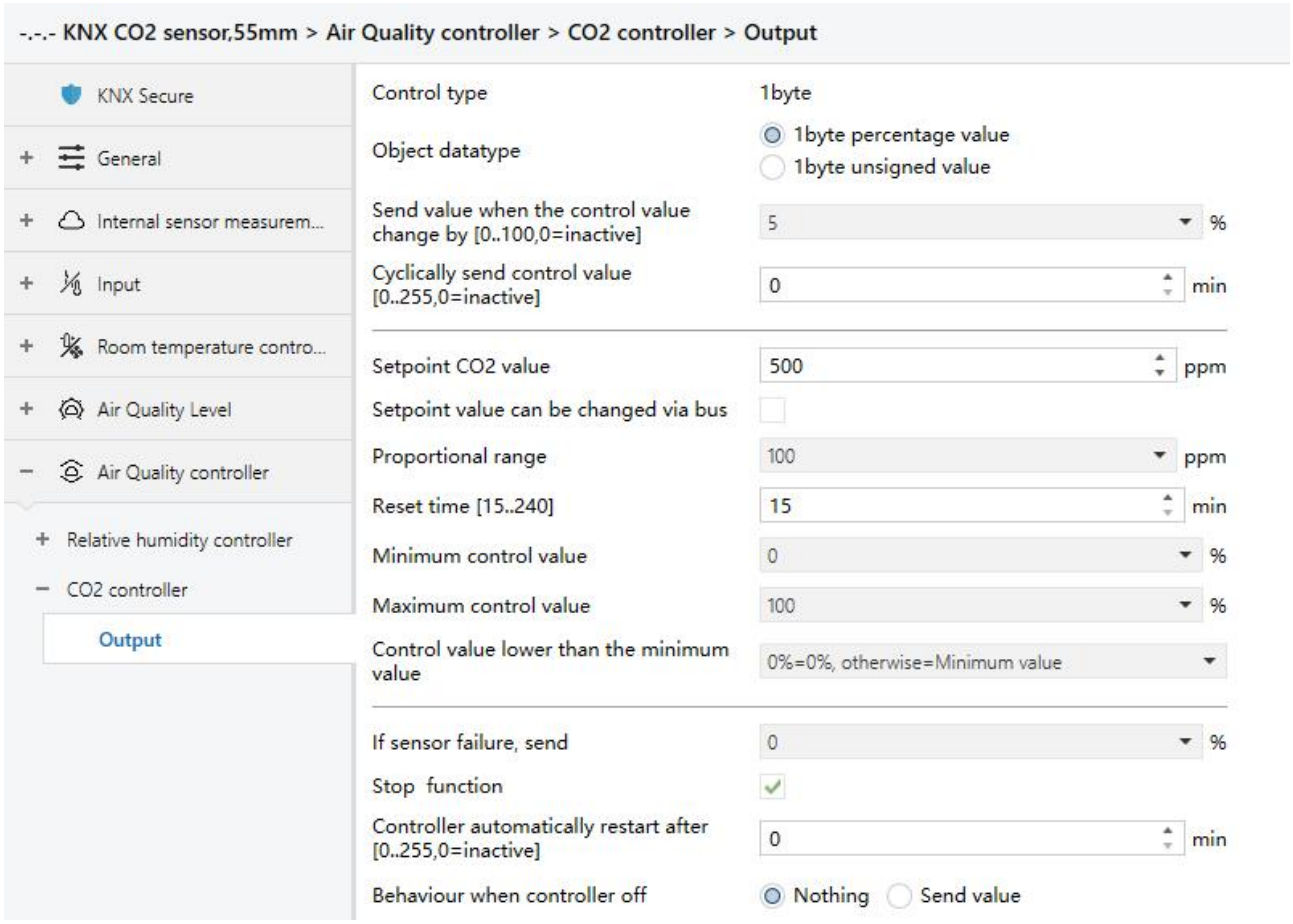


Fig.5.7.2.1(2) "Output"-PI control parameter window

Parameter "Control type"

This parameter is for setting the output type of control value. Option is only **1byte**

Parameter "Object datatype"

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

1byte percentage value

1byte unsigned value

Parameter "Cyclically send control value [0..255,0=inactive]"

This parameter is for setting the time for cyclically sending the control values to the bus. Not send when 0 is set. Options: **0..255 min**

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

When step control, parameters as follow are visible:

Parameter "Control value for step 0"(x=0~3)

These parameters are for setting the control values for each steps. Options are displayed according to 1byte object datatype.

When it is 1byte percentage value, Options:

0%

1%

...

100%

When it is 1byte unsigned value, Options: **0..255**

Parameter "Threshold value 1 (step 0 <->step 1)"

This parameter is for setting the threshold value 1, send the control value of step 1 if CO2 is greater than or equal to this threshold; send the control value of step 0 while it is less than this threshold.

Options: **1..2000 ppm**

Parameter "Threshold value 2 (step 1 <->step 2)"

This parameter is for setting the threshold value 2, send the control value of step 2 if CO2 is greater than or equal to this threshold. Options: **1..2000 ppm**

Parameter "Threshold value 3 (step 2 <->step 3)"

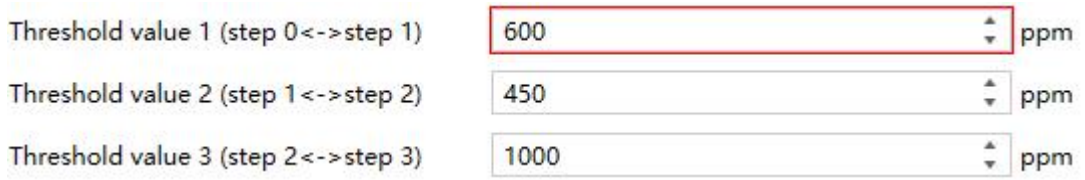
This parameter is for setting the threshold value 3, send the control value of step 3 if CO2 is greater than or equal to this threshold. Options: **1..2000 ppm**

Tip: The controller evaluates the threshold in ascending order.

First check →step 0<->step 1 threshold →step 1<->step 2 →step 2<->step 3.

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

The threshold of step 0<->step 1 is lower than that of step 1<->step 2, and the threshold of step 1<->step 2 is lower than that of step 2<->step 3. If not, they can not be configured on ETS, and display red box warning, as shown as follow:



Parameter "Hysteresis threshold value in +/- [50..300]"

This parameter is for setting the hysteresis value of the threshold value, which can avoid the unnecessary action when the control value fluctuates near the threshold. Options: **50..300 ppm**

Suppose that hysteresis value is 50ppm and the threshold is 350ppm, then the upper limit threshold 400ppm (Threshold value+Hysteresis value) and the lower limit threshold 300ppm (Threshold value-Hysteresis value). When the humidity is between 300~400ppm, device action will not be caused, and the previous status will still be maintained. Only less than 300ppm or greater than or equal to 400ppm will change the output level.

Parameter "Minimum time in step control [0..65535]"

This parameter is for setting the minimum running time for a step control, you need to wait at least until this period of time has elapsed before changing another step. 0 is no minimum running time.

Options: **0...65535 s**

When PI control, parameters as follow are visible:

Parameter "Setpoint CO2 value"

This parameter is for setting the setpoint value of CO2. Options: **1..1500 ppm**

Parameter "Setpoint value can be changed via bus"

This parameter is for setting whether the setpoint value can be changed via bus. When enabled, once a new value is received from bus, that value is used as the new setpoint.

Note: the value changed via bus is limited in 400~1500 ppm.

Parameter "Proportional range"
Parameter "Reset time [15..240]"

These two parameters are for setting the PI value for PI control.

Options **(P value)**:

100 ppm

200 ppm

...

1500 ppm

Options **(I value)**: **15..240 min**

Parameter "Minimum control value"
Parameter "Maximum control value"

These two parameters are for setting the minimum/maximum control value. Options are displayed according to 1byte object datatype.

When it is 1byte percentage value, Options:

0%

1%

...

100%

When it is 1byte unsigned value, Options: **0..255**

Note: minimum value < maximum value, if not, they can not be configured on ETS.

Parameter "Control value lower than the minimum value"

This parameter is for setting the behaviour when control value lower than the minimum value. Options are displayed according to 1byte object datatype, they are similar, only explain the options of 1byte percentage value:

0%=0%，otherwise=Minimum value

To be the minimum value

To be 0%

0%=0%, otherwise=Minimum value: send telegram 0 when control value is 0%, but operate as minimum value when the control value is lower than the minimum.

To be the minimum value: operate as minimum value when the control value is lower than the minimum, even if it is 0%.

To be 0%: operate as minimum value once the control value is lower than the minimum.

Parameter "If sensor failure, send"

This parameter is for setting whether to send control value when internal or external sensor is failure (failure to request data). Options are display according to the object datatype of 1byte.

When it is 1byte percentage value, Options:

0%

1%

...

100%

When it is 1byte unsigned value, Options: **0..255**

Parameter "Stop function"

This parameter is for setting whether to enable stop function. When enabled, display 1byte object, when receive command, controller becomes off. (**Not send the control value, and only the controller status changes to OFF.**)

Parameter "Controller automatically restart after [0..255,0=inactive]"

This parameter is visible when previous parameter is enabled. Used for setting the delay time for controller automatically restart from stop status. 0 is not automatically turned on the controller, and you can turn on the controller via external object. If there is a delay time, automatically return to active status.

Options: **0..255 min**

Parameter "Behaviour when controller off"

This parameter is for setting whether to send value when controller receives an off command from bus. Options:

Nothing

Send value

--Parameter "Value"

This parameter is visible when "Send value" is selected for previous parameter. Set the output value. Options are display according to the object datatype of 1byte.

When it is 1byte percentage value, Options:

0%

1%

...

100%

When it is 1byte unsigned value, Options: **0..255**

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
2	General	Alarm input			1 bit	C	-	W	T	U	alarm	Low
3	General	Alarm acknowledge			1 bit	C	-	W	-	-	acknowledge	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 that the device is working properly.					
2	**Alarm input**	**General**	**1bit**	**C,W,T,U**	**1.005 alarm**
The communication object is visible when alarm function is enabled. Used to receive the alarm telegram, send request telegram when bus recovery. Telegram value: 1——Alarm 0——Cancel alarm					
3	**Alarm acknowledge**	**General**	**1bit**	**C,W**	**1.016 acknowledge**
The communication object is visible when alarm function is enabled. Used to receive the acknowledge telegram from other device, the valid value 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
11	Internal sensor	CO2 value			2 bytes	C	R	-	T	-	parts/million (ppm)	Low
12	Internal sensor	CO2 error report			1 bit	C	R	-	T	-	boolean	Low
13	Internal sensor	Low CO2 alarm			1 bit	C	R	-	T	-	alarm	Low
14	Internal sensor	High CO2 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 to send the temperature value measured by the built-in temperature sensor of the device to the bus. Range:-50~99.8℃					
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.					
11	**CO2 value**	**Internal sensor**	**2byte**	**C,R,T**	**9.008 parts/million(ppm)**
The communication object is used to receive CO2 measurements sent from the humidity sensor on the bus. Range:1..2000 ppm					

12	**CO2 error report**	**Internal sensor**	**1bit**	**C,R,T**	**1.002 boolean**
The communication object is used to send CO2 error report to the bus. Options: 1——Error 0——Normal					
13	**Low CO2 alarm**	**Internal sensor**	**1bit**	**C,R,T**	**1.005 alarm**
The communication object is used to send the low CO2 alarm signal to bus, when CO2 lower than low threshold that defined by parameter.					
14	**High CO2 alarm**	**Internal sensor**	**1bit**	**C,R,T**	**1.005 alarm**
The communication object is used to send the high CO2 alarm signal to bus, when CO2 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
23	Input 1 - Temperature probe	Actual temperature, Sensor			2 bytes	C	R	-	T	-	temperature (°C)	Low
24	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
23	Input 1 - Switch sensor	Switch			1 bit	C	-	W	T	U	switch	Low
23	Input 1 - Scene control	Close, Scene			1 byte	C	-	-	T	-	scene control	Low
24	Input 1 - Scene control	Open, Scene			1 byte	C	-	-	T	-	scene control	Low
23	Input 1 - Switch sensor	Short, Switch			1 bit	C	-	W	T	U	switch	Low
24	Input 1 - Switch sensor	Long, Switch			1 bit	C	-	W	T	U	switch	Low
25	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
23	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
23	Input 1 - Scene control	Short, Scene			1 byte	C	-	-	T	-	scene control	Low
24	Input 1 - Scene control	Long, Scene			1 byte	C	-	-	T	-	scene control	Low
25	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
23	Input 1 - Send String	String			14 bytes	C	-	-	T	-	Character String (ISO 885...	Low
23	Input 1 - Send String	Close, String			14 bytes	C	-	-	T	-	Character String (ISO 885...	Low
24	Input 1 - Send String	Open, String			14 bytes	C	-	-	T	-	Character String (ISO 885...	Low
23	Input 1 - Send String	Short, String			14 bytes	C	-	-	T	-	Character String (ISO 885...	Low
24	Input 1 - Send String	Long, String			14 bytes	C	-	-	T	-	Character String (ISO 885...	Low
25	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
23	**Actual temperature, Sensor**	**Input 1 - {{Temperature probe}}**	**2byte**	**C,R,T**	**9.001 temperature**

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

The name in parentheses changes with the parameter “Description (max 30 char.)”. If description is empty, display “Input 1 - ...” by default. The same below.

24	**Temperature error report, Sensor**	**Input 1 - {{Temperature probe}}**	**1bit**	**C,R,T**	**1.005 alarm**

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.

23	**Switch**	**Input 1 - {{Switch sensor}}**	**1bit**	**C,R,W,T,U**	**1.001 switch**
23	**Close/Short, Switch**	**Input 1 - {{Switch sensor}}**	**1bit**	**C,R,W,T,U**	**1.001 switch**
24	**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

23	**Scene**	**Input 1 - {{Scene control}}**	**1byte**	**C,T**	**18.001 scene control**
24	**Close/Short, Scene**	**Input 1 - {{Scene control}}**	**1byte**	**C,T**	**18.001 scene control**
24	**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 1 2 … 63	Recall scene 1 Recall scene 2 Recall scene 3 … Recall scene 64
128 129 130 … 191	Store scene 1 Store scene 2 Store scene 3 … 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.

23	**String**	**Input 1 - {{Send String}}**	**14byte**	**C,T**	**16.001 character string (ISO 8859-1)**
23	**Close/Short, String**	**Input 1 - {{Send String}}**	**14byte**	**C,T**	**16.001 character string (ISO 8859-1)**
24	**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.

25	**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
29	RTC 1 - ...	Power on/off			1 bit	C	R	W	-	-	switch	Low
30	RTC 1 - ...	External temperature sensor			2 bytes	C	-	W	T	U	temperature (°C)	Low
31	RTC 1 - ...	Base setpoint adjustment			2 bytes	C	-	W	-	-	temperature (°C)	Low
32	RTC 1 - ...	Setpoint offset			1 bit	C	-	W	-	-	step	Low
33	RTC 1 - ...	Float offset value			2 bytes	C	-	W	-	-	temperature difference (K)	Low
34	RTC 1 - ...	Setpoint offset reset			1 bit	C	-	W	-	-	reset	Low
35	RTC 1 - ...	Heating/Cooling mode			1 bit	C	-	W	-	-	cooling/heating	Low
36	RTC 1 - ...	Operation mode			1 byte	C	-	W	-	-	HVAC mode	Low
37	RTC 1 - ...	Comfort mode			1 bit	C	-	W	-	-	enable	Low
38	RTC 1 - ...	Economy mode			1 bit	C	-	W	-	-	enable	Low
39	RTC 1 - ...	Frost/Heat protection mode			1 bit	C	-	W	-	-	enable	Low
40	RTC 1 - ...	Standby mode			1 bit	C	-	W	-	-	enable	Low
41	RTC 1 - ...	Extended comfort mode			1 bit	C	-	W	-	-	acknowledge	Low
42	RTC 1 - ...	Fan automatic operation			1 bit	C	-	W	-	-	enable	Low
43	RTC 1 - ...	Window contact			1 bit	C	-	W	-	U	window/door	Low
44	RTC 1 - ...	Presence detector			1 bit	C	-	W	-	U	occupancy	Low
45	RTC 1 - ...	Heating/Cooling mode, status			1 bit	C	R	-	T	-	cooling/heating	Low
46	RTC 1 - ...	Operation mode, status			1 byte	C	R	-	T	-	HVAC mode	Low
47	RTC 1 - ...	Comfort mode, status			1 bit	C	R	-	T	-	enable	Low
48	RTC 1 - ...	Economy mode, status			1 bit	C	R	-	T	-	enable	Low
49	RTC 1 - ...	Frost/Heat protection mode, status			1 bit	C	R	-	T	-	enable	Low
50	RTC 1 - ...	Standby mode, status			1 bit	C	R	-	T	-	enable	Low
51	RTC 1 - ...	Actual temperature, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
52	RTC 1 - ...	Base temperature setpoint, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
53	RTC 1 - ...	Setpoint offset, status			2 bytes	C	R	-	T	-	temperature difference (K)	Low
54	RTC 1 - ...	Current temperature setpoint, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
55	RTC 1 - ...	Heating control value			1 bit	C	R	-	T	-	switch	Low
56	RTC 1 - ...	Cooling control value			1 bit	C	R	-	T	-	switch	Low
57	RTC 1 - ...	Fan speed			1 byte	C	-	-	T	-	percentage (0..100%)	Low
58	RTC 1 - ...	Fan speed low			1 bit	C	-	-	T	-	switch	Low
59	RTC 1 - ...	Fan speed medium			1 bit	C	-	-	T	-	switch	Low
60	RTC 1 - ...	Fan speed high			1 bit	C	-	-	T	-	switch	Low
61	RTC 1 - ...	Fan speed off			1 bit	C	-	-	T	-	switch	Low
62	RTC 1 - ...	Additional heating control value			1 bit	C	R	-	T	-	switch	Low
63	RTC 1 - ...	Additional cooling control value			1 bit	C	R	-	T	-	switch	Low

Fig.6.4 “Room temperature controller” communication object

NO.	Object Function	Name	Data Type	Flag	DPT
29	**Power on/off**	**RTC 1 - {{...}}**	**1bit**	**C,W,R**	**1.001 switch**
The communication object is used to receive the telegram from the bus to control RTC power on/off. Telegrams: 1——On 0——Off The name in parentheses changes with the parameter “Description (max 30 char.)”. If description is empty, display “RTC 1 - ...” by default. The same below.					
30	**External temperature sensor**	**RTC 1 - {{...}}**	**2byte**	**C,W,T,U**	**9.001 temperature**
The communication object is used to receive the temperature value measured by the temperature sensor of the device from the bus. Range: -50~99.8℃					

31	**Current setpoint adjustment** **Base setpoint adjustment**	**RTC 1 - {{...}}**	**2byte**	**C,W**	**9.001 temperature**
"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.					
32	**Setpoint offset**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.007 step**
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 in the forward direction 0——Decrease the offset in the negative direction					
33	**Float offset value**	**RTC 1 - {{...}}**	**2byte**	**C,W**	**9.002 temperature difference**
The communication object is visible only when absolute adjustment, and offset function enabled. Used to modify the accumulated offset via 2 byte float value.					
34	**Setpoint offset reset**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.015 reset**
The communication object is visible only when absolute adjustment, and offset function enabled. Reset offset value when telegram is 1.					
35	**Heating/Cooling mode**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.100 cooling/heating**
The communication object is used for switching the heating and cooling via the bus. Telegrams: 1 ——Heating 0 ——Cooling					
36	**Operation mode**	**RTC 1 - {{...}}**	**1byte**	**C,W**	**20.102 HVAC mode**
37	**Comfort mode**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.003 enable**
38	**Economy mode**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.003 enable**
39	**Frost/Heat protection mode**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.003 enable**
40	**Standby mode**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.003 enable**
These communication objects are used to control the RTC operation mode via the bus.					

When 1 byte: object 36 is visible, telegrams: 1-comfort, 2-standby, 3-economy, 4-protection, other reserved.

When 1bit:

Object 37—— Comfort mode

Object 38—— Economy mode

Object 39—— Protection mode

Object 40—— Standby 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 no processing.

41	**Extended comfort mode**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.016 acknowledge**

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 in delay time, time will be timed again. And return the previous operation mode from comfort mode once finish timing. If there is a new operation mode in delay time, exit the comfort mode.

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

42	**Fan automatic operation**	**RTC 1 - {{...}}**	**1bit**	**C,W**	**1.003 enable**

The communication object is used to activate the fan automatic operation via the bus. Telegram:

1——Auto

0——Exit auto

43	**Window contact**	**RTC 1 - {{...}}**	**1bit**	**C,W,U**	**1.019 Window/door**

The communication object is used to receive the switch status of window contact. Telegrams:

1——Open window

0——Close window

44	**Presence detector**	**RTC 1 - {{...}}**	**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

45	**Heating/Cooling mode, status**	**RTC 1 - {{...}}**	**1bit**	**C,R,T**	**1.100 cooling/heating**
The communication object is used to feedback the telegram of switching cooling and heating function to the bus.					
46	**Operation mode, status**	**RTC 1 - {{...}}**	**1byte**	**C,R,T**	**20.102 HVAC mode**
47	**Comfort mode, status**	**RTC 1 - {{...}}**	**1bit**	**C,R,T**	**1.003 enable**
48	**Economy mode, status**	**RTC 1 - {{...}}**	**1bit**	**C,R,T**	**1.003 enable**
49	**Frost/Heat protection mode, status**	**RTC 1 - {{...}}**	**1bit**	**C,R,T**	**1.003 enable**
50	**Standby mode, status**	**RTC 1 - {{...}}**	**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 46 is visible, telegrams: 1-comfort, 2-standby, 3-economy, 4-protection, other reserved.

When 1bit:

Object 47—— Comfort mode

Object 48—— Economy mode

Object 49—— Protection mode

Object 50—— 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.

51	**Actual temperature, status**	**RTC 1 - {{...}}**	**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.					
52	**Base temperature setpoint, status**	**RTC 1 - {{...}}**	**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 31 base value)+accumulated offset value					
53	**Setpoint offset, status**	**RTC 1 - {{...}}**	**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.					
54	**Current temperature setpoint, status**	**RTC 1 - {{...}}**	**2byte**	**C,R,T**	**9.001 temperature**
The communication object is used to send current set temperature to the bus.					
55	**Heating/Cooling control value** **Heating control value**	**RTC 1 - {{...}}**	**1bit** **1byte**	**C,R,T**	**1.001 Switch** **5.001 percentage**
56	**Cooling control value**	**RTC 1 - {{...}}**	**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.					
57	**Fan speed**	**RTC 1 - {{...}}**	**1byte**	**C,T**	**5.001 percentage** **5.100 fan stage**
58	**Fan speed low**	**RTC 1 - {{...}}**	**1bit**	**C,T**	**1.001 switch**
59	**Fan speed medium**	**RTC 1 - {{...}}**	**1bit**	**C,T**	**1.001 switch**
60	**Fan speed high**	**RTC 1 - {{...}}**	**1bit**	**C,T**	**1.001 switch**
61	**Fan speed off**	**RTC 1 - {{...}}**	**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 58——Low fan speed

Object 59——Medium fan speed

Object 60——High fan speed

Object 61——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 57 sends the corresponding telegram value of the fan speed to the bus.					
273	**Additional heating control value** **Additional heating/cooling control value**	**RTC 1 - {{...}}**	**1bit** **1byte**	**C,R,T**	**1.001 switch** **5.001 percentage**
274	**Additional cooling control value**	**RTC 1 - {{...}}**	**1bit** **1byte**	**C,R,T**	**1.001 switch** **5.001 percentage**
These communication objects are used to send additional control value of heating or cooling function to the bus. Object datatype is according to parameter setting. If 1bit is selected, when open valve, send telegram 1 to the bus, while close valve, send telegram 0; If 1byte is selected, when open valve, send 100% to the bus, while close valve, send 0%.					

Table 6.4 “Room temperature controller” communication object table

6.5.“Relative humidity Level” Communication object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
134	Relative humidity Level	External sensor value 1			2 bytes	C	-	W	T	U	humidity (%)	Low
135	Relative humidity Level	External sensor value 2			2 bytes	C	-	W	T	U	humidity (%)	Low
136	Relative humidity Level	External sensor value 3			2 bytes	C	-	W	T	U	humidity (%)	Low
137	Relative humidity Level	Actual sensor value			2 bytes	C	R	-	T	-	humidity (%)	Low
138	Relative humidity Level	Output value of level 1			1 bit	C	R	-	T	-	switch	Low
139	Relative humidity Level	Output value of level 2			1 bit	C	R	-	T	-	switch	Low
140	Relative humidity Level	Output value of level 3			1 bit	C	R	-	T	-	switch	Low
141	Relative humidity Level	Output value of level 4			1 bit	C	R	-	T	-	switch	Low
138	Relative humidity Level	Output value			1 byte	C	R	-	T	-	counter pulses (0..255)	Low
142	Relative humidity Level	Alarm message			14 bytes	C	-	-	T	-	Character String (ISO 885...	Low

Fig.6.5 “Relative humidity Level” communication object

NO.	Object Function	Name	Data Type	Flag	DPT
134	**External sensor value 1**	**Relative humidity Level**	**2byte**	**C,W,T,U**	**9.007 humidity**
135	**External sensor value 2**	**Relative humidity Level**	**2byte**	**C,W,T,U**	**9.007 humidity**
136	**External sensor value 3**	**Relative humidity Level**	**2byte**	**C,W,T,U**	**9.007 humidity**
These communication objects are used to receive the humidity value measured by external sensors from the bus, and send read request cyclically (if configured). When status request is enabled, that is request time is not 0, send read request to the bus after voltage recovery.					
137	**Actual sensor value**	**Relative humidity Level**	**2byte**	**C,R,T**	**9.007 humidity**
The communication object is used to send the calculated humidity value to the bus.					

138	**Output value**	**Relative humidity Level**	**1byte** **3byte**	**C,R,T**	**5.010 counter pulses** **5.001 percentage(0..100%)** **17.001 scene number** **232.600 RGB value 3x(0..255)**
138	**Output value of level 1**	**Relative humidity Level**	**1bit**	**C,R,T**	**1.001 switch**
139	**Output value of level 2**	**Relative humidity Level**	**1bit**	**C,R,T**	**1.001 switch**
140	**Output value of level 3**	**Relative humidity Level**	**1bit**	**C,R,T**	**1.001 switch**
141	**Output value of level 4**	**Relative humidity Level**	**1bit**	**C,R,T**	**1.001 switch**
These communication objects are used to send telegram value of level 1~4. 1bit objects are visible according to the parameter setting : Object 138——Level 1 Object 139——Level 2 Object 140——Level 3 Object 141——Level 4 Send corresponding telegram value when change to a certain level, the telegrams are set by parameters. 1byte: the corresponding telegram value of each levels is defined by the parameter. Change to a level, object 138 sends the telegram to the bus.					
142	**Alarm message**	**Relative humidity Level**	**14byte**	**C,T**	**16.001 character string (ISO 8859-1)**
The communication object is visible when 1bye or 3byte is selected. Used to send alarm massage of each levels to the bus.					

Table 6.5 “Relative humidity Level” communication object table

6.6.“CO2 Level” Communication object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
143	CO2 Level	External sensor value 1			2 bytes	C	-	W	T	U	parts/million (ppm)	Low
144	CO2 Level	External sensor value 2			2 bytes	C	-	W	T	U	parts/million (ppm)	Low
145	CO2 Level	External sensor value 3			2 bytes	C	-	W	T	U	parts/million (ppm)	Low
146	CO2 Level	Actual sensor value			2 bytes	C	R	-	T	-	parts/million (ppm)	Low
147	CO2 Level	Output value of level 1			1 bit	C	R	-	T	-	switch	Low
148	CO2 Level	Output value of level 2			1 bit	C	R	-	T	-	switch	Low
149	CO2 Level	Output value of level 3			1 bit	C	R	-	T	-	switch	Low
150	CO2 Level	Output value of level 4			1 bit	C	R	-	T	-	switch	Low
147	CO2 Level	Output value			1 byte	C	R	-	T	-	percentage (0..100%)	Low
151	CO2 Level	Alarm message			14 bytes	C	-	-	T	-	Character String (ISO 885...	Low

Fig.6.6 “CO2 Level” communication object

NO.	Object Function	Name	Data Type	Flag	DPT
143	**External sensor value 1**	**CO2 Level**	**2byte**	**C,W,T,U**	**9.008 parts/million(ppm)**
144	**External sensor value 2**	**CO2 Level**	**2byte**	**C,W,T,U**	**9.008 parts/million(ppm)**
145	**External sensor value 3**	**CO2 Level**	**2byte**	**C,W,T,U**	**9.008 parts/million(ppm)**
These communication objects are used to receive the CO2 value measured by external sensors from the bus, and send read request cyclically (if configured). When status request is enabled, that is request time is not 0, send read request to the bus after voltage recovery.					
146	**Actual sensor value**	**CO2 Level**	**2byte**	**C,R,T**	**9.008 parts/million(ppm)**
The communication object is used to send the calculated CO2 value to the bus.					
147	**Output value**	**CO2 Level**	**1byte** **3byte**	**C,R,T**	**5.010 counter pulses** **5.001 percentage(0..100%)** **17.001 scene number** **232.600 RGB value 3x(0..255)**
147	**Output value of level 1**	**CO2 Level**	**1bit**	**C,R,T**	**1.001 switch**
148	**Output value of level 2**	**CO2 Level**	**1bit**	**C,R,T**	**1.001 switch**
149	**Output value of level 3**	**CO2 Level**	**1bit**	**C,R,T**	**1.001 switch**
150	**Output value of level 4**	**CO2 Level**	**1bit**	**C,R,T**	**1.001 switch**
These communication objects are used to send telegram value of level 1~4. 1bit objects are visible according to the parameter setting : Object 147——Level 1 Object 148——Level 2					

Object 149——Level 3

Object 150——Level 4

Send corresponding telegram value when change to a certain level, the telegrams are set by parameters.

1byte: the corresponding telegram value of each levels is defined by the parameter. Change to a level, object 147 sends the telegram to the bus.

151	**Alarm message**	**CO2 Level**	**14byte**	**C,T**	**16.001 character string (ISO 8859-1)**

The communication object is visible when 1bye or 3byte is selected. Used to send alarm massage of each levels to the bus.

Table 6.6 “CO2 Level” communication object table

6.7.“Relative humidity controller” Communication object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
170	Relative humidity controller	Controller on/off			1 bit	C	-	W	-	-	switch	Low
172	Relative humidity controller	External sensor value			2 bytes	C	-	W	T	U	humidity (%)	Low
173	Relative humidity controller	Controller status			1 bit	C	R	-	T	-	switch	Low
174	Relative humidity controller	Actual sensor value			2 bytes	C	R	-	T	-	humidity (%)	Low
175	Relative humidity controller	Control value			1 byte	C	R	-	T	-	percentage (0..100%)	Low
176	Relative humidity controller	Control stop			1 byte	C	-	W	-	-	percentage (0..100%)	Low

Fig.6.7 “Relative humidity controller” communication object

NO.	Object Function	Name	Data Type	Flag	DPT
170	**Controller on/off**	**Relative humidity controller**	**1bit**	**C,W**	**1.001 switch**

The communication object is used to receive the telegram from the bus to control humidity controller power on/off. Telegrams:

1——Controller on

0——Controller off

172	**External sensor value**	**Relative humidity controller**	**2byte**	**C,W,T,U**	**9.007 humidity**

The communication object is used to receive the humidity value measured by external sensor from the bus, and send read request cyclically (if configured). When status request is enabled, that is request time is not 0, send read request to the bus after voltage recovery.

173	**Controller status**	**Relative humidity controller**	**1bit**	**C,R,T**	**1.001 switch**

The communication object is used send the status of controller to the bus, send telegram once status is changed. Telegrams:

1——Controller on 0——Controller off					
174	**Actual sensor value**	**Relative humidity controller**	**2byte**	**C,R,T**	**9.007 humidity**
The communication object is used to send the calculated humidity value to the bus.					
175	**Control value**	**Relative humidity controller**	**1byte**	**C,R,T**	**5.010 counter pulses** **5.001 percentage(0..100%)**
The communication object is used to send control value operated via step control, value is set by parameters.					
176	**Control stop**	**Relative humidity controller**	**1byte**	**C,W**	**5.010 counter pulses** **5.001 percentage(0..100%)**
The communication object is visible when stop function is enabled. Controller becomes off when receive stop telegram, and send telegram OFF of controller at the same time, but not send output telegrams (that is, maintain the current status).					

Table 6.7 “Relative humidity controller” communication object table

6.8.“CO2 controller” Communication object

Nu	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
177	CO2 controller	Controller on/off			1 bit	C	-	W	-	-	switch	Low
178	CO2 controller	Setpoint adjustment			2 bytes	C	R	W	-	-	parts/million (ppm)	Low
179	CO2 controller	External sensor value			2 bytes	C	-	W	T	U	parts/million (ppm)	Low
180	CO2 controller	Controller status			1 bit	C	R	-	T	-	switch	Low
181	CO2 controller	Actual sensor value			2 bytes	C	R	-	T	-	parts/million (ppm)	Low
182	CO2 controller	Control value			1 byte	C	R	-	T	-	percentage (0..100%)	Low
183	CO2 controller	Control stop			1 byte	C	-	W	-	-	percentage (0..100%)	Low

Fig.6.8 “CO2 controller” communication object

NO.	Object Function	Name	Data Type	Flag	DPT
177	**Controller on/off**	**CO2 controller**	**1bit**	**C,W**	**1.001 switch**
The communication object is used to receive the telegram from the bus to control CO2 controller power on/off. Telegrams: 1——Controller on 0——Controller off					
178	**Setpoint adjustment**	**CO2 controller**	**2byte**	**C,W,R**	**9.008 parts/million(ppm)**
The communication object is used to modify the setpoint value of CO2 from bus, the received value					

<table>
<tr><td colspan="6">should be limited in 400~1500ppm, otherwise it is ignored.
Current CO2 setpoint value can respond to bus via a read request telegram, the value will take the parameter setting value as reference after ETS downloading, and the current value will be restored when bus failure.</td></tr>
<tr><td>179</td><td>External sensor value</td><td>CO2 controller</td><td>2byte</td><td>C,W,T,U</td><td>9.008 parts/million(ppm)</td></tr>
<tr><td colspan="6">The communication object is used to receive the CO2 value measured by external sensor from the bus, and send read request cyclically (if configured). When status request is enabled, that is request time is not 0, send read request to the bus after voltage recovery.</td></tr>
<tr><td>180</td><td>Controller status</td><td>CO2 controller</td><td>1bit</td><td>C,R,T</td><td>1.001 switch</td></tr>
<tr><td colspan="6">The communication object is used send the status of controller to the bus, send telegram once status is changed. Telegrams:
1——Controller on
0——Controller off</td></tr>
<tr><td>181</td><td>Actual sensor value</td><td>CO2 controller</td><td>2byte</td><td>C,R,T</td><td>9.008 parts/million(ppm)</td></tr>
<tr><td colspan="6">The communication object is used to send the calculated CO2 value to the bus.</td></tr>
<tr><td>182</td><td>Control value</td><td>CO2 controller</td><td>1byte</td><td>C,R,T</td><td>5.010 counter pulses
5.001 percentage(0..100%)</td></tr>
<tr><td colspan="6">The communication object is used to send control value operated via step control or PI control, value is set by parameters.</td></tr>
<tr><td>183</td><td>Control stop</td><td>CO2 controller</td><td>1byte</td><td>C,W</td><td>5.010 counter pulses
5.001 percentage(0..100%)</td></tr>
<tr><td colspan="6">The communication object is visible when stop function is enabled. Controller becomes off when receive stop telegram, and send telegram OFF of controller at the same time, but not send output telegrams (that is, maintain the current status).</td></tr>
</table>

Table 6.8 “CO2 controller” communication object table