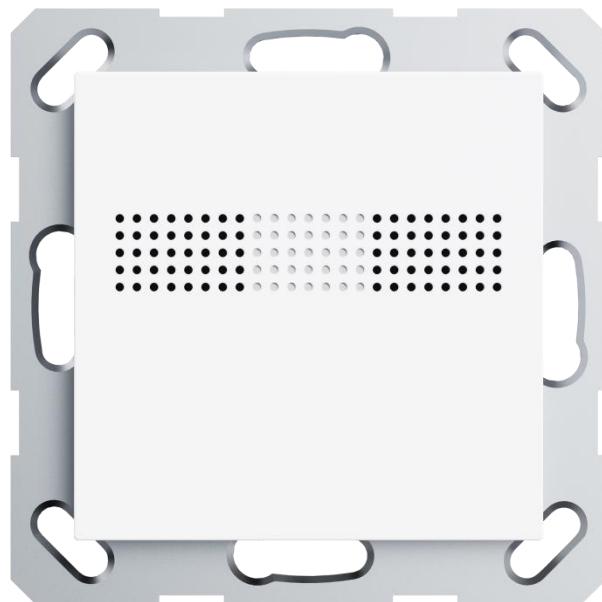


User manual

K-BUS KNX CO2 sensor,55mm_V1.5

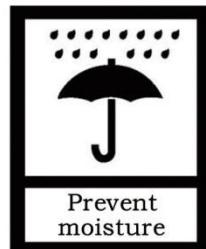
CHAQ-03/55.2.00 (White matt finish)



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.

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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

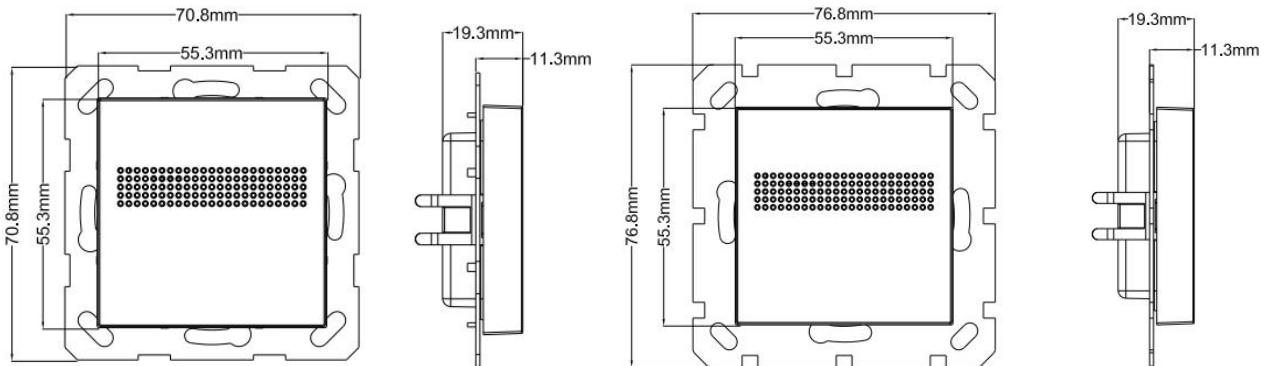
Chapter 2 Technical Data

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°C *
	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	

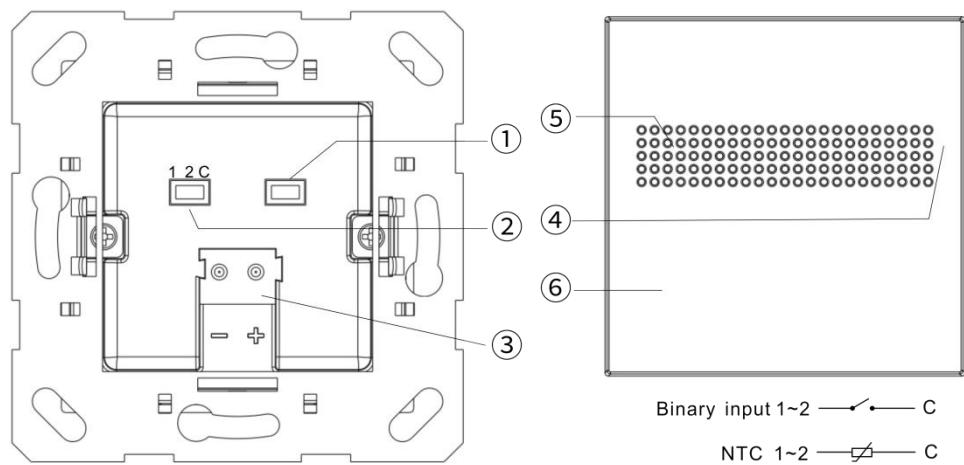
* These are more accurate detection ranges, while the actual ranges are: the total range of CO2 sensor is 0-40000ppm, temperature sensor is -40-100°C, and relative humidity sensor is 0-99.9%.

Chapter 3 Dimension and Structural Diagram

3.1. Dimension Diagram



3.2. Structural Diagram



① Programming button and LED

② Input terminals

③ KNX bus connection terminal

④ Internal temperature, humidity sensor

⑤ Internal CO2 sensor

⑥ Alarm 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 message 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 activated 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).

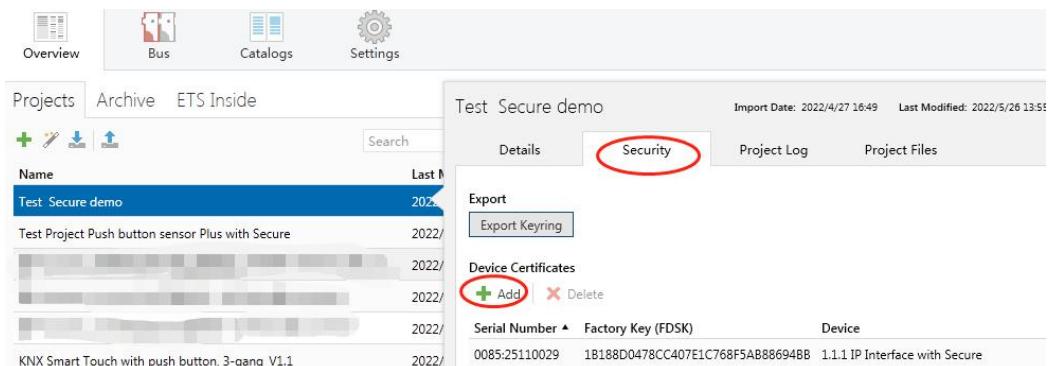


Fig.5.1(3) Add Device Certificate

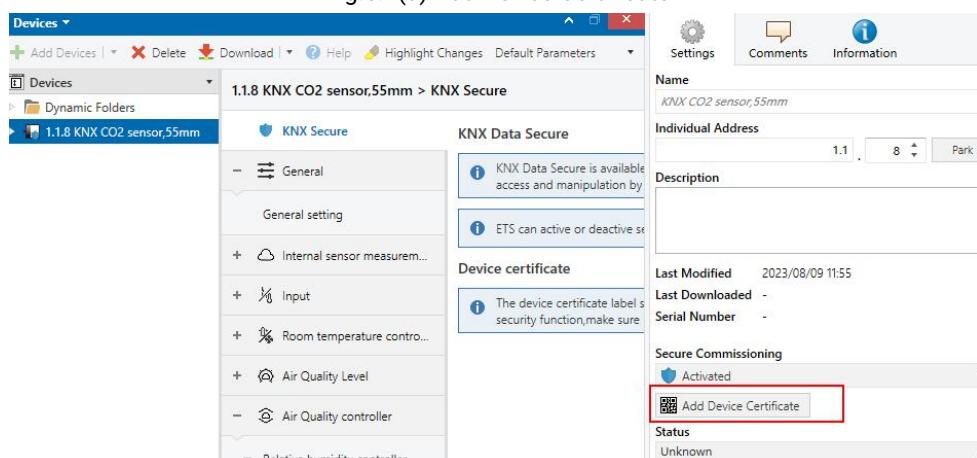


Fig.5.1(4) Add Device Certificate

◇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).

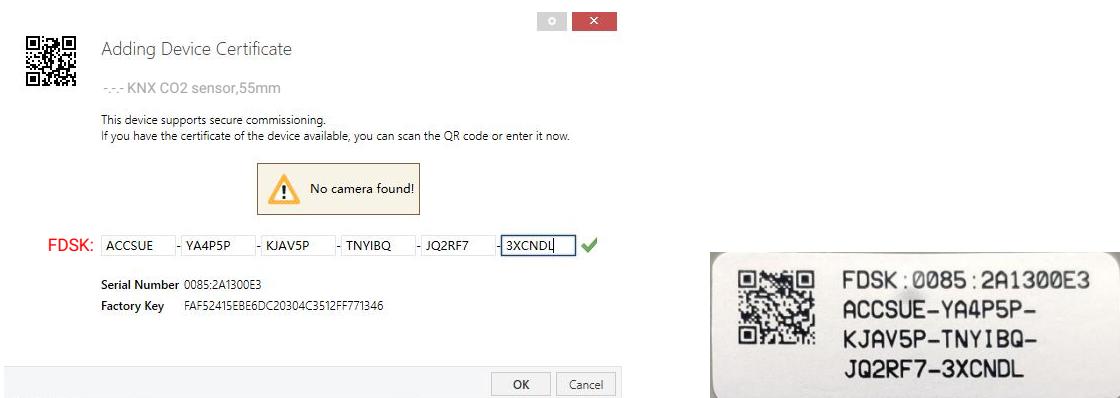


Fig.5.1(5)

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.

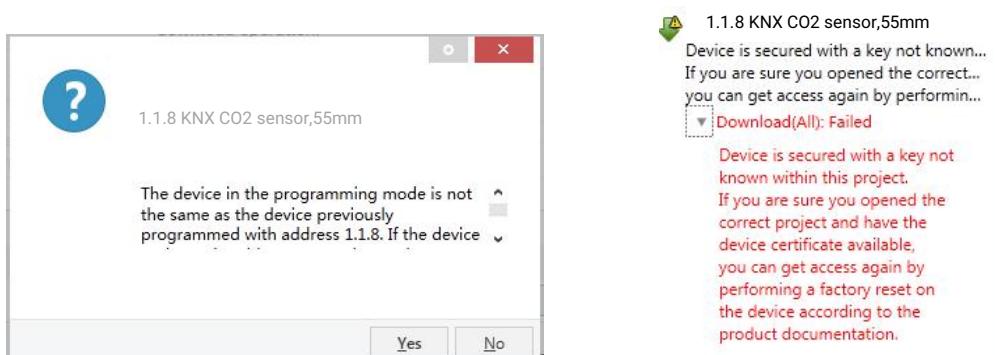


Fig.5.1(6) Example

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.

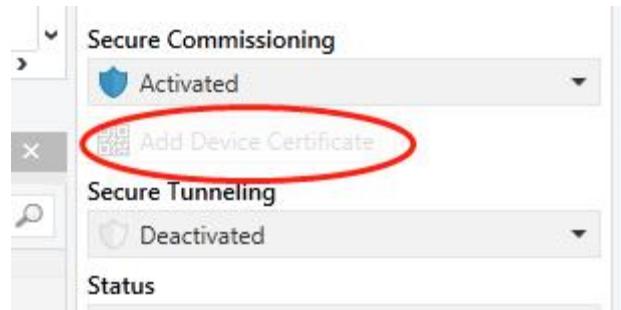


Fig.5.1(7)

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.

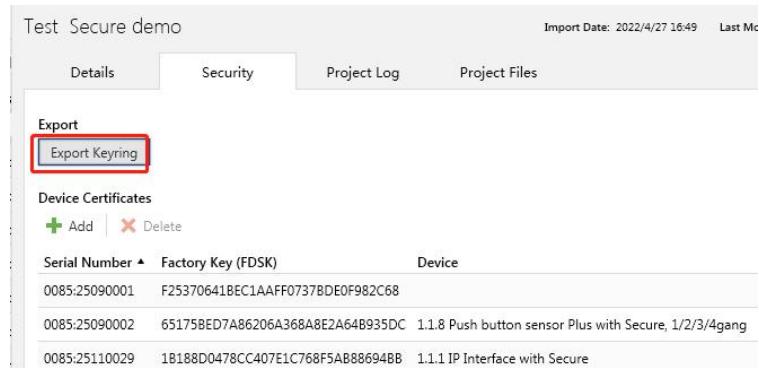


Fig.5.1(8)

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”

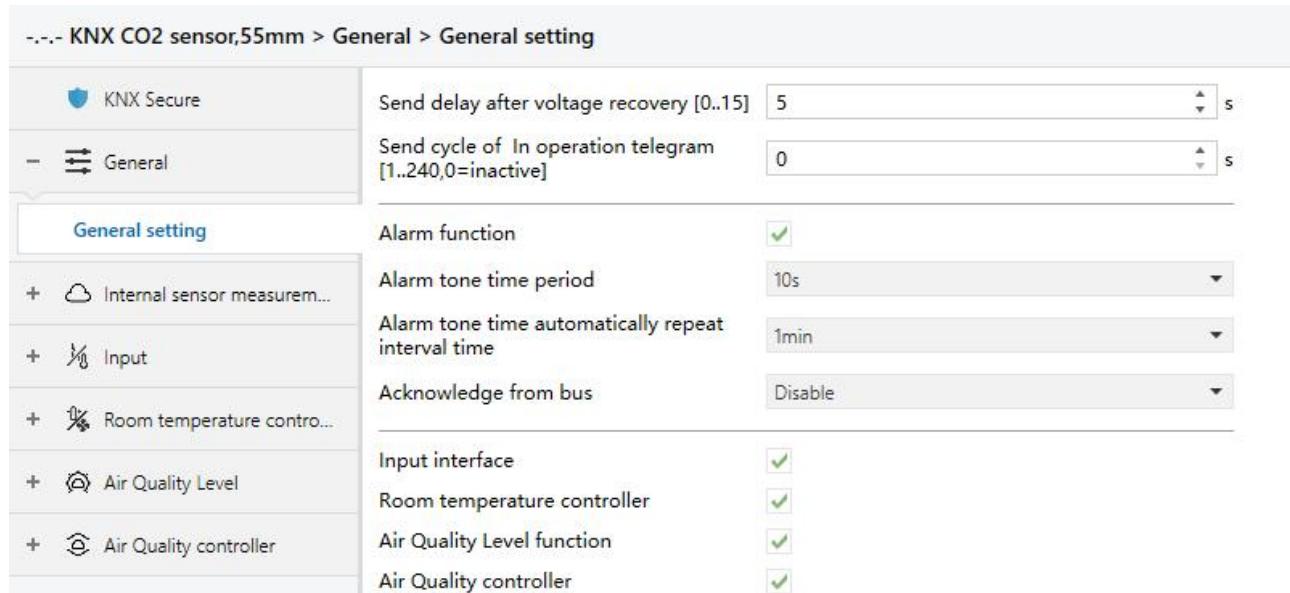


Fig. 5.2 “General setting” parameter window

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 does 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

message 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

... KNX CO2 sensor,55mm > Internal sensor measurement > Temperature sensor

KNX Secure	Temperature calibration	0.0	K
General	Send temperature when the result change by	1.0	K
Internal sensor measurement	Cyclically send temperature [0...255,0=inactive]	10	min
Temperature sensor	Send alarm telegram for low/high temperature	Respond after read only	
Relative humidity sensor	Threshold value for low temperature alarm [0..15]	0	°C
CO2 sensor	Threshold value for high temperature alarm [30..45]	45	°C

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

--- KNX CO2 sensor,55mm > Internal sensor measurement > Relative humidity sensor

KNX Secure	Humidity calibration	0	%
General	Send humidity when the result change by [0..20,0=inactive]	5	%
Internal sensor measurement	Cyclically send humidity [0..255,0=inactive]	10	min
Temperature sensor	Send alarm telegram for low/high humidity	Respond after read only	
Relative humidity sensor	Threshold value for low humidity alarm [5..50]	50	%
CO2 sensor	Threshold value for high humidity alarm [55..85]	85	%

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

--- KNX CO2 sensor,55mm > Internal sensor measurement > CO2 sensor

KNX Secure	CO2 calibration	0	ppm
General	Send CO2 when the result change	50	ppm
Internal sensor measure...	Cyclically send CO2 [0..255,0=inactive]	10	min
Temperature sensor	Report error when sensor failure	<input checked="" type="checkbox"/>	
Relative humidity sensor	Send alarm telegram for low/high CO2	No respond	
CO2 sensor	<p>! 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.</p>		

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.

Threshold value for low CO2 alarm
[400..2000]

1000 ppm

Threshold value for high CO2 alarm
[400..2000]

1000 ppm

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

-.- KNX CO2 sensor,55mm > Input > Input 2 - Temperature probe

KNX Secure	Description (max 30char.)	<input type="text"/>
General	B value of temperature sensor (must refer to the characteristic of component)	3950
Internal sensor measure...	Temperature calibration	0.0
Input	Send temperature when the result change by	1.0
Input 1 - Switch sensor	Cyclically send temperature [0...255]	0
Input 2 - Temperature probe	Reply error of sensor measurement	Respond after read only
Room temperature contro...	Object value of error	<input checked="" type="radio"/> 0=no error/1=error <input type="radio"/> 1=no error/0=error
Air Quality Level	Lower threshold value for error report	0
Air Quality controller	Upper threshold value for error report	60

Fig.5.4.1 Parameter setting of temperature probe

Parameter "Description (max 30char.)"

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

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

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

3275

3380

...

4200

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

-.-. KNX CO2 sensor,55mm > Input > Input 1 - Switch sensor

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

Fig.5.4.2(1) Parameter setting of switch sensor

-.-. KNX CO2 sensor,55mm > Input > Input 1 - Scene control

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

Fig.5.4.2(2) Parameter setting of scene control

-.-. KNX CO2 sensor,55mm > Input > Input 1 - Send String

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

Fig.5.4.2(3) Parameter setting of sending sting

Parameter "Description (max 30char.)"

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

Parameter "Distinction between short and long operation"

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

No

Yes

--Parameter "Long operation after [3..25]"

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”

... KNX CO2 sensor,55mm > Room temperature controller

KNX Secure	RTC 1	<input checked="" type="checkbox"/>
General	RTC 2	<input checked="" type="checkbox"/>
	RTC 3	<input checked="" type="checkbox"/>

... KNX CO2 sensor,55mm > Room temperature controller > RTC 1...

KNX Secure	Description (max 30char.)	
General	Room temperature reference from	Internal sensor combine with External sensor
	Combination ratio	50% Internal to 50% External
General setting	Time period for request room temperature sensor [0...255]	10 min
Internal sensor measure...	Send temperature when the result change by	1.0 K
Input	Cyclically send temperature [0...255]	0 min
Room temperature contro...	Control value after temp. error[0..100] (if 2-point control, set value '0'=0, set value '>0'=1)	0 %
RTC 1...		
Setpoint	Room temperature control mode	Heating and Cooling
Heating/Cooling control	Heating/Cooling switchover	<input checked="" type="radio"/> Via object <input type="radio"/> Automatic changeover
Fan auto.control	Heating/Cooling status after download	<input checked="" type="radio"/> Heating <input type="radio"/> Cooling
RTC 2...	Heating/Cooling status after voltage recovery	As before voltage failure
RTC 3...	Room temperature control system	<input checked="" type="radio"/> 2 pipes system <input type="radio"/> 4 pipes system
Air Quality Level	Operation mode	<input checked="" type="checkbox"/>
Air Quality controller	Controller status after download	Comfort mode
	Controller status after voltage recovery	As before voltage failure
	Extended comfort mode [0..255,0=inactive]	0 min
	1 bit object function for operation mode	<input checked="" type="checkbox"/>
	1 bit object for standby mode	<input checked="" type="checkbox"/>
	Fan speed auto.control function	<input checked="" type="checkbox"/>
	Window contact input function	<input checked="" type="checkbox"/>
	Delay for window contact [0..65535]	15 s
	Controller mode for open window	<input type="radio"/> Economy mode <input checked="" type="radio"/> Frost/heat protection
	Bus presence detector function	<input checked="" type="checkbox"/>

Fig.5.5 “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 \times 40%) + (external sensor's temperature \times 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 PI control, the parameter value is 40%, as well as the control value. When set to invert, the control value is invert to 60%.

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. When set to invert, the control value is invert.

For additional heating and cooling control, when the temperature sensor is error, the control value is 0 or 0%. When set to invert, the control value is 1 or 100%.

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"

-... KNX CO2 sensor,55mm > Room temperature controller > RTC 1... > Setpoint

KNX Secure	Setpoint method for operating mode	<input checked="" type="radio"/> Relative <input type="radio"/> Absolute
- General	Base setpoint temperature	20.0 °C
General setting	Additional setpoint offset for setpoint adjustment	<input type="radio"/> Disable <input checked="" type="radio"/> Enable
+ Internal sensor measure...	Step of setpoint offset	<input checked="" type="radio"/> 0.5K <input type="radio"/> 1K
+ Input	Min. setpoint offset [-10..0]	-5 K
- Room temperature contro...	Max. setpoint offset [0..10]	5 K
Heating		
- RTC 1...	Reduced heating in standby mode [0..10]	2 K
Setpoint	Reduced heating in economy mode [0..10]	4 K
Heating/Cooling control	Setpoint temperature in frost protection mode [5..10]	7 °C
Fan auto.control		
+ RTC 2...		
+ RTC 3...		
Cooling		
	Increased cooling in standby mode [0..10]	2 K
	Increased cooling in economy mode [0..10]	4 K
	Setpoint temperature in heat protection mode [30..37]	35 °C
	Min. setpoint temperature [5..37]	11 °C
	Max. setpoint temperature [5..37]	32 °C

Parameter setting of relative adjustment

... KNX CO2 sensor,55mm > Room temperature controller > RTC 1... > Setpoint

KNX Secure

General

General setting

Internal sensor measurem...

Input

Room temperature contro...

RTC 1...

Setpoint

Heating/Cooling control

Fan auto.control

RTC 2...

RTC 3...

Air Quality Level

Air Quality controller

Setpoint method for operating mode
 Relative
 Absolute

Heating

Setpoint temperature in comfort mode [5..37]

°C

Setpoint temperature in standby mode [5..37]

°C

Setpoint temperature in economy mode [5..37]

°C

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

°C

Cooling

Setpoint temperature in comfort mode [5..37]

°C

Setpoint temperature in standby mode [5..37]

°C

Setpoint temperature in economy mode [5..37]

°C

Setpoint temperature in heat protection mode [30..37]

°C

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

Min. setpoint temperature [5..37]

°C

Max. setpoint temperature [5..37]

°C

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.

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

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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



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

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

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

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

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

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

5.5.2. Parameter window "Heating/Cooling control"

-.- KNX CO2 sensor,55mm > Room temperature controller > RTC 1... > Heating/Cooling control

<ul style="list-style-type: none"> <input checked="" type="checkbox"/> KNX Secure + <input type="checkbox"/> General + <input type="checkbox"/> Internal sensor measurem... + <input type="checkbox"/> Input - <input type="checkbox"/> Room temperature contro... - RTC 1... Setpoint Heating/Cooling control Fan auto.control + RTC 2... 	Type of heating/cooling control	Switching on/off(use 2-point control)
	Invert control value	<input type="radio"/> No <input checked="" type="radio"/> Yes
	Heating	
	Lower Hysteresis [0..200]	10 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K
	Upper Hysteresis [0..200]	10 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K
	Cooling	
	Lower Hysteresis [0..200]	10 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K
	Upper Hysteresis [0..200]	10 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K
	Cyclically send control value [0..255]	10 <input type="button" value="▼"/> <input type="button" value="▲"/> min
	Additional heating/cooling	
Control type	<input checked="" type="radio"/> 1bit <input type="radio"/> 1byte	
Invert control value	<input type="checkbox"/>	
Temperature difference to switch on additional heating [-100..-5]	-25 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K	
Hysteresis to switch off additional heating [-20..-1]	-5 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K	
Temperature difference to switch on additional cooling [5..100]	25 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K	
Hysteresis to switch off additional cooling [1..20]	5 <input type="button" value="▼"/> <input type="button" value="▲"/> *0.1K	
Cyclically send control value [0..255]	0 <input type="button" value="▼"/> <input type="button" value="▲"/> min	
Parameter setting of "Switching on/off(use 2-point control)"		
<ul style="list-style-type: none"> + <input type="checkbox"/> KNX Secure + <input type="checkbox"/> General + <input type="checkbox"/> Internal sensor measurem... + <input type="checkbox"/> Input - <input type="checkbox"/> Room temperature contro... - RTC 1... 	Type of heating/cooling control	Switching PWM(use PI control)
	Invert control value	<input type="radio"/> No <input checked="" type="radio"/> Yes
	PWM cycle time [1..255]	15 <input type="button" value="▼"/> <input type="button" value="▲"/> min
	Heating speed	Hot water heating(5K/150min)
	Cooling speed	Cooling ceiling (5K/240min)
	Cyclically send control value [0..255]	10 <input type="button" value="▼"/> <input type="button" value="▲"/> min
	Additional heating/cooling	
	Parameter setting of "Switching PWM(use PI control)"	

<ul style="list-style-type: none">  KNX Secure +  General +  Internal sensor measurem... +  Input -  Room temperature contro... - RTC 1... Setpoint 	Type of heating/cooling control	Continuous control(use PI control)
	Invert control value	<input type="radio"/> No <input checked="" type="radio"/> Yes
	Heating speed	Hot water heating(5K/150min)
	Cooling speed	Cooling ceiling (5K/240min)
	Send control value on change by [0..100,0=inactive]	5
	Cyclically send control value [0..255]	10
	Additional heating/cooling	<input type="checkbox"/>
		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°C, if T is higher than 24°C, then it will stop heating; if T is lower than 24°C, then it will start heating; if T is between 21~24°C, then it will maintain the previous status.

Under the cooling control,

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

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

For example, the lower hysteresis temperature is 1K, the upper hysteresis temperature is 2K, the setpoint temperature is 26°C, if T is lower than 25°C, then it will stop cooling; if T is lower than 28°C, then it will start cooling; if T is between 28~25°C, then it will maintain the previous status.

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

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

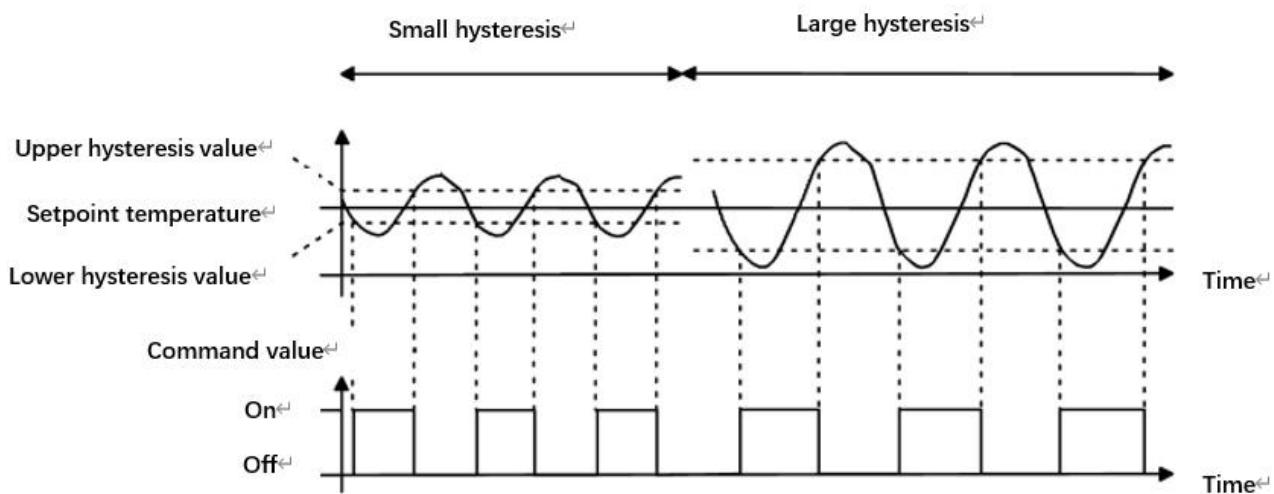


Fig.5.5.2(2) Effects of hysteresis on control value switch action(heating) under 2-point control mode

These two parameters as follow are suitable for PI control:

--- Parameter "Heating speed"

--- Parameter "Cooling speed"

These two parameters are for setting the responding speed of heating or cooling controller.

Different responding speeds are suitable for different environments.

Options:

Hot water heating (5K/150min)

Underfloor heating (5K/240 min)

Electrical heating (4K/100min)

Split unit (4K/90min)

Fan coil unit (4K/90min)

User defined

Options:

Cooling ceiling (5K/240min)

Split unit (4K/90min)

Fan coil unit(4K/90min)

User defined

--Parameter "Proportional range [10..100]"(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.

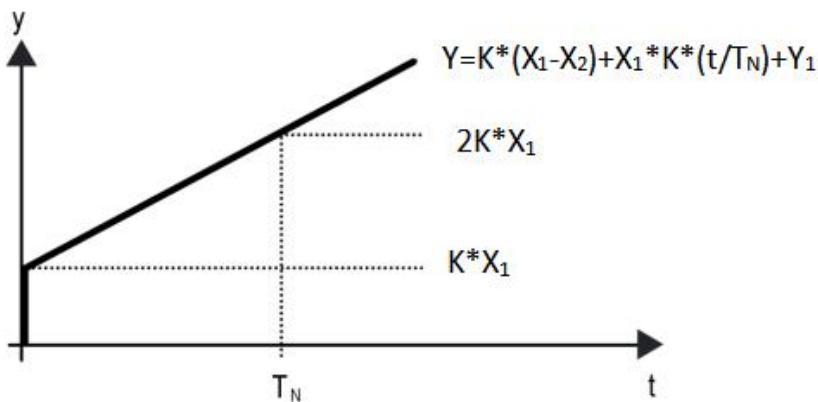


Fig.5.5.2(3) Control value of PI control mode

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: $Y = K (X1 - X2) + Y1$

Setting and influence of user-defined parameters:

Parameter setting	Effect
K: If the scale range is too small	Quick adjustment, and overshoot will occur
K: If the scale range is too large	Slow adjustment, but no overshoot
T _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 value 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°C, if T is lower than 15°C, then it will start heating; if T is higher than 17°C, then it will stop heating; if T is between 15~17°C, 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:

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

 *0.1K

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

 *0.1K

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 value 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°C, if T is higher than 25°C, then it will start cooling; if T is lower than 20°C, then it will stop cooling; if T is between 20~25°C, 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:

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

 *0.1K

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

 *0.1K

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”

-... KNX CO2 sensor,55mm > Room temperature controller > RTC 1... > Fan auto.control

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

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 1 byte 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:

Output value for Fan speed low	33	%
Output value for Fan speed medium	32	%
Output value for Fan speed high	100	%

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:

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

150

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

150

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

200

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:

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

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

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

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

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

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

--- KNX CO2 sensor,55mm > Air Quality Level > Relative humidity Level

KNX Secure	Relative humidity level function	2 levels
+ General	Reference internal sensor	<input checked="" type="checkbox"/>
+ Internal sensor measure...	Number of reference external sensor	1
+ Input	Calculation type	Weight average
+ Room temperature contro...	Weighting of internal sensor	50 %
- Air Quality Level	Weighting of external sensor 1	20 %
- Relative humidity Level	Time period for request external sensor [0...255,0=inactive]	10 min
Output	Send value when the result change by	5 %
	Cyclically send value [0..255,0=inactive]	0 min

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

--- KNX CO2 sensor,55mm > Air Quality Level > Relative humidity Level > Output

<ul style="list-style-type: none"> KNX Secure General Internal sensor measurement... Input Room temperature control... Air Quality Level Relative humidity Level Output CO2 Level Air Quality controller 	Control type	1bit
	Cyclically send output value [0..255,0=inactive]	0
	Hysteresis threshold value in +/- [1..10]	5
	Threshold value 1 for level 1	20
	If humidity value < threshold value 1, send	OFF
	If humidity value >= threshold value 1, send	ON
	If sensor failure, send	Nothing
	Threshold value 2 for level 2	40
	If humidity value < threshold value 2, send	OFF
	If humidity value >= threshold value 2, send	ON
If sensor failure, send	Nothing	

1bit

<ul style="list-style-type: none"> KNX Secure General Internal sensor measurement... Input Room temperature control... Air Quality Level Relative humidity Level Output CO2 Level Air Quality controller 	Control type	1byte
	Object datatype	1byte percentage value
	Cyclically send output value [0..255,0=inactive]	0
	Hysteresis threshold value in +/- [1..10]	5
	Send additional alarm message	<input checked="" type="checkbox"/>
	Threshold value 1 (Level 1<->Level 2)	20
	If humidity value < threshold value 1, send	<input type="radio"/> Nothing <input checked="" type="radio"/> Send value
	Value	0
	Alarm message	Alarm 1
	If humidity value >= threshold value 1, send	<input type="radio"/> Nothing <input checked="" type="radio"/> Send value
Value	33	
Alarm message	Alarm 2	
If sensor failure, send	<input checked="" type="radio"/> Nothing <input type="radio"/> Send value	

1byte

 KNX Secure  General  Internal sensor measurem...  Input  Room temperature contro...  Air Quality Level  Relative humidity Level Output  CO2 Level  Air Quality controller	Control type	3byte(RGB)	
	Cyclically send output value [0..255,0=inactive]	0	min
	Hysteresis threshold value in +/- [1..10]	5	%
	Send additional alarm message	<input checked="" type="checkbox"/>	
	Threshold value 1 (Level 1<->Level 2)	20	%
	If humidity value < threshold value 1, send	<input type="radio"/> Nothing <input checked="" type="radio"/> Send value	
	Value	#00FF00	
	Alarm message	Alarm 1	
If humidity value >= threshold value 1, send	<input type="radio"/> Nothing <input checked="" type="radio"/> Send value		
Value	#FF0000		
Alarm message	Alarm 2		
If sensor failure, send	<input type="radio"/> Nothing <input checked="" type="radio"/> Send value		
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:

Threshold value 1 (Level 1 <-> Level 2)	<input type="text" value="40"/> 40	<input type="button" value="▲"/> <input type="button" value="▼"/> %
Threshold value 2 (Level 2 <-> Level 3)	<input type="text" value="40"/> 40	<input type="button" value="▲"/> <input type="button" value="▼"/> %
Threshold value 3 (Level 3 <-> Level 4)	<input type="text" value="50"/> 50	<input type="button" value="▲"/> <input type="button" value="▼"/> %

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

--- KNX CO2 sensor,55mm > Air Quality Level > CO2 Level

KNX Secure	CO2 level function	2 levels
+ General	Reference internal sensor	<input checked="" type="checkbox"/>
+ Internal sensor measure...	Number of reference external sensor	1
+ Input	Calculation type	Weight average
+ Room temperature contro...	Weighting of internal sensor	50 %
- Air Quality Level	Weighting of external sensor 1	20 %
+ Relative humidity Level	Time period for request external sensor [0..255,0=inactive]	10 min
- CO2 Level	Send value when the result change by	50 ppm
Output	Cyclically send value [0..255,0=inactive]	0 min

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

--- KNX CO2 sensor,55mm > Air Quality Level > CO2 Level > Output

<ul style="list-style-type: none"> KNX Secure + General + Internal sensor measurement... + Input + Room temperature control... - Air Quality Level + Relative humidity Level - CO2 Level <ul style="list-style-type: none"> Output + Air Quality controller 	Control type	1bit	
	Cyclically send output value [0..255,0=inactive]	0	min
	Hysteresis threshold value in +/- [50..300]	50	ppm
	Threshold value 1 for level 1	350	ppm
	If CO2 value < threshold value 1, send	OFF	
	If CO2 value >= threshold value 1, send	ON	
	If sensor failure, send	Nothing	
	Threshold value 2 for level 2	450	ppm
	If CO2 value < threshold value 2, send	OFF	

<ul style="list-style-type: none"> KNX Secure + General + Internal sensor measurement... + Input + Room temperature control... - Air Quality Level + Relative humidity Level - CO2 Level <ul style="list-style-type: none"> Output + Air Quality controller 	Control type	1bit	
	Object datatype	1byte	
	Cyclically send output value [0..255,0=inactive]	0	min
	Hysteresis threshold value in +/- [50..300]	50	ppm
	Send additional alarm message	<input checked="" type="checkbox"/>	
	Threshold value 1 (Level 1<->Level 2)	350	ppm
	If CO2 value < threshold value 1, send	<input type="radio"/> Nothing <input checked="" type="radio"/> Send value	
	Value	0	%
	Alarm message	Alarm 1	
	If humidity value >= threshold value 1, send	<input type="radio"/> Nothing <input checked="" type="radio"/> Send value	
Value	33	%	
Alarm message	Alarm 2		
If sensor failure, send	<input checked="" type="radio"/> Nothing <input type="radio"/> Send value		

 KNX Secure  General  Internal sensor measurem...  Input  Room temperature contro...  Air Quality Level  Relative humidity Level  CO2 Level Output  Air Quality controller	Control type 3byte(RGB) Cyclically send output value [0..255,0=inactive] 0 min Hysteresis threshold value in +/- [50..300] 50 ppm Send additional alarm message <input checked="" type="checkbox"/> Threshold value 1 (Level 1<->Level 2) 350 ppm If CO2 value < threshold value 1, send <input type="radio"/> Nothing <input checked="" type="radio"/> Send value Value #00FF00  Alarm message Alarm 1 If humidity value >= threshold value 1, send <input type="radio"/> Nothing <input checked="" type="radio"/> Send value Value #FF0000  Alarm message Alarm 2 If sensor failure, send <input checked="" type="radio"/> Nothing <input type="radio"/> Send value
---	---

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:

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

ppm

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

ppm

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

ppm

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

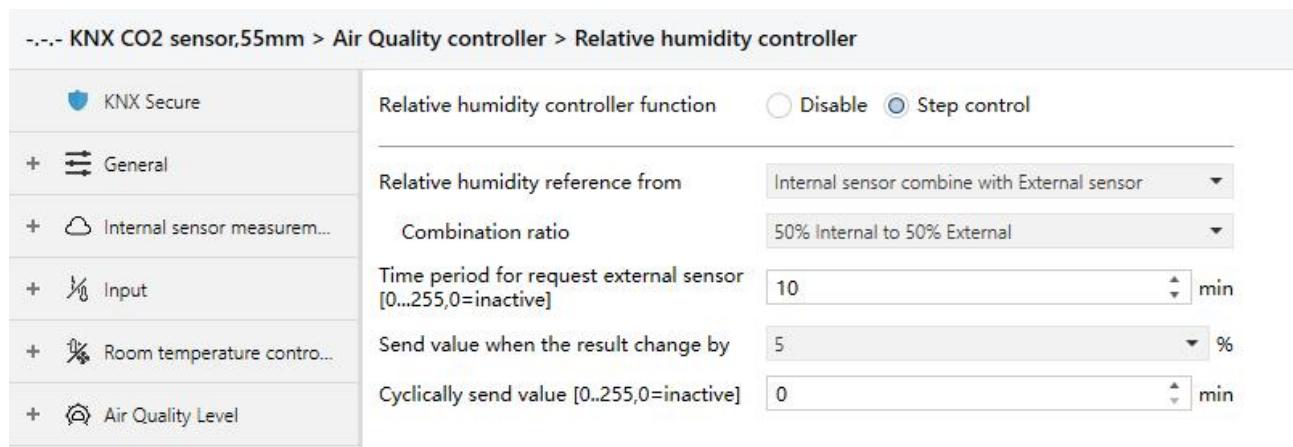


Fig.5.7.1 “Relative humidity controller” parameter window

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

-.- KNX CO2 sensor,55mm > Air Quality controller > Relative humidity controller > Output

KNX Secure	Control type	1byte
General	Object datatype	<input checked="" type="radio"/> 1byte percentage value <input type="radio"/> 1byte unsigned value
Internal sensor measurem...	Cyclically send control value [0..255,0=inactive]	0 <input type="button" value="▼"/> min
Input	Control value for step 0	0 <input type="button" value="▼"/> %
Room temperature contro...	Control value for step 1	33 <input type="button" value="▼"/> %
Air Quality Level	Control value for step 2	67 <input type="button" value="▼"/> %
Air Quality controller	Control value for step 3	100 <input type="button" value="▼"/> %
Relative humidity controller	Threshold value 1 (step 0<->step 1)	20 <input type="button" value="▼"/> %
Output	Threshold value 2 (step 1<->step 2)	40 <input type="button" value="▼"/> %
CO2 controller	Threshold value 3 (step 2<->step 3)	50 <input type="button" value="▼"/> %
	Hysteresis threshold value in +/- [1..10]	5 <input type="button" value="▼"/> %
	Minimum time in step control [0..65535]	0 <input type="button" value="▼"/> s
	If sensor failure, send	0 <input type="button" value="▼"/> %
	Stop function	<input checked="" type="checkbox"/>
	Controller automatically restart after [0..255,0=inactive]	0 <input type="button" value="▼"/> min
	Behaviour when controller off	<input checked="" type="radio"/> Nothing <input type="radio"/> Send value

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:

Threshold value 1 (step 0<->step 1)	<input type="text" value="50"/> %
Threshold value 2 (step 1<->step 2)	<input type="text" value="40"/> %
Threshold value 3 (step 2<->step 3)	<input type="text" value="50"/> %

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

--- KNX CO2 sensor,55mm > Air Quality controller > CO2 controller

KNX Secure	CO2 controller function	Step control
General	CO2 reference from	Internal sensor combine with External sensor
Internal sensor measurement	Combination ratio	50% Internal to 50% External
Input	Time period for request external sensor [0...255,0=inactive]	10 min
Room temperature control	Send value when the result change by	50 ppm
Air Quality Level	Cyclically send value [0..255,0=inactive]	0 min
Air Quality 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.

-.-. KNX CO2 sensor,55mm > Air Quality controller > CO2 controller > Output

KNX Secure	Control type	1byte
General	Object datatype	<input checked="" type="radio"/> 1byte percentage value <input type="radio"/> 1byte unsigned value
Internal sensor measure...	Cyclically send control value [0..255,0=inactive]	0 <input type="button" value="▼"/> min
Input	Control value for step 0	0 <input type="button" value="▼"/> %
Room temperature contro...	Control value for step 1	33 <input type="button" value="▼"/> %
Air Quality Level	Control value for step 2	67 <input type="button" value="▼"/> %
Air Quality controller	Control value for step 3	100 <input type="button" value="▼"/> %
Relative humidity controller	Threshold value 1 (step 0<->step 1)	350 <input type="button" value="▼"/> ppm
CO2 controller	Threshold value 2 (step 1<->step 2)	450 <input type="button" value="▼"/> ppm
Output	Threshold value 3 (step 2<->step 3)	1000 <input type="button" value="▼"/> ppm
	Hysteresis threshold value in +/- [50..300]	50 <input type="button" value="▼"/> ppm
	Minimum time in step control [0..65535]	0 <input type="button" value="▼"/> s
	If sensor failure, send	0 <input type="button" value="▼"/> %
	Stop function	<input checked="" type="checkbox"/>
	Controller automatically restart after [0..255,0=inactive]	0 <input type="button" value="▼"/> min
	Behaviour when controller off	<input checked="" type="radio"/> Nothing <input type="radio"/> Send value

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

... KNX CO2 sensor,55mm > Air Quality controller > CO2 controller > Output

KNX Secure	Control type	1byte
General	Object datatype	<input checked="" type="radio"/> 1byte percentage value <input type="radio"/> 1byte unsigned value
Internal sensor measure...	Send value when the control value change by [0..100,0=inactive]	5 %
Input	Cyclically send control value [0..255,0=inactive]	0 min
Room temperature contro...	Setpoint CO2 value	500 ppm
Air Quality Level	Setpoint value can be changed via bus	<input type="checkbox"/>
Air Quality controller	Proportional range	100 ppm
Relative humidity controller	Reset time [15..240]	15 min
CO2 controller	Minimum control value	0 %
Output	Maximum control value	100 %
	Control value lower than the minimum value	0% = 0%, otherwise = Minimum value
	If sensor failure, send	0 %
	Stop function	<input checked="" type="checkbox"/>
	Controller automatically restart after [0..255,0=inactive]	0 min
	Behaviour when controller off	<input checked="" type="radio"/> Nothing <input type="radio"/> Send value

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:

Threshold value 1 (step 0<->step 1)	<input type="text" value="600"/> ppm
Threshold value 2 (step 1<->step 2)	<input type="text" value="450"/> ppm
Threshold value 3 (step 2<->step 3)	<input type="text" value="1000"/> ppm

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
2	Alarm input	General	1bit	C,W,T,U	1.005 alarm
3	Alarm acknowledge	General	1bit	C,W	1.016 acknowledge

The communication object is used to periodically send a telegram "1" to the bus to indicate that the device is working properly.

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

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°C					
6	Low temperature alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the low temperature alarm signal to bus, when temperature lower than low threshold that defined by parameter.					
7	High temperature alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the high temperature alarm signal to bus, when temperature higher than high threshold that defined by parameter.					
8	Humidity value	Internal sensor	2byte	C,R,T	9.007 humidity
The communication object is used to receive humidity measurements sent from the humidity sensor on the bus. Range:0~100%					
9	Low humidity alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the low humidity alarm signal to bus, when humidity lower than low threshold that defined by parameter.					
10	High humidity alarm	Internal sensor	1bit	C,R,T	1.005 alarm
The communication object is used to send the high humidity alarm signal to bus, when humidity higher than high threshold that defined by parameter.					
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	R	W	T	U	switch	Low
23	Input 1 - Switch sensor	Close, Switch			1 bit	C	R	W	T	U	switch	Low
24	Input 1 - Switch sensor	Open, Switch			1 bit	C	R	W	T	U	switch	Low
23	Input 1 - Switch sensor	Short, Switch			1 bit	C	R	W	T	U	switch	Low
24	Input 1 - Switch sensor	Long, Switch			1 bit	C	R	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°C

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
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The communication object is used to send the error report of the external temperature sensor, and the object value is defined according to the parameters.

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	Recall scene 1
1	Recall scene 2
2	Recall scene 3
...	...
63	Recall scene 64
128	Store scene 1
129	Store scene 2
130	Store scene 3
...	...
191	Store scene 64

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

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
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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

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

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
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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°C

31	Current setpoint adjustment Base setpoint adjustment	RTC 1 - {{...}}	2byte	C,W	9.001 temperature
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“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
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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
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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
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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
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37	Comfort mode	RTC 1 - {{...}}	1bit	C,W	1.003 enable
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38	Economy mode	RTC 1 - {{...}}	1bit	C,W	1.003 enable
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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,	RTC 1 - {...}	2byte	C,R,T	9.001 temperature

	status				
<p>The communication object is visible only when relative adjustment. Used to send the current base set temperature to the bus.</p> <p>Current base set temperature value = parameter set value (or object 31 base value)+accumulated offset value</p>					
53	Setpoint offset, status	RTC 1 - {...}	2byte	C,R,T	9.002 temperature difference
<p>The communication object is visible only when relative adjustment. Used to send the accumulated offset value of base set temperature to the bus.</p>					
54	Current temperature setpoint, status	RTC 1 - {...}	2byte	C,R,T	9.001 temperature
<p>The communication object is used to send current set temperature to the bus.</p>					
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
<p>The communication object is used to send control value of heating or cooling function to the bus.</p> <p>Object datatype is according to parameter setting.</p>					
57	Fan speed	RTC 1 - {...}	1byte	C,W,T,U	5.001 percentage 5.100 fan stage
58	Fan speed low	RTC 1 - {...}	1bit	C,W,T,U	1.001 switch
59	Fan speed medium	RTC 1 - {...}	1bit	C,W,T,U	1.001 switch
60	Fan speed high	RTC 1 - {...}	1bit	C,W,T,U	1.001 switch
61	Fan speed off	RTC 1 - {...}	1bit	C,W,T,U	1.001 switch
<p>These communication objects are used to send control telegrams of the fan speed to the bus.</p> <p>1bit object is visible according to the parameter setting :</p> <ul style="list-style-type: none"> Object 58—Low fan speed Object 59—Medium fan speed Object 60—High fan speed Object 61—Fan speed off <p>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);</p>					

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	RTC 1 - {{...}}	1bit	C,R,T	1.001 switch
	Additional heating/cooling control value		1byte		5.001 percentage
274	Additional cooling control value	RTC 1 - {{...}}	1bit	C,R,T	1.001 switch
			1byte		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 1byte or 3byte is selected. Used to send alarm message 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 8859-1)	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)
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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 1byte or 3byte is selected. Used to send alarm message 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
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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
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The communication object is used send the status of controller to the bus, send telegram once status is changed. Telegrams:

<p>1--Controller on 0--Controller off</p>					
174	Actual sensor value	Relative humidity controller	2byte	C,R,T	9.007 humidity
<p>The communication object is used to send the calculated humidity value to the bus.</p>					
175	Control value	Relative humidity controller	1byte	C,R,T	5.010 counter pulses 5.001 percentage(0..100%)
<p>The communication object is used to send control value operated via step control, value is set by parameters.</p>					
176	Control stop	Relative humidity controller	1byte	C,W	5.010 counter pulses 5.001 percentage(0..100%)
<p>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).</p>					

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
<p>The communication object is used to receive the telegram from the bus to control CO2 controller power on/off. Telegrams:</p>					
<p>1--Controller on 0--Controller off</p>					
178	Setpoint adjustment	CO2 controller	2byte	C,W,R	9.008 parts/million(ppm)
<p>The communication object is used to modify the setpoint value of CO2 from bus, the received value</p>					

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.

179	External sensor value	CO2 controller	2byte	C,W,T,U	9.008 parts/million(ppm)
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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.

180	Controller status	CO2 controller	1bit	C,R,T	1.001 switch
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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

181	Actual sensor value	CO2 controller	2byte	C,R,T	9.008 parts/million(ppm)
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The communication object is used to send the calculated CO2 value to the bus.

182	Control value	CO2 controller	1byte	C,R,T	5.010 counter pulses 5.001 percentage(0..100%)
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The communication object is used to send control value operated via step control or PI control, value is set by parameters.

183	Control stop	CO2 controller	1byte	C,W	5.010 counter pulses 5.001 percentage(0..100%)
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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 6.8 "CO2 controller" communication object table