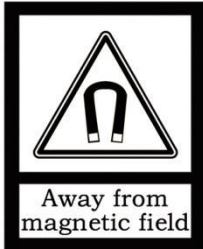# K·BUS® KNX Air Quality Sensor V2_V1.3

CSAQI-06/00.1.0x

KNX/EIB Home and Building Control System

Attentions

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

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

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

4. **Please do not disassemble the devices.**

Contents

Chapter 1 Summary

Air quality is related to our life so closely that it will affect our life directly. KNX Air Quality Sensor V2 is mainly used to detect and evaluate real-time air pollution index including PM2.5/PM10, VOC, CO2, AQI, temperature and humidity. It will control the detected pollution index, temperature and humidity accordingly to fresh the air and improve home environment. At the same time, Link to PM2.5, VOC, CO2 to control Ventilation. It has also logic output control. Air Quality Sensor, together with other bus devices is connected to KNX bus to form a complete system .

KNX Air Quality Sensor V2 is connected to bus directly by using KNX bus connection terminals. 12-30V DC auxiliary power supply is needed and it will be installed using a 80 or 86mm wiring box. It is available to assign the physical address and set the parameters by engineering design tool ETS with knxprod (ETS4 or above).

The functions of the product can be summarized as follow:

- **PM2.5, PM10 particle pollution detection display**

- **Temperature, humidity detection display**

- **Air Quality Index (AQI) detection display**

- **Atmospheric organic compounds (VOC)detection display**

- **Carbon dioxide (CO2)detection display**

- **Warning for AQI, VOC, CO2, temperature or humidity above the setting value**

- **Air quality level control**

- **Air pollution level control**

- **Cooling or heating control**

- **Humidity level control**

- **VOC exceeded control**

- **CO2 exceeded control**

- **Ventilation control, 3 level fan speed**

- **Three logic functions**

Note: If the CO_2 concentration in the sensor is abnormal, the detected CO_2 concentration diverge from the CO_2(400ppm) of the atmosphere. At this time, keep working still for 6-8s under ventilated conditions, ensure that the concentration of CO_2 in the test environment is consistent with the outdoor concentration. Then Long press the button below the sensor for more than 10s to perform CO_2 calibration (with the short ring), the user or engineer's mouth should not be near this sensor in this process. The corrected CO_2 concentration is the average CO_2 concentration in the atmosphere: 400 ppm.

Chapter 2 Technical Data

Power supply	Operation voltage	21-30V DC, , via the KNX bus
	Current consumption, bus	<3.0mA/24V DC, <2.6mA/30V DC
	Power consumption, bus	<80mW
Auxiliary supply	Voltage	12-30V DC
	Current	<73mA/12V DC, <34mA/24V DC <26mA/30V DC
	Power consumption	<0.9W
Connection	KNX	Bus connection terminal（Red/Black）
	Auxiliary supply	Bus connection terminal (Yellow/White)
Operating and display	Programming LED and button	For assigning the physical address
Temperature	Measuring range and Accuracy	-5°C…45°C, ±1°C
	Resolution	0.1°C
Humidity	Measuring range and Accuracy	10...90%, ±4.5% 0...10% / 90...100%, ±8%
	Resolution	0.1%
Particulates density	Measuring range	0-999 μg/m³
	Counting efficiency	50%(φ=0.3um)
	Response time	≤ 10s
VOC Detect	Range and accuracy	0-9.99 mg/m³, ±10%
CO2 Detect	Range and accuracy	400ppm~2000ppm, ±40ppm
Temperature range	Operating	− 5 °C ... 45 °C
	Storage	− 25 °C ... 55 °C
	Transportation	− 25 °C ... 70 °C
Ambient	Humidity	<93%, except dewing
Installation	in a conventional 80 or 86 mm wiring box	
Size	86×86×48.3mm	
Weight	0.15KG	

Chapter 3 Structure and Dimension Diagram

3.1 Dimension Diagram

86.0 mm

86.0 mm

48.3 mm

19.3 mm   29.0 mm
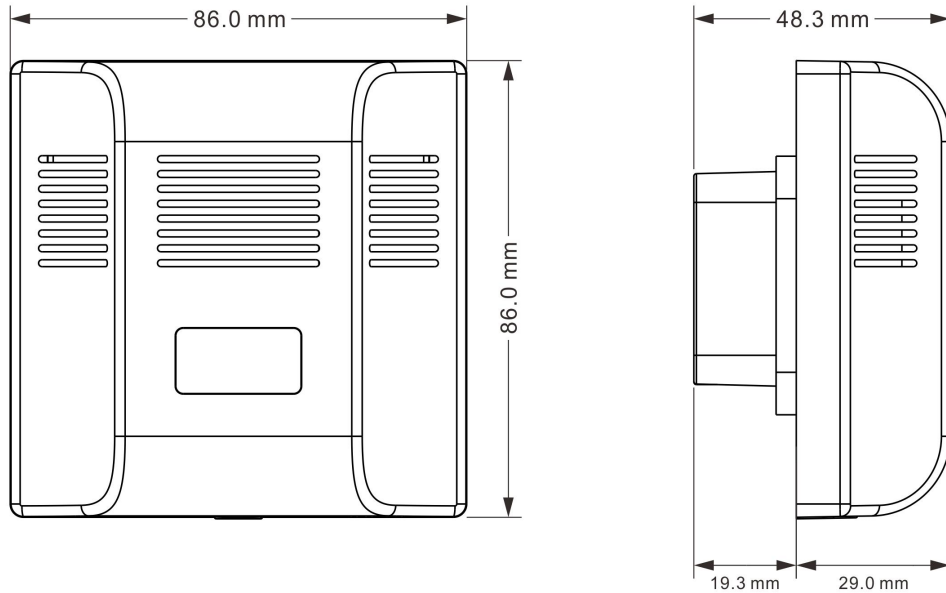
3.2 Structure
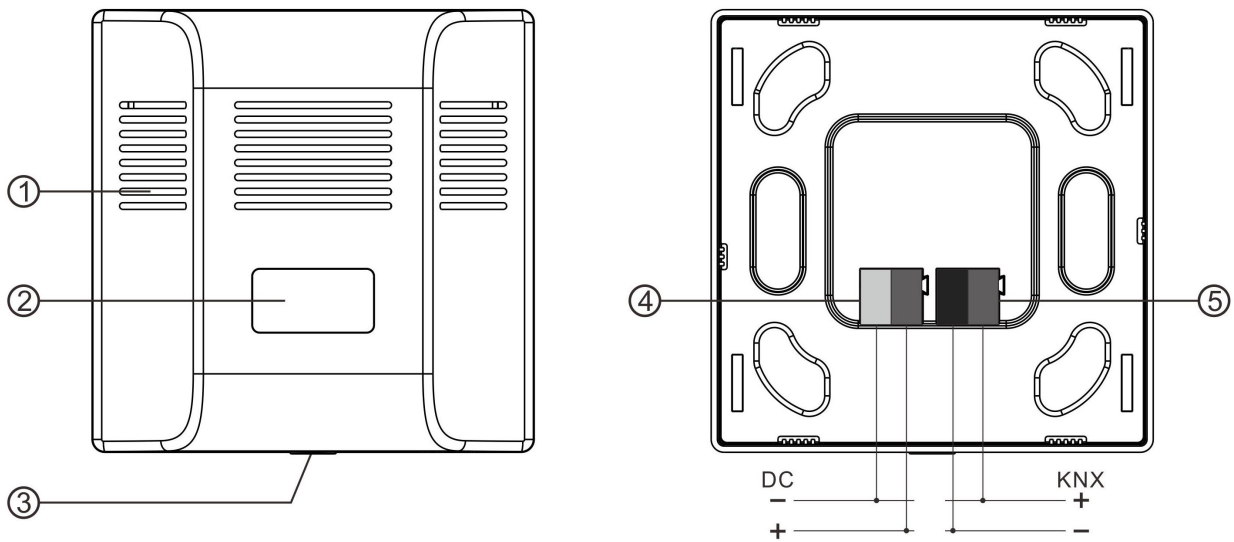
① Programming LED

② Display area

③ Programming button

④ Auxiliary supply connection terminal

⑤ KNX bus connection terminal

DC   KNX

4

Chapter 4 Project design and application

Application program	Maximum number of Communication objects	Maximum number of group address	Maximum number of associations
Air Quality Sensor, 6 in 1/2.0	45	120	120

Feature Overview:

Display various of detection index

It can display the current PM2.5, PM10, AQI levels, temperature, humidity, VOC and CO2. Automatically switches display.

Detection index excessive alarm

AQI level exceeded alert，VOC excessive alert，Over-temperature or humidity alert，the buzzer will be turned on when there is alarm, but this function can only be set to one of the alarm.

AQI

AQI have six levels, each level can send up to three different types of data values，like 1bit，4bit，1byte，according to the parameter settings.

AQI alarm

You can set the AQI alert level, send three different types of data values when there is alarm or no alarm occurred according to the parameters.

Temperature control

The sensor adds a simple temperature control function, simple heating / cooling, using two-point control mode, heating / cooling switch operated through the object. It can set the sending data values when the heating/cooling is being turned on or stopped，which is determines by the set parameters. The temperature setting values of heating/cooling can be changed by the bus, and the alarm temperature of overheat/over cold is set by the parameters.

Humidity

Three levels in total, each level can send up to three different types of data values, like 1bit，4bit，1byte, set according to the parameters. Meanwhile, humidity alarm can be set.

VOC alarm

VOC alarm value is configurable, either alarm or no-alarm situation sens 3 types of telegraph, which is also configurable.

CO2 alarm

CO2 alarm value is configurable, either alarm or no-alarm situation sens 3 types of telegraph, which is also configurable.

Ventilation controller

Auto control object, used for receiving enable auto function of device, and used to whether to trigger to enter auto control when voltage recovery. Link to PM2.5, VOC, CO2, to control Ventilation, with 3 level fan speed and 1bit/1byte output type.

Logic Function

The sensor provides three kinds of logic function, each of them has five logic inputs, they are: AQI sends 1bit value, AQI alarm sends 1bit value, temperature sends 1bit value, humidity sends 1bit value, VOC alarm sends 1bit value or logic output 1bit value and outside input. It can also provide 6 kinds of logical operation and door function. It can send three types of value according to the logic operation result.

Chapter 5 Parameter setting interface

5.1 Summary

This sensor parameter can be configured differently according to the user's need. The details are as below:

5.2 Parameter window "General settings"

"General settings" parameter setting interface is shown in Fig.5.2. It mainly includes some basic parameter setting.
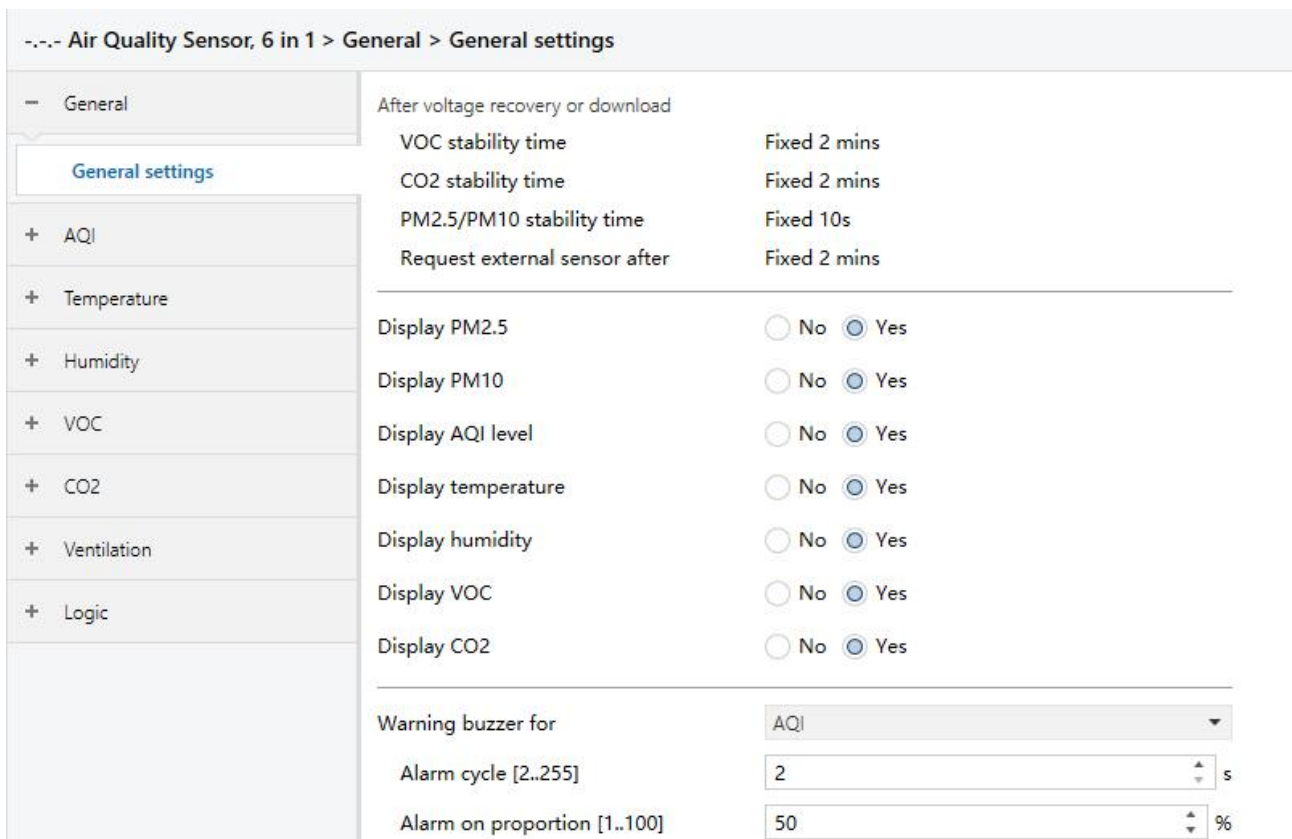

Fig.5.2 "General settings" parameter setting interface

After voltage recovery or download

Parameter "VOC stability time"

This parameter is VOC stability time. Fixed **2mins**.

Parameter "CO2 stability time"

This parameter is CO2 stability time. Fixed **2mins**.

Parameter "PM2.5/PM10 stability time"

This parameter is PM2.5/PM10 stability time. Fixed **10s**.

Parameter "Request external sensor after"

This parameter is to set the delay time for read request external sensor after bus voltage recovery or finish programming, such as control value of AQI, temperature, humidity, ventilation.Fixed **2mins**.

Parameter "Display PM2.5"

Parameter "Display PM10"

Parameter "Display AQI level"

Parameter "Display temperature"

Parameter "Display humidity"

Parameter "Display VOC"

Parameter "Display CO2"

These parameters are used to define whether to show the parameters detected or not. Options:

> **No**
>
> **Yes**

"Yes" means shown, "No" means not shown.

Parameter "Warning buzzer for"

This parameter is to set the contents of the buzzer alarm.Options:

> **Do not used**
>
> **AQI**
>
> **Temperature**
>
> **Humidity**
>
> **VOC**
>
> **CO2**

The "Do not used" is to disable the buzzer alarm function.

The "AQI" is air quality level alarm. When the detected air quality level is equal to or larger than the "Alarm level" level in parameter page"AQI Alarm settings", the buzzer warning.

The "Temperature" is temperature alarm, when the detected temperature value is equal to or larger than the "Heating/Frost alarm temperature [0..500]*0.1°C" value in parameter page "Temperature settings" , the buzzer warning.

The "Humidity" is humidity alarm, when the detected humidity value is equal to or larger than the

"Humidity alarm value [1..99]%" value in parameter page "Humidity settings", the buzzer warning.

The "VOC" is smell alarm, when the detected VOC value is equal to or larger than the "VOC alarm value [100..5000]ug/m^3" value in parameter page "VOC settings", the buzzer warning.

The "CO2" is carbon dioxide alarm, when the detected CO2 value is equal to or larger than the "CO2 alarm value [400..2000]ppm" value in parameter page "CO2 settings", the buzzer warning.

These two parameters as follow are visible when warning buzzer is enabled.

Parameter "Alarm cycle [2..255]"

This parameter indicates the time cycle of the buzzer alarm. Options: **2…255(s)**

Parameter "Alarm on proportion [1..100]"

This parameter indicates the percentage of buzzer alarm within the buzzer alarm time cycle. Options: **1…100(%)**

For example, if the time cycle is 2s and the parameter 50%, then the buzzer will be able for 1s and disabled closed 1s circularly.

5.3 Parameter window "AQI"

5.3.1 Parameter window "AQI General settings"

"AQI General settings" parameter setting is shown in Fig.5.3.1. It mainly includes the setting for the general parameters of temperature and humidity.
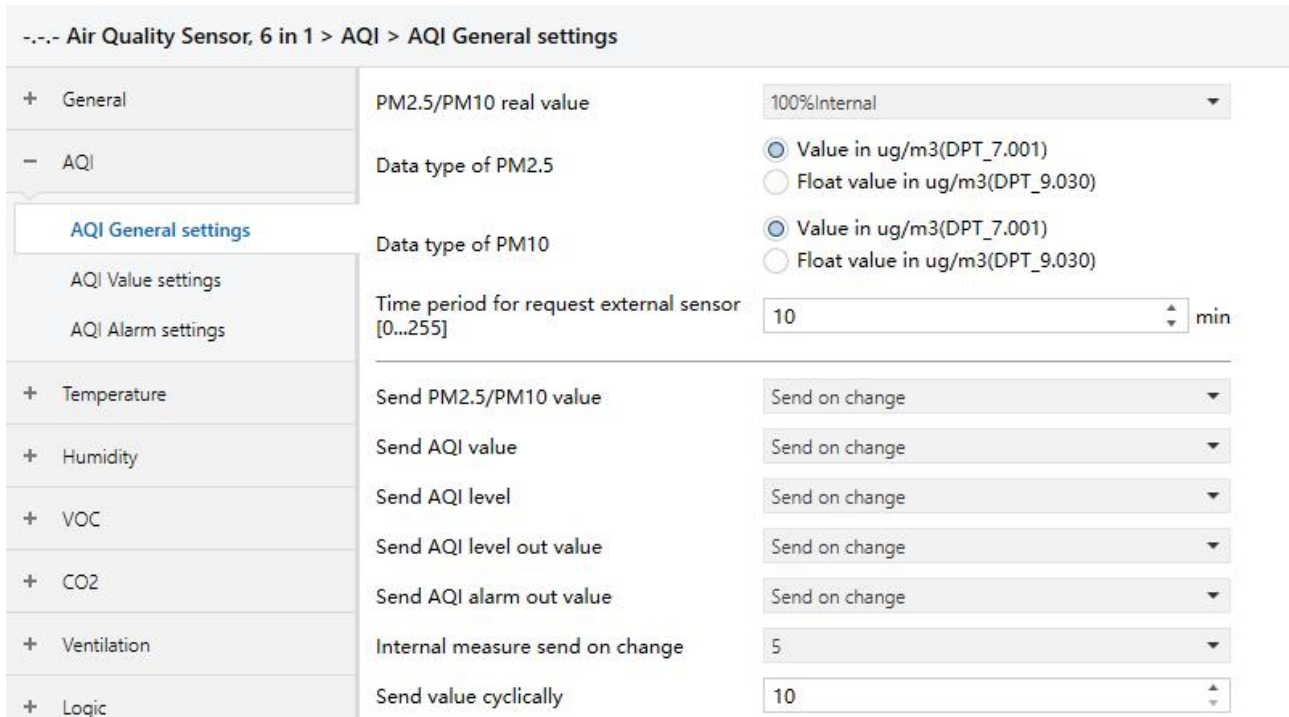
Fig.5.3.1 "AQI General settings" parameter setting interface

Parameter "PM2.5/PM10 Real Value"

This parameter is used to set the proportion between the locally detected PM2.5/PM10 value and the one from the KNX bus. Options:

> **100%External**
>
> **10%Internal+90%External**
>
> **...**
>
> **100%Internal**

For example, if it is "40%Internal+60%External", then the internal PM2.5/PM10 value (A) occupies 40%, external sensor (B) takes up 60%, the actual sensor value=(A×40%)+(B×60%).

Parameter "Data type of PM2.5"
Parameter "Data type of PM10"

These two parameters are the data types of setting PM2.5, PM10 object values. Options:

Value in ug/m³(DPT_7.001)

Float value in ug/m³(DPT_9.030)

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

This parameter is to set the time period for read request external PM2.5/PM1.0 sensor after bus voltage recovery or finish programming. Options: **0..255**

Parameter "Send PM2.5/PM10 value"

This Parameter is used to set the mode of sending the measurement of PM2.5/PM10. Options:

No send

Send on change

Send cyclically

"No send" means the measured value of the PM2.5/PM10 will not to be sent to the bus.

"Send on change" means the measured value of the PM2.5/PM10 will be sent to the bus when the change amount is up to one of the value of parameter "Internal measure send on change".

"Send cyclically" means the measured value of the PM2.5/PM10 will be sent to the bus in accordance with the cycle, which is set in the parameter of "Send value Cyclically".

Parameter "Send AQI value"

This Parameter is used to set the mode of sending Air Quality Index(abbr.AQI). Options:

No send

Send on change

Send cyclically

"No send" means the value of the AQI will not to be sent to the bus.

"Send on change" means the value of the AQI will be sent to the bus when the change amount is up to one of the values of parameter of "Internal measure send on change".

"Send cyclically" means the value of the AQI will be sent to the bus in accordance with the cycle,which is set in the parameter "Send value Cyclically".

Parameter "Send AQI level"

This Parameter is used to set the mode of sending AQI Level. The air quality is divided into six levels,respectively 0-35, 36-75,76-115,116-150,151-250 and more than 250. Options:

No send

Send on change

Send cyclically

"No send" means the level of the AQI will not to be sent to the bus.

"Send on change" means the level of the AQI will be sent to the bus when the AQI level changes.

"Send cyclically" means the level of the AQI will be sent to the bus in accordance with the cycle, which is set in the parameter "Send value Cyclically".

Parameter "Send AQI level out value"

This Parameter is used to set the mode of sending setting value when in different AQI level. Options:

No send

Send on change

Send cyclically

"No send" means the corresponded setting value with the parameter page of "AQI Value settings" will not to be sent to the bus.

"Send on change" means the corresponded setting value with the parameter page of "AQI Value settings" will be sent once to the bus when the AQI level changes.

"Send cyclically" means the corresponded setting value with the parameter page of "AQI Value settings" will be sent to the bus in accordance with the cycle,which is set in the parameter "Send value Cyclically".

Parameter "Send AQI alarm out value"

The parameter is for setting of sending way for AQI Level Alarm. Options:

No send

Send on change

Send cyclically

"No send" means that corresponding alarm value of parameter page "AQI Alarm settings" will not be sent to the bus.

"Send on change" means send when changed, when AQI level is more than or less than "Alarm Level" in parameter page "AQI Alarm settings", then it will send corresponding setting value to the bus for once.

"Send cyclically" is for cyclical sending, the corresponding alarm setting value in parameter page "AQI Alarm settings" will be sent to the bus according to the set value from parameter "Send value Cyclically".

Parameter "Internal measure send on change"

This parameter is used to set variations, value measured by the sensor will update that of the bus.

Options:

     5

     10

     30

     50

Parameter "Send value Cyclically"

This parameter is used to set cycle sending time, value measured by the sensor will update the value on the bus according to the set cycle sending time. Options: **10..50000**

5.3.2 Parameter window "AQI Value settings"

The "AQI Value settings" here mainly to set the value sent by AQI Level at different Level.

Fig.5.3.2 "AQI Value settings" parameter setting interface

Parameter "Level x Send Mode"

This parameter is used to set the data type being sent. Options:

> **No send**
>
> **Send 1Bit**
>
> **...**
>
> **Send 1bit+4Bit+1Byte**

Parameter "Level x 1Bit"

This parameter is used to set the 1Bit value being sent. Options:**0...1**

Parameter "Level x 4Bit"

This parameter is used to set the 4 Bit value being sent. Options:**0...15**

Parameter "Level x 1Byte"

This parameter is used to set the 1Byte value being sent. Options:**0...255**

5.3.3　Parameter window "AQI Alarm settings"

"AQI Alarm settings" parameter is shown below in Fig.5.3.3, it is used to set the AQI Alarm settings.
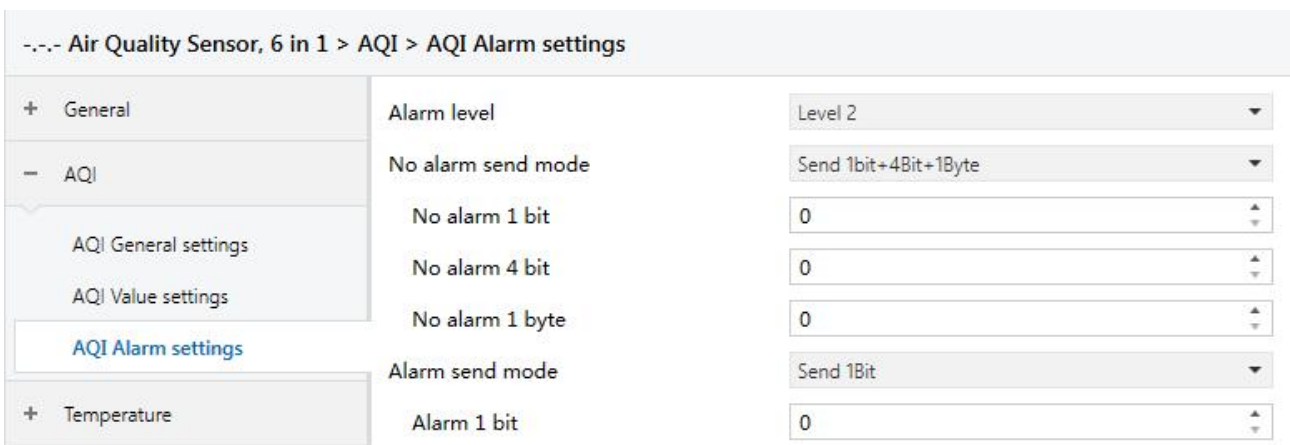
Fig.5.3.3 "AQI Alarm settings" parameter setting interface

Parameter "Alarm Level"

This parameter is used to set AQI Level Alarm, when the detected level is larger than the parameter, the value set in parameter "Alarm send mode" will be sent; or else the value set in parameter "No alarm send mode" will be sent. Options:

> **Level 2**

...

Level 3

Parameter "No alarm (Alarm)send mode"

This parameter is used to set the data type being sent. Options:

No send

Send 1Bit

...

Send 1bit+4Bit+1Byte

Parameter "No alarm (Alarm) 1Bit"

This parameter is used to set the 1Bit value being sent. Options:**0...1**

Parameter "No alarm (Alarm) 4Bit"

This parameter is used to set the 4Bit value being sent. Options:**0...15**

Parameter "No alarm (Alarm) 1Byte"

This parameter is used to set the 1Byte value being sent. Options:**0...255**

5.4   Parameter window "Temperature settings"

"Temperature settings" parameter is shown below in Fig.5.4, it is used to set the temperature parameter.

Fig.5.4 "Temperature settings" parameter setting interface

Parameter "Temperature real value"

This parameter sets the proportion of local temperature measurements with KNX bus uploaded value. Options:

          100%External

          10%Internal+90%External

          ...

          100%Internal

For example, option is "40%Internal+60%External", then the internal temperature measurements (A)

occupies the proportion 40%. External sensor (B) occupies the proportion 60%. Actual sensor value= (A×40%)+(B×60%).

Parameter "Internal temperature correction [-100..100]"
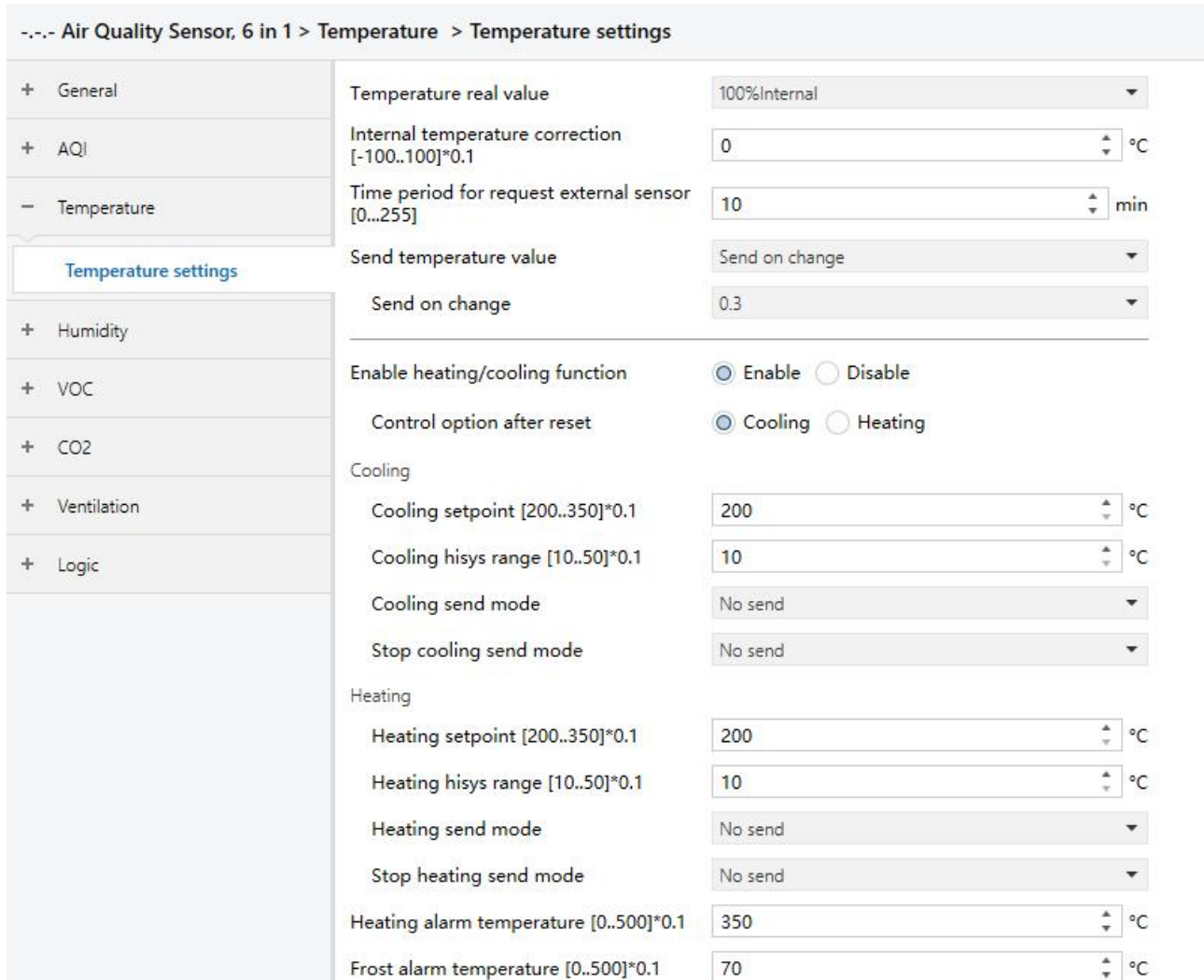
This parameter set temperature correction value. Options: **-100...100(*0.1°C)**

Temperature actual output value = measured temperature value + the parameter value. The measured temperature value is the actual value of the previous parameter of the sensor. If the previous parameter option is 100%External, will not be amended.

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

This parameter is to set the time period for read request external temperature sensor after bus voltage recovery or finish programming. Options: **0..255**

Parameter "Send temperature value"

This parameter sets the way to send temperature value. Options:

> **No send**
>
> **Send on change**
>
> **Send cyclically**

Select " No send", Do not send temperature value.

Select "Send on change". Only temperature value changed, then sent to the bus.

Select "Send cyclically", temperature value cyclically sent to the bus.

—— Parameter "Send on change"

This parameter set when the temperature changed a certain amount, send the current temperature value to the bus. Options:

> **0.1**
>
> **0.2**
>
> **...**
>
> **5**

—— Parameter "Period of send temperature"

This parameter sets the time of temperature cycle sent to the bus. Options: **10..50000(s)**

Parameter "Enable heating/cooling function"

This parameter is set the function whether enable control heating and cooling threshold. Options:

Enable

Disable

If select "Enable", the following parameters are visible:

—— Parameter "Control option after reset"

This parameter set the power-on reset to perform the heating or cooling function. Options:

Cooling

Heating

Parameter "Cooling /Heating setpoint [200..350]"

This parameter set the setpoint of heating and cooling temperature. Options: **200...350(*0.1°C)**

Parameter "Cooling/Heating Hisys range [10..50]"

This parameter set the hysteresis range of heating and cooling. Options: **10...50(*0.1°C)**

This range is used to prevent the small amplitude of temperature drops or rises, frequent moves by the actuator.

Parameter "Cooling/Heating(Stop cooling/heating) send mode"

This parameter is used to set open heating and cooling, the object to send data types. Options:

No send

Send 1Bit

...

Send 1bit+4Bit+1Byte

—— Parameter "Cooling/Heating(Stop cooling/heating) 1Bit"

The parameter set to send 1Bit value. Options: **0...1**

—— Parameter "Cooling/Heating(Stop cooling/heating) 4Bit"

The parameter set to send 4Bit value. Options: **0...15**

—— Parameter "Cooling/Heating(Stop cooling/heating) 1Byte"

The parameter set to send 1byte value. Options: **0...255**

Parameter "Heating alarm temperature"

This parameter is used to set the overheating of alarm temperature value. Options: **0...500(*0.1°C)**

Parameter "Frost alarm temperature"

This parameter is used to set cold of alarm temperature value. Options: **0...500(*0.1°C)**

5.5 Parameter window "Humidity settings"

Parameter window "Humidity settings" can be shown in Fig.5.7.
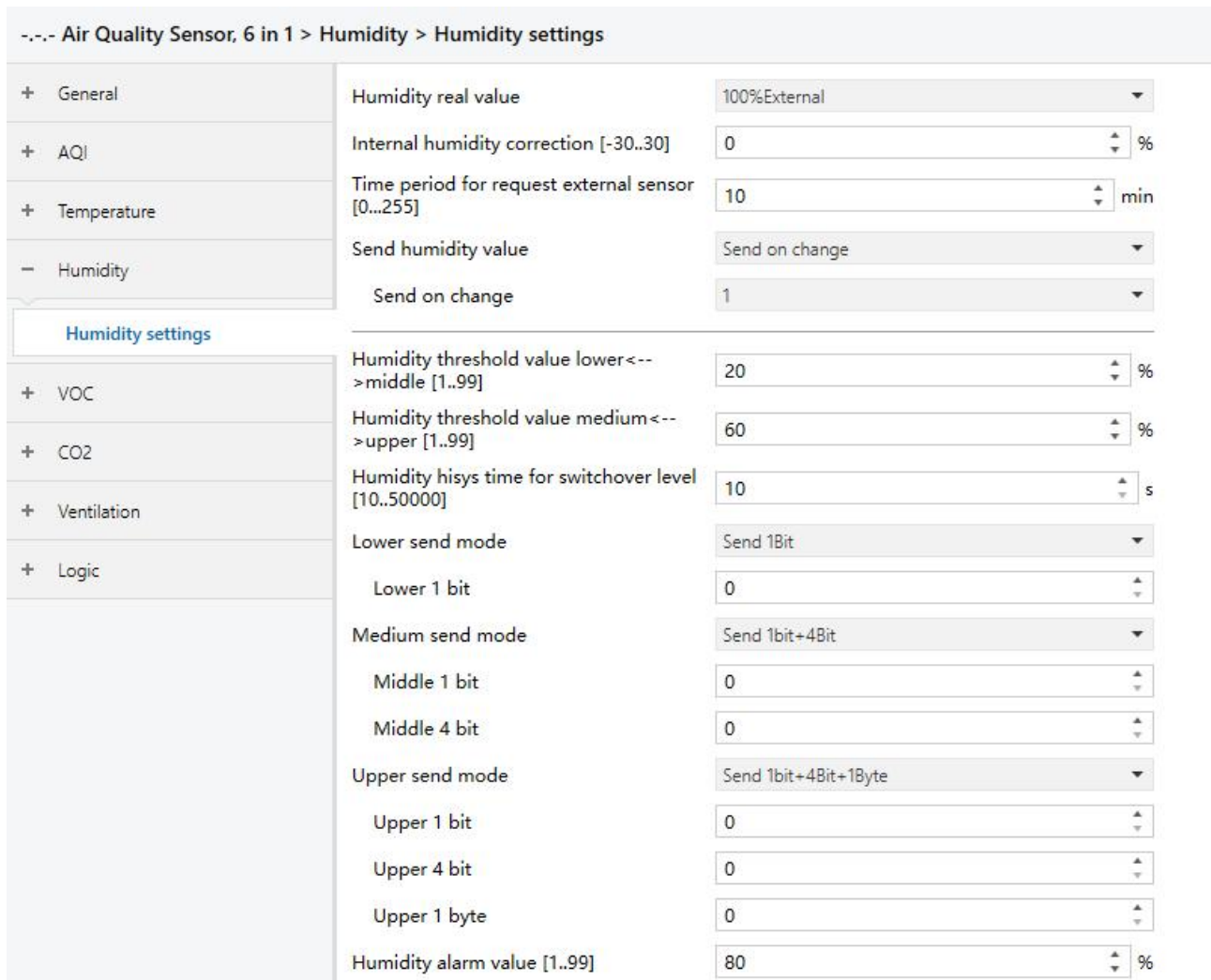
Fig.5.5 "Humidity settings" parameter setting interface

Parameter "Humidity real value"

This parameter sets the proportion between the local humidity value and value sent from the bus. Options:

100%External

10%Internal+90%External

...

100%Internal

For example, option is "40%Internal+60%External", shows internal humidity value (A) occupies for 40%. External sensor value (B) occupies for 60%. Actual sensor =(A×40%)+(B×60%).

Parameter "Internal humidity correction [-30..30]"

This parameter is used to set the humidity correction. Options:**-30...30(%)**

The actual output Humidity values= measured humidity value+ this parameter. Measured humidity value is the real value of the sensor. If the real value of the sensor is 100%External, will not be amended.

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

This parameter is to set the time period for read request external humidity sensor after bus voltage recovery or finish programming. Options: **0..255**

Parameter "Send humidity value"

This parameter is for setting the ways of sending humidity value. Options:

No send

Send on change

Send cyclically

Select "No send", it will not sent the measured humidity value.

Select "Send on change", it will sent the value to the bus until it was changed.

Select "Send cyclically", the value will be sent to the bus cyclically.

—— Parameter "Send on change"

This parameter is for setting as when humidity is changed, the current humidity measurements is send to the bus. Options:

0.1

0.2

...

5

This parameter is for setting the time of humidity sent cyclically to the Bus. Options:**10..50000(*1s)**

Parameter "Humidity threshold value 1 [1..99]"

Parameter "Humidity threshold value 2 [1..99]"

This parameter sets the threshold value of humidity level. Options: **1-99(%)**

0% ~Humidity threshold value 1 is for lower humidity;

Humidity threshold value 1~Humidity threshold value 2 is for middle humidity;

Humidity threshold value 2~ 100% is for upper humidity.

Note:Humidity threshold value 1<Humidity threshold value 2

Parameter "Humidity hisys time for switchover level [10..50000]"

This parameter is for setting the time for confirming the switch level. Options: **10-50000(s)**

For example, when the humidity level turns from lower humidity into middle humidity, humidity need to be kept the time of the parameter set in the range of middle humidity. Then it can be confirm to turn into the middle humidity level.

Parameter "Upper/Middle/Lower Send Mode"

This parameter is for setting the data type which was sent when humidity is in upper/middle/lower level. Options:

No send

Send 1Bit

...

Send 1bit+4Bit+1Byte

—— Parameter "Upper/Middle/ Lower 1Bit"

It is used to set that1 Bit was sent when humidity is Upper/Middle/ Lower level. Options: **0..1**

It is used to set that 4Bit was sent when humidity is Upper/Middle/ Lower level. Options: **0...15**

—— Parameter "Upper/Middle/Lower 1Byte"

It is used to set that 1Byte was sent when humidity is Upper/Middle/ Lower level. Options: **0...255**

Parameter "Humidity alarm value [1..99]"

It sets the threshold value of humidity alarm. Options: **1-99(%)**

5.6   Parameter window "VOC settings"

Parameter window "VOC settings" can be shown in Fig.5.8.

Fig.5.6 "VOC settings" parameter setting interface

Parameter "VOC alarm value [100..5000]"

This parameter is for setting threshold value of VOC alarm. Options: **100...5000(ug/m³)**

Please Note, when the display Unit is mg/m³, the data base is ug/m³ .

Parameter "Send VOC value"

This parameter is for setting way of VOC value sent. Options:

No send

Send on change

22

Send cyclically

Select "No send", VOC measured value did not sent .

Select "Send on change", the VOC value is sent to the bus until the VOC measured value make some change.

Select "Send cyclically", VOC measure value is sent to the bus.

—— Parameter "Send on change"

This parameter sets when the VOC change a certain amount, send the VOC measurements to the bus. Options:

5

10

30

50

—— Parameter"Period of send VOC value [10..50000]"

This parameter sets the time of VOC cycle send to the bus. Options: **10...50000(*1s)**

Parameter"No Alarm(Alarm) send mode"

This parameter sets the sending data type when the VOC alarm or not. Options:

No send

Send 1Bit

...

Send 1bit+4Bit+1Byte

—— Parameter"No Alarm(Alarm) 1Bit"

This parameter sets the VOC sending 1Bit values when alarm or not. Options: **0...1**

—— Parameter"No Alarm(Alarm) 4Bit"

This parameter sets the VOC sending 4Bit values when alarm or not. Options: **0...15**

—— Parameter"No Alarm(Alarm) 1Byte"

This parameter sets the VOC sending 1Byte values when alarm or not. Options: **0...255**

5.7 Parameter Windows "CO2 settings"

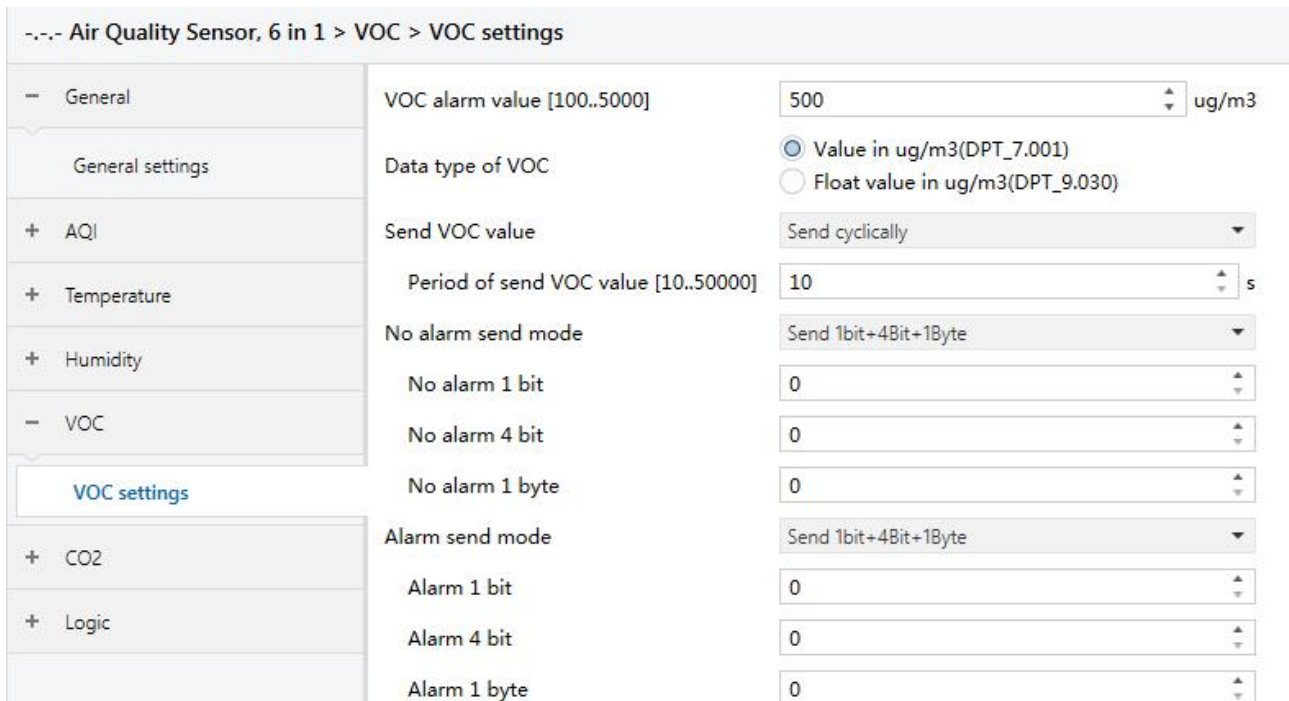Parameter window "CO2 settings" can be shown in Fig.5.9.

Fig.5.7 "CO2 settings" parameter setting interface

Parameter "CO2 alarm value [400..2000]"

This parameter is for setting threshold value of CO2 alarm. Options: **400...2000(ppm)**

Parameter "CO2 hysteresis value(ppm)"

This parameter sets CO2 hysteresis value of alarm.Options: **100...500(ppm)**

Example, the threshold value of CO2 alarm is 700, the hysteresis value is 100, then when the carbon dioxide concentration reached 700ppm, the alarm active, when it down to 600ppm, the alarm lifted .

Parameter "Data type of CO2"

This parameter sets the date type of CO2. Options:

        Value in ppm(DPT_7.001)

        Float value in ppm(DPT_9.008)

Parameter "Send CO2 value"

This parameter is for setting way of CO2 value sent. Options:

        No send

        Send on change

        Send cyclically

Select "No send", CO2 measured value did not sent .

Select "Send on change", the CO2 value is sent to the bus until the CO2 measured value make some change.

Select "Send cyclically", CO2 measure value is sent to the bus.

—— Parameter "Send on change"

This parameter sets when the CO2 change a certain amount, send the CO2 measurements to the bus. Options:

5

10

30

50

—— Parameter "Period of send CO2 value"

This parameter sets the time of CO2 cycle send to the bus. Options: **10...50000(s)**

Parameter "No Alarm(Alarm) send mode"

This parameter sets the sending data type when the CO2 alarm or not. Options:

No send

Send 1Bit

 ...

Send 1bit+4Bit+1Byte

—— Parameter "No Alarm(Alarm) 1Bit"

This parameter sets the CO2 sending 1Bit values when alarm or not. Options: **0...1**

—— Parameter "No Alarm(Alarm) 4Bit"

This parameter sets the CO2 sending 4Bit values when alarm or not. Options: **0...15**

—— Parameter "No Alarm(Alarm) 1Byte"

This parameter sets the CO2 sending 1 Byte values when alarm or not. Options: **0...255**

5.8   Parameter Windows "Ventilation controller"

Fig.5.8 "Ventilation controller"parameter setting interface

Parameter "Ventilation controller"

This parameter is for setting whether to enable ventilation controller. Parameters are visible when enabled. Options:

Enable

Disable

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

Auto=1/Man.=0

Auto=0/Man.=1

Parameter "State of Auto.operation after startup"

This parameter is for setting whether to enable auto operation when device startup. Options:

Enable

Disable

Fan speed output setting

Parameter "Data type of fan speed"

This parameter is for setting the data type of fan speed. Options:

1bit

1byte

Parameter "Object datatype of 1byte fan speed"

This parameter is for setting the object data type 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 parameters are for setting the value sent to each fan speed when select "1byte". Options according to previous parameter: **0..255/0..100**

——Parameter "Output value for fan speed off/low/medium/high"

These parameters are for setting the switching value sent by each fan speed when select "1bit". Options:

Low=0,Medium=0,High=0

Low=1,Medium=0,High=0

Low=0,Medium=1,High=0

Low=1,Medium=1,High=0

Low=0,Medium=0,High=1

Low=1,Medium=0,High=1

Low=0,Medium=1,High=1

Low=1,Medium=1,High=1

Parameter "Delay between fan speed switch [0..100]*50ms"

This parameter is for setting the conversion delay time. Options: **0..100**

When switch fan speed, first should turn off fan speed, then turn on fan speed after delay time. When the delay time is set to 0, it will not be turned off first, but will switch directly to the next fan speed.

Fan speed control setting

Parameter "Control value type"

This parameter for setting the control value under automatic operation. Options:

PM2.5

CO2

VOC

Parameter "Control value reference from"

This parameter for setting the reference of control value under automatic operation. Options:

Local

Bus

These four parameter as follow are visible when select "Bus".

——Parameter "Object datatype of PM2.5/VOC"

These parameters for setting the data types of PM2.5/VOC. Data type determines object type, select it according to the docking PM2.5 or VOC sensor data type. Options:

Value in ug/m3(DPT_7.001)

Float value in ug/m3(DPT_9.030)

DPT_7.001: suitable for integrated value.

DPT_9.030: suitable for float value.

———Parameter "Object datatype of CO2"

This parameter for setting the data types of CO2. Data type determines object type, select it according to the docking CO2 sensor data type. Options:

Value in ppm(DPT_7.001)

Float value in ppm(DPT_9.008)

DPT_7.001: suitable for integrated value.

DPT_9.008: suitable for float value.

Parameter "Time period for request control value [0...255]min"

This parameter is to set the time period for read request control value after bus voltage recovery or finish programming. Options: **0..255**

Parameter "The fan speed status when the control value error"

This parameter for setting the default fan speed of ventilation system when control value is error. Options:

Off

Low

Medium

High

Parameter "Threshold value speed OFF<-->low [1..999]/ [1...4000]"

This parameter defines threshold value for off-fan and low-level fan speeds, options: **1...999/1...4000**

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..999]/ [1...4000]"

This parameter defines 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...999/1...4000**

Parameter "Threshold value speed medium<-->high [1..999]/ [1...4000]"

This parameter defines 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...999/1...4000

Note: 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.

Parameter "Hysteresis threshold value in +/- [10..30]/[100..400]"

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: **10..30/100..400**

For example, the control type is PM2.5, the Hysteresis value is 10 and the threshold is 35, then the upper limit threshold 45 (Threshold value+Hysteresis value) and the lower limit threshold 25 (Threshold value-Hysteresis value). When the control value is between 25 ~45, fan action will not be caused, and the previous status will still be maintained.

Only less than 25 or greater than or equal to 45 will change the running status of the fan. As shown in the following figure:
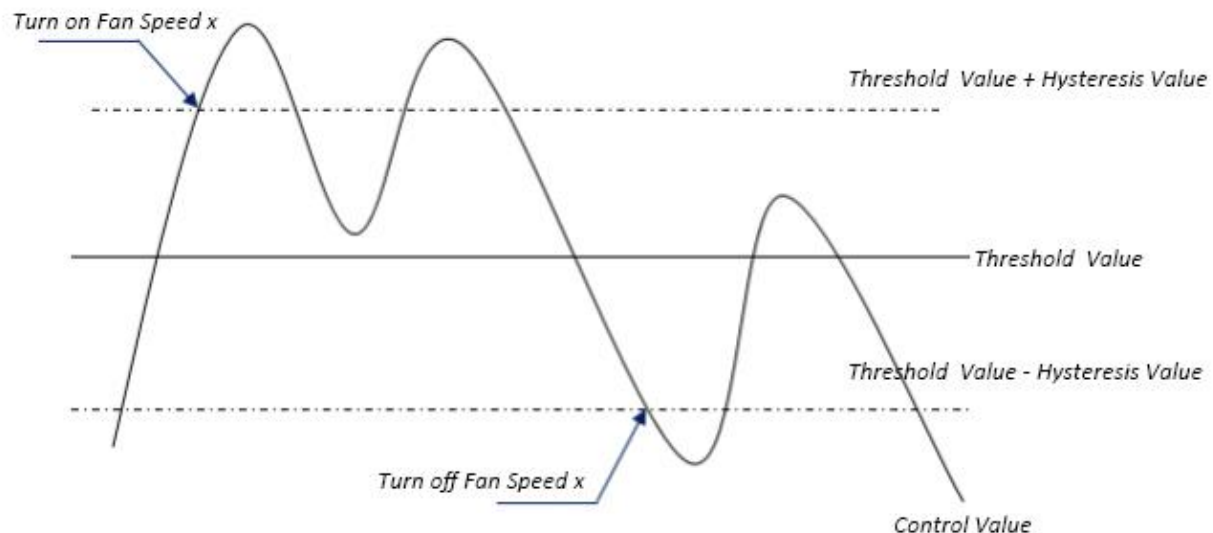
Note:

When hysteresis is enabled, if the threshold overlap occurs, fan action is specified as follows:

1） **Hysteresis determines the control point where Fan speed conversion occurs;**

2） **If Fan speed conversion occurs, new fan speed is determined by control value and threshold value, irrespective of hysteresis.**

For example (1):

Take PM2.5 as an example

OFF <-> Low fan speed threshold value is 35

Low fan speed <->Medium fan speed threshold value is 55

Medium fan speed <-> High fan speed threshold value is 75

Hysteresis value is 25

The fan speed of the fan turbine increases from OFF:

Fan OFF status will change at a control value of 60 (≥25+35), and new fan speed will be the mid-fan speed (because 60 is between 55 and 75, irrespective of hysteresis at this time), so the low fan speed is ignored;

The behavior of fan speed when descending from a high fan speed:

The high fan speed will change at a control value of 50 (<75-25), and new fan speed will be low fan speed (because 50 is between 35 and 55, irrespective of hysteresis), so the fan speed is ignored.

For example(2):

Take PM2.5 as an example

OFF <-> Low fan speed threshold value is 20

Low fan speed <->Medium fan speed threshold value is 40

Medium fan speed <-> High fan speed threshold value is 70

Hysteresis value is 10

When fan speed is increasing from OFF:

The OFF status will be turned when the control value is 30 （≥20+10）

When the control value 41 is received, the new speed will be at medium(because the hysteresis is ignored when the value 41 is between 40 and 70), therefore the low speed is ignored.

When the control value 39 is received, the new speed will be at low (because the hysteresis is ignored when the value 39 is between 20 and 40)

When Fan Speed decreasing from high:

The high speed will be turned when the control value is 60 （<70-10）

When the control value 39 is received, the new speed will be at low(because the hysteresis is

ignored when the value 39 is between 20 and 40),therefore the medium speed is ignored.

3） **When the control value is 0,the fan will be off at any circumstances.**

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

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

If the current fan speed has been running long enough, the fan speed can be changed quickly. Options: **0…65535**

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

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

5.9   Parameter window "Logic settings"

"Logic settings" parameter settings interface as shown in Fig.5.11.
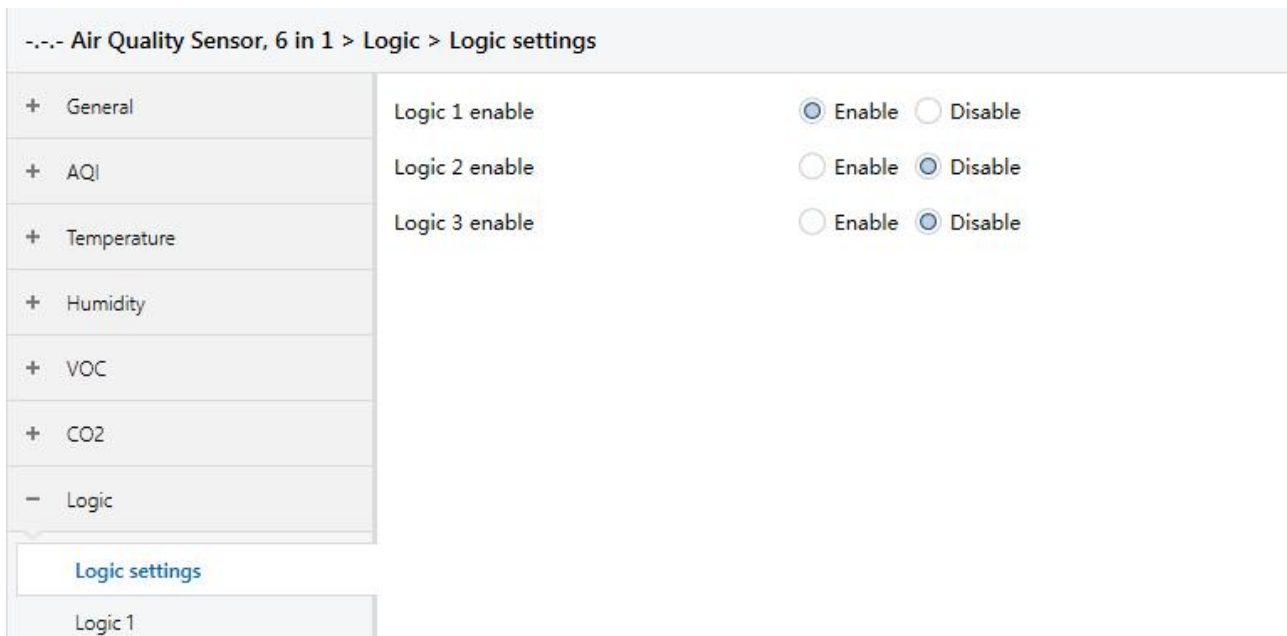
Fig.5.9 (1) "Logic" parameter setting interface
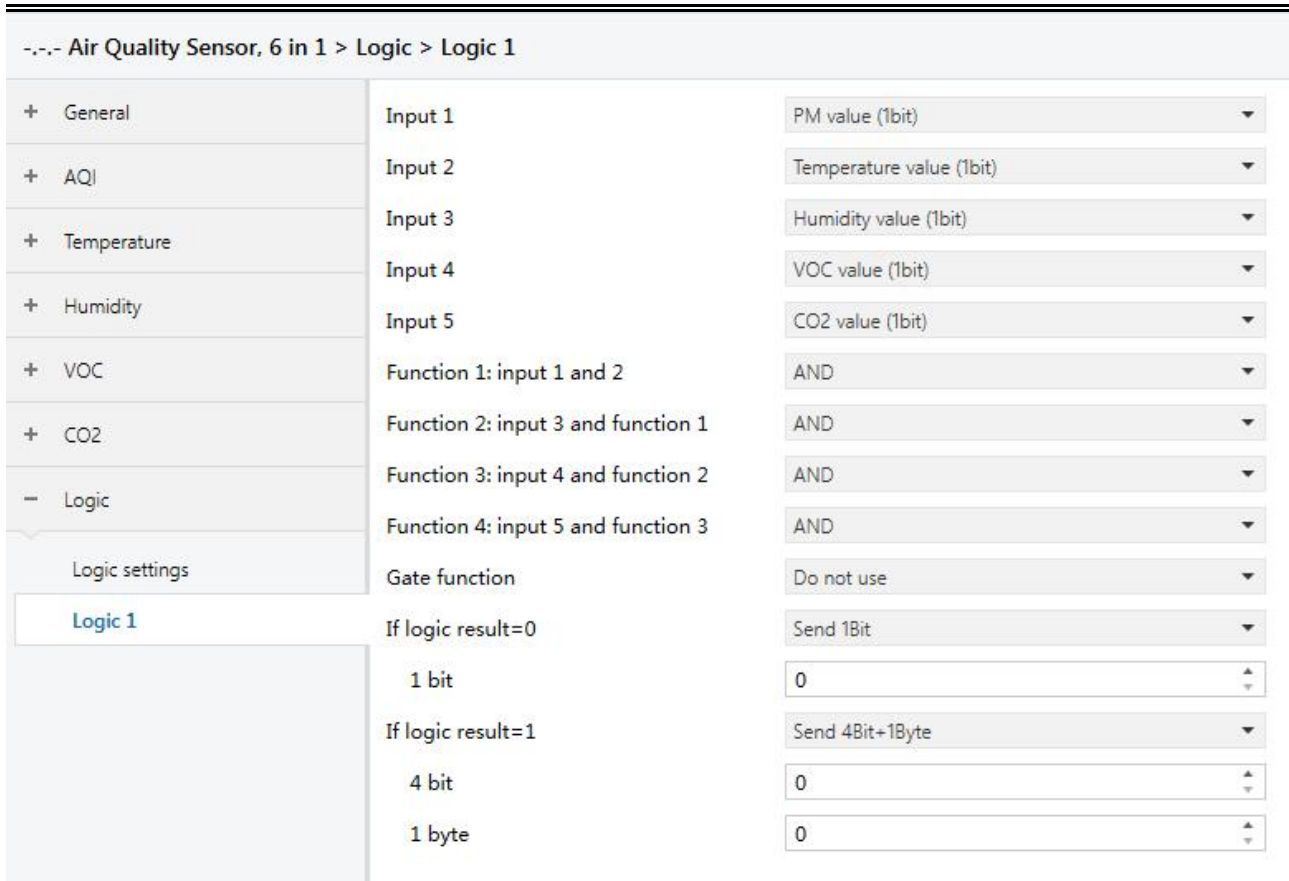
Fig.5.9 (2) "Logic" parameter setting interface

Parameter "Logic x enable"

This parameter is an enabling logic functions, there are three logical function can choose.

Options:

Enable

Disable

Parameter "Input x"

Parameter "Gate function"

This parameter is the value of selected to participate in the logical operation. Options:

Do not use

PM value (1bit)

PM alarm value (1bit)

Temperature value (1bit)

Humidity value (1bit)

VOC value (1bit)

CO2 value (1bit)

Extern input value

Logic 1 value

Logic 2 value

"Do not use" means not enabling the input.

"PM value (1bit)" means the value of communication object 6 is the input.

"PM alarm value (1bit)" means the value of communication object 9 is the input.

"Temperature value (1bit)" means the value of communication object 15 is the input.

"Humidity value (1bit)" means the value of communication object 22 is the input.

"VOC value (1bit)" means the value of communication object 26 is the input.

"CO2 value (1bit)" means the value of communication object 26 is the input.

"Extern input value" means the value of communication object 32/36/40 is the input.

"Logic 1 value" means the value of communication object 34, that is 1bit output value of logic 1 can be as the input of logic 2 and logic3. This option is visible when Logic 2 and 3 enable.

"Logic 2 value" means the value of communication object 38, that is 1bit output value of logic 2 can be as the input of logic3. This option is visible when Logic 3 enable.

The object is not to be transmitted, then this object is not in operation.

The parameter of "Gate function" is used as an input, and when it is "1", the result of the logical operation can be sent to the bus.

Parameter "Function 1: input 1 and 2"

Parameter "Function 2: input 3 and Function 1"

Parameter "Function 3: input 4 and Function 2"

Parameter "Function 4: input 5 and Function 3"

These parameter introduce the logical relationship of the logic operation, And the order of operations. Options:

AND

OR

XOR

NOT AND

NOT OR

NOT XOR

"AND" is the sum operation, "OR" is the OR operation, "XOR" is the XOR operation, "NAND" is the first AND then non-operation, "NOR" is the first OR then non-operation, "NOR" is the first OR then non-operation.

Parameter "If logic==0/1"

This parameter is to set the sending value for logical operation result 1 or 0. Options:

No send

Send 1Bit

...

Send 1bit+4Bit+1Byte

—— Parameter "1bit"

This parameter is set to send 1 bit value. Options: **0...1**

—— Parameter "4bit"

This parameter is set to send 4 bit value. Options: **0...15**

—— Parameter "1byte"

This parameter is set to send 1 byte value. Options: **0...255**

Chapter 6 Description of communication objects

Communication objects are media for devices on the bus to communicate with other devices, and only through communication objects can carry out bus communication. Following is the detail description for the communication objects.

Note: "C"means enabling communication functions; "W" means the value of communication objects can be modified through the bus; "R" means the value of communication objects can be read through the bus; "T" means the communication object has a transmission function; "U" means the value of the communication objects can be updated.

6.1 Communication objects of AQI function

	Number	Name	Object Function	Description	Group A	Length	C	R	W	T	U	Data Type	Priority
	1	AQI	PM2.5 value			2 bytes	C	R	-	T	-		Low
	2	AQI	External PM2.5 value			2 bytes	C	-	W	T	U		Low
	3	AQI	PM10 value			2 bytes	C	R	-	T	-	pulses	Low
	4	AQI	External PM10 value			2 bytes	C	-	W	T	U	pulses	Low
	5	AQI	AQI value			2 bytes	C	R	-	T	-	pulses	Low
	6	AQI	AQI level			1 byte	C	R	-	T	-	counter pulses (0..255)	Low
	7	AQI	AQI level out value, 1bit			1 bit	C	-	-	T	-	switch	Low
	8	AQI	AQI level out value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
	9	AQI	AQI level out value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low
	10	AQI	AQI alarm out value, 1bit			1 bit	C	-	-	T	-	switch	Low
	11	AQI	AQI alarm out value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
	12	AQI	AQI alarm out value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low

Fig.6.1 Communication objects of AQI function

NO.	Object	Functions	Data	Flag	DPT
1	**PM2.5 value**	**AQI**	**2byte**	**C, R,T**	**7.001 pulses** **9.030 concentration ug/m3**
2	**External PM2.5 value**	**AQI**	**2byte**	**C, W, T, U**	**7.001 pulses** **9.030 concentration ug/m3**
3	**PM10 value**	**AQI**	**2byte**	**C, R,T**	**7.001 pulses** **9.030 concentration ug/m3**
4	**External PM10 value**	**AQI**	**2byte**	**C, W, T, U**	**7.001 pulses** **9.030 concentration ug/m3**

Object NO.1 is for PM2.5 output and object NO.3 is for PM10 output. The value will be sent to the bus cyclically or only after change. The unit is ug/m^3.

Object NO.2 is for PM2.5 input and object NO.4 is for PM10 input. The value will be displayed when the update value is obtain via the bus. The unit is ug/m^3.

5	**AQI value**	**AQI**	**2byte**	**C, R,T**	**7.001 pulses**

This object is for sending the air quality index to the bus.   Range: 0...500

Table 6.1 Communication objects table of AQI function

6	AQI Level	AQI	1byte	C, R,T	5.010 counter pulses (0..255)
This object is for sending the value of air quality levels. There are 6 levels according to the air quality index. 0-35 36-75 76-115 116-150 150-250 >250					
7	AQI level out value, 1bit	AQI	1bit	C,T	1.001 switch
8	AQI level out value, 4bit	AQI	4bit	C,T	3.007 dimming control
9	AQI level out value, 1byte	AQI	1byte	C,T	5.010 counter pulses (0..255)
These objects are for sending different values of the setting level in window AQI Value settings.					
10	AQI alarm out value, 1bit	AQI	1bit	C,T	1.001 switch
11	AQI alarm out value, 4bit	AQI	4bit	C,T	3.007 dimming control
12	AQI alarm out value, 1byte	AQI	1byte	C,T	5.010 counter pulses (0..255)
These object is for sending different values of the setting alarm in window AQI Alarm settings.					

Table 6.1 Communication objects table of AQI function

6.2 Communication objects of Temperature function

Number	Name	Object Function	Description	Group Add	Length	C	R	W	T	U	Data Type	Priority
13	Temperature	Temperature			2 bytes	C	R	-	T	-	temperature (°C)	Low
14	Temperature	External temperature			2 bytes	C	-	W	T	U	temperature (°C)	Low
15	Temperature	Heating/Cooling switchover			1 bit	C	-	W	-	-	cooling/heating	Low
16	Temperature	Heating/Cooling output value, 1bit			1 bit	C	-	-	T	-	switch	Low
17	Temperature	Heating/Cooling output value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
18	Temperature	Heating/Cooling output value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low
19	Temperature	Heating setpoint			2 bytes	C	-	W	-	-	temperature (°C)	Low
20	Temperature	Cooling setpoint			2 bytes	C	-	W	-	-	temperature (°C)	Low

Fig.6.2 Communication objects of Temperature function

NO.	Object	Function	Data Type	Flag	DPT
13	Temperature	Temperature	2 byte	C, R,T	9.001 temperature (°C)
This object is for temperature output. The temperature will be sent to bus according to the preset mode.					
14	External temperature	Temperature	2 byte	C, W, T, U	9.001 temperature (°C)
This object is for temperature input. The temperature value will be obtained via the bus.					

Table 6.2 Communication objects table of Temperature function

15	Heating/Cooling switchover	Temperature	1bit	C, W	1.100 heating/cooling
	This object is for heating/cooling switchover. 1——Heating 0——Cooling				
16	Heating/Cooling output value, 1bit	Temperature	1 bit	C,T	1.001 DPT_Switch
17	Heating/Cooling output value, 4bit	Temperature	4 bit	C, T	3.007 dimming control
18	Heating/Cooling output value, 1byte	Temperature	1 byte	C, T	5.010 counter pulses(0..255)
	These objects are for sending different output values for heating or cooling.				
19	Heating setpoint	Temperature	2 byte	C, W	9.001 temperature (°C)
	This object is for receiving the setting temperature for heating via the bus.				
20	Cooling setpoint	Temperature	2 byte	C, W	9.001 temperature (°C)
	This object is to receive the setting temperature for cooling via the bus.				

Table 6.2 Communication objects table of Temperature function

6.3 Communication objects of Humidity function

	Number ᵃ	Name	Object Function	Description	Group Add	Length	C	R	W	T	U	Data Type	Priority
■‡	21	Humidity	Humidity			2 bytes	C	R	-	T	-	humidity (%)	Low
■‡	22	Humidity	External humidity			2 bytes	C	-	W	T	U	humidity (%)	Low
■‡	23	Humidity	Humidity output value, 1bit			1 bit	C	-	-	T	-	switch	Low
■‡	24	Humidity	Humidity output value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
■‡	25	Humidity	Humidity output value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low

Fig.6.3 Communication objects of Humidity function

NO.	Object	Function	Data Type	Flag	DPT
21	Humidity	Humidity	2 byte	C, R,T	9.007 humidity (%)
	This object is for humidity output. The humidity value will be sent to the bus according to the preset mode.				
22	External humidity	Humidity	2 byte	C, W, T, U	9.007 humidity (%)
	This object is for humidity input. The humidity value will be obtained via the bus.				

Table 6.3 Communication objects table of Humidity function

23	Humidity output value,1bit	Humidity	1 bit	C,T	1.001 DPT_Switch
24	Humidity output value,4bit	Humidity	4 bit	C, T	3.007 dimming control
25	Humidity output value,1byte	Humidity	1 byte	C, T	5.010 counter pulses (0..255)
	These objects are for sending different values for humidity control when it is in different humidity level.				

Table 6.3 Communication objects table of Humidity function

6.4   Communication objects of VOC function

	Number ▲	Name	Object Function	Description	Group Add	Length	C	R	W	T	U	Data Type	Priority
■‡	26	VOC	VOC value			2 bytes	C	R	-	T	-		Low
■‡	27	VOC	VOC output value, 1bit			1 bit	C	-	-	T	-	switch	Low
■‡	28	VOC	VOC output value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
■‡	29	VOC	VOC output value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low

Fig.6.4 Communication objects of VOC function

NO.	Object	Function	Data Type	Flag	DPT
26	VOC value	VOC	2 byte	C, R,T	7.001 pulses 9.030 concentration (ug/m3)
	This object is for VOC value output. The value will be send to the bus according to the preset mode.				
27	VOC value,1bit	VOC	1 bit	C, T	1.001 DPT_Switch
28	VOC value,4bit	VOC	4 bit	C, T	3.007 dimming control
29	VOC value,1byte	VOC	1 byte	C, T	5.010 counter pulses (0..255)
	These objects are for sending different values for VOC control whether the VOC is over range or not.				

Table 6.4 Communication objects table of VOC function

6.5   Communication objects of CO2 function

	Number ▲	Name	Object Function	Description	Group Add	Length	C	R	W	T	U	Data Type	Priority
■‡	30	CO2	CO2 value			2 bytes	C	R	-	T	-	pulses	Low
■‡	31	CO2	CO2 output value, 1bit			1 bit	C	-	-	T	-	switch	Low
■‡	32	CO2	CO2 output value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
■‡	33	CO2	CO2 output value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low

Fig.6.5 Communication objects of CO2 function

NO.	Object	Function	Data Type	Flag	DPT
30	CO2 value	CO2	2 byte	C, R,T	7.001 pulses 9.008 parts/million (ppm)
	This object is for CO2 value output. The value will be send to the bus according to the preset mode.				

31	CO2 value,1bit	CO2	1 bit	C, T	1.001 DPT_Switch
32	CO2 value,4bit	CO2	4 bit	C, T	3.007 dimming control
33	CO2 value,1byte	CO2	1 byte	C, T	5.010 counter pulses (0..255)

These objects are for sending different values for CO2 control whether the CO2 is over range or not.

Table 6.5 Communication objects table of CO2 function

6.6 Communication objects of Ventilation controller

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
46	Ventilation controller	Fan automatic operation			1 bit	C	-	W	-	U	enable	Low
47	Ventilation controller	PM 2.5 value			2 bytes	C	-	W	T	U	pulses	Low
48	Ventilation controller	Fan speed			1 byte	C	R	-	T	-	fan stage (0..255)	Low
49	Ventilation controller	Fan speed low			1 bit	C	R	-	T	-	switch	Low
50	Ventilation controller	Fan speed medium			1 bit	C	R	-	T	-	switch	Low
51	Ventilation controller	Fan speed high			1 bit	C	R	-	T	-	switch	Low

Fig.6.6 Communication objects of Ventilation controller

NO.	Object	Function	Data Type	Flag	DPT
46	**Fan automatic operation**	**Ventilation controller**	**1bit**	**C,W,U**	**1.003 enable**
	This object is for active auto control of fan speed via bus. 1——Auto 0——Exit auto				
47	**PM 2.5 value** **VOC value** **CO2 value**	**Ventilation controller**	**2byte**	**C,W,T,U**	**7.001 pulse** **9.030 concentration(ug/m3)** **9.008 parts/million(ppm)**
	These objects are visible when control value of auto operation is referenced from "Bus". Used to receive the input of the PM2.5/VOC/CO2 value and get the corresponding value from the bus to be updated to the display in ug/m3/ppm. The data type of the object is set by the parameter. Range: 0~999ug/m3 or 0~4000ppm For example, control value of auto operation is PM2.5, it will auto adjust fan speed according to concentration of the PM2.5 when set ventilation system.				
48	**Fan speed**	**Ventilation controller**	**1byte**	**C,R,T**	**5.001 percentage** **5.100 fan stage**
	The object is visible when the fan speed type is "1byte". Used to send 1byte fan speed telegrams to the bus when auto control. The specific telegram value corresponding to each fan speed is defined by the parameter.				

49	**Fan speed low**	**Ventilation controller**	**1bit**	**C,R,T**	**1.001 switch**
50	**Fan speed medium**	**Ventilation controller**	**1bit**	**C,R,T**	**1.001 switch**
51	**Fan speed high**	**Ventilation controller**	**1bit**	**C,R,T**	**1.001 switch**
These objects are visible when the fan speed type is "1bit", the fan speed is controlled by the three objects at the same time. Used to send 1bit fan speed telegrams to the bus when auto control. The specific telegram value corresponding to each fan speed is defined by the parameter.					

Table 6.6 Communication objects table of Ventilation controller

6.7 Communication objects of Logic function

	Number	Name	Object Function	Description	Group Add	Length	C	R	W	T	U	Data Type	Priority
	34	Logic 1	Logic 1 output value, 1bit			1 bit	C	-	-	T	-	switch	Low
	35	Logic 1	Logic 1 output value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
	36	Logic 1	Logic 1 output value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low
	37	Logic 1	Logic 1 extern input			1 bit	C	-	W	-	-	boolean	Low
	38	Logic 2	Logic 2 output value, 1bit			1 bit	C	-	-	T	-	switch	Low
	39	Logic 2	Logic 2 output value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
	40	Logic 2	Logic 2 output value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low
	41	Logic 2	Logic 2 extern input			1 bit	C	-	W	-	-	boolean	Low
	42	Logic 3	Logic 3 output value, 1bit			1 bit	C	-	-	T	-	switch	Low
	43	Logic 3	Logic 3 output value, 4bit			4 bit	C	-	-	T	-	dimming control	Low
	44	Logic 3	Logic 3 output value, 1byte			1 byte	C	-	-	T	-	counter pulses (0..255)	Low
	45	Logic 3	Logic 3 extern input			1 bit	C	-	W	-	-	boolean	Low

Fig.6.7   Communication objects of Logic function

No.	Communication object	Function	Data Type	Flag	DPT
34/38/4 2	**Logic x output value, 1bit(x=1,2,3)**	**Logic x**	**1 bit**	**C, T**	**1.001 DPT_Switch**
35/39/4 3	**Logic x output value, 4bit(x=1,2,3)**	**Logic x**	**4 bit**	**C, T**	**3.007 dimming control**
36/40/4 4	**Logic x output value, 1byte(x=1,2,3)**	**Logic x**	**1 byte**	**C, T**	**5.010 counter pulses (0..255)**
The communication object for the logic page of the corresponding results for 1 or 0, the output of the logic control of corresponding data.					
37/41/4 5	**Logic x extern input(x=1,2,3)**	**Logic x**	**1 bit**	**C, W**	**1.002 boolean**
The communication object is for external logic input, get the value from the bus and logic operations.					

Table 6.7   Communication objects table of Logic function